



Brussels, 15.7.2015
SWD(2015) 135 final

COMMISSION STAFF WORKING DOCUMENT

IMPACT ASSESSMENT

Accompanying the document

**Proposal for a Directive of the European Parliament and of the Council
amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-
carbon investments**

{COM(2015) 337 final}
{SWD(2015) 136 final}

TABLE OF CONTENTS

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES	10
1.1. Identification	10
1.2. Organisation and timing	10
1.3. Consultation and expertise	10
1.3.1. Expertise used	10
1.3.2. Consultation	11
1.4. Subsidiarity	13
1.5. Scrutiny by the Commission Impact Assessment Board	14
2. POLICY CONTEXT	14
3. GENERAL EVALUATION AND LESSONS LEARNT	16
4. GENERAL PROBLEM DEFINITION	19
5. OBJECTIVES	20
5.1. General policy objectives	20
5.2. Specific policy objective	21
5.3. Consistency with other policies and objectives	21
6. IMPLEMENTATION OF THE EU'S GHG EMISSION REDUCTION TARGET	22
6.1. Linear reduction factor	22
6.2. Auction share	23
7. FREE ALLOCATION AND ADDRESSING THE RISK OF CARBON LEAKAGE	27
7.1. Problem definition	28
7.1.1. Underlying drivers of the problem	29
7.2. Operational policy objectives	32
7.3. Policy options for free allocation and other carbon leakage measures	33
7.3.1. Benchmark values	33
7.3.2. Production level and adjustments	34
7.3.3. Reserve for new entrants	35
7.3.4. Carbon leakage groups	36
7.3.5. Cross-sectoral correction factor	37
7.3.6. Compensation for indirect carbon costs	37
7.4. Option packages	38
7.5. Analysis of impacts	41
7.5.1. Direct and indirect effects	41
7.5.2. Environmental impacts	41
7.5.3. Economic impacts	42
7.5.3.1. Quantified impacts on competitiveness	42
7.5.3.2. Administrative burden	46
7.5.4. Social impacts	46
7.5.4.1. Employment	46
7.5.4.2. Energy prices for households	47
7.5.5. Comparing the options	47
7.5.5.1. Quantified environmental and social impacts	47
7.5.5.2. Reflect technological progress in industry sectors	48
7.5.5.3. Fully preserve incentives for industry to innovate	48
7.5.5.4. Most efficient installations do not face undue carbon costs leading to carbon leakage	49
7.5.5.5. Better alignment with production levels	50
7.5.5.6. Avoid windfall profits	50
7.5.5.7. No increased administrative complexity	51
7.5.6. Concluding remarks	51
8. LOW-CARBON FUNDING MECHANISMS	53
8.1. Innovation fund	54
8.1.1. Problem definition	54
8.1.1.1. Underlying drivers of the problem	55
8.1.2. Operational policy objectives	56
8.1.3. Policy options	57
8.1.3.1. Screening of projects	57
8.1.3.2. Conditionality of Awards	58

8.1.3.3.	Type of instrument.....	58
8.1.3.4.	Maximum rate of funding.....	59
8.1.3.5.	Parameters not varied in the options.....	60
8.1.4.	Option packages.....	61
8.1.5.	Analysis of impacts.....	62
8.1.5.1.	General impacts.....	62
8.1.5.2.	Economic impacts.....	64
8.1.5.3.	Environmental impacts.....	68
8.1.5.4.	Social impacts.....	68
8.1.6.	Comparing the options.....	68
8.2.	Modernisation Fund.....	70
8.2.1.	Problem definition.....	70
8.2.1.1.	Context.....	70
8.2.1.2.	Underlying drivers of the problem.....	71
8.2.1.3.	Lessons learnt.....	71
8.2.2.	Policy Objectives.....	72
8.2.3.	Development and screening of policy options.....	72
8.2.3.1.	Policy options.....	72
8.2.3.2.	Option packages.....	73
8.2.4.	Analysis of Impacts.....	75
8.2.4.1.	Effectiveness.....	76
8.2.4.2.	Coherence.....	78
8.2.4.3.	Market Distortion.....	79
8.2.4.4.	Administrative Burden.....	80
8.2.5.	Comparing the Options.....	81
8.3.	Free allocation to promote investments for modernising the energy sector.....	81
8.3.1.	Policy objective and problem definition.....	81
8.3.2.	Conclusions on lessons learnt and policy context.....	82
8.3.3.	Operational policy objectives.....	83
8.3.4.	Development and screening of policy options.....	83
8.3.4.1.	Aspects not varied between the options.....	84
8.3.5.	Retained option packages.....	85
8.3.6.	Assessment of options.....	87
8.3.6.1.	General impacts - Effectiveness.....	87
8.3.6.2.	General impacts - Complexity and administrative burden / flexibility to adjust to MS circumstances.....	88
8.3.6.3.	General impacts - Transparency.....	89
8.3.6.4.	General impacts - Potential distortion of EU energy market / complementarity with existing EU instruments.....	89
8.3.6.5.	Timing and distribution of investments and volume and timing of allowances on market / auction revenues of investments.....	90
8.3.6.6.	Environmental impacts - Potential decarbonisation.....	91
8.3.6.7.	Social impacts.....	92
8.3.7.	Comparing the options.....	92
8.4.	Inter-linkages between the low carbon funding mechanisms.....	93
9.	MONITORING AND EVALUATION.....	94
	ANNEXES.....	96
1.	GLOSSARY.....	96
2.	SUMMARY OF RELEVANT FINDINGS OF THE 2030 IMPACT ASSESSMENT.....	100
3.	SUMMARY OF STAKEHOLDER CONSULTATIONS.....	102
3.1.	GENERAL CONSULTATION ON THE ETS REVISION.....	102
I.	Free allocation and addressing the risk of carbon leakage.....	103
	Industry stakeholders.....	103
	Public authorities.....	103
	Civil society.....	104
II.	Innovation Fund.....	104
	Industry stakeholders.....	104
	Public authorities.....	105
	Civil society.....	105
III.	Modernisation Fund.....	105

Industry stakeholders	105
Public authorities	106
Civil society	107
IV. Free allocation to promote investments for modernising the energy sector	107
Industry stakeholders	107
Public authorities	108
Civil society	109
V. SMEs/regulatory fees/other	109
Industry stakeholders	109
Public authorities	110
Civil society	110
VI. General evaluation	110
Industry stakeholders	110
Public authorities	111
Civil society	111
3.2. Consultation on carbon leakage provisions and innovation support	111
I. Business and trade representations of business interests	112
II. Government and regulatory authorities	116
III. Academic and research organisations, NGOs, citizens, trade unions (civil society)	118
4. SUMMARY OF EVALUATION	121
4.1. NER 300 - lessons learnt	121
4.1.1. Introduction	121
4.1.2. NER 300 principles	121
4.1.2.1. <i>Definition</i>	121
4.1.2.2. <i>Legal basis</i>	121
4.1.2.3. <i>Selection of projects</i>	122
4.1.3. State-of-play	123
4.1.3.1. <i>Results of calls for proposals</i>	123
4.1.4. Lessons learnt so far	125
4.1.4.1. <i>Geographical coverage</i>	125
4.1.4.2. <i>Technological coverage</i>	125
4.1.4.3. <i>Support to innovation</i>	125
4.1.4.4. <i>Cost-effectiveness in the use of NER 300 funds</i>	126
4.1.4.5. <i>Administrative simplification</i>	126
4.1.4.6. <i>Monetisation of allowances for grants</i>	126
4.1.4.7. <i>No ring-fencing</i>	127
4.1.4.8. <i>Number and timing of calls</i>	127
4.1.4.9. <i>Length of preparatory phase</i>	128
4.1.4.10. <i>Impact of projects</i>	128
4.1.4.11. <i>NER 300 and other financing instruments</i>	128
4.1.5. Main challenges encountered	129
4.1.5.1. <i>Financial barriers</i>	129
4.1.5.2. <i>Management structure</i>	130
4.1.6. Conclusions	131
4.2. Free allocation to the power sector	132
4.3. Exclusion of small emitters – lessons learnt	135
4.4. Guaranteeing a robust and secure EU ETS (registry fees) – lessons learnt	137
5. DETAILED DESCRIPTION AND SCREENING OF OPTIONS FOR FREE ALLOCATION TO INDUSTRY	139
5.1. Benchmarks	139
5.1.1. Lessons learnt from the current system in phase 3 (2013-2020)	139
5.1.2. Policy options for updating benchmark values for 2021-30	140
5.1.3. Screening	141
5.2. Carbon leakage groups and criteria	143
5.2.1. Lessons learnt from the current system in phase 3 (2013-20)	143
5.2.2. Policy options	146
5.2.3. Screening	150
5.3. Production level and adjustments	151
5.3.1. Lessons learnt from the current system in phase 3 (2013-20)	151
5.3.2. Policy options	153
5.3.3. Screening	154

5.4.	Reserve for new entrants	155
5.4.1.	Lessons learnt from the current system in phase 3 (2013-20)	155
5.4.2.	Policy options.....	155
5.4.3.	Screening.....	156
5.5.	Compensation for indirect carbon costs	157
5.5.1.	Lessons learnt from the current system in phase 3 (2013-20)	157
5.5.2.	Policy options.....	159
5.5.3.	Screening.....	159
6.	FURTHER IMPROVEMENTS TO THE CURRENT SET OF RULES	161
6.1.	Validity of emission allowances	161
6.1.1.	Problem definition.....	161
6.1.2.	Operational policy objective	162
6.1.3.	Policy options.....	162
6.1.4.	Analysis of impacts	162
6.1.5.	Comparing the options	162
6.2.	Optional exclusion of small emitters.....	163
6.2.1.	Problem definition and general objective.....	163
6.2.2.	Operational policy objective	164
6.2.3.	Policy options.....	164
6.2.3.1.	Assessment of the options.....	164
6.2.3.2.	Comparing the options.....	165
6.3.	Guaranteeing a robust and secure EU ETS (registry fees)	166
6.3.1.	Problem definition and general objective.....	166
6.3.2.	Operational policy objectives.....	167
6.3.3.	Policy options.....	167
6.3.3.1.	Screening of the options	168
6.3.3.2.	Analysis of impacts.....	168
7.	IMPACTS OF DIFFERENT OPTION PACKAGES FOR FREE ALLOCATION ON INDIVIDUAL SECTORS	170
7.1.	Effect of carbon leakage groups on sectors.....	171
7.2.	Cross sectoral correction factor.....	174
7.3.	Estimated level of free allocation for biggest sectors in phase 4.....	174
7.4.	Estimated compliance cost per sector, taking into account cost pass through.....	179
7.5.	Sensitivity analysis.....	183
8.	IMPACTS OF DIFFERENT OPTION PACKAGES FOR FREE ALLOCATION: ADMINISTRATIVE BURDEN AND SOCIAL IMPACTS	186
8.1.	Analysis of administrative burden.....	186
8.2.	Analysis of social impacts.....	188
8.2.1.	Employment	188
8.2.2.	Energy prices for households	191
9.	LITERATURE REVIEW ON COST-PASS THROUGH RATES	193
9.1.	Theoretical studies on cost pass-through.....	194
9.2.	Ex-ante empirical studies on the EU ETS	195
9.3.	Ex-post empirical studies for the EU ETS	197
9.4.	Conclusions	201
10.	DESCRIPTION OF FINANCIAL BARRIERS FOR ENERGY SECTOR: POWER GENERATION, ENERGY EFFICIENCY AND NETWORKS	206
11.	IMPACTS OF CREATING THE MODERNISATION FUND COMPARED TO THE BASELINE	208
12.	MORE COMPREHENSIVE OVERVIEW OF IMPACTS FOR DIFFERENT OPTIONS FOR CREATING THE MODERNISATION FUND	213
13.	TIMING AND APPROACH TO THE MONETISATION OF ALLOWANCES FOR THE INNOVATION FUND AND MODERNISATION FUND	215
14.	SENSITIVITY ANALYSIS FOR POSSIBLE FUNDING RATES FOR THE INNOVATION FUND	222
15.	OPTIONS FOR UNALLOCATED ALLOWANCES.....	225
	<i>Policy options</i>	<i>225</i>
	<i>Comparison between the options.....</i>	<i>226</i>

List of tables

Table 1: Option packages for addressing the risk of carbon leakage.....	40
Table 2: Estimated number of sectors and distribution of free allowances under 'Baseline', 'limited changes' and 'targeted' options.....	44
Table 3: Overview of assessment of policy option packages compared to 'Baseline B'.....	52
Table 4: Option packages for Innovation Fund.....	61
Table 5: Comparison of options for the innovation fund.....	69
Table 6: Retained options for examining for the Modernisation Fund.....	74
Table 7: Impact of policy options for the Modernisation Fund.....	81
Table 8: Option packages for the free allocation to the power sector.....	86
Table 9: Comparison of options for the free allocation to the power sector.....	92
Table 10 Stakeholder consultation responses.....	111
Table 11: Projects submitted and awarded.....	124
Table 12: Distribution of awarded NER 300 funding.....	124
Table 13: Screening of options for updating benchmark values.....	143
Table 14: Overview of minimum cost pass-through values found in existing literature.....	146
Table 15: Screening of options for carbon leakage groups and criteria.....	151
Table 16: Screening of options for production level and adjustments.....	155
Table 17: Screening of options for reserve for new entrants.....	156
Table 18: Screening of options for compensation for indirect cost.....	160
Table 19: Comparison of options.....	163
Table 20: Comparison of the options in relation to relevant problems and objectives.....	166
Table 21: Comparing the options in relation to relevant problems and objectives.....	169
Table 22: Estimated number of sectors, share of gross free allocation and GVA in the different groups.....	173
Table 23: Estimated carbon leakage status at sectoral level based on past data.....	173
Table 24 Overview table on estimated compliance cost per sector, taking into account cost pass-through rates.....	183
Table 25 Sensitivity analysis of compliance costs compared to sector turnover at different carbon prices.....	184
Table 26: Estimated administrative costs for additional NIMs exercises:.....	186
Table 27: Estimated additional annual administrative costs for production level adjustments.....	187
Table 28: Estimated administrative costs for harmonised rules for indirect cost compensation (additional costs compared to national compensation currently applied in 6 MSs as baseline).....	188
Table 29: Estimated employment impacts of policy option packages compared to baseline B from the pass through of additional costs (annual average for 2021 – 2030, underlying assumptions in italics).....	190
Table 30: High estimate of employment impacts of policy option packages compared to baseline B from additional costs absorbed (annual average for 2021 – 2030, underlying assumptions in italics).....	190
Table 31: Analysis of impacts of policy option packages on the district heating sector 2021-30.....	191
Table 32 Estimate of cost pass-through rates from ex-post econometric studies.....	199
Table 33 Overview of the range of average cost pass-through in selected sectors from literature.....	202
Table 34: Comparison under baseline and creation of the Modernisation Fund for allocation of 2% of total allowances, 2021-2030.....	209
Table 35: Modernisation Fund allocation shares per beneficiary Member States, 2021-2030.....	209
Table 36: Monetised health benefits in 2030 as a percentage of GDP.....	211
Table 37: Reduced air pollution control costs by 2030 as a percentage of GDP.....	211
Table 38: EU28 jobs associated with investments in the power sector and energy efficiency, 2011-2030.....	212
Table 39: Overview of impacts for different options for creating the Modernisation Fund.....	213
Table 40: Sensitivity of amount to raise by RES, CCS or industry project sponsor to funding rates and project size.....	224
Table 41: Sensitivity of 15% to price of carbon.....	224
Table 42: Comparison of options for further action with unallocated allowances.....	226

List of figures

Figure 1 Respondents from industry.....	12
Figure 2: Structure of the total quantity of allowances in phase 3.....	25
Figure 3: Sectors on and off the carbon leakage list.....	36
Figure 4: Estimated combined effect of carbon leakage groups and the correction factor under different option packages.....	45
Figure 5: Annual allowances from fund by type.....	88
Figure 6: Combined free allocation trajectories.....	91
Figure 7: Stakeholder consultation responses.....	102
Figure 8: Industry stakeholders – shares of each sector replying.....	102
Figure 9: Distribution of installations in terms of amount of emissions.....	135
Figure 10: Annual Emissions from small installations (installations with annual emissions < 25 kt) and from opt-out installations.....	136
Figure 11: Ranking of sectors in terms of emissions in EU ETS.....	170
Figure 12: Indicative carbon leakage groups in the 'Limited changes' option package based on 2009-2011 data.....	172
Figure 13: Indicative carbon leakage groups in the 'Targeted' option package based on 2009-2011 data.....	172
Figure 14: Estimated combined effect of carbon leakage groups and the correction factor under different option packages.....	175
Figure 15: Employment in selected energy-intensive industries.....	189
Figure 16 Cost pass-through rates derived by Vivid Economics (2014) in sectors investigated in reduced and full detail (2020, € 15/tCO ₂).....	197

EXECUTIVE SUMMARY SHEET

Executive Summary Sheet

Impact assessment on Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC

A. Need for action

Why? What is the problem being addressed?

The EU's long-term goal, also agreed in the context of the UNFCCC, is to limit global average temperature increase to below 2°C compared to pre-industrial levels. The general problem analysis concerning EU climate policy targets for 2030 and the ETS has been done in the impact assessment on the 2030 climate and energy framework. The European Council agreed on the 2030 framework in October 2014, including a binding domestic reduction of greenhouse gas (GHG) emissions of at least 40% in 2030 as compared to 1990, and a corresponding emission reduction target for the sectors in the EU Emissions Trading System (ETS) of 43% compared to 2005. The European Council also gave strategic guidance on the continuation of free allocation to industry and the establishment of low-carbon funding mechanisms to ensure EU's low-carbon transition. The problem to be addressed is how to adapt the respective ETS Directive provisions to make them suitable post-2020, including also further improvements to the system based on lessons learnt in phase 3 since 2013.

What is this initiative expected to achieve?

The specific policy objective is to align the EU ETS architecture with the 2030 emission reduction commitment and refine and improve the EU ETS post-2020 framework in the light of the lessons learnt in a context where fully comparable climate policy measures may not yet be undertaken by all other major economies; reinforced research, development and innovation efforts should take place in order to maintain Europe's industrial base and competence, and support the 2030 climate and energy framework as well as the long-term goal of low-carbon economy; reinforced investment efforts should take place in order to modernise the energy system and experience gathered during the first years of phase 3 since 2013 suggests that there is potential to reinforce efficiency.

What is the value added of action at the EU level?

The EU ETS Directive exists and will continue being in force post 2020. It is an EU policy instrument. Climate change is a trans-boundary problem. Therefore, coordination of climate action at European level and, where possible, at global level is necessary and EU action is justified on grounds of subsidiarity. Many of the policy elements have an important internal market dimension and many of the required investments and infrastructures have an important European dimension. Therefore, the objectives can be better achieved by an EU framework for action. Delegating the legislative powers to Member States would lead to partitioning, an uneven playing field and decreased efficiency.

B. Solutions

What legislative and non-legislative policy options have been considered? Is there a preferred choice or not? Why?

The impact assessment was carried out for a number of aspects on which the European Council gave strategic guidance allowing some discretion - addressing the risk of carbon leakage, establishment of a Modernisation and an Innovation Fund, optional free allocation to modernise the electricity sector in some Member States, and aspects building on the lessons learnt since 2013 (validity of emission allowances; guaranteeing a robust and secure Registry; and optional exclusion of small emitters). The options in these areas are screened preliminarily in view of achieving the operational objectives. There are numerous possible combinations of options on different elements that could be evaluated. Therefore, based on the screening, combinations of options are selected to form coherent packages, representing different ends of a spectrum and differentiating across the different elements to evaluate their specific impacts, while also focusing on the realistic options. For addressing the risk of carbon leakage, options are considered concerning benchmarks, production levels, new entrant reserve, carbon leakage groups and indirect cost compensation. For the Innovation Fund, options are developed for the way that projects are screened and selected, and the way in which financial support is provided. For the Modernisation Fund, potential options are considered on its governance. For the optional free allocation to the energy sector, options are developed for improving its modalities and enhance transparency compared to the current practice.

Who supports which option?

Different stakeholders have different views, sometimes within the same sector, making it difficult to categorise

homogenous groups of stakeholders supporting particular options. On addressing the risk of carbon leakage, a number of industry stakeholders are in favour of limited changes to the current system, while other stakeholders, including Member States and civil society, believe that more targeting or further harmonisation is needed. For the Innovation Fund, energy and industry stakeholders generally welcome continued support for low-carbon innovation and the expansion of scope to include industry, with diverging views on how the risk sharing approach could be tailored for industry or CCS to improve the effectiveness compared to the current NER 300 mechanism, for example by providing support at an earlier stage in the project life cycle or a higher rate of support. On the Modernisation Fund some stakeholders support a key role in managing it for the beneficiary Member States, while others ask for a stronger role for all Member States, the Commission and the European Investment Bank. On the optional free allocation to the energy sector, market participants generally support streamlined, common and simplified rules, and harmonised reporting guidelines.

C. Impacts of the preferred option

What are the benefits of the preferred option (if any, otherwise main ones)?

The general benefit of measures to address the risk of carbon leakage is addressing competitiveness issues and the potential risk of carbon leakage, as long as comparable climate policies are not undertaken by other major economies. The overall benefit of establishing the Innovation Fund is a stepped-up effort to rapidly introduce new low-carbon technologies to the market enabling the EU to reach its long-term decarbonisation goals. The general benefit of establishing the Modernisation Fund and optional free allocation to the energy sector is contributing to the modernization of the energy systems in low-income Member States.

What are the costs of the preferred option (if any, otherwise main ones)?

Costs must be seen in the overall context of the EU climate objectives of limiting global average temperature increase to not more than 2°C above pre-industrial level. Measures to address the risk of carbon leakage directly affect the costs for industrial installations covered by the ETS or EU Member States' budgets. Options for the Innovation and Modernisation Fund affect primarily administrative costs and for the Modernisation Fund may lead to market distortion. Together with a possible impact on the carbon market, these types of costs are also relevant for the options for the optional free allocation to the energy sector.

How will businesses, SMEs and micro-enterprises be affected?

Businesses covered by the EU ETS are directly affected. The overall impact is independent of the assessed policy choices as the contribution the EU ETS has to make to the overall EU 2030 reduction target has already been set. Sectoral impacts in major industrial sectors covered by the EU ETS vary to some degree depending on policy choices. However, choices that lower the costs and impacts on some industrial sectors necessarily result in higher costs and impacts for other industrial sectors. The proposal also affects producers of renewable energy, and manufacturers of equipment for low carbon technologies. Innovative technologies will generate new business opportunities. The revision of the ETS also constitutes an important part of the work on the achievement of a resilient Energy Union with a forward looking climate change policy at its core, which has as one of its goal giving EU consumers – including businesses – secure, sustainable, competitive and affordable energy. The majority of installations under the EU ETS are in the energy intensive industries with market structures characterised by large enterprises. Small emitters (not necessarily owned by SMEs or micro enterprises) should benefit from the option envisaging continuation of the possibility for Member States to exclude them from the ETS if they are subject to equivalent measures.

Will there be significant impacts on national budgets and administrations?

National budgets and administrations are primarily affected due to the link to auctioning revenues. If Member States were to be required to share the EU-level costs of the Union registry, this would also have an impact on their national budgets, but not a significant one.

Will there be other significant impacts?

No other significant impacts are expected.

D. Follow up

When will the policy be reviewed?

Not specifically foreseen, but Articles 10(5) and 29 of the ETS Directive require the Commission to establish regular reports on the carbon market and to verify whether the carbon market is functioning properly.

1. PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

1.1. Identification

Lead Directorate-General (DG): Climate Action

Other services involved: Secretariat-General; Legal Service; DG Budget; DG Competition; DG Economic and Financial Affairs; DG Employment; DG Energy; DG Environment; DG Internal Market, Industry, Entrepreneurship and SMEs; DG Mobility and Transport; DG Regional and Urban Policy; DG Taxation and Customs Union; DG Trade and DG Research, Science and Innovation.

Work Programme 2015 reference: Included under initiative no. 5 *Strategic framework for the Energy Union*

Agenda Planning reference: 2015/CLIMA/001

1.2. Organisation and timing

The analysis of the policy framework for climate and energy in the period from 2020 to 2030 (hereafter 'the 2030 framework')¹ has played a central role in identifying the key elements for the revision of the European Union Emission Trading System (EU ETS) for the period after 2020. The current impact assessment is a follow-up exercise from the impact assessment for the 2030 framework² and focuses on certain ETS-specific methodological elements not already assessed.

The work for this impact assessment (IA) started in December 2014 with the launch of a 12-week online consultation on the revision of the EU ETS³. The work also builds on the results of the consultation on the 2030 framework⁴ and a separate consultation on the post-2020 carbon leakage provisions⁵.

DG Climate Action invited the above-mentioned Commission services to be part of an Impact Assessment Steering Group. Three meetings took place (on 18 December 2014, 26 February 2015 and 16 April 2015) where comments were exchanged and taken into due account. The final draft impact assessment was submitted to the group on 13 April 2015. Another meeting of the Steering Group took place to discuss the revised draft on 23 June 2015.

An evaluation of the existing ETS Directive is part of the impact assessment work and has fed into the assessment of the policy options.⁶

1.3. Consultation and expertise

1.3.1. Expertise used

This impact assessment builds on the impact assessment for the 2030 framework and analyses ETS-relevant aspects not covered in it.

¹ Communication on A policy framework for climate and energy in the period from 2020 to 2030, COM(2014)15 final

² Commission Staff Working Document accompanying the Communication on A policy framework for climate and energy in the period from 2020 to 2030, SWD(2014) 15 final

³ http://ec.europa.eu/clima/consultations/articles/0024_en.htm See summary in Annex 3

⁴ <http://ec.europa.eu/energy/en/consultations/consultation-climate-and-energy-policies-until-2030>

⁵ Recordings of the meetings and the presentation can be found on the DG Climate Action website: http://ec.europa.eu/clima/policies/ets/cap/leakage/documentation_en.htm

⁶ See in particular sections on lessons learnt and Annex 4

In terms of external expertise, the Commission drew upon a study on evaluation of the ETS, commissioned in 2014 and carried out by a consortium led by ICF International⁷. Furthermore, in 2014, a study⁸ was commissioned to assess the issue of costs being passed through from industrial sectors to their downstream customers and to determine the factors influencing such ability to pass through costs quantifying it for major energy intensive industry sectors. Another study⁹ was commissioned to evaluate the experience gathered with the harmonised benchmark-based allocation process, and in particular to evaluate whether the benchmarks have achieved the intended objectives. In 2013, a study¹⁰ was commissioned to assess the evidence for carbon leakage in the period 2005-2012 for ten major energy intensive industry sectors. The findings of these studies are discussed in chapter 7.

In terms of data, in 2011-2013, Member States submitted to the Commission verified, detailed, confidential and commercially sensitive data on preliminary free allocation to industrial installations.¹¹ After checking their compliance with the harmonised allocation rules,¹² these data were used for the analysis of the amount of free allocation to industrial installations.

1.3.2. Consultation

Relevant stakeholders (Member States, industry representatives, NGOs, research and academic institutions, trade unions and wider public) were involved throughout the entire process. Complementing the consultation for the 2030 framework, an extensive follow-up stakeholder consultation was carried out on various technical aspects of the post-2020 carbon leakage provisions, as well as on innovation support. It included three stakeholder meetings (June, July and September 2014)¹³ and a written consultation (May–July 2014)¹⁴.

An online consultation (December 2014-March 2015) also on other aspects (free allocation for the power sector, Innovation and Modernisation Funds, small and medium sized enterprises (SMEs), regulatory fees and general evaluation of the EU ETS) followed. The Commission did its best to accept also late submissions, and the consultation attracted a total of over 529 contributions from a broad spectrum of stakeholders.¹⁵ The main findings of the public consultation are found in Box 1 and the summary report in Annex 3.

Moreover, there have been bilateral meetings with many stakeholders, allowing them to express their specific views on the future of the system, as well as their dedicated efforts on certain aspects. A questionnaire on benchmarks for industry stakeholders was distributed in March 2015 and a conference on the Modernisation Fund was organised.

⁷ ICF International, Umweltbundesamt, SQ Consult, Ecologic Institut, Vivid Economics and ZEW – on-going work

⁸ 'Study on different pass-through factors to assess the impact of the EU ETS carbon cost' – on-going work

⁹ 'Assessment of the first years of the functioning of the new allocation system based on benchmarks' – on-going work

¹⁰ Carbon Leakage and Competitiveness Assessment, Ecorys, 2014

(http://ec.europa.eu/clima/policies/ets/cap/leakage/docs/cl_evidence_factsheets_en.pdf)

¹¹ The National Implementation Measures (NIMs) to the Commission pursuant to Commission Decision 2011/278/EU

¹² Commission Decision 2011/278/EU

¹³ Recordings of the meetings and the presentation is published on DG Climate Action website: http://ec.europa.eu/clima/policies/ets/cap/leakage/documentation_en.htm

¹⁴ A summary of the findings and the individual submissions is published on DG Climate Action website http://ec.europa.eu/clima/consultations/articles/0023_en.htm

¹⁵ Published on DG Climate Action website http://ec.europa.eu/clima/consultations/articles/0024_en.htm

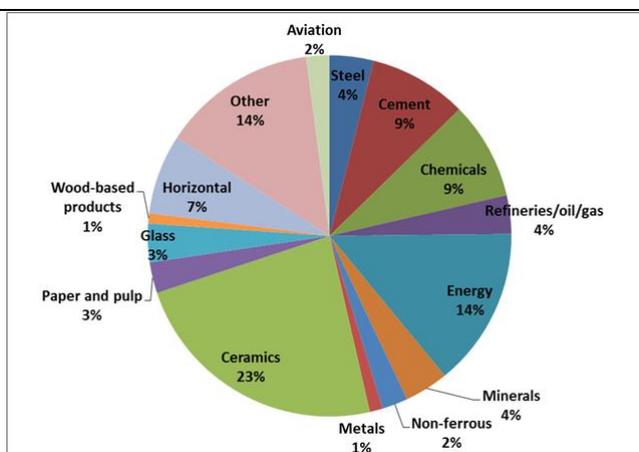
All of the above consultations have been published on the DG Climate Action website. The Commission minimum standards on stakeholder consultation have all been met.

The views of the stakeholders were taken into account to the extent possible in this impact assessment, given their number, the sensitivity and complexity of the issues and the diverging opinions expressed by different stakeholder groups. The respective sections indicate how the opinions have been reflected in the proposed options.

Box 1: Main findings of the general consultation on ETS revision

Over 500 responses were received both through the website and by email, including general position papers on the ETS revision. Some responses were coordinated at the level of industrial sector (e.g. over 100 identical submissions from ceramics companies and associations), and also in the case of several NGOs. The majority of submissions - 86% of which 14% from the power sector - were from a wide variety of industry stakeholders (companies, SMEs, national associations, European associations). The graph below shows the various industry stakeholders:

Figure 1 Respondents from industry



The public consultation showed that the EU ETS is considered to correspond well to the EU climate policy objectives and is perceived as an adequate tool to achieve these objectives. There is overall support for the system as a central instrument to reduce greenhouse gas emissions in the EU and as a market-based system. The majority of stakeholders support continuation of the existing principles, though with improvements in certain aspects according to their different concerns - e.g. industry would like enhanced protection against the risk of carbon leakage, whereas NGOs would like increased ambition of EU ETS and more investments in low-carbon technologies.

Stakeholders took the opportunity provided by the consultation to present their broader positions on climate and energy policy and highlighted their specific concerns. For instance, the steel sector stakeholders underline the issue of waste gas transfers, the ceramics sector highlights the issue of high labour costs leading to high gross value added which make the sector appear to have lower carbon costs, the non-ferrous metals sector refer to the importance of electricity costs in their total costs and argue for a better system for indirect cost compensation. Member States express concerns about administrative complexity, while civil society advocates for using auctioning revenues for climate-related measures. Given the variety of views not just among, but also within stakeholder categories, this box, the summary in Annex 3, and the analysis of policy options tries to focus on the views receiving widest support.

Free allocation and addressing the risk of carbon leakage

There is overall support for free allocation as the measure to address direct carbon costs. Industry stakeholders from different sectors (steel, ceramics, glass, chemicals) supported the idea that the best performers should be fully compensated by free allocation and therefore no correction factor should apply. Continuing with the existing principles and basing benchmarks on the most efficient EU

installations gathered quite some support, but some respondents (notably NGOs) argue for benchmarks based on worldwide performance in the sectors. Public authorities highlight the importance of maintaining the incentive to innovate and of rewarding the best performers.

The energy intensive industry stakeholders support '*dynamic allocation*' or allocation based on more recent production volumes. However, some energy sector stakeholders stress that defining the amount of free allowances available for industry should not create uncertainty on the available auction volumes, and therefore the amounts of allowances to be auctioned by Member States should be fixed *ex-ante*. They also argue that given the final EU objective to conclude an international agreement, the system of free allocation should continue to be considered as a transitional instrument only to address the risk of carbon leakage.

Regarding cost pass-through (passing the cost of allowances in product prices), many stakeholders claim it is difficult to quantify since products are traded on global markets and prices are determined internationally, influenced by a multitude of factors. Civil society stakeholders concur with the empirical evidence and are of the view that all industrial sectors are able to pass through to their customers at least some of the carbon costs. Some public authorities believe there should be no free allocation for the costs passed through by companies. Many stakeholders express the view the issue of cost pass through should be addressed.

Innovation Fund: Stakeholders support continuing with the application of the general set of rules for the NER300 programme and increasing the amount of allowances dedicated to the new Innovation Fund, while they also highlight the need for some improvements. Industry stakeholders typically support the rules being adapted to ensure they match industry needs, including those of SMEs. The energy sector stakeholders argue that the current NER 300 programme contains several lessons on pitfalls in energy innovation demonstration policy, such as insufficient coordination and Member State commitment. Some academics raise concerns about a lack of available information on the decision process and especially on lessons learnt from the current NER 300 programme. Similarly, NGOs ask for increased transparency particularly on the selection phase.

Modernisation Fund: Regarding the investments, some energy-intensive industry stakeholders argue that as a principle, private and public projects should be on an equal footing, and that industrial actors should also be eligible. The energy sectors highlight inefficiency and high administrative cost of complex funding systems, and hence the importance for investors of having simple structures. Some beneficiary Member States expressed preference that the main responsibility to ensure an effective and transparent management of the Fund should be at the Member State level. In contrast, other Member States support an important and strong role for the European Investment Bank (EIB) to play in managing the use of the Fund within the constraints of available EIB resources.

Optional free allocation to the energy sector: In principle, stakeholders tend to support agreeing on common, general EU level criteria for the selection of projects. Should free allocation to the electricity sector be introduced, it should at least ensure that the support does not subsidise investments in inefficient power generation.

General evaluation: Many energy intensive industry stakeholders support the EU ETS as a resilient and flexible solution to achieve EU emissions reductions in a cost-effective manner. However, strong concerns are raised about the absence of an international agreement and the EU ETS not being linked to any similar emission trading system. Stakeholders from the energy sector and public authorities see the objectives of the EU ETS as being in line with EU's climate policy objectives for 2020 and 2030.

1.4. Subsidiarity

The EU ETS Directive¹⁶ exists and will continue being in force post 2020. It is an EU policy instrument. A revision of the EU ETS can only be implemented through proposals by the Commission to amend the EU ETS Directive.

¹⁶ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02003L0087-20140430&from=EN>

Climate change is a trans-boundary problem. Therefore, coordination of climate action at European level and, where possible, at global level is necessary, and EU action is justified on grounds of subsidiarity. Articles 191 to 193 of the TFEU confirm and further specify EU competencies in the area of climate change.

Many of the policy elements have an important internal market dimension, in particular the options related to the indirect cost compensation for industry (see section 7.3.6), the Modernisation Fund (see section 8.2) and the free allocation to power (see section 8.3), and many of the required investments and infrastructures have an important European dimension, especially in the low-carbon funding mechanisms and the free allocation to industry.

The Modernisation Fund aims to modernise the energy systems and improve energy efficiency in the beneficiary Member States, but the fund also has important implications on the internal energy market as the investments supported would be made in the context of a liberalised European energy market.

Therefore, the objectives can be better achieved by an EU framework for action. Delegating the legislative powers to Member States would lead to partitioning, an uneven playing field and decreased efficiency.

1.5. Scrutiny by the Commission Impact Assessment Board

The Impact Assessment Board of the European Commission assessed a draft version of the present impact assessment and issued its opinion on 22 May 2015. The impact assessment was improved and resubmitted to the Board, which issued its final opinion on 17 June 2015. The Impact Assessment Board made several recommendations and, in the light of the latter, the final impact assessment report contains a clearer presentation and explanation of options and their impacts, including more assessment of impacts on particular sectors as added in section 7.5.3 and Annex 7. The report also explains better the rationale behind the choices of values for thresholds and criteria in sections 7.3 and 8.1.3. The coherence between various funding mechanisms is also addressed, as well as their options and impacts. Various methodological questions are clarified (use of carbon leakage criteria and relation to cost pass-through, modelling of employment effects and energy prices for households). Annex 15 was added to address the issue of using the unallocated allowances *inter alia* for carbon leakage and innovation as agreed in the context of the market stability reserve proposal.¹⁷ A particular effort has been made throughout the text to simplify the language and improve readability for non-expert audience, including boxes briefly explaining ETS and carbon leakage.

2. POLICY CONTEXT

Building on the Commission Communication on the 2030 framework and the accompanying impact assessment, in October 2014 the European Council¹⁸ and with the endorsement of the European Parliament¹⁹ agreed on the 2030 framework, which includes a binding domestic reduction of greenhouse gas (GHG) emissions of at least 40% in 2030 as compared to 1990.²⁰ To meet this target, the European Council also specifically agreed that the emissions in the EU ETS should be reduced by 43% compared to 2005. As a result of the measures needed to

¹⁷

http://www.europarl.europa.eu/meetdocs/2014_2019/documents/envi/dv/ets_msr_annex_/ets_msr_annex_en.pdf

¹⁸ http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/145397.pdf

¹⁹ European Parliament resolution on a 2030 framework for climate and energy policies (2013/2135(INI))

²⁰ The European Council also agreed on a binding EU target of at least 27% for the share of renewable energy consumed in 2030 and an indicative target at the EU level of at least 27% for improving energy efficiency.

meet this emission reduction target for the 2030 framework and the Market Stability Reserve which is expected to become operational in 2019 as provisionally agreed by the co-legislators²¹, the EU ETS will deliver a meaningful carbon price and stimulate cost-efficient emission reductions. A reformed EU ETS will play an important role in giving the right investment signals to businesses and Member States to ensure emission reductions happen at the least cost.

Box 2: EU ETS in brief

The EU ETS is the EU cornerstone policy to combat climate change. It is the first - and still by far the biggest - international system for trading GHG emission allowances covering more than 11,000 power stations and industrial plants in 31 countries (28 EU Member States and 3 EEA/EFTA states), as well as airlines. It covers around 45% of the EU's emissions.

It is a 'cap and trade' system: a 'cap', or limit, is set on the total amount of greenhouse gas that can be emitted by the factories, power plants and other installations in the system. The cap is reduced annually over time so that total emissions fall: in 2020, emissions from sectors covered by the EU ETS will be 21% lower than in 2005, and by 2030 43% lower.

Within the cap, companies receive or buy emission allowances which they can trade with one another as needed. After each year a company must surrender enough allowances to cover all its emissions, otherwise fines are imposed. If a company reduces its emissions, it can keep the spare allowances to cover its future needs or else sell them to another company that is short of allowances. The flexibility that trading brings ensures that emissions are cut where it costs least to do so. Participation in the EU ETS is mandatory for companies operating in the sectors covered.

By putting a price on carbon and thereby giving a financial value to each tonne of emissions saved, the EU ETS has placed climate change on the agenda of company boards and their financial departments across Europe. A sufficiently high carbon price also promotes investment in clean, low-carbon technologies.

Launched in 2005, the EU ETS is now in its third phase (2013 – 2020), significantly improved and based on EU-wide harmonised rules. For more details see Section 3.

Allowances are either auctioned or allocated for free to address international competitiveness concerns of industrial sectors that are deemed to be exposed to carbon leakage. The power sector is not eligible for free allocation, except under special conditions in few Member states (See section 8.3).

According to market analysis (Bloomberg New Energy Finance), the EU carbon market for emission allowances in 2014 had a volume of 8 330 Mt, amounting to a value of €47.4 billion. For more information and explanations see:

http://ec.europa.eu/clima/publications/docs/factsheet_ets_en.pdf

Mainly as a result of the severe economic recession the EU ETS has faced the challenge of a growing surplus of allowances for some years. In the short term this surplus risks undermining the orderly functioning of the carbon market; in the longer term it could affect the ability of the EU ETS to meet more demanding emission reduction targets cost-effectively. As an intermediate first step, the co-legislators agreed to postpone (or 'back-load') the auctioning of 900 million allowances, followed by an agreement to establish a market stability reserve - a sustainable solution to the surplus in the longer term. The latter proposal is informally agreed by co-legislators (at the time of writing) and is expected to start in 2019.

For more information see http://ec.europa.eu/clima/policies/ets/index_en.htm

²¹ <http://www.europarl.europa.eu/news/en/news-room/content/20150526IPR59608/html/CO2-market-fix-Environment-Committee-MEPs-back-deal-with-Council>. Compromise text
http://www.europarl.europa.eu/meetdocs/2014_2019/documents/envi/dv/ets_msr_annex_/ets_msr_annex_en.pdf
and Commission proposal COM(2014) 20 final

The European Council also gave strategic guidance on several issues regarding the implementation of the emission reduction target, namely free allocation of allowances to industry, the establishment of a Modernisation Fund and an Innovation Fund, as well as optional free allocation of allowances to modernise electricity generation in some Member States. Similarly, the European Parliament highlighted the necessity of a revised and well-functioning ETS, including the continuation of provisions on the need to address the international competitiveness of industrial sectors deemed to be at risk of carbon leakage. This guidance is being translated into a legislative proposal to revise the EU ETS for the period post-2020 and this impact assessment focusses on choices to be taken to establish these rules.

The free allocation of allowances to industry is a key element in addressing industry competitiveness concerns and how to determine the rules for this allocation constitutes a key part of this impact assessment, addressed mainly in chapter 7. The low-carbon funding mechanisms are analysed in chapter 8.

This impact assessment and the legislative proposal for revision of the ETS Directive do not cover detailed methodological options to establish the technical measures to implement these revised rules. Respective legislative proposals and accompanying analysis will follow in due course.

The revision of the EU ETS makes an important contribution to the efforts to establish a resilient Energy Union²² with a forward looking climate change policy at its core. The goal of the Energy Union is to give EU consumers – households and businesses – secure, sustainable, competitive and affordable energy.

The EU climate policy will continue contributing to a major shift away from expenditure on fuels towards innovative equipment with high added value that will stimulate investments for innovative products and services, create jobs and growth and improve the Union's trade balance²³. As already shown, together with the 2020 targets for renewable energy and energy savings, the GHG emission reduction target and the ETS have played a key role in driving progress to low-carbon economy and sustaining the employment of more than 4.2 million people in various eco-industries²⁴, with continuous growth during the crisis.

3. GENERAL EVALUATION AND LESSONS LEARNT

The main aim of the EU ETS is to incentivise cost-effective emission reductions in the sectors in its scope. As the emission reductions and thus the positive environmental outcome in the EU ETS is guaranteed by its absolute limit on emissions, i.e. the cap²⁵, the EU is currently well on track to meet its 2020 targets for GHG emissions reduction not only for the sectors in the EU ETS, but for the EU as a whole. As decided in the 2008 climate and energy package, thanks to the emission reductions incentivised by the European carbon market and the measures taken in sectors out of the EU ETS, as well as the policies on renewables and energy efficiency, in 2020 the GHG emissions from the sectors in the EU ETS will be at least 21% lower than in 2005. Thus, the ETS in particular, and EU climate and energy policies in general, seem to be working well.

²² COM(2015) 80 final

²³ Communication on A policy framework for climate and energy in the period from 2020 to 2030, COM(2014)15 final

²⁴ Eurostat data on the environmental good and services sector quoted in A policy framework for climate and energy in the period from 2020 to 2030 (COM(2014) 15 final)

²⁵ For explanation of terms, see the Boxes and Annex 1 Glossary.

The regulatory framework of the EU ETS was largely unchanged during the first eight years of its operation (2005-2012). Based on the lessons learnt in these years, in phase 3 (2013-2020), a significant number of architectural and regulatory changes took effect, improving the functioning of the system.

The following fundamental changes have been applied:

- an EU-wide cap on allowances was introduced, as opposed to individual Member State caps. This EU-wide cap decreases by 1.74% annually, up to and beyond 2020, providing much greater regulatory predictability and stability;
- auctioning became the default system of allocation of emission allowances in phase 3, ceasing the previous practice of granting free allocation for electricity production. Revenues from these auctions are distributed to Member States (for more details see section 6.2). At least 50% of these revenues are to be used for climate action. As a transitional derogation, some Member States can still grant some of their auction volume as free allowances to their power sector (for more details see section 8.3);
- harmonised rules for transitional free allocation to industrial sectors were introduced, ensuring that all companies in the EU in one sector receive free allowances based on harmonised rules to address the risk of carbon leakage. The amount of free allocation for the installations is calculated based on emission performance benchmarks established prior to phase 3, production data and a carbon leakage factor measuring the exposure of the industrial sectors to international competition and carbon leakage risk (for more details see chapter 7);
- stricter rules on the type and quantity of international credits that are allowed for use in phase 3. These aspects are not analysed in the current impact assessment, as they have been covered by the impact assessment by the 2030 framework;
- replacement of national registries by a single Union registry;
- Emission allowances were classified as a financial instrument with the latest revision of the financial markets legislation in 2014, to be enforced in 2017²⁶.

The revised EU ETS Directive can be considered as fairly recent legislation. However, it is already clear that the present institutional framework with auctioning and EU-wide harmonised free allocation rules constitutes a significant improvement and simplification compared to the previous trading periods that still had National Allocation Plans. Allowing for auctioning to fully function as the main driving principle of the ETS - as compared to having rules for free allocation to industry and to power sector in certain Member States - would bring further simplification to the system.

Research concludes that in periods when the carbon price is likely to increase, other beneficial impacts of the EU ETS are visible through a broad range of mechanisms – incentives for cost-cutting and attention, experimentation, learning and investment in low-carbon solutions outside business-as-usual for companies²⁷. Studies show that due to the EU ETS a large proportion of firms pursued some measures to reduce GHG emissions and that CO₂ has now become part of the investment appraisal in construction of power stations²⁸.

²⁶ Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and Regulation (EU) No 596/2014 of the European Parliament and of the Council of 16 April 2014 on market abuse (market abuse regulation)

²⁷ Jon Birger Skjærseth and Per Ove Eikeland (eds), *Corporate Responses to EU Emissions Trading*, 2013

²⁸ E.g. literature review of studies in: Tim Laing et al, *Assessing the effectiveness of the EU Emissions Trading System*, 2013

However, at the start of phase 3 in 2013, the EU ETS was characterised by a large imbalance between supply and demand of allowances, resulting in a surplus of around 2 billion allowances expected to grow over the coming years to more than 2.6 billion allowances by 2020, and a correspondingly weak carbon price signal.

As a short term measure to mitigate the effects of the surplus on the carbon market it was decided to postpone (“back-load”) the auctioning of 900 million allowances in the early years of phase 3²⁹. This was followed by a proposal for a long-term measure of establishing a Market Stability Reserve to make the auction supply of emission allowances more flexible and increase shock resilience. The reserve's architecture also captures changes in the demand of allowances due to renewables and improved energy efficiency and, if need be, adjusts the auction supply accordingly. Hence, the Market Stability Reserve will, once fully functional, also strengthen the coherence between the EU ETS and energy efficiency and renewables policies, which also lead to lowering of emissions. The operation of the Market Stability Reserve is open-ended and does not affect the total quantity of emission allowances (the cap). Therefore, the introduction of the Market Stability Reserve improves the functioning of the EU ETS, but does not change its nature as a market-based policy instrument.

According to many energy-intensive industry stakeholders, the EU ETS corresponded well to the EU climate objectives, namely to cost-effectively reduce GHG emissions, in its initial architecture. However, they argue that with back-loading and the Market Stability Reserve³⁰, the EU ETS sectors will be facing a stricter GHG-target compared to EU climate policy objectives³¹. In contrast, other business stakeholders, including from renewables sector³², believe that the EU ETS is currently giving neither a long-term price signal that impacts investment decisions nor a short-term signal for operating decisions. Hence, they advocate in favour of structural measures, such as earlier implementation of the Market Stability Reserve and additional measures to address the surplus in order to 'fix' the EU ETS in the short and mid-term.

Some stakeholders responded that the EU ETS does not correspond to the EU's climate policy objectives, because no country in the world has accepted the EU ETS concept³³. However, it should be stressed that there are actually 17 emission trading systems in operation across four continents, accounting for 40% of global GDP³⁴.

The study to evaluate the existing ETS Directive is ongoing³⁵. It analyses the EU ETS in terms of relevance, effectiveness, efficiency, EU-added value and coherence with other Union policies.

The preliminary findings³⁶ indicate that despite criticism on some of its details, the EU ETS as a policy tool combining environmental regulation with a market instrument is working in practice and delivering on its targets. It is highly relevant for meeting the EU's climate targets, as it represents a cost-effective way for emission reductions. Emissions in the covered sectors have decreased steadily, and even though not all emission reductions can be attributed

²⁹ Decision No 1359/2013 EU

³⁰ Proposal for a Decision of the European Parliament and of the Council concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC – COM(2014) 20

³¹ E.g. CEPI response to the consultation

³² E.g. EWEA response to the consultation

³³ Central Europe Energy Partners response to the consultation

³⁴ International Carbon Action Partnership, Status Report 2015: <https://icapcarbonaction.com/status-report-2015>

³⁵ See section 1.3.1

³⁶ At the time of writing, the final evaluation report has not yet been received.

to the ETS alone, evidence has been found that the system does contribute effectively to emission reductions.

At the same time, the study observes that the EU ETS has found its way to the board rooms of companies and thus facilitates the internalisation of CO₂ costs. The ETS contributes to investments decisions, even though with the current low carbon price, the CO₂ costs are often included in the general envelope of energy costs. Smaller improvements in terms of GHG efficiency have become regular practice, but larger investments in GHG efficiency still remain the exception.

Moreover, the EU ETS has a clear EU value added since different systems or other climate policies at Member State level would lead to a fragmented and costly situation for the regulated entities, as well as different ambition levels and carbon prices throughout the EU, leading also to unfeasibility and administrative complexity. The EU ETS with an EU-wide carbon price and its harmonised infrastructure takes advantages of the synergies that EU action can provide.

In terms of coherence with EU policies, the study observes that renewables and energy efficiency policies both overlap with the EU ETS and may affect the cost of achieving the ETS' target, but both policies fully support the environmental effectiveness of the EU ETS as they do not affect the cap. In terms of coherence with international climate policy, the study also finds that the EU ETS performs well. It is widely used as a model for emissions trading systems around the world, benefitting from the EU's learning effects.

Specific evaluation and lessons learnt on the different aspects of the EU ETS are presented in the corresponding chapters.

A comprehensive evaluation summary report on individual aspects can be found in Annex 4.

4. GENERAL PROBLEM DEFINITION

The general problem analysis concerning EU climate policy targets for 2030 and the ETS has been done in the impact assessment on the 2030 climate and energy framework.

In brief, despite the fact that the EU is on track to meet its short-term emission reduction target of -20% by 2020, to ensure the long-term goal of a low-carbon economy and emission reductions of 80 to 95% by 2050, an intermediate step needs to be made with the binding EU target of at least 40% domestic reduction by 2030 compared to 1990. This target should be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS sectors amounting to 43% and 30% in the non-ETS sectors compared to 2005. Concerning the implementation of the emission reduction target, setting the cap at the emission level leading to a reduction of 43% would require a change in the linear reduction factor³⁷ from 2021 onwards. The European Council conclusions already foresee certain methodological elements for the implementation of the EU's GHG emission reduction target, for which no options were hence developed. These include the change in the annual linear reduction factor reducing the EU ETS cap from 2021 onwards and the share of allowances to be auctioned. These elements are outlined in chapter 6.

Free allocation and carbon leakage, low-carbon funding mechanisms and further improvements to the current system need to be analysed and specific problem definitions and options are developed in the respective sections.

³⁷ The ETS cap for stationary installations declines linearly, by an annual amount equal to 1.74% of the average annual allocation during phase 2 (2008-2012), referred to as the linear reduction factor. See section 6.1.

Free allocation and carbon leakage

While current policies to prevent carbon leakage such as the allocation of free allowances in the ETS have been successful³⁸, these do not automatically apply beyond 2020. In its strategic guidance the European Council has been clear that free allocation should not expire. Existing measures should continue after 2020 to prevent the risk of carbon leakage due to climate policy, as long as no comparable efforts are undertaken in other major economies, with the objective of providing appropriate levels of support for sectors at risk of losing international competitiveness. The problem to be addressed is how to adapt the respective ETS Directive provisions to make them suitable post-2020.

Low-carbon funding mechanisms: Modernisation Fund and Innovation Fund

The impact assessment of the 2030 climate and energy framework indicated that significant investments will be needed in the EU in the period through 2030 related to energy system modernisation and to reach the objectives of the 2030 climate and energy framework. In this context, the European Council has also given clear guidance that Member States with a GDP per capita below 60% of the EU average may opt to continue giving free allowances to modernise their energy sector up to 2030 (see section 8.3). In addition, a new reserve of 2% of the total quantity of allowances should be set aside to address particularly high additional investment needs in these Member States (so-called Modernisation Fund). The specific problems to be addressed with the setting up of the Modernisation Fund are analysed in section 8.2

The European Union will have to step up its efforts in research and innovation to support the post-2020 climate and energy framework. The European Council conclusions provide clear guidance that the existing NER 300 facility should be renewed, including for carbon capture and storage (CCS) and renewables, with the scope extended to low-carbon innovation in industrial sectors and the initial endowment increased to 400 million allowances (so-called Innovation Fund). The specific problems to be addressed with the setting up of the Innovation Fund are analysed in section 8.1

While the current architecture of the EU ETS is relatively recent, based on experience gathered, certain additional technical changes to the current set of rules in the ETS Directive should also be considered for the period post-2020. Since these changes are of more technical nature, options for these are developed in Annex 5.

This impact assessment explicitly does not address issues related to aviation emissions as covered under the ETS. As indicated in Regulation (EU) No 421/2014, following the 2016 ICAO Assembly, the Commission shall report to the European Parliament and to the Council on actions to implement an international agreement on a global market-based measure from 2020, that will reduce greenhouse gas emissions from aviation in a non-discriminatory manner.

5. OBJECTIVES

5.1. General policy objectives

The general objective of climate action policy, and of EU ETS as its key instrument, is to contribute to achieving the EU climate goal of limiting global average temperature increase to not more than 2 degrees Celsius above pre-industrial level. EU action against climate change was translated into a GHG emission reduction target of 20% compared to 1990 as

³⁸ See section 1.3, and 7.1, as well as Annex 3

adopted in the 2020 Climate and Energy Package. For the period 2021-2030, the GHG emission reduction target of at least 40% domestic reductions compared to 1990 by 2030, ensures the EU is on the path of low-carbon transition to emission reductions of 80-95% by 2050.

5.2. Specific policy objective

The specific policy objective is to align the EU ETS architecture with the 2030 emission reduction target and refine and improve the EU ETS post-2020 framework. This needs to be achieved in the light of the lessons learnt in a context where:

- Fully comparable climate policy measures may not yet be undertaken by all other major economies;
- Reinforced research, development and innovation efforts should take place in order to maintain Europe's industrial base and competence, and support the 2030 climate and energy framework as well as the long-term goal of a low-carbon economy;
- Reinforced investment efforts should take place in order to modernise the energy system, and support the 2030 climate and energy framework;
- Experience gathered during the first years of phase 3 (from 2013) suggests that there is still potential to reinforce efficiency of the system.

These specific objectives for the revision of the ETS Directive are further developed in the operational objectives of each of the chapters and sections. The operational objectives are tailored to the specifics of each cluster of issues, but also contribute to the achievement of the specific and general policy objectives of the ETS revision.

5.3. Consistency with other policies and objectives

As outlined in the 2030 impact assessment, the policy aim of the 2030 framework was to set climate and energy targets up to 2030, which are consistent and mutually reinforcing.³⁹ A well-functioning EU ETS is a key instrument to achieve the GHG emission reduction target and cornerstone of Europe's climate policy, consistent also with emission reduction efforts in non-ETS sectors. In line with the Energy Union strategy⁴⁰, by putting a price on carbon at EU level the EU ETS reinforces the functioning of the internal energy market and stimulates the uptake of renewables and other low-carbon and energy-efficient technologies. Through low carbon funding mechanisms, it financially supports power sector, industry and Member states in the low-carbon transition.

In general, consistency of a revised EU ETS with any related policies is addressed in this impact assessment when discussing specific issues, such as for instance a forward-looking approach to CCS for the power and industrial sectors and the Innovation Fund.

There is a need to continue driving progress towards a low-carbon economy, as this ensures competitive and affordable energy for all consumers, creates new opportunities for growth and jobs and provides greater security of energy supplies and reduced import dependence for the European Union as a whole. This ETS revision initiative is coherent with these objectives in the field of climate and energy policy.

In terms of international competitiveness, previous Commission analyses of energy prices and costs have shown that there has been little impact on the EU's relative competitiveness

³⁹ Consistency between targets is in particular assessed in the 2030 impact assessment.

⁴⁰ COM(2015) 80 final

which could be directly attributed to the ETS carbon price in the context of energy prices, although in the future the carbon price is assumed to be reflected in electricity retail prices⁴¹. However, as long as there are no comparable efforts undertaken in other major economies, policy measures (including a system of free allocation of allowances) are appropriate after 2020 to address the competitiveness of Europe's energy-intensive industries.

6. IMPLEMENTATION OF THE EU'S GHG EMISSION REDUCTION TARGET

6.1. Linear reduction factor

The outcome of the ETS in terms of emissions is determined by its cap on the total number of allowances. According to the ETS Directive and the present target of -21% by 2020 compared to 2005, the ETS cap for stationary installations declines linearly, by an annual amount equal to 1.74% of the average annual allocation during phase 2 (2008-2012), referred to as the linear reduction factor. Setting a cap at the 2030 emission level of -43% compared to 2005 requires a change in the linear reduction factor from 2021 onwards. This change is also needed in line with the EU's longer-term GHG emission reductions objectives. According to the analysis in the impact assessment accompanying the 2030 framework⁴², a revised linear reduction factor of 2.2% from 2021 onwards is required to ensure coherence with a 2030 cap equal to 43% emission reductions. The change from 1.74% to 2.2% reduces the supply of allowances by around 556 million in the period 2021-2030.

The European Parliament has called for legislation to be proposed at the earliest appropriate date with a view to adjusting the 1.74% annual linear reduction requirement so as to meet the requirements of the 2050 emission reduction target of 80 to 95% emission reductions. The European Council also explicitly endorsed the linear reduction factor of 2.2%. As the Commission proposal for the ETS revision has to achieve the objective of emission reductions in the ETS sectors of 43%, meeting the specific requirements of the European Council conclusions, no diverging policy options for the linear reduction factor post-2020 could be developed.

The impact assessment for the 2030 framework provides a comprehensive analysis of the impacts of emission reductions in the ETS of 43% by 2030 compared to 2005, and hence of the required linear reduction factor of 2.2%⁴³.

Although the Market Stability Reserve was not explicitly included in the modelling work for the impact assessment for the 2030 framework, its effects can be considered as reflected: in the analysis the emission reductions required to reach the 40% GHG target in 2030 and the 80% in 2050 and the respective carbon prices were determined so as to achieve these emission reductions cost-efficiently and assuming rational behaviour⁴⁴. In reality, however, businesses seem to base their abatement decisions on a shorter outlook for their industry than the 2030 reduction target would imply.⁴⁵ This is likely to mean that the current large supply-demand imbalance in the ETS reduces the incentives for low-carbon investment and thereby

⁴¹ COM(2014) 21; SWD(2014) 19; SWD(2014) 20

⁴² SWD(2014) 15 finals

⁴³ The relevant scenario that achieves this is the scenario with 40% GHG reductions and moderate energy efficiency and renewables policies up to 2030.

⁴⁴ The PRIMES model simulates emission reductions in ETS sectors as a response to current and future ETS prices. Furthermore the model assumes perfect foresight of the ETS carbon price progression in the period 2020-50, allowing as such sufficient investor confidence in the carbon market to make long term optimal investment decisions.

⁴⁵ Luca Taschini and Corina Comendant, Report on cost-containment mechanisms and market oversight, 2012: http://entracte-project.eu/uploads/media/ENTRACTE_Report_EU-ETS_Reform_and_Expansion.pdf

negatively affects the cost-efficiency of the system and of the achievement of EU emission reduction goals. Hence, by simulating the achievement of the 40% target, the economic model actually acts as capturing in a simplified way the expected impact of the Market Stability Reserve of addressing the surplus, increasing the confidence of market participants, and in turn delivering a meaningful price on carbon emissions and ensuring the emissions evolve in line with the cap by stimulating cost-efficient emission reductions.

Concerning changes in the underlying assumptions in the work for the impact assessment for the 2030 framework, notably the recently lower oil prices, it can be concluded that this price drop is not expected to lead to any major changes in the modelling results, even if it is sustained. It has had no major impact on the carbon price because of the reduced supply due to back-loading and the increasing expectation of the Market Stability Reserve being established. According to the International Energy Agency, the recent developments have made non-OPEC production more responsive to price swings than previously, which would likely set the stage for a relatively swift recovery⁴⁶. In addition, as relatively little oil is used as a fuel by installations in the ETS, the direct impact of changes in the oil price to the carbon price between 2021 and 2030 are expected to be limited, and a separate sensitivity analysis would not affect the outcomes for this impact assessment.

6.2. Auction share

In phase 2 (2008-2012), the overall cap that limits the amount of emissions and thereby sets the ambition level of the ETS was equal to the sum of national caps determined by the Member States in their National Allocation Plans (NAPs). These national plans determined different allocations at sector and installation level among the Member States. Allocating allowances on the basis of historical emissions (grandfathering) was the general rule and the auctioning of allowances the exception, leading to non-optimal investment and undesired distributional effects. As part of the EU's climate and energy package for 2020, it was thus agreed that as of 2013 a single EU-wide cap would be set and that auctioning would become the rule with transitional declining free allocation of allowances.

For phase 3, the EU-wide total cap⁴⁷ amounted to 2.084 billion allowances in 2013 and this annually decreases by the linear reduction factor of 1.74%.

The total cap is divided into a part that is made available to installations for free and a part that is auctioned. While the rule is that everything that is not allocated for free is auctioned and the volume of auctioned allowances increases over time, the maximum amount for free allocation is currently a fixed share of the total cap⁴⁸. Setting a maximum to the free allocation constitutes a backstop to ensure long-term environmental integrity of the system, effectively implementing the polluter-pays-principle, while recognising the need for maintaining the international competitiveness of industrial sectors exposed to the risk of carbon leakage.

In 2013, the maximum amount available for free allocation was around 809 million allowances.⁴⁹ The determination of the maximum amount for free allocation has been a

⁴⁶ IEA, Medium-Term Oil Market Report 2015:

<http://www.iea.org/newsroomandevents/pressreleases/2015/february/a-business-as-unusual-outlook-for-oil-in-the-medium-term.html>

⁴⁷ Commission Decision 2013/448/EU

⁴⁸ See Article 10a(5) of Directive 2003/87/EC

⁴⁹ Commission Decision 2013/448/EU

lengthy process (involving the Commission, Member States' authorities and companies included in the ETS), in particular due to the amount and nature of the necessary data. The wider public generally perceived the procedures as complex and insufficiently transparent.

Over the period 2013 to 2020, free allocation is provided on the basis of EU-wide harmonised rules and product benchmarks. Because the aggregate amount of gross free allocation⁵⁰ calculated by Member States on the basis of these rules exceeded the maximum amount of free allocation available to industry, the allocation for all installations over the period up to 2020 is reduced by the same proportion through the application of the cross-sectoral correction factor (Article 10a(5) of the ETS Directive) (for more details, see section 7.1).

As an exception to the general rule that electricity generators should not receive any free allocation, additional allocation is provided in case these installations produce heat. Since this allocation benefits the power generation sector, this free allocation is not part of the maximum amount for free allocation to industry, but of the quantity of allowances auctioned by Member States which is reduced accordingly.

Additional free allocation is made available from the new entrants' reserve (NER) for newly built plants or in case installations extend their capacity by more than 10%. The new entrants' reserve is constituted from 5% of the total cap, amounting to a total of around 780 million allowances for the period 2013 to 2020. 300 million of the allowances in the new entrants' reserve have, however, been earmarked and used to support carbon capture and storage (CCS) or innovative renewable energy projects under the NER300 facility.

Since, according to the ETS Directive, everything that is not allocated for free is auctioned, some allowances are foreseen to be added to the auction volume at the end of phase 3 in 2020. This concerns in particular, allowances that remain unused in the new entrants' reserve and allowances that are not handed out to installations because they stop operations (closures) or reduce their production (partial cessations) will be auctioned at the end of the period. In the context of the legislative discussions on the Market Stability Reserve, the co-legislators decided that these allowances (so called "unallocated allowances") should be transferred into the Market Stability Reserve in 2020 to avoid that auctioning them would create another supply peak adversely affecting the market balance in 2020. The ETS revision should also analyse whether these unallocated allowances can be used *inter alia* for innovation and to address the risk of carbon leakage. This analysis is provided in Annex 15.

Certain Member States have the option to provide free allocation to the power sector in return for investments modernising power generation. This option constitutes a derogation from the general principle that no free allowances are available to installations generating electricity. However, considering the investment needs in the power sector in certain Member States, the ETS Directive foresees this derogation. While this amount is qualified as free allocation, the allowances given to the power companies are provided from the Member States' auction volumes if, and to the extent, Member States make use of this option. If not used to the full extent, the allowances are auctioned on behalf of the Member State concerned. For more details, see section 8.3.

⁵⁰ 'Gross' free allocation is the amount of free allocation determined by applying the benchmark values to the production data, before the application of any further factors, such as carbon leakage factor and the correction factor.

Figure 2: Structure of the total quantity of allowances in phase 3

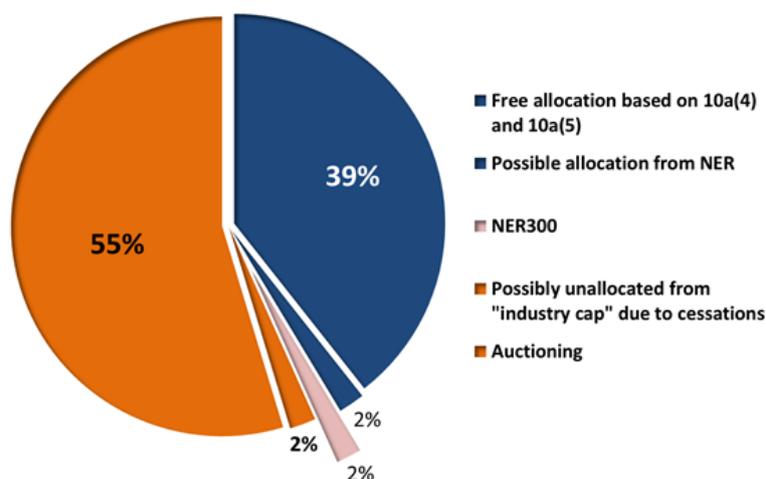


Figure 2 illustrates the auction share over phase 3 (2013-2020). It translates the starting point of the ETS Directive, according to which, in principle, all allowances should be auctioned, but free allocation is granted transitionally. Over phase 3, 39% of the total quantity of allowances available will be allocated for free to industry and electricity-generating installations for the heat they produce. This share of free allocation will be further increased due to allocations to new entrants until 2020. Today, it is not yet known how much of the NER will be used in the coming years. However, up until January 2015, 247 installations have received allocation from the NER, which will amount to 69.6 million allowances to be allocated from the NER by 2020, representing 14% of the total of 480.2 million allowances. Based on these trends, it is thus expected that no more than 2% of the cap may additionally be allocated for free from the NER. In total, the free allocation over phase 3 is thus expected to be around 41% of the total amount.

To the same extent that the allocations from the NER are not yet known today, it will also only be known at the end of the phase how many installations that currently receive an allocation will stop operation or reduce their capacity or production. Where installations no longer receive free allowances, the legal default is that these allowances will be auctioned on behalf of the Member States. In 2013 and 2014, the allocations to around 1100 installations were revised downwards by 85.7 million allowances. In general, the uptake from the NER and the return from closures and reductions are expected to be within the same order of magnitude⁵¹, so that another 2% of total allowances are expected to remain within the auction share.

Another some 2% of the total cap is used to fund the NER300 programme for CCS and innovative renewables projects.

As explained above, free allowances provided to the power sector in return for investments modernising power generation are deducted from or added to the auction share of the relevant

⁵¹ Returns because of partial cessations and closures and additional allocations from the new entrants' reserve depend on the economic development over the coming years. In case of more returns of allowances due to closures, partial cessations and capacity reductions than requests for new entrants' allocations, the auction share would increase; in the opposite case, i.e. lower new entrants' allocations than reductions, it would lower. As a working assumption, it is considered that they balance out over phase 3.

Member State and, as such, remain part of the auctioned volumes even though they are given for free to the energy sector⁵².

Taking into account these different elements, the average auction share over phase 3 amounts to 57%.

For phase 4, these elements should not fundamentally change. As was the case for the NER300 programme, 400 million allowances should be made available for innovation support. Free allocation provided to the power sector in return for investments modernising power generation should continue and allowances used for this purpose would remain part of the auction volumes which individual Member States can decide to allocate for free in return for investments. In line with the starting point in the ETS Directive, that in principle all allowances should be auctioned, the allowances that according to the European Council should be auctioned for a new fund for the modernisation of the energy systems in certain low-income Member States are part of the auction share in phase 4⁵³.

The "backloading", i.e. postponing auction volumes into the latter part of phase 3, and the functioning of the Market Stability Reserve to address the structural surplus of allowances in the EU carbon market both relate to the amount of allowances auctioned by Member States. For example, in case of the Market Stability Reserve, auction volumes will be reduced when allowances are transferred into the reserve and increased at the time allowances are released from the reserve. Both these mechanisms have a neutral effect on the overall auction share.⁵⁴

The European Council agreed that the share of allowances to be auctioned under the EU ETS post-2020 should not be reduced⁵⁵. This principle of not reducing the auction share was an important and integral part of the agreement to which Member States attach particular importance. Any change to the auction share would have distributional implications and adversely affect the balance of the European Council agreement⁵⁶, and have implications on the low-carbon funding mechanisms, in particular the free allocation to power, and on the re-distribution for solidarity purposes of allowances to be auctioned.

⁵² A theoretical total of around 680 million allowances may be allocated for free by the 8 Member States that have chosen to make use of the option in the period 2013-2020. For most of those Member States, actual allocations have, however, so far been below the annual maximum (see status tables at: http://ec.europa.eu/clima/policies/ets/cap/auctioning/documentation_en.htm).

⁵³ To note that the European Council conclusions provide that the "allowances from the reserve will be auctioned according to the same principles and modalities as for other allowances". See EUCO 169/14 European Council (23 and 24 October 2014) – Conclusions, point 2.7.

⁵⁴ The proposal to establish a Market Stability Reserve has been politically agreed by the co-legislators. See at http://www.europarl.europa.eu/meetdocs/2014_2019/documents/envi/dv/ets_msr_annex_/ets_msr_annex_en.pdf. The Market Stability Reserve will operate as of 2019 and allowances in the reserve will count towards the auction share. At the end of each trading period, allowances in the reserve will not be cancelled, but carried forward to the next trading period. This way, they remain available for release. Appropriate accounting ensures that in case of release, the distribution between Member States takes place according to the key in place during the trading period when the allowances were placed in the reserve instead of being auctioned. Accordingly, allowances in the reserve are counted towards the auction share of their trading period "of origin". The same principle applies to allowances held by operators on their respective accounts.

⁵⁵ For more information on the impact of auctioning or free allocation in respect of a 40% GHG emission reduction target by 2030, see 2030 framework Impact Assessment SWD(2014) 15 final

⁵⁶ For example, 10% of the EU ETS allowances to be auctioned by the Member States will be redistributed to the benefit of the low-income Member States and only if the overall auction share is known the Member States concerned have clarity on how much this would be. The same applies to Member States that make use of the transitional free allocation for the modernisation of the power sector (see section 8.3), which may hand out for free after 2020 up to 40% of the allowances allocated for auctioning to them and need to know what the auction share will be to determine this maximum.

The system post-2020 builds on phase 3. The shares of auctioned allowances between Member States are already set in the Directive and, to meet the specific requirement of the European Council conclusions, it is appropriate to express the auction share as a percentage figure in the legislation. The environmental integrity of the system guaranteed by the cap would remain entirely preserved, while providing a percentage figure for the auction share in the legislation would have considerable positive impacts on transparency, predictability and the functioning of the carbon market. It would enhance planning certainty of investment decisions and transparency for market participants inside and outside the system, as well as for the wider public. It would render the system simpler, more transparent, more easily understandable and thus positively impact the confidence in the EU ETS.

7. FREE ALLOCATION AND ADDRESSING THE RISK OF CARBON LEAKAGE

The main policy tool to address the risk of carbon leakage is the provision of free allowances to industry. Free allowances lower the effective carbon cost for industry as otherwise allowances would have to be purchased on the carbon market. The total amount of allowances available to be handed out for free to industry for the period under assessment (2021 to 2030) is in the order of 6.3 billion allowances. The value of these allowances depends on the market price at the time and could be in the order of €160 billion.

If not handed out for free to industry, these allowances could be auctioned by Member States and provide them with revenues. Free allowances are thus a public resource. This section of the impact assessment covers different options on how to distribute this public resource in a way that gives optimal impact in terms of effectively addressing the potential risk of carbon leakage.

Box 3: Carbon leakage

The EU ETS is in principle a quite simple instrument. The quantity of allowances is determined by policymakers, and any installation under the system has to cover the tonnes of CO₂ it has emitted with allowances bought on the market. Incentives to reduce emissions and improve technology are driven by the fact that each tonne of CO₂ to be covered by one allowance has a price (carbon price).

Since buying allowances represents a cost (carbon cost), there have been concerns about the competitiveness impacts on the industry covered by the ETS, as long as competitors in other countries are not covered by a similar system or a carbon tax. There have also been environmental concerns linked to this: if European companies move production to outside of the EU, this could lead to increased emissions globally (in particular if the installations outside of the EU are more carbon intensive, which is often the case). This problem is the so called **carbon leakage**.

If most major economies in the world had set a price on carbon and if these carbon prices were similar across the world, carbon costs would not be a problem for competitiveness since the impact would be the same for all companies.

Steady progress is being made towards having an international carbon price which is one of the long-term goals of international climate negotiations. Until this happens, the EU ETS foresees certain measures to reduce the risk of carbon leakage. The measures consist of providing free allowances to industry, thereby reducing the cost of buying allowances (e.g. if an installation receives free allowances covering 90% of its emissions, it has to buy the remaining 10%). Nevertheless, it was deemed important that companies should still have an economic incentive to reduce their emissions and this was ensured when designing the free allocation system.

To efficiently create such a system, the right balance should be found between addressing the problem of carbon leakage and avoiding compensating beyond the actual needs for allowances (over-compensating).

The risk of carbon leakage differs across sectors as carbon costs are more or less important in relation to total costs in a given sector. The sectors which are deemed to be exposed to a significant risk of carbon leakage and which therefore receive more free allowances are included in the so-called "carbon leakage list" which the Commission is mandated to draw up every five years. At present, the sectors on the list represent more than 97% of industrial emissions under the ETS.

7.1. Problem definition

Free allocation of allowances to industry is designed to address the potential risk of carbon leakage (increase in greenhouse gas emissions in third countries where industry is not subject to comparable carbon constraints) until an international agreement is concluded or comparable climate policy measures are undertaken by other major economies. This gives the justification to deviate from the general principles of EU environmental policy, i.e. the "polluter pays principle" and "internalisation of external cost" principle, meaning that the costs of measures to deal with pollution should be borne by the polluter and that all costs associated with the protection of the environment should be included in the companies' production costs⁵⁷.

Since carbon leakage could lead to an increase in worldwide emissions, thereby undermining the EU climate policy objective, free allocation was chosen as a transitional measure to address this risk.

In the first two phases of the ETS (2005-2007 and 2008-2012), free allocation was based on historic emissions and decided nationally. Basing the allocation on historic emissions implied that installations that emitted relatively more received more free allowances, compared to the more efficient ones.

The revision of the ETS Directive ensured that in the third phase (2013-2020), the approach for allocation of allowances was harmonised⁵⁸ across the EU to ensure a level-playing field across the internal market and to address concerns about potential market distortion.

From 2013, the amount of free allowances that each installation receives is determined mainly by performance benchmarks instead of historic emissions. Generally speaking, benchmarks represent a value in CO₂ emissions per tonne of product, reflecting the greenhouse gas emission performance of the best installations in the EU producing a specific product. Allocation to each industrial installation is calculated by multiplying the benchmark for the product it makes with its production data (for more details see Box 4).

For allocation purposes, each industrial sector is classified according to its exposure to the risk of carbon leakage that is assessed combining two parameters: trade intensity (imports and exports) and carbon intensity (CO₂ emissions per tonne of product). Those sectors with a high combination of these two parameters are in general deemed as more impacted by the EU ETS, and therefore get a higher share of free allowances. They are put on the carbon leakage list and as such receive 100% of the amount of free allocation determined according to the benchmark-based methodology. The percentage of free allocation for sectors not on the carbon leakage list decreases in a linear manner from 80% in 2013 to 30% in 2020.

In line with the EU's climate policy to reduce GHG emissions, the ETS cap (maximum amount of allowances available) decreases gradually over time. The total amount of allowances available for industry is a share of the total cap and therefore decreases correspondingly. For more details see chapter 6.

According to the current legal provisions, higher free allocation for sectors deemed to be exposed to the risk of carbon leakage ends⁵⁹ in 2020. Thereafter free allocation for all

⁵⁷ Commission Staff Working Document accompanying document to the Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the EU greenhouse gas emission allowance trading system, Impact Assessment, SEC(2008)52

⁵⁸ Commission Decision 2011/278/EU of 27 April 2011 sets out the rules for free allocation, including the benchmarks.

⁵⁹ See Article 10a(12) of the ETS Directive

industrial sectors would correspond to 30% of the amount determined based on the benchmarks.

A further element in reducing costs for industries affected by the ETS is that installations in certain sectors can be compensated by Member States for higher electricity prices due to the ETS. These so called "indirect costs" are due to the power sector passing through the costs of the allowances (needed to cover their emissions) to their customers. This compensation is provided through state aid schemes determined at national level under the relevant State Aid Guidelines⁶⁰.

The ETS is a flexible tool as it allows companies to choose the most cost-effective options to contribute to the overall emission reduction target, either by purchasing allowances on the market, or investing in less-carbon intensive technologies.

A crucial input to the work on revising the EU ETS came from the European Council, which, in its Conclusions of October 2014⁶¹ gave strategic guidance on the 2030 climate and energy framework in general, but also on the design of the ETS post-2020. As long as no comparable efforts are undertaken by other international partners, the European Council underlined the need to continue free allocation to industry after 2020. This is meant to ensure appropriate level of support for sectors at risk of losing international competitiveness due to the carbon costs when operating in the EU. It can be noted that industry stakeholders also hold the view that free allocation is an adequate instrument.⁶²

The European Council also stated that the most efficient installations in sectors should face no undue carbon costs, that there should be no windfall profits due to free allocation, and that existing measures to compensate for indirect emissions should remain also in phase 4.

Considering that the amount of free allowances is limited and will continue to decline in line with the necessary emission reductions, the future system to address the risk of carbon leakage needs to be better targeted. The total amount of allowances available for free allocation in phase 3 (2013-2020) is some 6.6 billion allowances, amounting to some € 50 billion (based on current carbon price), and the total amount available for free allocation in phase 4 (2021-30) is some 6.3 billion allowances, amounting to as much as €160 billion.

The future system also needs to ensure that incentives for industry to innovate will be fully preserved and windfall profits (i.e. situation when industry receive allowances to cover carbon costs, even though they are able to pass on these costs to their consumers) avoided, without reducing the share of allowances to be auctioned.

The problem to be addressed in this section concerns the future rules for free allocation to industry, and notably based on the principles defined by the European Council to establish how to optimally allocate the roughly 6.3 billion free allowances available.

7.1.1. Underlying drivers of the problem

The starting point for the analysis is the existing system.

Some general observations can be made. The harmonised rules applicable as of phase 3 represent an improvement compared to the previous situation. The harmonised approach is

⁶⁰ Guidelines on certain State aid measures in the context of the greenhouse gas emission allowance trading scheme post-2012 (2012/C 158/04)

⁶¹ EUCO 169/14 European Council (23 and 24 October 2014) – Conclusions.

⁶² See Annex 3

functioning well (an OECD study finds that the EU ETS has stimulated substantial emissions abatement of up to 28% compared to business-as-usual, while, at the same time, not causing disadvantages for the competitive position of the EU ETS firms⁶³) and the risk of carbon leakage seems to be properly addressed, while emission reduction incentives are also preserved⁶⁴. A study concluded in 2013⁶⁵ that no conclusive evidence of carbon leakage occurrence can be found.

However, when determining the amount of free allowances to be handed out each year for phase 3 (2013-2020) the amount calculated based on the agreed rules exceeded the amount available. Already in 2013, the demand for allowances ("gross free allocation", i.e. the amount of free allocation determined by multiplying the benchmark and production before the application of the carbon leakage and the possible correction factor) exceeded the amount available by about 6%. This triggered, as foreseen in the ETS Directive, the application of a uniform cross-sectoral correction factor⁶⁶. Since the amount of allowances available decreases each year, and since allocation for phase 3 was determined for the entire period 2013-20, the cross-sectoral correction factor increases each year to 2020, when it will be 18%.

While the cross-sectoral correction factor is effective in ensuring that free allocation stays within the overall allocation limit and the amount of allowances available for auctioning and delivering fiscal revenue to Member States remains predictable, it does not differentiate among sectors: i.e. does not account for differences in terms of ability to decarbonise over time, exposure to the risk of carbon leakage, the pass through of costs in product prices, etc. Given the shrinking amount of allowances it is self-evident that unchanged carbon leakage rules would result in an increasing correction factor beyond 2020 reaching potentially a level of 35 % in 2030.

It should be noted that the cross-sectoral correction factor does not determine which sectors receive a certain level of free allocation: its purpose is only to ensure that the overall limit is respected and Member States auctioning revenues guaranteed.

The correction factor is subject to strong criticism by industry stakeholders⁶⁷, which constitute the majority of the stakeholders replying to the consultation, mainly because it applies equally to all sectors and therefore the system does not guarantee that the most efficient installations in each sector do not face undue carbon costs. It has also been criticised for having been determined too shortly before the start of phase 3.

Since many industry stakeholders considered that the cross-sectoral correction factor represents high unpredictability in the system, one element of this impact assessment is to analyse different ways that the current allocation system can be improved to ensure a fair and

⁶³ Arlinghaus, J. (2015), "Impacts of Carbon Prices on Indicators of Competitiveness: A Review of Empirical Findings", OECD Environment Working Papers, No. 87, OECD Publishing, Paris.

⁶⁴ See Annex 3.2. Summary of the Stakeholder Consultation on carbon leakage provisions and innovation support: over 90% of respondents confirmed that free allocation preserves the incentive to innovate. Furthermore, it is noteworthy that the EU is on track to meet its Kyoto and EU2020 GHG emission reduction targets (COM(2014) 689).

⁶⁵ See *inter alia* Ecorys' Carbon Leakage Evidence Project: Factsheets for selected sectors, September 2013.

⁶⁶ Commission Decision 2013/448/EU.

⁶⁷ In both public consultations (Consultation on the ETS revision and Consultation on carbon leakage provisions and innovation support) industry stakeholders from many sectors called for a removal of the cross-sectoral correction factor considering its gradually increasing impact (along with decrease of the amount of free allocation).

efficient allocation of allowances, while avoiding or minimising the likelihood that a cross-sectoral correction factor would apply in phase 4.

Box 4: The basics of the free allocation system

For each installation in the EU ETS the amount of free allocation is calculated based on a formula where its production quantity (in tonnes of product) is multiplied with the benchmark value for that particular product (measured in emissions per tonne of product). A producer of lime thus multiplies its production of lime, e.g. 10000 tonnes with the benchmark for lime (0.954 tonnes of CO₂ per tonne lime). This provides an amount, in this example, 9540 allowances for the installation. The installation is in principle eligible to receive this amount each year until from 2013 to 2020.

The legislators have also decided that 100% of this amount should be provided only to sectors that were deemed to be at a significant risk of carbon leakage and are on the carbon leakage list (See Box 3: Carbon leakage). Sectors not on this list get a gradual reduction of the amount of free allocation.

After checking whether the sector in which the installation operates is on the carbon leakage list or not, the allocation per installation is adjusted if needed, and Member States report requested allocation amounts to the Commission. The Commission adds up the requested allocations for all installations in the EU. If this amount exceeds the amount pre-determined as available for free allocation, a reduction is made for all – i.e. the allocation calculated per installation is reduced by the same percentage for all installations. This is the cross-sectoral correction factor which had to be applied as from 2013. It has reduced allocation by ca 6% in 2013 and will reach 18% in 2020 as it increases each year as the amount of allowances available to be handed out for free decreases each year.

In brief, the formula to determine the amount of free allocation is:

$$\text{Allocation} = \text{production} * \text{benchmark value} * \text{carbon leakage factor} * \text{correction factor}$$

For the analysis, it is necessary to look at the different elements that determine free allocation. These are:

- the updating of the benchmark values;
- the classification of sectors, based on market situation including the possibility to pass through carbon costs into product prices;
- the production data used.

On these three elements in the allocation system, the following can be noted:

1) The starting point for determining the benchmark values in phase 3, in accordance with the ETS Directive, was the average emission performance of the 10% most efficient installations in a sector in the years 2007-08. Since the benchmark values were set based on data from 2007-08, any technological progress since then is not taken into account. The ambition level of the benchmark values therefore erodes over time and in 2030 benchmarks would reflect the state of technology of more than two decades ago.

2) Currently based on criteria defined in the ETS Directive⁶⁸, almost all industrial sectors, i.e. those responsible for more than 97% of industrial emissions under the ETS are on the 'carbon leakage list'. The system is thus not targeted.

3) The third element in the allocation formula is the production data used to multiply the benchmark values. According to the current implementing rules, operators were allowed to choose between two historic production baseline periods (either 2005 – 2008 or 2009 –

⁶⁸ See Article 10a(15-17) of the ETS Directive

2010). This led to a significantly higher demand for free allocation than if the same baseline period had been used for all. Furthermore, in general these years had particularly high production levels for most installations, but due to the economic crisis and slow recovery, actual production levels in 2013 and 2014 were significantly lower in certain sectors compared to the baseline production. This latter fact, however, is not always reflected in lower amounts of free allocation, resulting in a situation where some installations with low production levels receive allocation that exceeds the amount needed to cover their emissions.

All the above features must thus be assessed in order to improve the existing system with a view to ensuring the optimal allocation of allowances and targeting the measures against carbon leakage to those sectors most exposed. A more general goal is to ensure predictability for companies covered by the system (which is a key request from a considerable number of industry stakeholders).

4) A further element important to consider is how new and/or growing installations i.e. "new entrants" will be treated in the system post-2020. The current system provides specific rules and a specific amount of allowances is set aside (new entrants' reserve) for this purpose.

5) Due to requests from the electricity intensive sectors, which argue that the current system of addressing indirect carbon costs passed through in electricity prices via state aid causes distortions in the internal market, the issue of compensation for these costs will also be analysed.

Since the correction factor is a less efficient way of directing free allowances to those sectors most exposed to the risk of carbon leakage, an objective of this impact assessment is to analyse how a more focused system, resulting in a reduced likelihood of triggering a significant correction factor post-2020, should be designed.

7.2. Operational policy objectives

As mentioned above, the overall objective of the free allocation system is to address the risk of carbon leakage by providing appropriate levels of support to sectors at risk of losing international competitiveness, as long as no comparable efforts are undertaken in other major economies. In line with the European Council Conclusions of October 2014⁶⁹, this general objective is operationalized in the following operational objectives:

- Reflect technological progress in industry sectors;
- Fully preserve incentives for industry to innovate;
- Most efficient installations do not face undue carbon costs leading to carbon leakage;
- Better alignment with production levels;
- Avoid windfall profits;
- No increased administrative complexity.

The options for each element to be assessed will be screened preliminarily for the effectiveness, efficiency and feasibility in achieving the operational objectives. Not increasing administrative complexity reflects the efficiency and feasibility criteria, while all the other operational objectives relate to the effectiveness. Some operational objectives are particularly relevant for some aspects of the free allocation rules, but not for others, so when

⁶⁹ EUCO 169/14 European Council (23 and 24 October 2014) – Conclusions.

screening and comparing options, preference will be given to the most relevant operational objective(s).

The degree of fulfilling an objective is indicated with pluses and minuses. Their meanings are: "--" much worse than baseline, "-" worse than baseline, 0 equal to baseline, "+" better than baseline, "++" much better than baseline.

As mentioned above, the likelihood of triggering a correction factor post-2020 will be analysed for the option packages as a whole to assess the cumulative impacts of the elements composing them.

It should be underlined that the development and assessment of options for the future system of free allocation and measures addressing the risk of carbon leakage are based on the assumption that no comparable climate policy measures are undertaken by other major economies.

However, there are a number of countries and regions that have or are intending to develop different emission trading systems (e.g. China, South Korea, California, Switzerland, some regions in Canada). Their approaches, design features and levels of ambition are heterogeneous, making it difficult to quantify the impacts. The policy options therefore assume that third countries fulfil Copenhagen/Cancun pledges, but there is no assumption on any further significant climate action in third countries.

Should an international climate agreement be concluded, it will be necessary to first analyse the concrete measures taken as a consequence and to determine their implications for the EU climate policy in general, and impact on the competitiveness of EU industry in particular, before any revision of the existing/proposed rules.

7.3. Policy options for free allocation and other carbon leakage measures

As explained above, the carbon leakage and free allocation system contains a number of elements. The level of free allocation per installation is the mathematical product of a benchmark value, a production level value, a carbon leakage factor and, if needed, a correction factor (see Box 4). The guiding principles adopted by the European Council address these elements and also compensation for indirect costs. Depending on the policy choices made, there will be differences in terms of the degree of realising individual operational objectives. The choices may also have different distributional effects between industrial sectors.

This section summarises the underlying rationale and range of policy options which have been used to design option packages. A more detailed discussion of the options can be found in Annex 5.

7.3.1. Benchmark values

The first element in the allocation formula is the benchmark value. It determines tonnes of carbon emissions per tonne of product and is independent of the mode of production in terms of technology, fuel, the size of an installation, or its geographical location.

The currently used benchmark values were determined based on performance data of the most carbon efficient installations throughout the EU in each sector based on real-life historic industrial production in the years 2007 and 2008.

The European Council has requested a regular review of the benchmark values in order to reflect technological progress. The benchmark values should thus be lowered in phase 4, leading *ceteris paribus* to reduced allocation. However, this reduced allocation reflects lower emissions thanks to the ongoing technological progress and does therefore not as such make the allocation system less generous.

There are various options how and how frequently to update the benchmark values. The full range of these options is presented in Annex 5.1, and out of the screened options two are used in the option packages.

The baseline option is to update all benchmark values based on new data reported by operators of ETS installations on mandatory basis and to keep the benchmarks constant over phase 4 (2021-2030). This baseline option is also used in the "Baseline Bbis" and "Limited changes" option packages.

One alternative option is the single flat-rate update (option 1 from Annex 5.1), updating all benchmark values by the same percentage once before the start of phase 4 and keeping them constant in the whole phase 4. This option is used in the "Simple" option package.

The other option is the full data collection update (option 4 from the Annex 5.1), updating all benchmark values based on new full data collection, and revising them every five years, i.e. twice during phase 4. This option is used in the "Targeted" option package.

In summary, the analysis shows that single flat rate is administratively simple, but may not sufficiently capture technological differences across sectors. However, using multiple flat rates (e.g. high, medium, low) can address this downside. On the other hand, full data collection update is administratively highly complex, creates prolonged regulatory uncertainty for companies and compromises the incentives to innovate, as realised profits from lowering emissions are taken away from fast movers. For further details see Annex 5.1.

7.3.2. Production level and adjustments

The second element in the allocation formula is the production level. The determination of the production value is important for the functioning of the system. Linked to this are the rules on how allocation can change over the phase, e.g. if production increases or decreases

Currently historic production data from 2005-2010 were used to determine allocation for the 8-year period 2013-2020. Each installation had thus certainty in 2012 how many allowances it would receive year by year until 2020.

From the point of view of an installation, the system is quite stable and predictable. The installation keeps its allocation unchanged until the production level is 50% below the historic level. If the installation invests in new capacity it can apply for additional allowances from the new entrants' reserve.

Many industrial stakeholders have commented on the current situation and proposed that allocation should be adjusted not only for capacity increases, but also for production increases.

These rules can have a considerable impact on the total amount of allowances to be handed out per year in different economic circumstances, i.e. during an economic slowdown or upturn. The rules therefore also have an impact on the likelihood for the need for the correction factor. Moreover, the rules have a large bearing on the degree of administrative complexity and costs.

There are various options to tackle production level and adjustments. The full range of these options is presented in Annex 5.3, and out of the screened options two are used in the option packages.

The baseline option is to have the production levels determined once and keep the current rules for production changes. This baseline option is also used in the "Baseline Bbis" package.

Out of the screened options (see Annex 5.3), the ones used in the option packages are:

- One alternative (option 1) has the historical production levels defined once and based on five years (2013-17) for the entire 10-year period. Significant production increases and decreases are addressed through symmetrical annual adjustments⁷⁰, i.e. same thresholds for increased and decreased production. This option is used in the "Simple" option package.
- Another alternative (option 2) has the production levels defined for two five-year periods (2013-17, respectively 2018-22)⁷¹. Significant production increases and decreases are addressed through symmetrical annual adjustments i.e. same thresholds for increased and decreased production. This option is used in the "Limited changes" and "Targeted" option packages.

In both options, the increased allocation for increased production comes from the new entrants' reserve.

These options provide for a closer alignment to production levels building on lessons learnt from the current system and responding to requests from the European Council to this effect. A careful balance needs to be struck to avoid creating red tape and undermining incentives for further emissions reductions. For further details see Annex 5.3.

7.3.3. Reserve for new entrants

A topic related to the previous aspect on production level and adjustments is the so-called new entrants' reserve. This is a reserve that in the current phase of the ETS is used to provide allowances to installations that are new or increase their capacity. As a result of the European Council's strategic guidance to continue free allocation, such a reserve is also needed for phase 4.

It is important to ensure that the size of the new entrants' reserve is sufficient to accommodate new demands during phase 4, but new installations are typically more carbon-efficient and therefore facilitate the gradual transition to a low-carbon economy. The analysis therefore assesses different options – guided by building on current practice while making the rules more flexible – for how to create this reserve and ensure that it will not be depleted.

The baseline option is to have a new entrants' reserve with a fixed amount of allowances (about 374 million allowances in phase 4). This baseline option is also used in the "Baseline Bbis".

Out of the screened options (see Annex 5.4), the one used in the option packages is the option (Option 1) with new entrants reserve set up with phase 4 or unallocated phase 3 allowances

⁷⁰ The exact threshold for significant changes is to be determined in implementing legislation. For the purposes of this IA it is assumed that the threshold is 15% difference compared to the baseline production level.

⁷¹ Data collection for production levels to be undertaken jointly with data collection for updating benchmarks, in order to minimise administrative burden.

and replenished throughout 2021-2030 with unused phase 4 allowances (see Annex 14). This option is used for the "Simple", "Limited changes" and the "Targeted" packages.

7.3.4. Carbon leakage groups

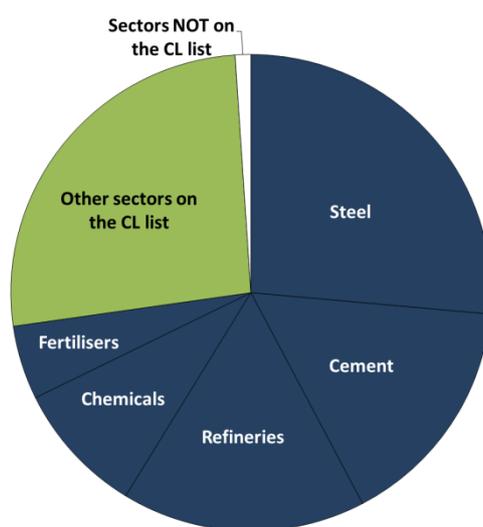
The third element in the allocation formula is the carbon leakage factor. The ETS Directive currently categorises industrial sectors in two categories depending on the level of exposure to the risk of carbon leakage.

Installations in sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage are inscribed in the so-called 'carbon leakage list' (see Box 3) and are given free allocation at 100% of the quantity determined based on the benchmark values and production levels, i.e. the carbon leakage factor in the allocation formula is 1.

Installations in other industrial sectors not covered by the carbon leakage list receive a lower (annually decreasing from 80% to 30%) level of free allocation, i.e. the carbon leakage factor in the allocation formula is 0.8 in 2013 and shrinks to 0.3 in 2020.

In practice, there is very limited differentiation among industrial sectors since sectors accounting for more than 97 % of industrial ETS emissions are on the carbon leakage list (see Figure 3). Hence, practically all industrial sectors receive the same treatment irrespective of the degree of exposure to carbon leakage risks, including the ability to pass on costs.

Figure 3: Sectors on and off the carbon leakage list The chart indicates the share of sectors from industrial emissions



A more targeted approach to allocation whereby differences in terms of exposure to carbon leakage risk translate into differentiated allocation levels could have made it possible to limit or even avoid the need to apply a cross-sectoral correction factor in phase 3. It is therefore pertinent to explore the possibility of enhanced differentiation between industrial sectors.

The baseline option considers two carbon leakage groups based on the current trade and emission intensity criteria. It is used in the "Baseline B" package.

Out of the screened options (see Annex 5.3), the ones used in the option packages are:

- A slight variation to the baseline option (option 2) with somewhat modified criteria is used in the "Baseline Bbis" package.

- An alternative is an approach with no groups and a uniform carbon leakage factor (option 1), i.e. no differentiation among sectors and activities. This option is used for the "Simple" option package.
- Other alternative options (options 3 and 4) with four groups ('Very high', 'High', 'Medium' and 'Low' level of carbon leakage risk) are also based on the criteria of emission intensity and trade intensity. These options are used for the "Limited changes" and "Targeted" option packages⁷².

The options vary according to the differentiation they bring among sectors – from none (all sectors in one group), to two groups (exposed / not exposed) and four groups (more detailed differentiation of the level of risk exposure).

The 'Baseline approaches' and Option 1 fail to sufficiently differentiate between the different levels of carbon leakage and lead to a high correction factor that cuts free allowances for all. The alternative approaches should lead to a more targeted distribution of allowances across sectors and provide a better outcome for the most exposed sectors.

See Annex 5.2 for further details.

7.3.5. Cross-sectoral correction factor

A fourth, potential, element in the allocation formula is the cross-sectoral correction factor which is a stopgap to ensure that the available budget for free allocation is not over-subscribed. No options are developed for this factor as the likelihood of this factor being necessary and its magnitude depends on the policy design of the first three factors. The avoidance of having to apply this factor is an important consideration in assessing different options and option packages.

7.3.6. Compensation for indirect carbon costs

Indirect carbon costs occur in many sectors across the economy and are a natural consequence of pricing carbon emissions. In the political debate, the term is used to describe the costs of carbon emissions related to producing electricity, which are passed through to industrial consumers of electricity. As electricity producers covered by the ETS do not receive free allowances to cover their emissions (and therefore have to buy needed allowances on the market) and given the situation of the electricity market (i.e. almost no imports from outside the EU and still a high proportion of fossil fuel used), electricity producers typically pass through these carbon costs in their prices to industrial customers and households alike.

As a safeguard against potential carbon leakage, the ETS Directive gives Member States the possibility to compensate certain electro-intensive industries for these costs, subject to state aid control⁷³.

Some industries with high electricity intensity have criticised the fact that compensation of indirect costs is at the discretion of individual Member States⁷⁴. They notably highlight the

⁷² For the purposes of the analysis, it is assumed that free allocation is 100%, 80%, 60% and 30% of the amount calculated based on the benchmarks and production activity – sectors are divided in three groups: the 'Very high', 'High', 'Medium' and 'Low' group, respectively. As far as the thresholds between carbon leakage groups are concerned, different approaches are assumed under the 'Limited changes' and the 'Targeted' options packages. For further details, see Annex 5. (section 5.2.2)

⁷³ The current measures are assessed under the Commission's 2012 Guidelines on state aid measures related to the ETS: [http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012XC0605\(01\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012XC0605(01)&from=EN)

risk of distortion of competition due to a lack of harmonisation. As a consequence, electricity intensive industry stakeholders have asked that compensation of indirect costs is done through an EU-wide harmonised system.⁷⁵

The impact assessment therefore analyses different options of providing such compensation, whereby different aspects have to be taken into account such as whether compensation is optional or mandatory and how it is resourced, which could be national state budgets, auction revenues or free allowances.

Based on the screening, the following two options are used in the option packages:

- The baseline option is to continue with the optional compensation by Member States with the key features for compensation determined at EU level, but the decision to grant compensation is discretionary and depends on the respective Member State and is subject to State aid control. This option is used in the option packages "Baseline B", "Baseline Bbis", "Simple" and "Limited changes".
- The other option is a mandatory Union-wide compensation scheme, financed by using national auctioning revenues. The compensation would be triggered when the carbon price exceeds a certain value, and when this situation occurs, a minimum amount of compensation is to be given by all Member States. The system would be financed by each Member State using its national auctioning revenues. Compensation would, like in baseline, be limited to certain sectors and limited to a share of the estimated carbon costs. This option is used in the "Targeted" option package.

See Annex 5.5 for further details. The options for indirect cost compensations differ in terms of the nature of compensation: optional or mandatory for Member States to provide it. The analysis indicates that more harmonised arrangements for indirect cost compensation has benefits but care is needed to avoid red tape and lock-in in emission intensive production methods.

7.4. Option packages

The options for all relevant elements presented above are combined into "Option packages" in order to facilitate the assessment of impacts. The option packages contain the elements needed to determine the amount of free allocation (see Box 4: The basics of the free allocation system) and some other relevant aspects, such as indirect cost compensation and new entrants' reserve.

As already mentioned, some important provisions that are currently in place will expire in 2020 (e.g. increased free allocation for sectors deemed to be exposed to a significant risk of carbon leakage). As such, the "legal baseline" option (i.e. the provisions of the ETS Directive with no change whatsoever) - 'Baseline A' does not correspond to the key requirements of the European Council, therefore this option is not further pursued.

⁷⁴ These views have been also reiterated during the stakeholder consultations. A part of energy intensive industry asked for the development of an EU-wide instrument to replace the national state aid mechanisms. However, a significant number of industry stakeholders have also highlighted the fragmentation of the EU power market, noting that the impact of the ETS is marginal compared to the large variation of electricity prices across Member States. These industries have underlined the need for strengthened EU market, and competitive energy prices, as being of greater importance.

⁷⁵ In this context 'harmonised' means a system under which indirect costs are compensated at the same level across the countries concerned.

The more relevant baseline ('Baseline B') assumes the current rules are prolonged to the next ETS phase (i.e. amendments to the ETS Directive required). The option packages will therefore be assessed against the Baseline B in order to allow for easier comparisons between policy options.

Furthermore, an additional 'Baseline Bbis' package is developed. It is similar to the 'Baseline B', but with modified carbon leakage criteria, so the sectors with low emissions are excluded from the carbon leakage list. This will shorten the carbon leakage list by some 100 sectors, but will otherwise not have a more distinctive impact, as these sectors only emit about 2% of the industrial emissions in the ETS.

Based on the initial screening performed in previous sections, and aiming to ensure a manageable level of complexity, three option packages are proposed in addition to the Baselines. These option packages are developed based on the following guiding principles:

- The "Simple" package is structured around the concept of minimum level of administrative burden and complexity. It should be noted that some of the operational objectives nevertheless require administrative efforts (e.g. some data collection is still needed, but this should be less extensive).
- The "Targeted" package is based on policy options aiming to ensure that the sectors most exposed to the risk of carbon leakage do not face undue costs, while, at the same time, avoiding windfall profits. This would be achieved by providing an optimal level of free allocation (i.e. regularly updated benchmarks, 2 allocation decisions to reflect more recent production data, 4 carbon leakage groups) and mandatory compensation for indirect costs to installations.
- The 'Simple' and 'Targeted' packages represent different ways to address the trade-offs between the guiding principles defined by the European Council, as most of the policy options used for 'Targeted' package require intensive data collection, thereby going contrary to the minimum administrative burden principle.
- The third package, 'Limited changes', uses a more conservative approach in trying to achieve the operational objectives, while building upon the current rules. This package therefore entails only moderate changes compared to 'Baseline B', instead of more ambitious exercise presented in 'Simple' and 'Targeted' packages. The 'Limited changes' mainly concerns the number of allocation decisions (two instead of one per phase) and the number of carbon leakage groups (4 instead of 2).

The table below summarises the main features of the option packages.

Table 1: Option packages for addressing the risk of carbon leakage

Policy option package	Benchmark update	Carbon Leakage groups and criteria / Cost pass-through rates	Production levels and reserve for new entrants	Indirect cost compensation
Baseline B: Current rules continued	Once before 2021 based on real data	2 groups: <ul style="list-style-type: none"> • 100% - CL-exposed; • 30% - non CL-exposed Same criteria and thresholds as in Phase 3	1 NIMs exercise for 10 years; Same rules for capacity changes and (partial) cessations New entrant reserve: 5% minus NER300 (i.e. ca.3.1% of the cap available for new entrants, amounting to some 480 million allowances)	National compensation (subject to state aid rules)
Baseline B bis: Current rules continued with adjustment of carbon leakage criteria	Once before 2021 based on real data	2 groups: <ul style="list-style-type: none"> • 100% - CL-exposed; • 30% - non CL-exposed Somewhat modified criteria and thresholds as in Phase 3	1 NIMs exercise for 10 years; Same rules for capacity changes and (partial) cessations New entrant reserve: 5% minus Innovation Fund (i.e. ca.2.4% of the cap available for new entrants, amounting to some 375 million allowances)	National compensation (subject to state aid rules)
Simple	Reducing all benchmark values by a same uniform percentage to reflect technological development	No groups, '100% of costs not passed through' reflected by default value (e.g. 90% for all, i.e. default level of costs not passed through) No criteria needed	1 NIMs exercise for 10 years. Annual adjustments for significant production level changes (both directions: up and down) New entrant reserve set up from unallocated allowances from phase 3, and replenished by allowances from cessations ⁷⁶	National compensation (subject to state aid rules)
Limited changes	Once before 2021 based on real data	4 groups according to cost pass through capability with fixed allocation rates Emission intensity and trade criteria	2 separate NIMs exercises for 5 years each. Annual adjustments for significant production level changes (both directions) New entrant reserve set up from unallocated allowances from phase 3, and replenished by allowances from cessations	National compensation (subject to state aid rules)
Targeted	Two updates (before 2021 and mid-term) based on real data	4 groups according to cost pass through capability with fixed allocation rates Emission intensity and trade criteria	2 separate NIMs exercises for 5 years each. Annual adjustments for significant production level changes (both directions) New entrant reserve set up from unallocated allowances from phase 3, and replenished by allowances from cessations	Mandatory financial support by Member States from auction revenues

⁷⁶ For further details please see Annex 14.

7.5. Analysis of impacts

In this section, the impacts of the option packages presented in section 7.4 are compared to 'Baseline B'⁷⁷ and assessed in terms of achieving operational objectives.

7.5.1. Direct and indirect effects

Free allocation addressing the risk of carbon leakage has a direct impact on industrial installations covered by the ETS and on the budgets of the Member States. The amount of free allowances to companies has an effect on their cash-flows and profit margins (as it decreases total carbon costs). It could be argued that free allocation also indirectly affects a company's clients and final consumers, depending on the ability of each actor in the supply chain to pass the carbon costs downstream. Due to multiple variables and uncertainties, it is not possible to quantitatively assess these indirect effects.

The analysis will therefore focus on the analysis of the economic impacts (competitiveness considerations for industry), environmental impacts, social impacts and assessment of administrative complexity.

7.5.2. Environmental impacts

The environmental outcome of the ETS is determined by its overall cap and the EU climate ambition. The European Council has decided to reduce GHG emissions in sectors covered by the ETS by 43% until 2030. Consequently, the environmental outcome of the ETS is determined by the EU ambition in general terms and by the overall cap in particular. This means that a limit is set on emissions allowed, corresponding to allowances, to ensure the reduction foreseen is achieved.

When it comes to the international context, EU policies may impact on third country policies on climate and other connected areas. In view of the upcoming international negotiations and meetings (Conference of the Parties to the UNFCCC set to take place at the end of 2015 in Paris) the EU has come forward with an Intended Nationally Determined Contribution (INDC)⁷⁸ in the form of a binding, economic-wide emission reduction target.

The target includes the sectors benefitting from free allocation. However, the specific rules for the distribution of free allowances will not impact the policy choices of third countries. The general setup of the EU ETS and the benchmarking system in particular, has served as an input for the design of other emissions trading systems worldwide, but the positive impact cannot be quantified or considered in comparing option packages.

Another aspect to consider is the impact of the ETS on air quality. In addition to carbon dioxide emissions, many installations covered by the EU ETS also generate a significant amount of other air pollutants (e.g. NO_x, SO_x and particulate matter). The reduction of carbon dioxide emissions imposed by the ETS and the cap will lead to a reduction of the other air pollutants, but the specific choices for the distribution of free allocation will not make a difference in this sense: the reduction will happen regardless with the corresponding positive effect on air quality. The overall

⁷⁷ 'Baseline A' reflects the current text of the ETS Directive, and is the 'legal' baseline. 'Baseline B' takes into account the current ETS Directive and assumes that current rules will continue beyond 2020, in line with the spirit of the Directive. As such, this is a 'pragmatic' baseline. This is the primary baseline for the impact assessment.

⁷⁸ Commission Communication "The Paris Protocol – A blueprint for tackling global climate change beyond 2020" COM(2015) 81

environmental goal remains unchanged irrespective of the exact methodology to allocate allowances for free.

In terms of environmental impacts, the risk of carbon leakage has also been considered since it implies a potential increase in global emissions. Nevertheless, this is a risk that has been considered at every step of this analysis and all policy packages proposed include safeguard measures against it, making significant carbon leakage unlikely. As such, the potential impact of the packages at global level is considered to be minimal and beyond the scope of this impact assessment.

7.5.3. Economic impacts

The analysis carried out in the context of the 2030 climate and energy framework included detailed modelling of economic impacts, including sectoral impacts⁷⁹, which concluded that free allocation of allowances would be an effective means of reducing the risk of carbon leakage and preserving the output of the concerned industries. It also notes that understanding of different levels of cost pass-through is needed in order to elaborate carbon leakage measures that provide adequate safeguards, but avoid over-compensation of industry for costs recovered through the market.

The order of magnitude of the economic impacts of free allocation modalities is estimated to be about 6.3 billion allowances, which could amount to some €160 billion⁸⁰. These public resources need to be allocated in an optimal way, while ensuring that the polluter pays principle is not undermined. In the stakeholder consultation, NGOs emphasized that these public resources should be provided only when strictly necessary.

7.5.3.1. Quantified impacts on competitiveness

This section investigates the impact of free allocation options on the compliance costs at sector level and the possibilities to pass on these compliance costs to consumers⁸¹. It should be noted this analysis does not cover all aspects of competitiveness. In particular, a qualitative assessment on incentives for innovation – which will determine carbon costs in the long-term – will follow in section 8.1 below.

The purpose of the free allocation and carbon leakage rules is to address the costs which installations included in the ETS may be facing due to the ETS, potentially putting them at disadvantage vis-à-vis international competitors that do not face comparable climate policy costs. If installations in third countries would face similar costs, for instance as a result of the conclusion of an international binding agreement on climate change or the implementation of climate policies at national level, the carbon leakage risk would disappear. It should be noted that other countries may also use policy measures like free allocation. However, the more countries

⁷⁹ See Impact Assessment for the 2030 Climate and Energy Framework (e.g. Section 5.1.4.).

⁸⁰ Calculated with the allowance prices estimated in the "EU Energy, Transport and GHG emissions Trends to 2050 – Reference scenario 2013 (http://ec.europa.eu/clima/policies/2030/docs/eu_trends_2050_en.pdf)

⁸¹ OECD study found that substantial cost pass-through of EU ETS allowance price is found in the empirical literature, both in electricity and manufacturing sectors. Especially in electricity markets, cost pass-through rates to wholesale prices are found to lie between 60% and larger than 100%. In manufacturing, the extent of cost pass-through is varied. Pass-through rates found in the literature vary between 0% pass-through for UK glass production to 20% in ceramics, and more than 100% in iron, steel, chemicals and refineries. This implies that in all markets investigated, producers do not bear the full carbon costs and that in most markets investigated, producers can pass on a large share of the carbon cost to product prices and do thus not bear more than a minor share of carbon costs. For details, please refer to Arlinghaus, J. (2015), "Impacts of Carbon Prices on Indicators of Competitiveness: A Review of Empirical Findings", OECD Environment Working Papers, No. 87, OECD Publishing, Paris.

taking action against climate change, the less there is a need for individual countries to provide free allocation.

(a) Impact on compliance costs

The compliance costs depend on the carbon price, the level of free allocation, and the amount of emissions released during production.

The carbon price is not directly impacted by modalities for distribution of free allocation, as the total amount of allowances available (the cap) has been fixed in advance (see section 6.1 on the linear reduction factor) and is not affected by the modalities of allocation (auctioning or free allocation). The carbon price is rather influenced by other factors, such as the surplus of allowances in the system, the level of industrial production, the level of emissions, etc.

Therefore, the total carbon costs at macro level are determined by the 40 % overall GHG reduction target, and the specific 43% reduction target for the ETS. The effects of these targets have been analysed in the impact assessment for the 2030 climate and energy framework. Furthermore, it is important to recall that the European Council conclusions have also determined the total amount of available allowances for free. The difference between the option packages is therefore how this finite amount is distributed among industrial sectors. The higher the amount of free allocation, the lower the compliance costs for a sector.

The impacts of free allocation and carbon leakage options on the competitive position of ETS sectors have been analysed and compared to the outcome under 'Baseline B'⁸². Other factors affecting competitiveness, but not related to the EU ETS (e.g. global change of demand and trade patterns, labour costs, access to finance and capacity to invest etc.) are not analysed since they are independent from the ETS.

Following the call of the European Council conclusions "*to provide appropriate levels of support for sectors at risk of losing international competitiveness*", the carbon leakage rules should achieve a targeted allocation of free allowances across sectors such to avoid undue costs for the most efficient installations.

The '**Baseline B**' package – based on the current ETS rules – fails to respond to this call because a mere continuation of the current approach – based on two carbon leakage groups – would lead to an average correction factor of some 10% to 20% over the next decade⁸³. This means that free allocations across all sectors would be reduced by this percentage irrespective of their carbon leakage risk.

As shown in Table 2, '**Baseline Bbis**' would reduce by two thirds the number of sectors eligible for increased level of free allocation as a result of being on the carbon leakage list, but still lead to similar levels of free allocation as 'Baseline B'. The free allocation would only be reduced by about 2% since most of the sectors removed from the list emit very little. Consequently, this would entail some redistribution from the sectors removed from the carbon leakage list to those on the list but not significantly reduce the correction factor. The "Simple" package is not included in Table 2 since all sectors would be in one and the same group.

⁸² Please see the more detailed analysis results in Annex 7 Impacts of different option packages for free allocation on individual sectors.

⁸³ For the purposes of the analysis it is assumed that (i) benchmarks values would be reduced by 1% per annum on average if recalculated based on new performance data, and (ii) that production will moderately increase compared to 2014 level (last available data at the time of the analysis), but on average will not reach the production levels experienced in the baseline period for phase 3 (median annual production during 2005-08 or 2009-10, depending on which value is higher per sub-installation).

Table 2: Estimated number of sectors and distribution of free allowances under 'Baseline', 'limited changes' and 'targeted' options

	Baseline B		Baseline Bbis		Limited changes		Targeted	
	# sectors	Distribution of free allowances across groups	# sectors	Distribution of free allowances across groups	# sectors	Distribution of free allowances across groups	# sectors	Distribution of free allowances across groups
Very High	150	95%	54	93%	4	33%	5	33%
High					12	32%	9	49%
Medium					42	32%	21	11%
Low	86	5%	182	7%	178	3%	201	8%

The **'Simple' option package**⁸⁴ offers a similar level of free allocation as 'Baseline B' and 'Baseline Bbis' for the industrial sectors that are currently on the carbon leakage list. There are some limited differences among sectors in terms of level of free allocation level compared to 'Baseline B', because updating the benchmark value by using a flat rate can have different effects for different sectors. This happens because of varying rates of emission intensity reductions linked to technological improvements and investment cycles.

At the same time, the 'Simple' option package would lead to significantly higher levels of free allocation than 'Baseline B' for those sectors that are currently not on the carbon leakage list, as they would move from the group with 30% free allocation to 90% free allocation.

Even though the coverage is reduced from 100% to 90% for most sectors, a correction factor of 5% to 10% would kick in and lead to an effective coverage of around 80% (comparable to levels under 'Baseline B').

The **'Limited changes' and the 'Targeted' options packages** offer a more refined classification of sectors into four carbon leakage groups based on the same criteria – emission and carbon intensity – as in the 'Baseline' packages. Depending on the carbon leakage group (Very high, High, Medium or Low), the amount of free allowances can increase or decrease compared to 'Baseline B'. The more refined classification into four groups is estimated to minimise, if not avoid the correction factor.

Sectors in the 'Very high' group (100% free allocation) will receive more free allowances compared to the 'Baseline B' packages if the correction factor disappears.

For sectors in the 'High' carbon leakage group, the total amount of free allocation under these two option packages would be quite similar to allocation under 'Baseline B'. This would happen because the difference in carbon leakage factors⁸⁵ (80% instead of 100% under 'Baseline B') is estimated to be in the same order of magnitude as the average cross-sectoral correction factor estimated for 'Baseline B' over phase 4. So instead of a correction factor of about 20%, there will be a reduction of allocation of 20% due to the lower allocation rate (assuming the same level of benchmark updates under both options).

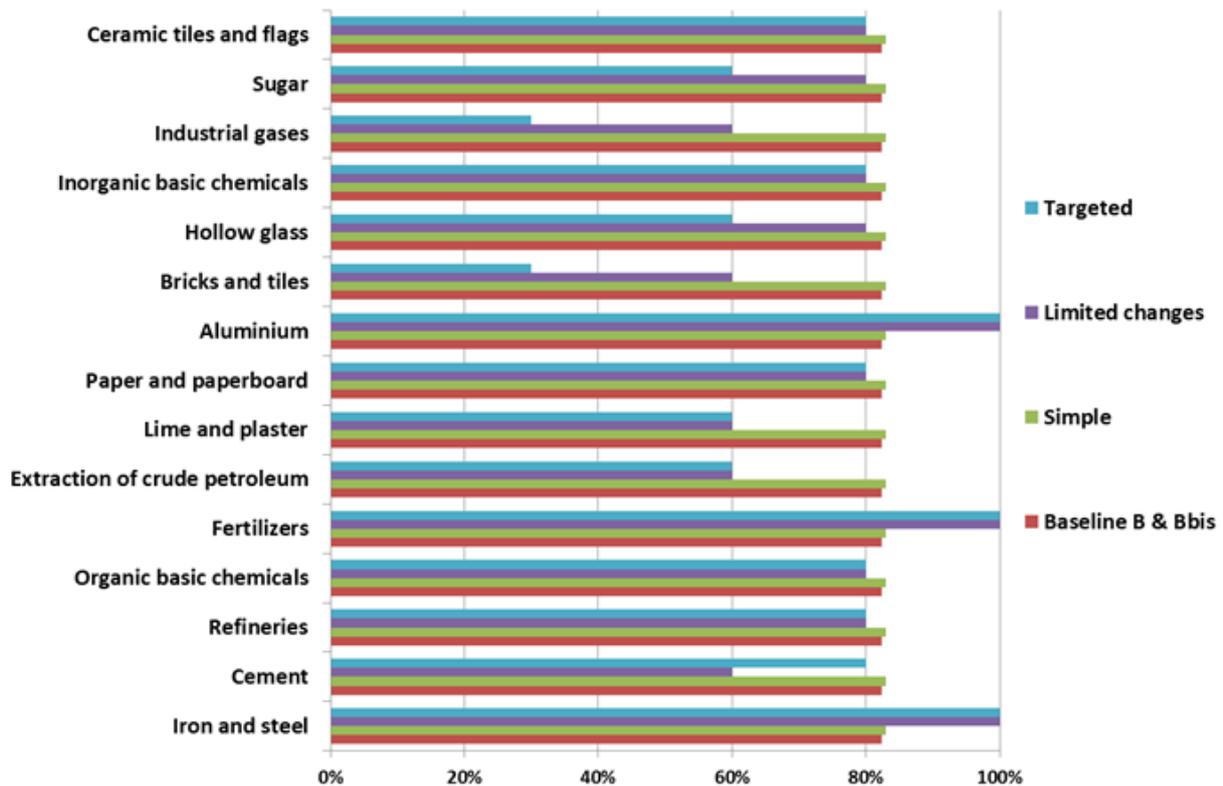
For sectors, which are in the group with 100% free allocation under the 'Baseline B' package but would now change to the 'Medium' and 'Low' groups, the level of free allocation would be lower ('Medium' group) or significantly lower ('Low' group) compared to 'Baseline B'.

⁸⁴ For the purposes of the analysis, a 1% per annum flat-rate benchmark update and a 90% uniform carbon leakage factor has been assumed for the 'Simple' package

⁸⁵ The carbon leakage factors define what percentage of the 'gross' free allocation sectors in the given carbon leakage group receive

The figure below summarises how the various carbon leakage groups impact the level of free allocation for the 15 largest sectors. All sectors are under current rules ('Baseline B') on the carbon leakage list and entitled to 100% free allocation. However, due to the correction factor of around 15-20% on average, they will effectively receive only around 80-85% of free allocation (to respect the overall constraint on the total amount of available allowances for free).

Figure 4: Estimated combined effect of carbon leakage groups and the correction factor under different option packages⁸⁶



(b) Compliance costs and possibilities for cost pass through

The compliance costs borne by sectors are ultimately dependent on their ability to pass through carbon costs to their customers. The ETS Directive already recognises this fact suggesting that the level of carbon leakage risk possibly faced by sectors depends on the extent to which it is possible for these sectors to pass through their costs without losing market share.

Although there is a general understanding that carbon-intensive sectors are able to pass through at least a part of the carbon costs, it remains to date difficult to quantify the exact rate of costs passed through per sectors or products.

It is generally recognised that some industrial sectors may face increasing competitive pressure on the international markets, potentially making it more challenging for them to sustain existing

⁸⁶ See Annex 7. As data from the (currently: future) baseline period for any actual future carbon leakage assessment are not yet available at the time this estimation is prepared, the graphs should be interpreted purely as a rough indicator of the possible outcome of the option packages. The final outcome of the actual assessment, i.e. to which group each sector will belong, can be similar to the situation illustrated by the graphs below in case the main indicator values (emission intensity and trade intensity) in the future will be similar to the ones based on 2009-11 data.

pass-through rates. At the same time, it is reasonable to assume that climate policies will become more significant in other countries over time, which could lead to increased, or at least stable, cost pass-through rates.

As the number of total allowances will further decrease over the next decade, it is possible that industries will face increased compliance costs after 2020 but this will ultimately depend on the ability to increase carbon efficiency in production, and the ability to pass on carbon costs, e.g. through more specialised products. Considering that a share of carbon costs is likely to be passed through, it can effectively limit carbon cost increases for industrial sectors. In some cases, additional carbon costs may be more than fully offset by increases in product prices. See Annex 7 for more detailed results for some of the biggest sectors in terms of emissions (steel, cement, refineries, chemicals, fertilisers, glass, paper and aluminium).

7.5.3.2. Administrative burden

Avoiding an increase of the administrative complexity is an operational objective relevant for all elements of the option packages. For the purposes of this impact assessment, the level of administrative complexity was quantified using the EU Standard Cost Model, complemented with qualitative expert judgment. In particular, the costs were estimated separately for the data collection needed for NIMs exercises⁸⁷, benchmark update, annual adjustments for production level changes compared to baseline (capacity changes and cessations); and compensation for indirect carbon costs.

The underlying methodology and detailed calculations are presented in Annex 8.1. In short, the option packages 'Limited changes' and 'Targeted' lead to higher costs compared to 'Baseline B' (€82 million and €110 million, respectively), reflecting a higher level of administrative complexity (due to additional data collection exercise). To note in this context, one full data collection is estimated to cost about €80 million. The annual adjustment for significant production changes is not expected to trigger substantial additional administrative costs as they replace activities currently required for 'Baseline B' (capacity changes and partial cessations). For that reason, the administrative costs of the "Simple" package' and 'Baseline B' package are not expected to differ significantly. The 'Targeted' package shows the highest administrative complexity due to the mandatory financial support for indirect cost compensation.

7.5.4. Social impacts

7.5.4.1. Employment

The analysis of social impacts has been undertaken and is presented in detail in Annex 8.2. It concluded that the estimated impacts across different option packages are limited in nature. In a more targeted allocation, the costs for the sectors that receive lower allocation will be higher, which a priori could lead to more employment losses for those sectors. But as explained above, since the reason for the lower allocation to some sectors would be the ability to pass on costs, this should limit the employment effects.

⁸⁷ In 2011-2013, Member States submitted their National Implementation Measures (NIMs) containing verified, detailed and commercially sensitive data on preliminary free allocation to industrial installations in the EU Member States, which was subsequently checked by the Commission for compliance with the harmonised allocation rules and are used for the analysis of the amount of free allocation to industrial installations.

Total employment impact has been estimated by considering whether the additional costs are absorbed by the manufacturing sectors, or are being passed through in higher prices to the customers, resulting in decreasing sales (i.e. not absorbed by the sector).

For the option packages 'Simple', 'Limited changes' and 'Targeted', small positive impacts on employment compared to 'Baseline B' are expected in the order of magnitude of up to 5000 jobs, representing an increase of 0.1%.

An additional aspect on employment is the likelihood that an ambitious climate policy will generate a demand for low carbon technologies, and renewable energy. If industrial sectors covered by the ETS do not receive more free allocation than necessary to cover their real costs (that cannot be passed on), this should incentivize higher demand for such technology and services, leading to positive employment impacts. These effects have not been quantified.

The employment impact of 'Baseline A' is slightly negative reflecting the additional cost for companies.

In the lower estimate case, where all absorbed costs are reflected in changed profits, the total employment impact will reflect the consequences of the costs passed through. In this case, the employment impacts are even more negligible.

7.5.4.2. Energy prices for households

The impacts on the energy prices for households that are supplied by district heating covered by the ETS were also assessed (Annex 8.2).

Overall, the estimated impacts of the 'Simple' option package compared to 'Baseline B' are reductions in heat prices of € 0.77/GJ (almost 3% of baseline price). For 'Limited changes' there will be no significant change, while for the 'Targeted' a small increase of 0.8% is projected, due to a reduction of the heat benchmark.

The 'Simple' option package results in the highest reduction due to the significantly more generous carbon leakage factor compared to 'Baseline B' which outweighs the effect of a reduced benchmark value. The limited cost reduction for 'Limited changes' results from the fact that no cross-sectoral correction factor is expected to be used for these options.

7.5.5. Comparing the options

In the following assessment step, in addition to the quantified impacts, the operational objectives as described in section 7.2 are used to compare the option packages.

7.5.5.1. Quantified environmental and social impacts

No significant differences have been identified between policy option packages in terms of environmental impacts because the required GHG emission reduction of 43% in 2030 (compared to 2005) and air pollution are determined through the increased linear reduction factor of 2.2% (see section 6.1).

In terms of social impacts employment level and prices for district heating have been considered. Regarding impacts on the level of employment, no significant differences between policy option packages and 'Baseline B' have been identified. With the exception of the 'Simple' package, no significant impacts on prices for district heating have been identified. The 'Simple' package is

expected to lead to lower prices in the order of magnitude of 3% of the baseline price. For the 'Targeted' package, a limited price increase of 0.8% is estimated.

In conclusion, for social impacts, overall, the differences between the options packages are rather small. The 'Simple' package could be considered as slightly better than 'Baseline B' due to the positive impact on district heating prices for households. 'Baseline Bbis' and the 'Targeted' packages could be regarded as less beneficial due to slightly higher district heating prices. The 'Limited changes' package shows no significant difference compared to 'Baseline B'.

7.5.5.2. *Reflect technological progress in industry sectors*

Regular updates based on data collection ('Baseline', 'Limited changes' and 'Targeted' packages) will most closely align the benchmark values to technological progress.

Updates based on a single flat rate ('Simple' package) will yield a benchmark value that is more demanding for sectors with below-average technological capabilities than for sectors with above-average technological capabilities. A more nuanced approach, for instance with an update based on multiple flat rates (e.g. low, medium, high) and/or complemented with data collection, could bring a closer alignment to achieved technological progress in different sectors.

The 'Targeted' package ensures technological progress is reflected in the benchmark values more closely than other packages due to regular recalculation of all benchmarks based on collection of sector-specific data.

The 'Simple' package reflects technological progress by applying a flat-rate percentage to all benchmark values. At the same time, this simple approach based on a single flat-rate cannot account for differences between sectors in terms of their historic ability to reduce GHG emissions.

The option packages 'Limited changes', 'Baseline B' and 'Baseline Bbis' update benchmarks once prior to 2021 based on newly collected data. This allows for a reflection of technical progress made by then. However, technical developments after this update cannot be considered. Therefore, these packages can be ranked between 'Targeted' as the best package, and 'Simple'.

7.5.5.3. *Fully preserve incentives for industry to innovate*

A too close alignment of free allocation to the characteristics of an industry (technological progress, production or emission levels) may reduce the incentives to innovate.

More frequent benchmark updates based on full data collection (like in the 'Targeted' package) may lower innovation incentives as companies would fear that they could not earn the full return on their innovation efforts. To the contrary, a benchmark update that is based on a single or multiple flat rate(s) does not as rapidly and fully reduce allocation of the best performing sectors but leaves them a fair share of these gains. At the same time, it keeps the pressure on sectors with slow innovation rates to improve further.

Similarly, a mandatory compensation of indirect carbon costs in full, as desired by some industry stakeholders, may come at the cost that companies have less incentives to search for contracts with providers of renewable energy on the market or for Member States to support investments into renewable energy with a view to bring down the carbon intensity of electricity (and thereby the carbon costs).

7.5.5.4. Most efficient installations do not face undue carbon costs leading to carbon leakage

A key request from the European Council conclusions is to better target free allocation towards those installations that are best performers and are most exposed to carbon leakage risks.

The benchmark values have to be updated in line with technological progress (but without compromising innovation incentives).

The amount of free allocation has to be brought in line with the degree of carbon leakage risk to which the sectors are exposed. The 'Baseline' packages fail to achieve a targeted allocation because the correction factor – that may increase to around 30-35% in 2030 – decreases free allocation across sectors irrespective of their carbon leakage risks. The option packages 'Limited changes' and 'Targeted' show how to better address the differences in carbon leakage risk across sectors by classifying sectors into 4 carbon leakage groups and possibly avoiding the correction factor.

To ensure that the most efficient installations do not face undue carbon costs leading to carbon leakage, it is important that those installations that can operate at a carbon-efficiency level close to the applicable benchmarks receive a level of free allocation that covers their carbon costs that are not passed through to consumers.

The benchmarking approach in general leads to a low risk of undue carbon costs for the most efficient installations as those *de facto* set the benchmark values. However, the 'Simple' package is not sector-specific (reducing values of 2007-08 benchmarks by a flat-rate percentage) and some sectors might not be able to reduce their emissions to the same extent as others. Examples are activities with a significant share of CO₂ process emissions. This specific situation could however be addressed by using multiple flat rates, and/or complementing with additional data collection. Therefore, the "Limited changes", "Targeted" and "Baseline B" packages with their sector-specific benchmark updates score better in ensuring that the most efficient installations can operate at benchmark levels.

The option packages 'Limited changes' and the 'Targeted' offer refined classification of sectors into four carbon leakage groups and are expected to avoid the application of the correction factor. The 'Baseline' packages and the 'simple' package do not achieve a free allocation that matches the carbon costs of the most efficient installations because the correction factor kicks in: the estimated average correction factor (over the period 2021 – 2030) for package 'Simple' is around 5-10% and 10-20% for 'Baseline B' and 'Baseline Bbis'. In 2030, the correction factor may even reach 35%.

It is noteworthy that 'Baseline Bbis' excludes a high number of sectors with low trade or carbon intensity from 100% free allocation, However, this is not enough to significantly reduce the correction factor because those excluded sectors would anyway be eligible only for a low number of free allowances (due to their low carbon intensity).

As part of the 'Targeted' package, mandatory financial support to compensate for indirect costs (passed through carbon costs of electricity production) would minimise the risk that the most efficient installations of electro-intensive sectors could face undue carbon costs.

To conclude, 'Targeted' package offers a range of elements to ensure the most efficient installations do not face undue carbon costs. The package 'Limited changes' addresses indirect costs to a lesser extent, but has a clearly higher capability to avoid undue costs for most efficient installations than 'Baseline B' (since in "Limited Changes" a cross-sectoral correction is not expected to be applied). 'Baseline Bbis' leads to similar results as 'Baseline B'. The 'Simple'

package fails to provide a better targeted allocation as all sectors receive the same percentage of free allocation and the correction factor is also triggered.

7.5.5.5. *Better alignment with production levels*

Based on the lessons learnt from the current EU ETS phase, the rules for the adjustments to changes in production levels and for the New Entrants Reserve can be improved (as in 'Simple', 'Limited changes', and 'Targeted' option packages). These changes can further contribute to reduce the correction factor and provide more free allowances for fast-growing companies.

'Baseline B' allows adjustments for production level decreases (partial cessation rules) and significant capacity increases. However, no additional free allowances are granted for production increases. Furthermore, the rules for the New Entrants' Reserve stay unchanged.

The 'Limited changes' and 'Targeted' packages ensure a very high level of alignment with production levels as they use two baseline periods, thus avoiding that allocation at the end of the period is based on production data more than a decade old. Furthermore, they allow annual adjustments for changing production levels in both directions (increases and decreases). This means additional allocation can be provided for significantly increased production even without a capacity increase.

For the 'Simple' package, the alignment with production levels is better than for 'Baseline B' due to the annual adjustments for changing production levels in both directions. However, only one data collection process for 10 years is part of this package.

More flexible rules for the New Entrants Reserve (with the 'Simple', 'Limited changes' and 'Targeted' packages) will provide more allowances for fast-growing installations. Furthermore, if the New Entrants Reserve is funded by unallocated allowances from phase 3 (and not from the available free allowances in phase 4), a higher amount of free allowances will be available for distribution to industries. This will help to reduce the correction factor and lead to a more targeted allocation of free allowances. It could however impair to some extent the functioning of the Market Stability Reserve.

7.5.5.6. *Avoid windfall profits*

A better targeted allocation system, considering cost pass-through (as with the 'Limited changes' and 'Targeted' packages), will also reduce the likelihood for windfall profits.

Windfall profits are avoided if the allocation system provides compensation only for costs that are actually assumed by the operators, i.e. costs which cannot be passed on into product prices without a significant loss of market share. A well-targeted allocation system aims to achieve this objective.

The 'Limited changes' and 'Targeted' packages are highly targeted with their four carbon leakage groups and benchmark values reflecting updated performance data, and thus represent a lower level of risk of windfall profits than 'Baseline B'.

On the contrary, the 'Simple' package (with no carbon leakage groups) has a higher risk of windfall profits in certain sectors than in 'Baseline B' (two groups).

Furthermore, the high level of alignment with production levels of the 'Limited changes' and 'Targeted' packages leads to a lower risk of windfall profits from overestimated production levels

for those two packages. The 'Simple' package allows such adjustments to a lesser extent, but is still somewhat better in that respect than the 'Baseline B' packages.

7.5.5.7. *No increased administrative complexity*

A fully targeted allocation system comes at the cost of higher administrative complexity.

Administrative complexity puts a burden both on private companies, as well as public authorities. The 'Limited changes' and 'Targeted' packages show the highest degree of administrative complexity: the frequent and detailed adjustments of all elements (benchmark values, carbon leakage groups, production levels) may lead to lengthy administrative processes and therefore reduce predictability for industry. In particular, a regular update of the benchmark values based on full data collection (from all installations in the EU) will involve a high workload for all involved parties because each benchmark value has to be re-calculated precisely taking into account lessons learnt from the first data collection exercise. To the contrary, an approach based on flat rates can build on the existing benchmarks.

With regard to the alignment to production data, the administrative costs of the 'Simple' package and 'Baseline B' are not expected to differ significantly as both packages are based on one data collection exercise. The annual adjustment for significant production level changes (as introduced in the 'Simple' package) is expected to decrease administrative complexity because these new rules would simplify the current procedures for capacity changes and partial cessations.

With regard to carbon leakage rules, a higher number of groups could require some more data from certain installations (e.g. installations exporting or using heat for several activities) and therefore slightly increase administrative costs. Finally, the 'Targeted' package foresees that all Member States shall provide compensation for indirect costs. As currently the vast majority of Member States does not provide compensation, this requirement will increase the administrative burden for those national authorities which would otherwise not provide compensation, as well as beneficiary companies in those Member States.

7.5.6. Concluding remarks

The 2030 Climate and Energy Framework – as endorsed by the European Council in October 2014 – sets important limits on the allocation of free allowances to industry:

- There will only be a limited amount of allowances available for free allocation to industry as from 2021 (see section 6.2 on the auction share);
- This limited amount of free allowances will decrease further in line with the linear reduction factor (see section 6.1.).

Furthermore, the European leaders have given clear guidance that the allocation of this limited amount of free allowances should be done in such a way not to constrain the competitiveness of European industries (as long as other major economic regions have not adopted similar climate policies). The operational objectives (as listed in the table below) are therefore based on the guidance by the European leaders, and the first four operational objectives refer to competitiveness in its different dimensions.

The foregoing assessment has shown that it is possible to better target the available allowances towards those sectors that are most exposed to carbon leakage risks ("Targeted" option package):

- Regular updates of benchmarks to better reflect technological progress;
- More refined classification of sectors according to their carbon leakage risks;
- Closer alignment of free allocation to recent production levels.

However, such a policy has its costs in terms of reduced innovation incentives and increased administrative complexity. In particular, repeated benchmark updates based on full data collection may lower innovation incentives as companies would fear that they could not retain the full return on their innovation efforts. Furthermore, each additional collection of benchmarking and production data increases administrative costs for private companies and public authorities.

Similarly, a more harmonised compensation of indirect carbon costs – out of the EU ETS auction revenues for Member States – has the benefit to offer a better protection for electro-intensive industries. But this comes at the cost that auction revenues cannot be used to support e.g. renewable electricity generation that may in the long term be the better investment to reduce the carbon costs. Furthermore, higher compensation may reduce the incentives for companies to search for contracts with providers of renewable energy on the market.

Table 3: Overview of assessment of policy option packages compared to 'Baseline B'

Operational objectives	Baseline B	Baseline B bis	Simple	Limited changes	Targeted
Technological progress reflected	0	0	-	0	++
Incentives to innovate fully preserved	0	0	+	0	-
No undue costs for most efficient installations	0	0	-	++	++
Better alignment with production levels	0	0	+	++	++
Avoid windfall profits	0	0	-	+	++
No increased administrative complexity	0	0	++	-	--

Given the trade-offs emerging from the analysis and the range of guiding principles for the future carbon leakage and free allocation rules agreed by the European Council, policy makers will have choices between the following alternatives:

- The 'Baseline B' and 'Baseline Bbis' packages provide predictability to industry as the current rules are continued. However, industry will be subject to a uniform cross-sectoral correction factor that may increase up to 35% in 2030 and reduce free allocation across sectors irrespective of their carbon leakage risk. Even though 'Baseline Bbis' excludes sectors with low trade or carbon intensity from 100% free allocation group, this will not significantly reduce the correction factor because those excluded sectors would anyway be eligible only for a low number of free allowances (due to their low carbon emissions).
- The 'Simple' package groups together the options with low administrative complexity:
 - The benchmarks are updated based on a flat-rate – which reflects the average technological progress over the last decade – instead of going through a laborious

and complex data collection exercise to re-establish new benchmark values for all sectors. This keeps administrative costs low and provides good incentives for innovation as above-average performers can keep a larger share of their profits. A further benefit is the closer alignment of free allocation to production data that comes at limited additional administrative cost.

- However, on the down-side, this simple benchmark and a single carbon-leakage group with 90% free allocation do not sufficiently take account of differences in technological capabilities or in carbon leakage risks across sectors. The 'Simple' package scores therefore poorly on avoidance of undue costs and reflection of technological progress.
- An interesting improvement to better reflect technological differences could be to use three flat rates (low, medium, high) instead of one to address outliers. Even though some data collection would become necessary, the administrative complexity would still be considerably lower than with a full-fledged re-benchmarking of all individual rates.
- The option packages 'Limited changes' and 'Targeted' show how to better address the differences in carbon leakage risks across sectors. Instead of two carbon leakage groups ('Low risk' with 30% free allocation and 'Very high' risk with 100% free allocation), the sectors are classified into four groups according to their risk exposure. In addition to the two existing groups, a 'High risk' group with 80% free allocation and a 'Medium risk' group with 60% free allocation are created. This more refined classification methodology provides a better targeted distribution of allowances across sectors and avoids that the most exposed sectors face undue carbon costs but also that less exposed sectors enjoy windfall profits.

Together with regular benchmark updates based on data collection (two collection exercises in "Targeted package") and a more harmonised indirect cost compensation (only with 'Targeted' package), these packages show also the highest degree of administrative complexity. Furthermore, the frequent and detailed adjustments of all elements (benchmark values, carbon leakage group, production level) may reduce predictability and therefore investment and innovation incentives.

Given the advantages and disadvantages of the different packages, it could also be considered to choose certain measures of the 'Simple' package that perform well with regard to economic incentives and administrative simplicity – e.g. benchmark values based on (multiple) flat rate(s) and closer alignment to production data – and combine them with the carbon leakage rules (from the 'Limited changes' and 'Targeted' packages) to better target free allowances towards those sectors that are most exposed to carbon leakage rules. However, the policy choice ultimately depends on what emphasis decision-makers put on the different objectives.

8. LOW-CARBON FUNDING MECHANISMS

The impact assessment of the 2030 climate and energy framework indicated that in the period to 2030 significant investments will be needed in the EU for energy system modernisation and reaching the 2030 climate and energy framework objectives. According to the impact assessment, the investments for meeting the 2030 objectives would be higher compared to GDP for lower income Member States, reflecting the relatively higher carbon intensity and lower energy efficiency of their economies and more limited financial resources. Lower income Member States may face general and financial barriers (less liquid local financial markets, high risk profile and limited creditworthiness of several key actors) to mobilise the required investments which

may prevent full financing by the market and limit the potential to finance the needed investments without public support. Realising the emission reductions in the lower income Member States could thus contribute to cost-effective reductions from a European perspective. It could also contribute towards the priorities of the European Energy Union with a forward-looking climate policy: more sustainable, secure, competitive and affordable energy for both citizens and businesses.

In this context, the European Council has agreed that a reserve of 2% of the EU ETS allowances will be set aside between 2021 and 2030⁸⁸, and the proceeds from selling the allowances in this reserve will be used to create a Modernisation Fund supporting the lower income EU Member States (with GDP per capita below 60% of the EU average) in improving energy efficiency and modernising their energy systems, while ensuring simplified arrangements for small scale projects. Furthermore, the existing option for lower income Member States to allocate allowances for free to their power sectors is to be continued up to a maximum of 40% of the allowances belonging to a given Member State before redistribution. Such investments will need to be aligned with European climate and energy policies and (where relevant) support will be subject to State aid control. In contrast to the Innovation Fund, where allowances belonging to all Member States are used and projects from across the EU are eligible for support, for the Modernisation Fund, while allowances from all Member States are used, only projects in the beneficiary Member States would be eligible. The share of each of the beneficiary Member States for the Modernisation Fund follows directly from the European Council conclusions of October 2014.

In addition, the ETS Directive supports low-carbon innovation through renewables and carbon capture and storage through the existing NER 300 mechanism. The €2.1 billion of NER 300 funding awarded so far will leverage approximately €2.7 billion of private investments and mobilise €700 million from other public sources (see Annex 4.1). Recognising the continuing importance of technological development, in its conclusions on the 2030 framework the European Council agreed to broaden the support by including industrial innovation. To achieve this, it was agreed to set up an Innovation Fund also including industry and with an initial endowment increased to 400 million allowances.⁸⁹

This chapter builds on existing experience and analyses options for the implementation of these low-carbon funding mechanisms in the ETS Directive.

8.1. Innovation fund

8.1.1. Problem definition

To reach its long-term decarbonisation goals⁹⁰ the EU needs to step up its efforts to rapidly introduce new low-carbon technologies to the market. An innovation-driven transition to a low-carbon economy contributes to the EU climate objectives and offers opportunities for growth and jobs. This has been recognized in the EU's framework strategy for a resilient Energy Union with a forward looking climate change policy⁹¹, which highlighted as key priorities for research and development renewable energies and CCS for the power sector and industry. To reach the EU objectives, further support is needed for innovative low-carbon technologies and processes in the demonstration phase, which is a crucial step towards commercialisation and deployment.

⁸⁸ This translates into around 310 million allowances, which could result in as much as € 8 billion

⁸⁹ The 400 million allowances could mobilise as much as € 10 billion.

⁹⁰ In line with the EU Roadmap for moving to a competitive low-carbon economy. COM(2011) 112 final

⁹¹ http://ec.europa.eu/priorities/energy-union/docs/energyunion_en.pdf

At the end of 2014, the Special Task Force (Member States, Commission, EIB) on Investment⁹² report indicated that while the EU remains a world leader in a number of medium- and high-technology sectors (including clean energy technologies), the EU position is increasingly being challenged by our global competitors, such as USA and China. As indicated in the report, an increasing number of Member States have started to cut back direct public R&D spending in their fiscal consolidation efforts. Complementary action at EU level is an effective way to maximise the development of highly innovative, low-carbon demonstration projects through EU-wide competition. Therefore, the Commission has identified the expansion of renewable energy and resource efficiency as well R&D as priority areas of the European Fund for Strategic Investment (EFSI) that will generate €315 billion of additional investment in the EU in the next three years. These efforts could be complemented by using revenues generated through the sale of EU ETS allowances to promote cost-effective emission reductions in line with the ETS.

This impact assessment analyses how to design the Innovation Fund to enable highly innovative, low-carbon first-of-a-kind (FOAK) projects in the European energy and industry sectors to support innovative low-carbon technologies and processes, especially in the demonstration phase.

8.1.1.1. Underlying drivers of the problem

Together with the price of EU ETS allowances, the need for companies to remain competitive and to create new products incentivises the development of innovative low-carbon technologies. Irrespective of the level of the carbon price, the ETS by itself may be insufficient to drive investment in R&D and trigger pre-commercial demonstration phase of new low-carbon technologies, in particular where other factors such as the high inherent level of technological risk, are present. The prevailing low carbon price has further underlined the need for public support for highly innovative technologies to achieve the necessary emission reductions. Still, the long-term development of the carbon price will be a key driver for the projects to be effectively supported by the Innovation Fund.

Innovative technologies, notably those involving FOAK projects, face considerable risks and often require public financial support to make the transition from R&D to commercialisation and to overcome the "valley of death", i.e. the transition between R&D and market uptake, when new products have to be produced and tested at commercial scale for the first time. The risk profile of demonstration investments in low-carbon innovations is often too high to attract conventional commercial finance and there is a considerable technological risk in the construction and implementation of new technologies for industrial users. Once the technologies are proven and performance is validated, the market can provide private finance to scale them up and to commercialise them.

Most EU energy-intensive industries and low-carbon energy sectors have developed sectoral low-carbon roadmaps for 2050, identifying promising future technologies to decrease CO₂ emissions⁹³. However, in an uncertain environment many companies might be reluctant to commit to innovation cycles, which put notable strain on their human and financial resources, and are a liability on their balance sheets. This uncertainty, in particular during the construction phase, forms a financial barrier for both small companies, who often suffer from a lack of access

⁹² http://ec.europa.eu/priorities/jobs-growth-investment/plan/docs/special-task-force-report-on-investment-in-the-eu_en.pdf

⁹³ The European Strategic Energy Technology Plan (SET-Plan) supports this process through the European Industrial Initiatives (EII) which bring together industry, the research community, the Member States and the Commission in risk-sharing, public-private partnerships aimed at the rapid development of key energy technologies at European level.

to capital, and large ones, who may lack sufficient financial incentives in the decision-making process to justify innovative and therefore risky investments. A stable carbon price signal is one of the elements that can improve the investment climate for low-carbon investments.

The need to provide additional incentives to trigger private investments in new low-carbon technologies has been confirmed by Commission analysis which highlighted the importance of speeding up investments in breakthrough technologies and addressing access to finance as a key challenge⁹⁴. There is a need to channel public funds to support investments that contribute to achieving the EU policy objectives related both to climate and economic growth. Existing support has not always provided the financing required for deployment of all new technologies due to the high level of risk and large size of the projects.

Financial support for innovation could be provided through traditional grants and/or through financial instruments. The Commission⁹⁵ has highlighted that financial instruments as a form of policy intervention can have several benefits, including increased effectiveness and multiplier effects for limited public resources.

The Innovation Fund could help to bridge this financing gap by providing grants and/or financial instruments specifically targeted at the risk profile of low-carbon demonstration projects for renewable energy sources (RES), CCS and industry.

For these reasons, this analysis focuses on how to address the financial barriers preventing investments in low-carbon innovation, with the existing approach of the NER 300 as starting point. For detailed analysis of lessons learnt on NER300 see Annex 4. Section 8.2.1.3 indicates which lessons can be drawn from other existing EU instruments.

8.1.2. Operational policy objectives

Based on the underlying problem drivers and the lessons learnt from the existing NER 300 mechanism, the operational objectives for the design of the Innovation Fund are the following:

- Achieve breakthrough innovation in the energy and industry sectors in Europe, while targeting support to ensure best use of limited funds;
- Address financial barriers that the project developer needs to overcome when starting the project and provide incentives to commercial-scale low-carbon FOAK projects;
- Avoid distortion of competition and minimise the impact on the general functioning of the European carbon market;
- Set up an efficient, simple management structure.

The operational objectives will be used to derive criteria for comparing policy options and assessing their impacts.

⁹⁴ COM(2014) 14 final - For a European Industrial Renaissance

⁹⁵ COM(2011) 662 final: A framework for the next generation of innovative financial instruments - the EU equity and debt platforms

8.1.3. Policy options

A key challenge in developing the policy options is to appropriately cover the different breakthrough technologies and proposals within the RES, CCS and industry sectors to ensure the selection of sufficiently innovative proposals. The Innovation Fund also has to ensure that appropriate types and levels of support can be offered. The question of addressing risk – both in terms of the funding rate and of reducing the operational risk – needs to be tackled. To this end, potential options are considered both for the screening and selection of projects and for how financial support is given.

8.1.3.1. *Screening of projects*

As under the NER 300, to be eligible projects should fall under one of the pre-defined innovative technology categories. The proposals should then be assessed to ensure they are sufficiently innovative. Eligible projects should then be ranked based on the cost-effectiveness of their performance.

Industry projects might merit a different approach, since putting projects with different characteristics and needs in direct competition might not deliver a good technological spread of proposals. Ranking industry projects only on the basis of their performance would likely reward only the large ones, which may benefit from economies of scale and, thus, have better overall cost performance. The selection would then risk primarily reflecting the differences between sectors and in physical boundaries, rather than level of innovation.

Certain sectoral low-carbon roadmaps for 2050 developed by industry have identified possible future technologies with a high level of detail, for instance in the forest and fibre sector⁹⁶. However, more work is still needed to identify innovative low-carbon breakthroughs in many other industrial sectors.

In industrial sectors, capturing the relative merits of proposals in terms of innovation based on a directly comparable criterion could be done through a qualitative assessment, but this approach would make a direct comparison more difficult than a quantitative criterion such as cost-per-unit performance. Special attention must be paid to maintaining an objective way of comparing diverse industry projects, to ensure that funding will deliver innovation breakthroughs with EU value added. For these reasons, comparing improvements to a pre-defined benchmark⁹⁷ or the replicability potential of a technology⁹⁸ could be considered as eligibility criteria when making the support scheme operational.

Alternatively, innovation could be used as a ranking criterion. Industry projects' innovative potential could for example be rated from 1 to 4⁹⁹ by comparing projects' technologies to the state-of-the-art and measuring their availability amongst multiple vendors, degree of development and potential for scale-up. Where the innovative quality is judged to be equal and the funds are

⁹⁶In the forest and fibre sectors, the identified technologies potentially offer significant leaps of more than a 20% improvement that could be demonstrated within a few years.

⁹⁷ This would be the indicator of progress compared to products' benchmarks, e.g. a 20% reduction compared to current product benchmarks for ETS free allocations.

⁹⁸ Replicability is important to streamline technologies across the board in a specific sector. It could be measured in terms of EU installations that could implement the same solution. This can be ensured for example via licencing agreements, continuous development in excellence centres or multi-year consortia agreements, aiming to achieve a certain number of industry installations.

⁹⁹ 1. Little or no innovation 2. Some innovation demonstrated, but mainly incremental 3. Highly innovative project for some component or aspect of technology 4. Highly innovative project that is likely to represent a game changing step in technology

insufficient to fund all proposals within the same rating, the cost-effectiveness of performance could be used as a second criterion.

It should be noted that innovation should be used either as an eligibility criterion or as a ranking one, to avoid confusion in the selection process.

8.1.3.2. Conditionality of Awards

NER 300 awards are linked to projects achieving operational performance. In order to cover some of the risks, the project can receive a certain degree of upfront funding upon a Member State's guarantee, followed by 100% of funding when demonstrating at least 75% of the targeted performance.

An alternative approach in order to widen the risk coverage in the Innovation Fund would be to award part of the funding on the basis of achieving milestones in the construction phase. A fixed percentage (e.g. 30%) of the additional costs of innovation could be granted conditional on finalising steps in design, permitting and construction. This is the approach followed by the US ARPA-E programme¹⁰⁰, advancing high-potential, high-impact energy technologies. ARPA-E selectees may request a Budget Plan Payment (BPP), to obtain reimbursements on a prospective basis in order to purchase the necessary equipment or services required to achieve specific milestones.

Linking funding to the achievement of specific milestones has proved beneficial also in the EU based on one of the lessons from the 2009 European Energy Programme for Recovery (EEPR). Under this programme, grants were awarded to highly strategic projects in gas and electricity infrastructure, offshore wind and carbon capture and storage¹⁰¹. This could apply to both energy and industry projects, since there is no material difference in the construction process.

As an example, the hypothetical steps in the construction of an innovative offshore wind farm could be considered to identify some steps which could be considered milestones: reaching final investment decision (FID), construction of all foundations, construction of all turbines or installation of all turbines and the start of the delivery of power to the grid. All milestones should be relevant in terms of justifying the partial granting of investment support.

8.1.3.3. Type of instrument

The NER 300 mechanism provides cash grants. Such support is attractive both for financial institutions, for which innovative projects are often not bankable, and for project sponsors, which find in grants an effective way of improving their financial standing (see also section 8.1.5.2). The NER 300 programme has linked such grants to operational performance to deliver funding to highly innovative FOAK projects characterised by long planning and construction times, a high risk profile and hard-to-predict budgets.

An alternative could be to switch to a financial instrument. Financial instruments are designed to address market failures or sub-optimal investment situations which have proven to be economically viable but do not give rise to sufficient funding from market sources due to their particular risk structure. As an illustration, financial instruments can include guarantees on first loss that could allow banks to provide loans to riskier projects than they would otherwise support. An alternative could be to invest public equity, in which case projects would be selected through

¹⁰⁰ Bill Text Versions 111th Congress (2009-2010) H.R.5116 - America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science Reauthorization Act of 2010 (Enrolled Bill [Final as Passed Both House and Senate])

¹⁰¹ Report from the Commission to the European Parliament and the Council on the implementation of The European Energy Programme for Recovery, COM(2013) 791

a permanent financing facility on an open-call basis. Due to the high risk involved in FOAK demonstration, the Innovation Fund should target projects with higher risk levels when compared to the investments supported through existing financial instruments.

8.1.3.4. *Maximum rate of funding*

NER 300 covers up to 50% of the projects' additional costs of the innovation (for example, the CCS part of a power plant or additional costs for a RES plant compared to a fossil fuel reference plant). RES projects on average requested NER 300 funding equivalent to 39% of their additional costs. Due to 'funding cap'¹⁰², no more than €300 million could be awarded to the only CCS project, which covers 34% of its additional costs.

In the consultation on carbon leakage provisions and innovation support¹⁰³, more than half of the industry respondents indicated that in their view, there is a particular need to strengthen the EU's innovation support for the implementation of large-scale pilot projects. In the general consultation on the ETS revision, different industrial sectors, Member States and civil society members (including trade associations and NGOs) have highlighted the importance of appropriate risk sharing in the innovation process, for example through an increase in the current co-financing rate. At the same time, for industry innovation, the projects are not as large as for CCS. They are thus not likely to be limited by the 'funding cap' of 15% share of the total amount available. However, a low limit on the funding rate per project could have a negative impact on the financial viability of highly innovative and therefore risky industrial projects.

Access to finance is a major barrier for implementation of innovative projects and in certain cases the current 50% co-financing requirement has been too high for project promoters to secure implementation and may also have resulted in some projects not participating.

For these reasons and to reduce the significant financial barriers (e.g. lacking or not ensured national funding, additional operating support, feed-in-tariffs or similar national support schemes, equity, long-term debt financing or revenues¹⁰⁴) as well as the level of technological risk, the maximum funding rate in the Innovation Fund could be increased to up to 75%.

For CCS, 10 out of 11 submitted proposals were not confirmed, mainly due to a lack of sufficient additional funding and as such, increasing the rate will improve their financial viability. As regards other technologies, existing experience suggests that for most subcategories of RES projects, the actual requested funding for such projects from the NER 300 will on average be lower than the maximum allowed. At the same time, many awarded RES projects have not yet achieved a Final Investment Decision, which could be a reason to also consider allowing an increased maximum rate for RES projects, if further experience confirms this is needed.

As the lessons learnt from the NER 300 are limited to a few years of implementation and the NER 300 has a more limited scope than the Innovation Fund, the exact impact of using higher rates is challenging to evaluate. Specific needs should, therefore, be assessed separately for RES, CCS and industry through more extensive market testing in the context of the implementing legislation. Comparing options which include the current maximum funding rate of 50% to an increased maximum rate 75% gives a first indication of the potential range of effects. To provide additional information on what these thresholds mean for project promoters, a short sensitivity analysis in (Annex 14) shows the level of possible funding for a range of RES, CCS and industry projects, across a range of funding rates.

¹⁰² €300 million is equivalent to 15% of the total available resources following the monetisation of allowances.

¹⁰³ See Annex 3.2

¹⁰⁴ See also Annex 4.1

If support was provided through financial instruments rather than grants, this would imply a different approach. While the detailed parameters for such support would need to be further elaborated, financial instruments could for example take the form of equity participation or of a guarantee on the first loss covering a certain percentage of the additional cost of the innovation. With such an approach, there would be no directly comparable level of funding, but rather a maximum coverage of risk related to the investment with the aim to increase the financial viability of the project.

The State aid guidelines for Energy and Environment, which apply until 2020, note that centrally managed funding, including also NER 300 funding¹⁰⁵ does not constitute State Aid. When such funding is combined with state aid, only the latter is considered for determining notification thresholds and maximum intensities. The existing maximum aid intensities vary between technologies and other factors, such as size of the targeted recipients or innovative nature of the project. For the Innovation Fund, the maximum funding rates and further design of the operational modalities would need to be consistent with future State Aid rules. Moreover, the use of different financial instruments (for instance equity vs. guarantees) may have different effects and the further design of the operational modalities for such instruments should be consistent with future State Aid rules.

8.1.3.5. Parameters not varied in the options

There are a number of design features, which have proven appropriate under the NER 300 programme and it is proposed not to vary these in the options, except for an adjustment to the higher volume (400 instead of 300 million allowances) and longer duration (10 instead of 5 years) of the Innovation Fund:

The NER 300 management structure, consisting of cooperation between the European Commission, Member States and the EIB, was effective for developing and selecting projects, for monetising allowances and for managing revenues. While the simplification of the interaction between the three bodies and a reduction of administrative burden for project sponsors should be considered, this will mainly be subject to a future implementing measure and will be assessed in this context.

The 'funding cap' (limit of maximum 15% allowances per project) is proposed to be maintained¹⁰⁶. A higher limit would increase the potential for large projects to participate, but would result in a lower total number of projects funded.

The limit of 3 projects per Member State introduced in the NER 300 Decision was appropriate to ensure adequate geographical coverage under the programme (see Annex 4.1). It could be maintained or adjusted to 4 projects per Member State, dependent on other design features such as the maximum funding rate and the resulting total number of projects. This element will be subject to a future implementing measure and will be assessed in this context.

Two calls for proposals within 5 years were adequate under the NER 300 programme, to ensure stability in funding and monetisation of allowances. This could be maintained or adjusted to 4 calls, depending on the appropriate timing of monetising 400 million allowances, as described in Annex 4.1

¹⁰⁵ Recital (81), Guidelines on State aid for environmental protection and energy 2014-2020 (2014/C 200/01)

¹⁰⁶ The resulting amount will be higher, due to the increase from 300 million to 400 million allowances. For example, if the average value of the monetised allowances were between €10 - 25, the resulting total resources would be between € 4 and 10 billion. 15% of this total would then be € 0,6-1,5 billion.

The current knowledge-sharing provisions could be streamlined to ensure smoother implementation. An element of knowledge sharing should be kept as there is a clear public interest in replicability of the projects. Industrial sectors that have an intra-sectoral cooperation already incorporated, i.e. that have elaborated their low-carbon roadmaps, could have better possibilities of developing breakthrough technologies than individual companies acting alone. Previous examples, such as e.g the ULCOS¹⁰⁷ process of the steel sector, illustrate that such cooperative approach is possible and accepted by industry. In case several companies of a particular sector join resources, the benefits of knowledge-sharing – and of their possible licensing - could be included as one of the design features, taking into account respect of competition rules. These knowledge-sharing provisions are set in implementing legislation and will be assessed in this context.

Indicative shares for CCS and RES projects with a smooth spill over possibility between the groups were crucial under the NER 300 programme to ensure the allocation of all available funds. A similar indicative share could be set for industry projects.

8.1.4. Option packages

Four option packages are taken into consideration, by combining the options for the elements set out in chapter 8.1.3. The legal baseline scenario would imply no changes to the ETS Directive and hence no continuation of support to innovation. The alternative baseline scenario represents a continuation of the current practice by extending the current NER 300 rules to industry, increasing its endowment to 400 million allowances, and its duration to 10 years.

Option 1 envisages tailored rules and selection criteria applying for industry, and the current rules for RES and CCS. The risk approach would be changed for all categories (industry, RES and CCS) by higher co-funding rates and early disbursement of part of the funds following the achievement of construction milestones. The essence of this option is to provide alternatives to share investors' risks and create a more conducive climate for innovative investments.

Option 2 foresees the creation of a permanent financing facility selecting projects continuously on a first-come-first-served basis considering the innovation merits of the proposal. This option assumes financial instruments instead of grants.

Table 4: Option packages for Innovation Fund

	Screening of projects		Conditionality of awards	Type of instrument / risk approach	Maximum rate of funding (for all categories)
	Eligibility	Ranking			
Baseline (Directive unchanged)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Alternative baseline	Innovation	Performance (CPUP)	Achieving operational performance	Grant (2-4 rounds / calls for	Up to 50% of additional costs

¹⁰⁷ ULCOS (Ultra-Low Carbon dioxide (CO₂) Steelmaking) is a consortium of 48 European companies and organisations from 15 European countries that launched a cooperative R&D initiative to enable substantial reductions in CO₂ emissions from steel production. The consortium consists of all major EU steel companies, of energy and engineering partners, research institutes and universities and has been supported by the European commission. The consortium brings together the shared knowledge so that for a particular technology developed, patents may be owned by different companies and licencing rights for new plants may have been agreed with other partners

Current rules continued			(funds awarded based on realising 75% of performance)	proposals)	
Option 1 Amended approach for all sectors with tailoring for industry	For industry: Innovation (e.g. certain percentage improvement of benchmark, where applicable) AND Replicability (e.g. applicable in installations representing a minimum share of ETS emissions) Current rules for RES and CCS	Performance (CPUP) potentially complemented with "innovation criterion" for industry	Achieving milestones in construction phase (e.g. 30% of additional costs, awarded for finalising steps in design, construction) AND Operational performance (e.g. 45% of additional costs, upon realising 75% of performance)	Grant (2-4 rounds / calls for proposals)	Up to 75% of additional costs
Option 2 Permanent financing facility	Innovation	Selection based on due diligence - projects are approved on 1 st come 1 st served basis if eligible	Not award but financial instrument (e.g. guarantee on first loss covered, loan or equity)	Financial instrument with continuous open window	Not applicable, depends on design of financial instrument

8.1.5. Analysis of impacts

8.1.5.1. *General impacts*

Complexity and administrative burden

In the alternative baseline and Option 1 the innovation support would be awarded via calls for proposals, primarily carried out under the responsibility of the European Commission. Building on the NER 300 experience, well-organised and managed calls would not increase the complexity or administrative burden compared to current practice. However, specific rules for the inclusion of industrial projects might increase the complexity of the selection assessment, since elements such as replicability and ranking based on innovation and cost-effectiveness of performance would need to be considered.

In Option 2, the permanent financing facility would allocate support to projects selected on a first-come-first-served basis. This continuous selection would provide applicants with more flexibility as their proposals would not be tied to the timing of calls for proposals. In terms of project evaluation, for a comparable number of projects to be reviewed under Options 1 and 2, no substantial differences are expected in the overall administrative burden. Structuring financial instruments to address the specific needs of different technologies would require considerable know-how to assess and allocate the risks properly and this could increase complexity. At the

same time, under Option 2 this role would need to be assumed by financial institutions such as the EIB that already has extensive experience in structuring complex deals. An expanded role for such a financial institution may be reflected in an increase of the fees charged for the activities carried out when compared to the baseline scenarios. The transparency of the level of support should also be ensured. The experience in setting up and operationalising the new European Fund for Strategic Investments under the EU Investment Plan would also be relevant to ensure a simple and transparent governance structure.

When compared to the alternative baseline, the complexity and administrative burden of Option 1 and Option 2 would be higher, due to the additional factors to be taken into account during the selection process.

Complementarity to other EU instruments

A range of instruments has been developed at EU level to support the development of innovation activities, and research and development more broadly¹⁰⁸, and these are expected to support total R&D investments of approximately €48 billion through 2020¹⁰⁹. Additionally, at the end of 2014 the Commission unveiled the new European Fund for Strategic Investments under the EU Investment Plan¹¹⁰. It is expected to make an important contribution in the short term to the climate and energy investments, highlighting the importance of infrastructure, energy efficiency and renewables¹¹¹.

While it cannot be anticipated what EU level instruments will exist in 2021, the complementarity of the Innovation Fund to existing policy instruments would come from its specific focus on support for low-carbon innovation at the pre-commercial demonstration phase. Managing the Innovation Fund at EU level ensures that it complements and reinforces other existing instruments.

Providing support in the form of a performance-based grant (as in the alternative baseline or option 1) or through a financial instrument which explicitly targets projects with a higher level of risk when compared to other existing EU-wide instruments, such as the existing InnovFin¹¹² programme (as in option 2) can be complementary to other EU instruments.

When compared to the alternative baseline, the complementarity of both Option 1 and Option 2 is similarly positive, and explained primarily by the focus of the support on low carbon first of a kind demonstration projects and the expansion of scope to industrial projects.

¹⁰⁸ For example as part of InnovFin under Horizon 2020.

¹⁰⁹ http://europa.eu/rapid/press-release_IP-14-670_en.htm

¹¹⁰ http://ec.europa.eu/priorities/jobs-growth-investment/plan/index_en.htm

¹¹¹ It should be noted that the NER 300 and the Innovation Fund differ from the new European Fund for Strategic Investments. EFSI will work through financial instruments only, lending to existing projects ready to start within three years and will have a wider scope covering variety of sectors such as the digital economy and education.

¹¹² In particular, the Commission, in cooperation with the EIB, has developed a pilot scheme under InnovFin, InnovFin Energy Demo Projects (EDP), that aims to support technologies in the pre-commercial stage of development in the energy sector. It will provide loans to first-of-a-kind demonstration projects at industrial scale in the fields of renewable energy and hydrogen and fuel cells, or extend guarantees to financial intermediaries who make such loans. It will address projects with a higher risk profile than the current InnovFin suite of products. If successful and further developed, possible synergies between this scheme and the Innovation Fund could be explored in the context of implementing legislation for the Innovation Fund. (<http://www.eib.org/infocentre/press/releases/all/2015/2015-134-eib-group-and-ec-expand-support-for-innovative-companies-across-europe.htm>)

8.1.5.2. *Economic impacts*

Several economic impacts are considered in this section. Firstly, the overall ability of the fund to attract and support a large number of innovative projects is considered to be the result of three impacts: the ability to attract innovative projects, the fund's effectiveness in addressing barriers to allow these projects to be realised and finally the expected leverage, indicating the volume of additional investment mobilised as a result of the support offered. Two other economic impacts at a higher level are also considered, the effects on competitiveness and the EU added value realised.

Effectiveness in addressing barriers for low-carbon innovation

The NER 300 lessons learnt (see Annex 4.1) showed that the current NER 300 rules, i.e. the alternative baseline option, were effective in encouraging the development of projects for RES innovation. However, the deadlines for reaching the final investment decision within two years and starting operations within four years proved to be too ambitious due to factors such as the long preparation, construction and permitting timelines of FOAK projects. In addition, this approach does not seem to adequately address the risks for pre-commercial demonstration projects in energy intensive industries and CCS projects. This is supported both by the NER 300 experience of only 1 CCS project awarded and by the majority of stakeholders¹¹³.

Various stakeholders indicated that the current NER 300 rules would not be sufficient to trigger innovation for the energy intensive industry, since project sponsors would have to bear the high financial and technical risks of capital intensive investments. Since the return on such investments can be reaped only in the longer term, in the short run such projects do not seem to be ranked as a first priority in companies' internal decision-making processes. As a result, innovation might not occur at the speed needed to meet the EU's long-term decarbonisation objectives. It is likely that such investments would rather be realised in those Member States where higher levels of national public support are offered, while in others the emission reduction and innovation potential could remain underdeveloped.

In that regard, Option 1 could substantially lower the project sponsors' needs for co-financing, given the higher funding rate and the early disbursement of part of the funds following the achievement of milestones. The funding provided through a grant would lower the costs borne by project sponsors, improving the financial viability of the project. At the same time, linking the grant to the achievement of milestones would be more attractive when compared to the alternative baseline. Under the alternative baseline, the funding is tied to operational performance at a later stage and discounts will be applied by the company to reflect uncertainty about the current value of funds that will be received in future.

Option 2 which envisages the creation of a financial instrument (e.g. guarantees, loans or equity investments, and risk-sharing instruments)¹¹⁴, can also address barriers faced by project promoters. If providing public equity, the projects could be supported from the initial stages of development. Such public equity investment could lower the need for project promoters to raise debt and private equity. As an alternative, if the financial instrument is implemented as a guarantee that would cover for a percentage of the losses in case of a loan default, this would allow financial institutions such as the EIB, national promotional banks and/or commercial banks to lend to riskier projects than they would have done otherwise. This also addresses projects in the earlier stage of development compared to the alternative baseline, i.e. continued current rules.

¹¹³ See Annex 3

¹¹⁴ As an illustration, the funds could be used to invest in equity alongside project promoters. This would lower the costs for private investors, while also lowering their expected revenues from the project.

In certain cases, financial instruments might not address the large financing gap in the demonstration of FOAK projects (e.g. CCS projects). Financial instruments can stimulate a significantly higher level of private investments, but this will likely be in technologies that are closer to commercial scale deployment.

In conclusion, while both Option 1 and 2 have potential to address barriers for low-carbon innovation when compared to the alternative baseline, Option 1 is expected to be more effective due to the combination of a more targeted risk sharing approach and the possibility of a higher rate of funding.

Potential to attract innovative projects

The lessons learnt from the existing NER 300 mechanism (Annex 4.1) show that the current rules and selection mechanism have resulted in a portfolio of projects for renewables that were identified in many cases as highly innovative or even game changing (80%) in the existing framework. At the same time, while multiple proposals were initially submitted, only one CCS project has been confirmed.

The alternative baseline option would imply applying a one-size-fits-all approach, using the existing rules for RES, CCS and industry. As discussed in Section 8.1.5.2, there is a risk of not attracting a similar number of innovative project proposals in the CCS and industry sectors. As a result, in particular CCS projects could still face similar risks as the existing NER 300 projects, such as uncertain national funding, lack of private equity or long-term debt financing.

Option 1 has a higher potential to attract innovative projects with its risk sharing elements. Raising the maximum funding rate (up to 75%) has the potential to encourage more innovative project proposals to be submitted for the Innovation Fund. In addition, directly targeting innovation for industry proposals as the basis for the ranking of projects during the selection process (compared to the current practice of innovation as eligibility criterion) is expected to make the system more attractive for innovative projects with a lower technological maturity. As discussed above, increasing the maximum funding rate would also facilitate addressing the financial barriers of such innovative projects, if they are selected.

Option 2 involves providing support to projects through financial instruments, such as loans, guarantees or equity which would target projects with a higher risk level compared to existing instruments (e.g. the current InnovFin programme, with the exception of the recently launched InnovFin Energy Demo Projects (EDP) pilot facility which does cover such higher risk levels). This could enable a pipeline of more innovative projects with a higher risk profile to access financing when compared to existing EU and EIB financial instruments, for example by covering the first loss which would be incurred or through co-investing equity (See Section 8.1.5.2). A decision on supporting a project would be carried out by an entrusted financial entity such as the EIB that would evaluate the projects based on economic, financial, technical and environmental criteria. There is a risk that such an approach would be more beneficial to closer to market pre-commercial technologies that have higher short-term revenue generating potential, overlooking technologies that take longer to develop but are more interesting in the long term. Therefore under Option 2 financial instruments might not be sufficient to fully address the financial barriers faced by breakthrough innovation projects without additional public interventions, such as grants. In conclusion, while financial instruments could be targeted at earlier stages in project life cycle when compared to the performance based grant in the alternative baseline, there is a risk that such an approach would be likely to attract technologies closer to commercialisation. Whether Option 2 could attract more high risk innovative projects when compared to the alternative baseline would therefore depend on how the instrument is operationalised.

In conclusion, option 1 has the highest potential to attract innovative projects when compared to the alternative baseline, while option 2 would be expected to lead to comparable outcomes.

Leverage

A similar leverage as for the NER 300 funding (see Annex 4.1) is expected for the alternative baseline. The leverage of Option 1 would likely be lower due to the higher co-financing rate and hence the lower need for private investments. Additionally under Option 1 part of the funds would be reimbursed prior to proof of performance. While funding partial success or failure can still deliver benefits in the form of knowledge sharing, from a financial perspective this would imply the loss of some funds compared to disbursement based on proving operational performance.

On the other hand, significantly higher overall leverage could be reached under Option 2. Preliminary evidence shows that the EU contribution to financial instruments mobilises a global investment exceeding the EU contribution by 4 to 10 times on average¹¹⁵. Since the Innovation Fund addresses inherently riskier innovation projects, the leverage realised would likely be in the lower range but still significantly higher than for traditional grants under Options 1 and the alternative baseline. While project failures may lead to overall higher losses than with grants or debt instruments, financial instruments proceeds might reflow into the fund and be used to finance additional projects.

When compared to the alternative baseline, Option 1 would result in a lower leverage due to the higher funding rate, while Option 2 would be expected to result in an increase of the leverage as financial instruments can mobilise more additional funding.

Competitiveness

Low-carbon innovation in the energy and industry sectors would improve the overall EU competitiveness by supporting low-carbon technologies in which the EU has global technological leadership. Better and more efficient technologies will benefit the entire supply value chain and ultimately consumers. Furthermore, such innovative technologies can create a substantial number of new jobs and generate new business opportunities. There is also evidence that low-carbon technologies bring larger overall economic benefits, as they generate more knowledge in the economy, which in turn can be used by other innovators to further develop new technologies, leading to a virtuous cycle of innovation.¹¹⁶

Additionally, knowledge-sharing requirements under the Innovation Fund would contribute to the dissemination of the results across EU borders, technology exchange and associated catching-up effects. It could also help to reduce the innovation gap between and within sectors and/or Member States.

The Innovation Fund could improve the prospects for EU companies to increase exports in rapidly growing low-carbon markets, thus enhancing EU competitiveness. The extent to which the different options would improve EU competitiveness would depend on how effectively the fund incentivises innovation in new low-carbon technologies and processes. The alternative baseline and Option 1 would strengthen the global competitive position of EU businesses selling low-carbon technologies. The inclusion of replicability as an eligibility criterion for industry projects in the assessment would also ensure a measure of the overall potential for improved

¹¹⁵ Report from the Commission to the European Parliament and the Council on financial instruments supported by the general budget according to Art.140.8 of the Financial Regulation as at 31 December 2013, COM(2014) 686.

¹¹⁶ The impacts of environmental regulations on competitiveness, Grantham Research Institute on Climate Change and the Environment, UK, 2014

competitiveness through a significant contribution to overall industrial emissions across the energy intensive industry sector in the EU. This could help to ensure higher benefits for competitiveness.

Option 2 is expected to result in higher leverage and may be more attractive to investments which are close to commercialisation. This could lead to quicker realisation of the projects and a more rapid diffusion of the technologies supporting competitiveness, but there is a risk that to enable breakthrough innovative FOAK demonstration projects additional support might be needed in the form of grants.

Consequently, Options 1 and 2 both have the potential to improve competitiveness compared to the alternative baseline.

EU added value and geographical distribution

The Innovation fund would target support towards projects with EU-wide significance. Through EU-wide coordination, it would be possible to reach the requisite scale for highly capital intensive demonstration projects in RES, CCS and industry across Member States in particular compared to a scenario where only national schemes exist. The EU focus could provide additional benefits in terms of the development of technological standards at EU-level. Under the alternative baseline and options 1 and 2 such benefits would also be extended to the energy-intensive industry sectors.

The Innovation Fund is to cover projects in industry, CCS and RES. Investment projects in all Member States, including small-scale projects. The experience with the NER 300 projects, selected and ranked through two calls for proposals by EU-wide competition, showed the EU value added of the programme in terms of maximising innovation and decarbonisation benefits. The geographical and technological spread of innovative projects (see Annex 4.1), combined with the knowledge-sharing requirement for project sponsors, is likely to result in an effective knowledge spill-over throughout Europe. As indicated in Annex 4.1, the rules relating to the maximum number of projects per Member State did not guarantee that projects were funded in all Member States, but acted as a relatively light safeguard against a high number of project proposals being approved in only one Member State. The alternative baseline for the Innovation Fund would lead to a comparable outcome in terms of geographical distribution and contribution of EU value added. On the other hand, for both options 1 and 2, the expansion of scope to include industry is an opportunity to develop a promising project pipeline in lower income Member States which have high potential for economic growth. This could contribute to a wider geographical distribution.

Since Option 1 also includes replicability as one of the eligibility criteria for industry projects, this could help ensuring an even higher EU value added, since projects' technology could be deployed / licensed at a larger scale to other similar installations. Additionally, under the alternative baseline, project promoters should have received a guarantee from Member States to receive up-front financing. In Option 2, financial instruments would need to include a provision for maximum geographical concentration ratio to ensure geographical balance. In fact, through a large portfolio of projects with different risk profile, an optimal level of portfolio risk could be achieved. As a result, both Option 1 and Option 2 can be considered to represent a higher potential EU added value than the alternative baseline.

8.1.5.3. *Environmental impacts*

The Innovation Fund addresses investments in low-carbon innovation for CCS, RES and energy intensive industries. All three scenarios would facilitate the commercialization of new low-carbon technologies that would facilitate achieving the long-term decarbonisation objectives in the EU. The environmental benefits of low-carbon technologies will increase over time as the technologies are replicated and deployed on a larger scale.

In the longer term, more direct environmental benefits such as increased use of renewable energy resources, improved energy efficiency, improved local air quality and related health benefits are expected.

It should be noted that projects supported under the three options could have a different impact regarding verified avoidance of CO₂ emissions. Under the alternative baseline, funding would continue to be disbursed strictly upon proof of avoided CO₂ emissions. Options 1 and 2 would be less directly linked to such reductions, as the support could be paid before the project enters into operation.

With regard to environmental impacts, Option 1 and 2 are thus considered to have a similar impact when compared to the alternative baseline.

8.1.5.4. *Social impacts*

Although it is not possible to quantify the impacts on employment in the individual Member State, a positive impact on employment such as the creation of new high value-added jobs across the entire supply chain, could be expected in proportion to the level of investments triggered by the Innovation Fund.

As indicated in the impact assessment accompanying the Communication from the Commission "Horizon 2020 - The Framework Programme for Research and Innovation"¹¹⁷, a wealth of evidence demonstrates the crucial role that research and innovation play for the creation of more and better jobs, for productivity growth and competitiveness, and for structural economic growth. To boost future productivity and growth, it is critically important to generate breakthrough technologies and translate them into innovations that are taken up by the wider economy.

8.1.6. Comparing the options

In the previous section, seven different impacts, in particular economic impacts, were analysed as presented in the table below. These impacts contribute to the operational policy objectives that were identified (section 8.1.2) as follows. A positive score on the impacts "potential to attract innovative projects", "EU added value and geographical distribution", "competitiveness" and "leverage" would contribute to the objective of achieving breakthrough innovation in the energy and industry sectors in Europe, while targeting support to ensure best use of limited funds.

The impact "Effectiveness in addressing barriers for low-carbon innovation" relates directly to the objective to address financial barriers that the project developer needs to overcome when starting the project and provide incentives to commercial-scale low-carbon FOAK projects.

Thirdly, a positive score on the impact "minimise complexity and administrative burden" contributes to the objective to set up an efficient, simple management structure. Finally, while the

¹¹⁷Commission Staff Working Paper – Impact Assessment accompanying the Communication from the Commission "Horizon 2020 - The Framework Programme for Research and Innovation", SEC(2011) 1427

objective of minimising the impact of the mechanism on the general functioning of the European carbon market is not directly reflected in the comparison of the options, there is a further discussion of potential impacts in relation to the timing and monetisation (Annex 13).

Table 5: Comparison of options for the innovation fund

	Baseline (directive unchanged / no support for innovation)	Alternative baseline (Current rules continued)	Option 1 (Amended approach for all sectors with tailoring for industry)	Option 2 (Permanent financing facility)
Minimise complexity and administrative burden	Not applicable	0	-	-
Complementarity with other EU instruments	Not applicable	0	+	+
Effectiveness in addressing barriers for low-carbon innovation	Not applicable	0	++	+
Potential to attract innovative projects	Not applicable	0	++	0
Leverage	Not applicable	0	-	+
Competitiveness	Not applicable	0	++	++
EU added value and geographical distribution	Not applicable	0	+	+

When screening and comparing the options, two pluses indicate a major improvement when compared to the alternative baseline, one plus indicates an improvement, zero indicates no change and one minus indicates deterioration.

The analysis of the options shows that the options involve several trade-offs with regard to the resulting impacts. While all seven criteria presented above are relevant to comparison of the options, relative to the other criteria the ‘Effectiveness in addressing barriers for low-carbon innovation’ and ‘Potential to attract innovative projects’ are key factors contributing towards the fund objectives.

Option 1 would be very effective in addressing specific barriers for low-carbon innovation by substantially lowering the financial barriers for project sponsors. It would provide cash grants (opposed to a financial instrument such as equity or a guarantee in Option 2) combined with a higher funding rate (up to 75%, as opposed to 50% in the alternative baseline) and the option for early disbursement of part of the funds following the achievement of construction milestones (opposed to the disbursement of funds only on the basis of achieving operational performance as in the alternative baseline).

While it would be expected to result in a lower leverage and a lower number of projects being supported than either the alternative baseline or Option 2, Option 1 represents the highest potential to address the specific barriers to support the commercialization of breakthrough

innovation for CCS, RES and energy intensive industry. This package would likely attract the highest number of applications of innovative FOAK projects in the energy and industry sectors and ensure effective project implementation.

Option 1 could also deliver significant EU value added by taking into account replicability of industry projects, while still rules providing safeguards to allow a wide variety in the geographical and technological spread of projects within the EU and achieving a critical mass of funding which would not be attainable by Member States alone.

Similar outcomes could also be realised by the first-come-first-served selection process provided by Option 2, but this option would offer smaller scope for a comparison between numerous project proposals and may need to be combined with additional public support in order to enable more far reaching innovative projects to be realised. Both Option 1 and Option 2 are expected to provide significant benefits with regard to competitiveness and to be complementary to existing EU instruments.

An Innovation Fund implemented through Option 1 (provision of grants), could be closely coordinated with other EU-level and national level support schemes. To increase the impact of the Innovation Fund under Option 1, an increased level of coordination between grants and financial instruments could be beneficial to address market failures. Duplication should be avoided, but a combination of such instruments could cater to a wider set of technologies and projects as grants and financial instruments normally do not fully cover the same underlying risks and could be regarded as complementary. How to ensure the coordination between the Innovation Fund and relevant existing financial instruments should be assessed in the context of the implementing legislation for the Innovation Fund.

More detailed assessment of the relevant modalities should take place in the context of the preparation of a future implementing legislation for the Innovation Fund.

8.2. Modernisation Fund

8.2.1. Problem definition

8.2.1.1. Context

The European Council in October 2014 agreed that a reserve of 2% of the EU ETS allowances will be set aside between 2021 and 2030¹¹⁸, and the proceeds from this reserve will be used to create a Modernisation Fund to support the EU Member States with lower income (with GDP per capita below 60% of the EU average) in improving energy efficiency and modernising their energy systems, while ensuring simplified arrangements for small scale projects. There are 10 beneficiary Member States: Bulgaria, the Czech Republic, Estonia, Croatia, Latvia, Lithuania, Hungary, Poland, Romania, and Slovakia¹¹⁹. The creation of the Modernisation Fund implies a net transfer of 223 million allowances, translating into potentially as much as € 5.5 billion, to the beneficiary Member States from the remaining EU Member States (See Table 34 in Annex 11).

¹¹⁸ This translates into around 310 million allowances, which could result in as much as € 8 billion

¹¹⁹ Eurostat, 2013 GDP per capita at market prices.

8.2.1.2. *Underlying drivers of the problem*

At the end of 2014, the Special Task Force (Member States, Commission, EIB) on Investment¹²⁰ as one of its tasks analysed the market barriers for investments to various sectors in the EU. It concluded that across sectors macroeconomic uncertainty, insufficient structural reforms, incomplete single market as well as regulatory constraints negatively affect the investment climate. Administrative burden has also been identified as a major bottleneck. The report highlighted that for the energy sector the barriers to investment, and hence potential solutions, differ between grids, production projects, energy efficiency and distributed renewable energy projects. See Annex 10 for details on the financial barriers for investment in the energy sector.

The Modernisation Fund could play a role in addressing specific financial barriers. While the European Council already agreed on the establishment of the fund and its purpose to modernise the energy sector and improve energy efficiency, it did not define the governance structure, including the details of the respective roles of the beneficiary Member States, EIB and other institutions.

Since the governance structure matters for the effectiveness of funding mechanisms, this impact assessment focuses on the design of the fund to make best use of the expertise and knowledge of the various institutions involved. As the Modernisation Fund is a new funding mechanism created with allowances which belong to the Member States and as such are not part of the EU budget, this Impact Assessment aims to determine, as a first step, to what extent the different institutions would be involved in setting the eligibility and selection criteria for the projects to be supported by the fund. Thus at this stage no options are developed on the eligibility criteria and the specific type of support used (grants, financial instruments or a mix of the two). The further details on the modalities of the fund, including eligibility criteria and specific type of support used (grant, financial instrument or a mix of the two) would need to be clarified and analysed in a subsequent implementing legislation following further assessment and/or decided by the board of the fund, depending on the option chosen for the governance structure.

8.2.1.3. *Lessons learnt*

The Modernisation Fund is a new policy mechanism, so it should draw on the experience of existing initiatives related to the ETS such as the optional free allocation to the power sector under Article 10c of the ETS Directive (see section 8.3.2 and Annex 4.2) and the funding of innovative investments through the NER300 initiative (see Annex 4.1). More general lessons on governance of investment platforms can be drawn from the Commission, EIB and Member States' experience in implementing financial instruments, and from the work related to setting up of the European Fund for Strategic Investments under the EU Investment Plan.¹²¹

One element that has been highlighted by private stakeholders in the recent discussions of the EU Investment Plan is the importance of robust project quality criteria and an independent selection of projects¹²². Additionally, Member States have expressed political commitment¹²³ to have financial instruments play a more important role in the multiannual financial framework for 2014-2020, preliminary data suggest that the uptake can be higher¹²⁴. The experience gained

¹²⁰ http://ec.europa.eu/priorities/jobs-growth-investment/plan/docs/special-task-force-report-on-investment-in-the-eu_en.pdf

¹²¹ http://ec.europa.eu/priorities/jobs-growth-investment/plan/index_en.htm

¹²² http://ec.europa.eu/priorities/jobs-growth-investment/plan/docs/proposal_regulation_efs_i_en.pdf

¹²³ EUCO 9622/15' (<http://data.consilium.europa.eu/doc/document/ST-9622-2015-INIT/en/pdf>)'

¹²⁴ http://ec.europa.eu/regional_policy/sources/docoffic/official/reports/cohesion6/6cr_en.pdf

during the 2007-2013 implementation period with financial instruments¹²⁵ developed by the EU and EIB shows that the effectiveness and efficiency of financial instruments can be enhanced by implementing fewer financial instruments with larger volumes to ensure critical mass¹²⁶.

As discussed in Section 8.3, the free allocation to the power sector in the lower income Member States indicates the need for a simple, transparent and clear approach to make effective use of available resources. Finally, the NER300 programme (see Section 8.1 and Annex 4.1), demonstrates the EIB's expertise to cooperate with the Commission and Member States in due diligence to select projects and act as an agent to monetise allowances. An important element to ensure that the Modernisation Fund can start financing projects in 2021 is to time the auctioning of allowances in such a way as to provide certainty of available funds, while also avoiding a negative impact on the carbon market.

8.2.2. Policy Objectives

As discussed above, the impact assessment focuses on the governance structure of the Modernisation Fund. The fund should support transition to low carbon economy in beneficiary Member States and contribute to ensuring EU-value added and support the completion of the EU internal energy market, while ensuring that the specific market barriers and national priorities in the beneficiary Member States are addressed. In this respect, the impact assessment will also assess the potential role the Commission could play. This reflects also the views of stakeholders: on the one hand, many stakeholders¹²⁷ highlighted the importance of reflecting national priorities, while on the other hand, many indicated the importance of minimising distortion to the internal market and contributing to the EU long-term climate objectives¹²⁸.

An additional concern raised by many stakeholders¹²⁹ is that the governance structure and decision-making process should minimise administrative burden, be feasible for operational implementation, and be coherent in order to catalyse additional investments. In particular, the process should be simplified for small-scale projects.

8.2.3. Development and screening of policy options

8.2.3.1. *Policy options*

The main options assessed relate to the governance structure of the Modernisation Fund and in particular the different roles that Member States, the European Commission and the EIB can play to advance its objectives. The approach taken involves varying their role of these actors in aspects, such as who determines the investment guidelines (including criteria for project eligibility and selection) monitors performance, and selects projects and programmes. While

¹²⁵ Financial instruments may take the form of equity or quasi-equity investments, loans or guarantees, or other risk-sharing instruments, examples include credit enhancement mechanisms (e.g. Project Bond Initiative), risk sharing for financial intermediaries (e.g. PF4EE) and the setting-up of funds, including senior and junior loans, guarantees and equity participation (e.g. Marguerite).

¹²⁶ COM(2014) 686 final

¹²⁷ For example, several energy sector stakeholders from beneficiary Member States indicated the need for Member States to be able to set priorities for the use of resources, in line with subsidiarity, while the other stakeholders highlighted the need for investments in a modernized power sector in lower income Member States in order to achieve Europe-wide decarbonisation. See annex 3 with summary of stakeholder consultation results.

¹²⁸ See Annex 3 with summary of stakeholder consultation results.

¹²⁹ For example, several energy sector stakeholders indicated the need for simple structures for investors. See annex 3 with summary of stakeholder consultation results

various combinations are possible, the key consideration is that the governance structure needs to reflect the specific strengths and expertise of the different institutions involved.

Eligibility, selection criteria, investment guidelines and monitoring

A main factor that can be varied is the composition of the Steering Board, which will further define the rules and guidelines insofar as this has not been done in the implementing legislation of the Modernisation Fund. Membership of the Steering Board could either be primarily reserved for the beneficiary Member States, or for a balanced representation of all 28 Member States and the Commission.

- *Variation 1:* the 10 beneficiary Member States have control over defining the eligibility criteria, selection criteria and investment guidelines of the fund and monitoring its performance. The Commission provides general guidance.
- *Variation 2:* the 28 Member States together with the Commission are involved in defining eligibility, selection criteria and investment guidelines and monitoring the operations of the fund.
- *Variation 3:* The Commission defines the eligibility, selection criteria and investment guidelines and monitors performance. Within this framework beneficiary Member States pre-approve the project pipeline in line with these criteria, but do not directly define the priorities of the fund.

Project selection

With regards to project selection, the role of the EIB and other institutions is examined. There are two general options of how the EIB can be involved in the selection of projects and programmes:

- *Variation 1:* the EIB is involved in due diligence and takes an advisory role¹³⁰. The Commission and beneficiary Member States are responsible for project selection and approval, following advice by the EIB. The Steering Board would need to justify investment decisions that deviate from the EIB advice.
- *Variation 2:* the EIB is delegated to take the role of a fund manager on behalf of the beneficiary Member States and the Commission, and therefore takes investment decisions in line with investment guidelines. The Steering Board would need to justify a refusal to support investment decisions taken by the EIB.

The EIB could also act as an agent to monetise the EU ETS allowances. Finally the EIB may be one of the institutions that implements the financial instruments selected under the Modernisation Fund, together with national and regional promotional banks.

8.2.3.2. Option packages

Three different combinations for the governance structure are examined to evaluate the specific impacts and reflect the differences in stakeholder views on the relative roles of the beneficiary Member States, other Member States, the Commission and the EIB¹³¹:

- **Baseline** - a legal baseline would imply that 2% of the ETS allowances would be allocated to all 28 Member States rather than being used for modernising energy systems and

¹³⁰ This implies involvement of national and regional promotional banks in the day-to-day management of the fund with respect to financial instruments.

¹³¹ See Annex 3 on stakeholder consultation to the revision of the EU ETS directive.

improving energy efficiency in the beneficiary Member States¹³². The lower income Member States would then receive only some 87 million allowances, less than a third of the 310 million in the Modernisation Fund.

- Option 1 - large discretion and responsibility for the 10 beneficiary Member States as the only representatives on the Steering board, setting eligibility criteria and investment guidelines. The EIB would have a limited advisory role, including performing due diligence, while the Commission could administer calls for proposals for grants. The implementation could be either through grants and/or financial instruments.
- Option 2 - a wider representation on the Steering board of all 28 Member States and the Commission as well as a greater role in implementation for the EIB. The implementation would be through grants and/or financial instruments, for which the EIB could have an enhanced role as fund manager, but remaining accountable to the Steering Board to which it would report. The Commission could administer calls for proposals for grants, for which the EIB performs due diligence.
- Option 3 - the beneficiary Member States would identify a pipeline of projects to which funds should be allocated, but projects would conform to eligibility criteria and general principles for project selection analysed and set in the fund's implementing legislation. The Commission would administer any calls for proposals, for which the EIB would perform due diligence. For the purposes of the analysis, the implementation would be through a grant rather than financial instruments¹³³.

An option in which each beneficiary Member State implements the funds individually at national level is not analysed further, since this would have a limited added value compared to instruments that the beneficiary Member states already have at their disposal¹³⁴. Such an option also has the potential to have a higher administrative burden, a higher distortive effect on the common energy market and to be less suited to promote investments with beneficial cross-border effects.

The options are summarised below:

Table 6: Retained options for examining for the Modernisation Fund

	Eligibility and Selection Criteria	Investment Guidelines & Monitoring done by	Day-to-Day Management done by
Baseline	No Modernisation Fund	No Modernisation Fund	No Modernisation Fund

¹³² The current ETS Directive provides that Member States should spend at least 50% of the auctioning revenues for climate and energy related purposes but has no provisions for the creation of a Modernisation Fund,

¹³³ It should be noted that financial instruments could also be used under Option 3. However, to reflect the Council conclusions that beneficiary Member States should have a role in the Modernisation Fund, and to ensure sufficient differences between the options, for the purposes of the analysis, the implementation assumed is through grants with beneficiary Member States involvement in approving a project pipeline.

¹³⁴ For example, the optional free allocation to the power sector and the European Structural and Investment Funds.

Option 1	Implementing legislation: general principles; Steering board of beneficiary MS decides further details	Steering board of Beneficiary MS	Financial instruments: beneficiary MS approval; EIB advisory role Grants: COM organizes call for proposals; EIB performs due diligence
Option 2	Steering board of COM and 28 MS	Steering board of COM and 28 MS with input from EIB	Financial instruments: EIB acts as fund manager Grants: COM organizes call for proposals; EIB performs due diligence
Option 3	Implementing legislation: detailed principles	COM	Grants: beneficiary MS approve project pipeline; COM organizes call for proposals; EIB performs due diligence

8.2.4. Analysis of Impacts

The environmental, social and economic implications of the creation of the Modernisation Fund are driven by the European Council strategic guidance that determined the number of allowances available for the fund, the criteria based on which Member States are determined as eligible beneficiaries, as well as the method for allocation among Member States and the type of project supported¹³⁵. Annex 11 assesses the impacts of having a Modernisation Fund against the baseline scenario of not having a Modernisation fund at all. In summary, the effects of creating the Modernisation Fund when compared to the baseline are:

- **Economic impacts:** Compared to the baseline scenario, the Modernisation Fund would help trigger important investments in the beneficiary Member States that could contribute towards the key aspects of creating a strong European Energy Union with a forward looking climate policy. It is expected to contribute not only towards cost-effectively reaching the 2030 climate and energy objectives, but also towards diversifying the energy mix, improving security of supply and lowering import dependency.
- **Environmental impacts:** The creation of the Modernisation Fund has environmental and health benefits for the beneficiary Member States compared to the baseline scenario. Through facilitating investments in energy efficiency and modernising the power sector, the fund would contribute to lowering greenhouse gas emissions in the beneficiary Member States under both the ETS and the non-ETS sectors. Additionally, by lowering fossil fuel consumption, local air quality may improve leading to health benefits in the beneficiary Member States and contributing to lower costs related to controlling emissions of air pollution.
- **Social impacts:** Since the Modernisation Fund would contribute to realizing investments to facilitate the energy sector modernisation and improving energy efficiency in the

¹³⁵ The distribution of funds will be based on the combination of a 50% share based on verified emissions and 50% share based on GDP

beneficiary Member States, when compared to the baseline, it is expected to have a positive impact on employment for the beneficiary Member States, for example, through the creation of jobs through small scale projects. The final impact will depend on the amount of realized investments and in which specific sectors these are implemented.

After being compared to the baseline option of not creating a Modernisation Fund, the three options identified and presented in Section 8.2.3 will be compared with one another in their ability to achieve the operational objectives as outlined in Section 8.2.2. the following criteria will be used in order to assess the relevant differences in achieving the specific policy objectives, categorized as follows:

- Effectiveness: a governance structure should be able to catalyse additional investments, address specific barriers that limit investments in the modernisation of the energy sector and in increased energy efficiency in lower income Member States, including for small scale projects. Since a different set of instruments might be needed to address the market barriers in the different sectors, the implications of the options on the possibility to use grants, financial instruments or a mix of both would be considered.
- Coherence: a coherent governance structure should appropriately align the interests of the institutions involved, while achieving transparency in the use of the funds. The coherence evaluates the extent to which the options present a governance structure that would give confidence to private investors. In this context, the transparency of the fund is evaluated against the possibility for the European citizens and the private sector to be informed about the setting up and operations of the Modernisation Fund.
- Market distortion: Evaluate to what extent there is a risk of distorting the internal energy market.
- Administrative burden: Minimize the complexity and the administrative burden of setting up and operating the Modernisation Fund. This includes consideration of the administrative burden for project promoters.

8.2.4.1. *Effectiveness*

The three options are expected to be more effective in modernizing the energy systems and improving energy efficiency in the lower income Member States compared to the baseline scenario as they channel specific funds towards these objectives.

Depending on the barriers faced, the different types of projects in the lower income Member States may require public intervention in the form of grants, financial instruments, or a mix of the two (see Annex 10 for discussion on the barriers in different sectors, including networks, energy efficiency, and power generation). The specific type of support provided through the Modernisation Fund would depend on the project eligibility that would be determined at a later stage, depending on the chosen governance option. Based on this, a suitable form of public intervention would need to be determined based on the specific market needs. It may be needed to contribute part of the funding towards providing technical assistance facilities to speed up project preparation, and improve the quality of projects.

Grants are typically used to support non-revenue generating projects that at the same time advance the EU policy objectives¹³⁶. Grants require a certain rate of co-financing by project promoters, so assuming a co-financing rate of 50%, grants would lead to 2 fold leverage on investment. However, this rate could vary so that the minimum needed support is provided. Financial instruments, on the other hand, can realise higher leverage and scale-effects and enable cost-effective use of public resources. Evidence from the use of financial instruments implemented by the Commission and the EIB in the energy sector shows that financial instruments, depending on how they are structured, can leverage public money in the range of 6 to 15¹³⁷ times. It is possible to also blend financing options.

The options on governance have some implications for the design of any future grants and/or financial instruments. Options 1 and 2 allow flexibility to balance between addressing sub-optimal investment situations that need grant support, and maximizing leverage by using the funds through financial instruments. On the other hand, under Option 3, the proceeds would be disbursed through grants so focus will likely be given to specific sub-sectors where providing grant support would not distort the internal energy market.

Under Option 1 the use of financial instruments would potentially be more limited than under Option 2. As discussed in Section 8.2.1.3, the experience with the European Structural and Investment Funds indicates that the use of financial instruments in Member States may be limited due to bottlenecks in administrative capacity and in some cases market maturity. Therefore, under Option 1, the beneficiary Member States might opt for more traditional means of supporting investments such as grants. Under Option 2, the EIB can use its extensive experience with financial instruments and the expertise to ensure the effectiveness and competitiveness of such instruments. Therefore, once project eligibility is determined under this option it is more likely that the use of grants would be limited only to situations where financial instruments cannot help adequately.

Regarding the possible use of financial instruments, under Option 1, it is more likely that national and regional promotional banks would be more involved in structuring the financial instruments, which, in turn, could lead to a more fragmented approach resulting in different structures and financial terms offered in the different Member States for similar projects. This may result in a suboptimal level of risk sharing and diversification. On the other hand, it would allow promotional banks in the beneficiary Member States to strictly tailor these instruments to the specificity of the domestic market, in particular to support small scale projects.

On the other hand, in Option 2 the management role of the EIB could allow applying a harmonised approach across the beneficiary Member States. Standardised financial instruments have the advantage to offer consistent financial terms to project promoters and intermediary financial institutions. They could also contribute to a more optimal level of risk-sharing, which can be achieved with a larger portfolio of projects with different risk profile across the beneficiary Member States. The EIB could play a pivotal role in providing more assurances to project promoters and ensuring that evaluation and selection are performed ensuring value for money. Regarding small scale projects, under Option 2 it will be necessary to work with financial

¹³⁶ For example, the EU budget has already contributed grant support to investments in energy efficiency (through the European Structural and Investment Funds, for instance) where financial instruments may not be sufficient to overcome the financial and technical barriers. The EU budget has also provided grant support for cross-border projects (through the Connecting Europe Facility) that face additional difficulties in terms of coordination, justification, permitting and social acceptance.

¹³⁷ Report from the Commission to the European Parliament and the Council on financial instruments supported by the general budget according to Art.140.8 of the Financial Regulation as at 31 December 2013, COM/2014/0686

intermediaries¹³⁸. It allows to aggregate together similar projects of smaller size across the beneficiary Member States to build a critical mass, diversify the risks and make such projects more attractive to private investors. Specific targeted calls for proposals could be organised for small scale projects (e.g. less than €5 million) under Option 3, as well as for awarding grants under Options 1 and 2.

Option 1 gives the highest discretion to the beneficiary Member States to address national priorities but there is a risk that projects with higher EU-wide value added, such as cross-border projects might not be sufficiently included. This is addressed or at least mitigated through a stronger role for the Commission and all EU 28 Member States in Option 2. Certainty that EU-wide value added will be achieved is maximised under Option 3, under which the Commission will have high discretion, ensuring alignment with EU objectives. Under this option the pre-approval of a project pipeline by beneficiary Member States would give them flexibility to align the fund to their national priorities.

Under the three options, the EIB would be involved in the technical and financial due diligence of the projects supported by grant schemes. This would ensure that the grants are provided to maximise the environmental and economic impact and in the minimum needed amount. The organisation of calls for proposals by the Commission would avoid the issue of fragmentation and also create better visibility for the Modernisation Fund, which could improve the quality of the submitted projects.

8.2.4.2. *Coherence*

Since the three options provide different balance of the roles between the institutions, there are varying impacts on coherence of the governance structure.

Under Option 1, since the rules of the fund are agreed only among the beneficiary Member States, these might introduce fragmented approaches based on national preferences, not necessarily aligned with internal rules of the EIB¹³⁹ or with EU objectives, and thus not ensuring EU value added. This might limit the scope of the EIB role with regard to implementation and increase the uncertainty for investors about how projects will be assessed.

Under Option 2, with a wider representation of Member States and institutions at the Steering Board, it is more likely that the guidelines for selection of projects will be consistent with internal guidelines of the Commission and the EIB, and with EU objectives. This would make it more likely to enhance the EIB role, which would provide certainty for private investors. Under such circumstances it is more likely that the EIB may decide to be involved in risk-sharing or co-financing of projects, which could decrease the cost of capital for project promoters who can take advantage of the EIB's favourable financial terms.

On complementarity with existing instruments, Option 1 may facilitate coordination with existing national schemes and the use of the European Structural and Investment Funds, which are distributed at national level, but it will be more challenging to ensure complementarity with EU-level instruments. On the other hand, in Option 3, the Commission will have higher discretion in setting priorities and selecting projects, ensuring alignment with EU objectives. The involvement of the beneficiary Member States through pre-approval of projects that can apply for funding

¹³⁸ For example, the EIB and the Commission are already using this approach with the Private Finance for Energy Efficiency financial instrument. It provides guarantees managed by the EIB to commercial banks in Member States to support small scale energy efficiency projects.

¹³⁹ The EIB has internal energy lending criteria, set at EU level with the agreement of all 28 Member States (<http://www.eib.org/infocentre/publications/all/eib-energy-lending-criteria.htm>).

would ensure that the selected projects are in line with the national investment plans. As a more balanced distribution of the roles, Option 2 would ensure that consideration is given to consistency with existing initiatives both at beneficiary Member State and at EU level, while maximising the respective strengths of the Member States, Commission and the EIB.

In terms of transparency, under Options 1 and 2, the operational details of the fund will be set by a Steering Board, rather than during the process of defining implementing legislation. This may reduce the transparency in how investment criteria are set. However, stronger involvement of the Commission, which is accountable to the European Parliament, would likely improve transparency vis-à-vis European citizens in designing the rules of the fund and monitoring the operations, notably for Option 2. In that vein, Option 3 provides the highest level of transparency as the majority of the operational rules would be analysed and included in the implementing legislation. The Commission would ensure an EU level competitive process, including appropriate reporting on the use of funds and the timely review of the Modernisation Fund.

8.2.4.3. *Market Distortion*

Since the energy sector is commercially driven and revenue bearing, public intervention should use the least distortive tools to address potential market failures or sub-optimal levels of investment. Any support provided should maintain a level playing field in the internal energy market, so as to ensure open access for possible use of infrastructure. Support should avoid overcompensation and wasteful duplication of investments.

Under Option 1, beneficiary Member States are strongly involved in the investment decisions. As discussed, this might result in more fragmented approach with different criteria and terms applied in each beneficiary Member State and a risk that minimising the distortions of the internal market are considered to a lesser extent. The support may be cumulative to aid granted under other options of funding.

Option 2 would differ from Option 1 through a wider representation in the governance structure, but the way in which support is granted could still lead to distortions. Therefore, this support would again have to be subject to State aid control. The EIB and the Commission would act under mandate from the EU28 Member States to ensure consistent selection and treatment of financing for equivalent projects across the beneficiary Member States. This would make distortion of the internal market less likely.

Option 3 would imply the most extensive rules and procedures to avoid the risk of market distortion, by analysing and setting detailed eligibility and selection criteria in advance, including requiring the use of competitive bidding processes where possible. The involvement of the Commission would ensure that the fund addresses concerns of market distortion and takes into account the EU-value added, for example through contributing to creating an Energy Union and completing an internal energy market.

Across all options, support granted by Member States would need to be subject to State aid control (where relevant). However, small-scale projects may fall in categories which exempt them from ex-ante notification under state aid rules or benefit from low support levels. Under the current rules, small-scale projects could qualify for an exemption from state aid notification under the *de minimis* regulation¹⁴⁰ if less than EUR 200,000 of aid is given over 3 years. While the fund would be operational only as of 2021, some projects could qualify for an exemption from ex-ante

¹⁴⁰ http://ec.europa.eu/competition/state_aid/legislation/de_minimis_regulation_en.pdf

notification under a possible future general block exemption regulation¹⁴¹, if certain conditions on amount, intensity and recipients are met, as the Commission evaluated that the provision of such aid does not unduly distort competition in the single market. .

8.2.4.4. *Administrative Burden*

Under all options, project promoters need to provide information to facilitate an assessment of the necessity and proportionality of support and to assist the selection process. As such, all options involve some administrative burden for project promoters, Member States the EIB and the Commission.

On administrative burden for the institutions involved in managing the Modernisation Fund, Option 3 is the least burdensome for Member States since it involves the setup of a single mechanism – a competitive call for proposals across all beneficiary Member States. Option 1 and 2 may involve higher administrative burden due to the setting-up of additional financial instruments. This burden would fall on the financial institutions that would be entrusted to implement these instruments, unless the Steering Board decides to implement the fund through already existing instruments. Under Option 1, a decentralized solution to financial instruments may increase the management complexity and costs and might be less efficient in ensuring the due diligence process is conducted in a uniform manner. Compared to Option 1, Option 2 could limit the administrative burden through the implementation of standardised financial instruments.

Administrative simplification for project promoters is important for facilitating investment, in particular for small scale projects. Two aspects are noteworthy in that regard: 1) the extent to which there is clarity for project promoters and investors on project selection and investment criteria, and 2) the administrative burden faced by project promoters in applying for funding.

Option 3 provides the highest clarity on the criteria for project selection as they would be defined in the implementing legislation and be applicable to all beneficiary Member States. Compared to this, Option 1, results in a fragmented national approach with different criteria per Member State. This could result in confusion for project promoters, in particular for international investors, and become an obstacle to effective implementation. Option 2 would simplify the procedures for international investors through the introduction of standard financial instruments across the beneficiary Member States. It would improve visibility through the 'one-stop shop' approach, providing the same procedures and terms for project promoters and investors across the 10 beneficiary Member States. It will be particularly important to ensure simplified procedures for financing of small-scale projects to facilitate the specific challenges these projects face. Under all Options, calls for proposals could target small-scale projects applying for grant schemes. Compared to Option 2, under Option 1 there would be closer proximity between local project promoters (that tend to support smaller ticket projects) and the managing financial institutions and this would facilitate the support for small-scale projects. On the other hand, Option 2 could address small scale projects through local financial intermediaries. This would mean simplified rules for project promoters, but it would create additional burden for setting up such intermediary arrangements with the financial institutions. Specific technical barriers could be addressed by dedicated technical assistance facilities.

¹⁴¹ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0651&from=EN>

8.2.5. Comparing the Options

As the Modernisation Fund is a new funding mechanism that will be operational as of 2021, the detailed operational modalities would ultimately need to reflect the types of projects eligible and the specific barriers that need to be addressed to realize these investments. The governance structure of the fund is therefore a crucial first step towards further choices regarding eligible projects and the modalities for financing. Compared to the baseline scenario, the creation of the Modernisation Fund is expected to have important positive benefits for the beneficiary Member States through contributing towards the key dimensions of a strong Energy Union with forward-oriented climate change policy and towards cost-effectively reaching the 2030 climate and energy objectives. It is expected to trigger investments that create employment opportunities, lower greenhouse gas emissions and improve air quality in the beneficiary Member States.

The table below lists the evaluation of impacts of the three different options.

Table 7: Impact of policy options for the Modernisation Fund

	Increase effectiveness	Increase coherence	Minimise risk of market distortion	Minimise administrative burden
Baseline	No Modernisation Fund	No Modernisation Fund	No Modernisation Fund	No Modernisation Fund
Option 1	+	0	-	-
Option 2	++	+	+	+
Option 3	0	+	++	+

When screening and comparing the options, two pluses indicate a major improvement when compared to the alternative baseline, one plus indicates an improvement, zero indicates no change and one minus indicates deterioration.

The three examined options illustrate some key trade-offs to be considered in the overall governance of the fund. While all four criteria (effectiveness, coherence, market distortion and administrative burden) are instrumental in the comparison of the options, ‘effectiveness’ is key in ensuring the governance structure contributes towards the objectives to modernise the energy sector and improve energy efficiency served by the Modernisation Fund

While Option 3 provides for a clear and simple governance structure, it may have a more limited impact on mobilising private investments if implemented by grants and would therefore have a more limited effect on the modernisation of the energy systems.

Option 1 has clear advantages in addressing national priorities and specificities, but it may not fully reflect European priorities. Furthermore the risk of distortions to the internal energy market is higher and fragmentation may be too burdensome for larger investors resulting in lower effectiveness compared with Option 2. Option 2 presents a balanced approach that would allow to maximize private investments, while taking in account both national and European priorities. However, appropriate structure of intermediation would be needed to finance small scale projects.

8.3. **Free allocation to promote investments for modernising the energy sector**

8.3.1. Policy objective and problem definition

For the electricity generation sector, the rule is that operators no longer receive any free allowances but have to buy them. However, eight of the Member States which have joined the

EU since 2004 - Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Lithuania, Poland and Romania - have made use of a derogation under Article 10c of the EU ETS Directive which allows them to give a decreasing number of free allowances to existing power plants for a transitional period until 2019. Latvia and Malta were also eligible to use this derogation but chose not to.

In the context of the 2030 climate and energy framework European leaders have decided in October 2014 that this option should also be available for lower income Member States with a GDP of less than 60% of the EU average in 2013 during the next decade up to a maximum of 40% of their allowances before redistribution is taken into account.¹⁴² If all eligible Member States make full use of this option, the maximum amount given for free could be more than twice as much as the number of allowances used for the Modernisation Fund.

The policy objective of the optional free allocation to the power sector is similar to that of the Modernisation Fund - to enable lower income Member States to modernise their energy sector. As indicated in Annex 10, besides the scale of the relevant investment challenges in the energy sector in these Member States between 2021 and 2030, common barriers to realising the investments also occur, such as underdeveloped financial markets, split incentives for realising improvements to energy efficiency and a higher perceived level of risk, which can form challenges to mobilising the necessary investments in the energy sector, as also noted for the Modernisation Fund

Free allocation to the power sector differs from the Modernisation Fund because the allowances which can be given for free are deducted from the auction volume of the Member State concerned, while the Modernisation Fund has a collective funding basis and thus re-distributional characteristics. Consequently, free allocation is optional, and during the current trading period (2013-2020) several Member States have chosen not to make use of it or only to make limited use of this possibility. The free allowances can only be given subject to carrying out investments aimed at modernising the energy sector in the Member State. The investments must be at least equal in value to the free allocation.

To assess the potential options for continuation of this policy, the lessons learnt from implementation of the existing arrangements to make use of free allocation to the power sector are first considered.

As with the Modernisation Fund, optional free allocation to the power sector aims to support investments to improve energy efficiency and to modernise the energy systems in 10 lower income Member States. Underlying problem drivers include the general barriers to investment to investments described in section 8.2.1.2 and the financial barriers specific to the energy sector listed in Annex 10.

8.3.2. Conclusions on lessons learnt and policy context

An extensive discussion of the lessons learnt from the current implementation of free allocation to power can be found in Annex 4.2. The initial results from the experience of the first year (2013) of implementation of this provision indicate that while many of the investments included by the beneficiary Member States in their national investment plans on free allocation to the power sector are taking place, the modalities for the implementation of the provision differ

¹⁴² Assuming a range for the average annual total quantity of 1 to 25 million allowances this could be as much as €25 million - €625 million

significantly. These differences between Member States, combined with differing availability of public data, make a direct comparison difficult and result in limited transparency.

There is scope for streamlining and creating a simpler, clearer and more transparent approach for the Member States that will choose to use the derogation after 2020. Care should be taken to avoid distortion of the energy market, for example by more clearly establishing the need for investments and their effect.

The European Council has indicated that the continuation of free allocation should be based on improved modalities to ensure the funds are used to promote real investments in modernising the energy sector, while avoiding distortions of the energy market. In this context, and taking into account the lessons learnt, this impact assessment focuses on the options for improvement of these modalities compared to current practice.

8.3.3. Operational policy objectives

The operational policy objectives for free allocation to the power sector relate to the key areas for improvement identified in relation to the existing mechanism.

The main operational objectives are:

- to improve transparency and ensure that the funds are used to promote real investments modernising the energy sector;
- Simplicity - lowering the complexity and reduce the administrative burden related to the implementation;
- Avoid distortions of the internal energy market and minimise the impact of the mechanism on the general functioning of the European carbon market.

In this context, "real" is considered to refer to additional investments compared to what would have been invested in the absence of the free allocation.

8.3.4. Development and screening of policy options

The main options assessed relate directly to the timing and selection of investments and to transparency requirements. These elements are key issues for which the implementation currently varies among Member States and which can affect either the volume of allowances coming to the market (timing of investments and auctioning of unused allowances), or the achievement of the operational objectives, such as transparency and simplicity (selection of investments and transparency requirements).

With regard to the **selection of investments**, the current practice based on national plans designed by Member States based on common principles¹⁴³ could be replaced by the selection of investments at the national level through an open competition based on targeted performance, which could be e.g. organised through a tender or competitive bidding with the investment representing the best value for money being selected / prioritised.

A change which could be considered to reflect the longer period covered (2021-2030) and potentially changing investment priorities would be an optional revision or update of the national

¹⁴³ For example, principle 5 in the guidance document on the optional application of Article 10c (2011/C 99/03) states that "Investments identified in the national plan should contribute to diversification, and reduction in carbon intensity, of the electricity mix and the sources of energy supply for electricity production.

investment plan, for example midway through the trading period. This could allow changes to the design of proposed investments to be evaluated. At the same time, ensuring equal treatment for revised and initial investments could necessitate an approval process for such an update similar to the one carried out for the initial national plan. This would result in a significantly higher administrative burden for operators, Member States and the Commission, and would pose comparability concerns, while *de facto* limiting the possible scope of the review.

A competitive bidding process would need to take place before the trading period, in order to determine the investments eligible for free allocation. The bidding process could be a tender based on pre-determined criteria and cost-per-unit of performance, to provide an objective way of assessing which investments would offer value for money.¹⁴⁴ A further change that could be considered is applying this process for large investments, while allowing smaller investments to be approved without the competitive bidding process subject to State aid regulations¹⁴⁵.

With regard to **transparency**, instead of reporting at Member State level, the Commission could, for instance, be mandated to centrally publish the relevant information in a timely manner. In addition, the selection of investments through an open competition would likely also enhance transparency.

With regard to **timing**, a flat or consistent share of free allocation (equal amount per year) could be considered instead of the current approach which was in line with the transitional nature of the free allocation to power provisions in phase 3 and requires the highest level of investment at the start of the period and a decline to zero at the end of the trading/derogation period. From 2021 to 2030, a similar distribution could be maintained or a choice could be made for a flatter distribution of allocation and corresponding investments over the derogation period. For example, the share could be a consistent percentage of the auctioning volume of the Member State for each year, or the amount over the period could simply be divided over the years with a high start and a linear decline to zero to the end of the period. Changing the timing would potentially affect both the distribution of investments over the period and the supply of allowances to the market.

One other issue identified in the lessons learnt are the variations of provisions for the **auctioning of unused allowances** provisions across beneficiary Member States. Harmonised rules on auctioning after a specified time or during the same year if the allowances are not given for free could be envisaged. This would reduce the variation between Member States and set a clear timetable for auctioning of unused allowances, enhancing predictability for the carbon market.

8.3.4.1. *Aspects not varied between the options*

In the current legislation two aspects are regulated differently: i) the use of either benchmarks or verified emissions as the basis for determining potential free allocation to individual installations and ii) the use of a reference price determined in advance or based on observed market prices in the year concerned to calculate the market value of free allowances. As described in the lessons learnt, these choices result in differentiation between Member States, increase the complexity of the implementation and make it considerably more difficult for outside parties to understand what the basis for the free allocation to individual installations is.

¹⁴⁴ For example, investments in renewable energy could be compared based on the cost per unit of renewable energy produced, investments in modernising existing power plants could be compared based on the cost per unit of reduction in emissions intensity achieved or the reduction in energy use could be compared based on the cost per unit of reduction in primary energy use.

¹⁴⁵ Under the currently existing regulations, small projects can qualify for an exemption from state aid rules under the *de minimis* regulation (if less than €200,000 of aid over 3 years is provided) or under the general block exemption regulation (if certain conditions on amount, intensity and recipients are met).

To ensure a more consistent and transparent approach, an easy and effective simplification would be to use only one approach rather than allowing several alternatives which differ mainly in the methodology used, rather than the underlying principles. To determine the maximum allocation for an individual operator, the existing benchmark methodology could be applied to all installations. To determine the reference price for free allowances, the approach applied by several Member States to use the average market price in primary auctions for the calendar year¹⁴⁶ could be generalised. These methods more closely reflect market conditions and could be easily applied. To ensure consistent implementation, only one approach would be allowed in each case.

The existing approach now taken by almost all Member States to base the request for free allocation by operators on proof that the investments have been carried out is foreseen to be continued for all assessed options. Several Member States, such as the Czech Republic and Estonia, emphasised the importance of this practice for the monitoring of the investments.¹⁴⁷

8.3.5. Retained option packages

Four coherent combinations of options are analysed below, representing an increasing level of change compared to the continuation of the current practice, in particular reducing the variation in certain aspects currently implemented differently in individual Member States and moving towards a competition as the basis for the selection of investments by Member States.

Baseline A: a strict legal baseline would imply no continuation of free allocation to the power sector after 2020. The allowances in question would then be auctioned and the revenues would be at the disposal of the individual Member States. The same result would be achieved if Member States choose not to make use of the derogation for free allocation to the power sector.

Alternative baseline B: this scenario most closely represents a continuation of the current practice of the implementation of free allocation to the power sector.

Option 1: Streamlined: this option envisages more consistent rules and procedures compared to current practice. The allowances are either given for free for a specific calendar year, or otherwise auctioned in the following calendar year, excluding delays for investments. The relevant information reported to justify the free allocation would no longer be reported separately by the individual Member States, but directly and centrally by the Commission, enhancing transparency.

The determination of the maximum allocation per installation and the reference price are also replaced by one method, thus making a more standardised version of current practice, reducing differences in methodologies now varied between Member States while leaving in place most of the principles for free allocation to the power sector.

For this option, it is assumed that the timing of the free allocation remains as it is now, with a high start and a declining trajectory. The option for a revision of the national plan could be included in such an approach.

Option 2: Open selection: this option involves further changes to the provisions for the selection of investments as compared to the current practice. Changing the selection can affect the effectiveness in promoting investments and the transparency of the basis for this selection. The change compared to Option 1 is that for large investments any potential risk of market distortion

¹⁴⁶ If this is more than 20% lower compared to the value set in advance based on the guidance document

¹⁴⁷ See Annex 3 on summary of stakeholder consultation

would be reduced by requiring an open competition based on best value for money and an objective to which the investments should contribute set by Member States. The competitive selection process to compare the investments will be based on value for money, rather than listing the investments in a national plan as for the current free allocation. Smaller investments could be approved without the selection process provided they comply with relevant State aid rules¹⁴⁸. The possibility to delay the auctioning of unused allowances for 1 or 2 years is maintained. It is assumed that the timing of the free allocation remains as it is now, with a high start and a declining trajectory.

Option 3: Annual basis and open selection: this option would imply the greatest level of standardisation, by applying the permitted percentage of free allocation on an annual basis. This "use it or lose it" approach has the benefit of being fully predictable for the market in terms of timing of the supply be it as free allocation or via auctions. As in option 2, the selection of the investments is changed to an open competition based on best value for money. This option provides the additional possibility to 'opt-in'/'add' the free allocation to power allowances to the Member State's share of resources for the Modernisation Fund. Doing so would allow for implementation through the single governance structure of the Modernisation Fund rather than through two parallel administrative procedures. Although in principle this 'opt-in' is possible for each option, it is indicated specifically here because this option represents the greatest number of changes compared to current practice.

Table 8: Option packages for the free allocation to the power sector

	Timing of investments	Selection of investments	Auctioning of unused allowances	Reporting
Baseline (Directive unchanged – 10c discontinued)	Not applicable	Not applicable	No free allowances	Not applicable
Alternative baseline (current rules continued)	High allocation in 2021 and declining trajectory to 0 in 2030	National plan with investments selected by Member States	1 or 2 years after planned allocation if not used	Application and annual reports published by Member States
Option 1 As base case (+ streamlined)	High allocation in 2021 and declining trajectory to 0 in 2030	National plan with investments selected by Member States	Same year if not used	Application and annual reports published by Commission
Option 2 As base case (+open selection)	High allocation in 2021 and declining trajectory to 0 in 2030	Open competition for large scale investments based on value for money at Member State level, small projects under state aid rules	1 or 2 years after planned allocation if not used	Application and annual reports published by Commission

¹⁴⁸ Under the currently existing regulations, small projects can qualify for an exemption from state aid rules under the *de minimis* regulation (if less than EUR 200,000 of aid over 3 years is provided) or under the general block exemption regulation (if certain conditions on amount, intensity and recipients are met).

Option 3 (Annual basis and open selection)	Start in 2021 and equal amount per year or share of auctioning	Open competition for all investments based on value for money at Member State level (with possibility to add allowances to the MS share for the Modernisation Fund)	Same year if not used	Application and annual reports published by Commission
--	--	--	-----------------------	--

8.3.6. Assessment of options

The assessment of the impacts focuses on the economic, environmental and social impacts of the relevant policy options, specific impacts relating to the operational objectives are outlined in the section on general impacts. In each case, Option 1, 2 and 3 are compared with the alternative baseline, which represents a continuation of current rules for Article 10c.

8.3.6.1. *General impacts - Effectiveness*

A strict legal baseline would imply that the current provisions for free allocation to the power sector expire after 2020. This would exclude the possibility for Member States to give free allowances to their power sector in return for investments in modernising the energy sector and could slow the modernisation of the energy sector. On the other hand, the Member States would receive higher revenues from the auctioning of the allowances which would otherwise be allocated for free. 50% of these revenues should then be spent on climate action in accordance with the existing provisions of the ETS Directive. Such revenues could be spent on modernisation of the energy sector.¹⁴⁹

The level of investment is not quantified for the options under consideration. However, in general it could be expected that the options with a higher amount of allocation in the early years of the trading period lead to a proportionally higher level of investment for these years. The provisions for delays could affect the investment in two ways. If a longer delay is allowed, this may allow for investments which would otherwise not be eligible to be counted for free allocation, thus increasing the potential investment that can be triggered. However, the use of such delay provisions can also make it easier for investments to take place later than planned. This could affect the distribution over time with more investments taking place later in the trading period, and such delays may also be associated with cost increases.

The scenarios involving an open selection of projects would be more effective at encouraging private investment, given that the winning projects in such a competitive selection would be those scoring best in terms of the value for money. On the other hand, scenarios based on national plans may lead to a diverging outcome, depending on the priorities and energy policy objectives of the individual Member States, and thus lead to a fragmentation of the common market.

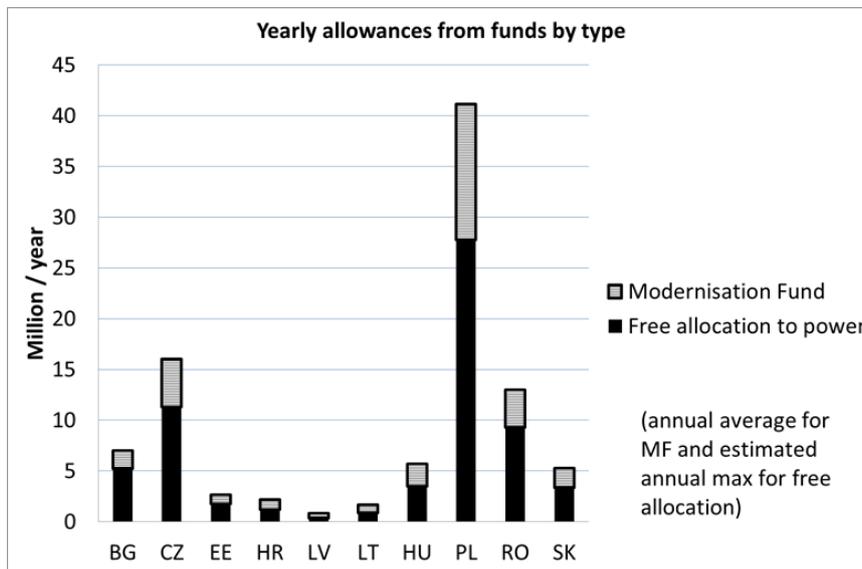
A final consideration relates to the possibility to add allowances to the Member States share in the Modernisation Fund. Because this fund will involve the EIB, this option may allow Member States to avoid the administrative burden and complexity of having to implement two programmes with overlapping objectives. The governance structure for the Modernisation Fund will also provide a mechanism for the selection and guidelines for support for investments aimed at modernising their energy sector.

¹⁴⁹ 50% of these revenues would be expected to be spent on climate action in accordance with the existing provisions of the ETS Directive. Where applicable, such spending should comply with State aid rules.

For Member States with the lowest absolute number of allowances under the derogation, i.e. small Member States, the ability to combine both resources may also be a valuable way to ensure a critical mass making the use of public resources more effective. For instance, it could allow Member States to support larger projects, assuming that otherwise combining funding from the Modernisation Fund and free allocation to the power sector is not possible. For more than half of the beneficiary Member States, the combined resources from the Modernisation Fund and the optional free allocation to the power sector would amount to less than 5 million allowances per year. Although the amounts depend on the timing of the allocation and the applied market value, there is a clear indication that combining the Modernisation Fund and free allocation to power could contribute to less fragmentation and more effective use of public resources.

In conclusion, when compared to the alternative baseline, option 2 and 3 are considered to have a positive impact due to the competitive selection, while option 1 would be expected to lead to similar outcomes.

Figure 5: Annual allowances from fund by type



8.3.6.2. General impacts - Complexity and administrative burden / flexibility to adjust to MS circumstances

A delay of one or two years in realising the investments will require monitoring and verification by the Member State and the assessment of the associated annual reports by Commission to track these investments and the allocation linked to them over a period of two or three years. This significantly increases the complexity and administrative burden as the reference price used to estimate the market value of the allowances can also differ from year to year leading to uncertainty on the number of allowances that will be allocated in any individual year. On the other hand, if allowances are either issued or auctioned in a single year, the monitoring and reporting would be simpler, but it could mean that investments which take place one or two years later than planned become ineligible for free allocation, providing less certainty to investors.

Drawing up an individual national plan with a full framework of specific rules per Member State places a significant administrative burden on the Member States. By contrast, if the selection of investments is based on an open competition and general principles ensuring limited market distortions, the process could be relatively straightforward. However, depending on the number of different types of projects for which a competitive bidding process would be organised, it

could also pose an administrative burden. For option 2, the possibility for smaller investments to be approved without competitive bidding, subject to compliance with State aid rules could facilitate a simpler approval process leading to a lower complexity.

An optional revision or update of the national plan as part of Option 1 would be expected to significantly increase the administrative burden.

In conclusion, when compare to the alternative baseline, option 1 is expected to have a positive impact due to the streamlined modalities, while option 2 and 3 would be expected to lead to a higher administrative burden when compared to the alternative baseline as a result of the requirement to organise a competitive selection process.

8.3.6.3. General impacts - Transparency

Transparency is related to both the accessibility of information and the level of detail of the information in the public domain on the preparation and implementation of the free allocation to the power sector. As indicated in the lessons learnt, transparency is affected by the general process for the selection of investments, the implementation of free allocation, and also by the wide variation in reporting and the difficulty in some cases of accessing the available information.

First, those options involving a centralised publication by the Commission would increase the transparency compared to the current practice. The clarity of the information and transparency of the process would benefit from a single consistent reporting format .

Second, having the harmonised rules for auctioning of unused allowances would improve the clarity and predictability of market supply of allowances, while a direct link to the actual year in question (a "use it or lose it" approach) would be best. If it is known that all unused allowances are auctioned either one or two years later, then it is much easier to assess the range of the potential quantity of allowances that could be issued under the derogation or auctioned if unused. If all unused allowances are auctioned in the following year, the volume can immediately and automatically be identified once the allocation for a year is known. The greatest uncertainty would arise from continuing the current variation, which makes it difficult for market analysts to interpret how many allowances will be allocated or auctioned at which stage.

Third, the options differ in the selection of investments. If done by Member States through an open competition based on clear pre-defined criteria with a clear measure of value for money, it is likely to contribute to a more transparent process as compared to distinct national investment plans.

When compared to the alternative baseline, options 1, 2 and 3 are all expected to lead to an improvement. For option 2 and 3, the positive impact is expected to be greater, as reporting of the relevant is centralised and the open selection process for investments is expected to also contribute to greater transparency regarding the selection of investments when compared to the alternative baseline.

8.3.6.4. General impacts - Potential distortion of EU energy market / complementarity with existing EU instruments

Giving allowances for free from 2021 to companies operating on the energy market in specific Member States in return for realising investments modernising the energy sector has the potential to distort competition on the energy market. It can also lead to a fragmentation of the internal market, especially along national borders. Assuming a range for the average annual total quantity of 1 to 25 million allowances and a price per allowance of €25, the allocation could represent an

annual market value between €25 million and €625 million. In particular, if the free allocation is distributed selectively to power producers in a Member State, but not to potential competitors in the same market or in neighbouring Member States where no free allocation is given to the power sector, this can lead to an undue advantage and thus a market distortion.

The potential distortion of the energy market also depends on the progress towards market liberalisation and on the types of investments receiving free allocation. If the investments are only in activities in markets with clear market failures (e.g. renewable energy or energy efficiency), or to activities related to infrastructure investments in regulated markets (such as energy grids), the risk of distortion of competition is considerably lower than if investments in conventional power generation also receive free allocation. Investments in conventional power generation risk to fragment the internal market or to prevent alternative solutions from being developed (e.g. demand response).

This is also the case where the rules specify that investments related to power generation must be strictly limited to the modernisation of installations. For example, this is currently regulated through requirements to de-commission an equivalent capacity if an investment would otherwise lead to a net increase in the level of generating capacity.

Another potentially significant factor relates to the basis for selection between comparable investments. If the selection is based on a competitive open procedure (i.e. a tender or bidding process based on value for money that is open to all the operators) and an objective basis ensuring selection of the investments based on best value for money, as is the case for large investments in Option 2 or for all investments in Option 3, an undue distortion of the market would be less likely. The options based on such selection mechanism are thus assumed to involve a lower risk of market distortion than those based on national plans.

In conclusion, although the actual outcome will depend on the type of investments selected, Option 1 is expected to lead to similar outcomes as the alternative baseline. By contrast, the competitive selection process for investments in Option 2 and 3 is expected to have a positive impact in reducing the risk of potential distortion of the energy market.

8.3.6.5. Timing and distribution of investments and volume and timing of allowances on market / auction revenues of investments

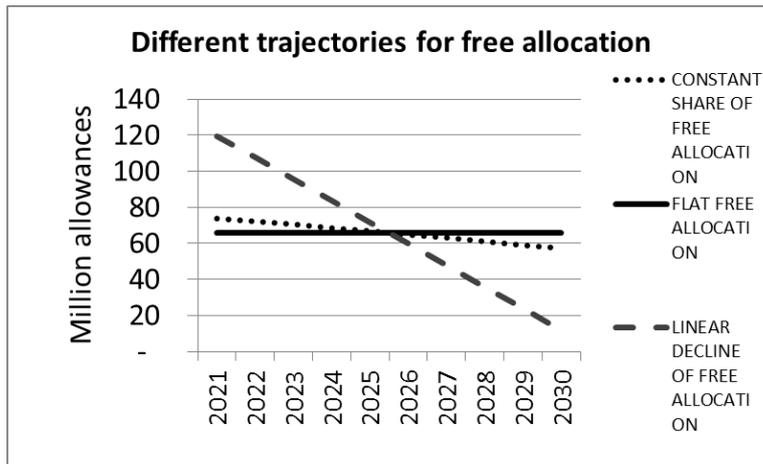
The volume and timing of market supply of allowances depends on the trajectory for free allocation, which varies for the options considered. Specifically, the impact is determined by the counterfactual scenario of what would happen if the Member State chose to auction all the allowances, instead of allocating them for free.

If the free allocation trajectory is assumed to decline in a linear manner from a high start, as is the case in the current free allocation, a relatively higher amount of allowances will be issued in the initial years of the period ("front-loading") compared to what would otherwise have been auctioned, while a lower amount is issued in the later years of the period. The degree of any front-loading also has implications for the transfer of allowances into the Market Stability Reserve. In case individual Member States decide to front-load a substantial amount, the surplus would be higher and relatively more allowances would be transferred to the reserve¹⁵⁰. If by contrast the share of freely allocated allowances is kept constant relative to the annual auctions, the impact is much lower. Similarly, if an equal amount of allowances is allocated for free each

¹⁵⁰ Under the MSR proposal (COM/2014/20), each year 12% of the total number of allowances in circulation are transferred in the MSR provided this total number is higher than 833 million allowances.

year, the impact on the market in terms of additional supply is relatively low. This is shown in a stylised example illustrated below. Thus, the options with a constant share or flat amount of allowances per year will have a more limited impact on the carbon market.

Figure 6: Combined free allocation trajectories



This aspect, however, interacts with another factor further determining the impact on the carbon market: the rules governing the auctioning of unused allowances. If an investment is allowed to be delayed for one or more years, then this creates uncertainty about when these allowances will enter the market, either through free allocation or auctioning. The quantity of allowances for which this uncertainty applies is highest during the early years of the trading period, in particular if a linear trajectory with a high start is assumed in combination with a longer delay. If unused allowances are auctioned in the same year, there is no underlying uncertainty because regardless of the way they are put in circulation, the quantity of allowances reaching the market is known.

As described in the lessons learnt (see Annex 4.2), in the first year of implementation for free allocation under Article 10c, roughly 18 million allowances remained unused (around 12% of the maximum amount that could be allocated for free). This quantity is likely to increase during future years, as unused allowances accumulate. The timing and scale of volumes of unused allowances being auctioned by the Member States will determine their impact on the carbon market.

8.3.6.6. Environmental impacts - Potential decarbonisation

At the EU level, the reduction in greenhouse gas emissions within the sectors covered by the EU ETS is guaranteed by the declining cap. As a result, the different options described here are assumed to have no impact on emissions at the EU level, although if additional investments take place as a result of the free allocation to the power sector these could ensure that a relatively larger share of the expected reduction takes place in the Member States concerned. A higher level of reductions in greenhouse gas emissions can also deliver a corresponding improvement in other pollutants which negatively affect air quality.

Direct environmental benefits may occur at Member State level, in particular through improved local air quality and the related health benefits. Certain investments relating to energy efficiency such as renewing heat networks may also lead to a larger reduction of carbon emissions in sectors outside the EU ETS.

Option 1, 2 and 3 are thus considered to have a similar environmental impact when compared to the alternative baseline.

8.3.6.7. Social impacts

It is not possible to quantify the impacts on employment in the individual Member States, although a positive impact on employment may be expected in proportion to the level of increased investment, if this is realised as a result of the free allocation to the power sector. At the same time, if such investments lead to the replacement of existing assets in the power sector, there may be a net shift in employment rather than an expansion.

On the other hand, if Member States choose not to provide free allocation to the power sector, they will have more revenues from the auctioned allowances to be used for climate action, in line with the existing provisions of the Directive that at least 50% of revenues should be used for these purposes, including all revenues from allowances redistributed to lower income Member States¹⁵¹.

Options 1, 2 and 3 are considered to have similar social impact outcomes when compared to the alternative baseline.

8.3.7. Comparing the options

The outcomes of the impacts for the different options are displayed below.

Table 9: Comparison of options for the free allocation to the power sector

	Effectiveness	Minimise administrative burden	Increase transparency	Minimise risk of market distortion	Minimise impact on carbon market
Baseline (Directive unchanged – 10c discontinued)	No support for modernisation -	Not applicable +	Not applicable +	No risk ++	No impact ++
Alternative baseline (current rules continued)	0	0	0	0	0
Option 1 As base case (+ streamlined)	No change	+	+	+	+
Option 2 As base case (+open selection)	+	0	++	+	No change
Option 3 (annual basis and open selection)	+	0	++	+	+

When screening and comparing the options, two pluses indicate a major improvement when compared to the alternative baseline, one plus indicates an improvement, zero indicates no change and one minus indicates deterioration.

In terms of comparison of the options, the strict legal baseline would imply discontinuation of free allocation to the power sector. If this is the case, the policy objective of supporting investment in the eligible low-income Member States may not be met.

The alternative baseline by contrast implies the continuation of current practice, expecting to lead to a continued high administrative burden for Member States and perceived lack of transparency. It also offers little scope for improvement with regard to the potential risk of distortion of the energy markets. As a result, this option would not allow the objectives to be met.

¹⁵¹ Article 10(3)

As the table shows, the streamlined approach (option 1) would provide some improvements on most of the criteria considered: it would help improve transparency and reduce the administrative burden because of simpler implementation with fewer exceptions. If an option to revise or update the national plan was included, this would significantly increase the administrative burden. Transparency would benefit from centralised reporting. This option 1 would not involve radical changes to the selection of investments and provision of free allocation, and therefore the effectiveness is assumed not to improve compared to the current practice.

Changing the trajectory of free allocation and including specific procedures for the selection of investments based on a competitive process may lead to a higher administrative burden, in particular for option 3 where this is applied to all investments. However, at the same time this also offers a greater potential to improve transparency by using a clear and consistent basis for the selection of investments. A competitive selection based on value for money could also lead to a higher effectiveness in realising investments in modernising the energy sector.

A possibility to provide additional benefits would be to allow those Member States that choose to do so to use the governance structure of the Modernisation Fund to efficiently select and fund projects aimed at modernisation of their energy sector. This would avoid unnecessary duplication of administrative structures, reduce overhead and give the potential to make use of the EIB expertise in project selection. This option would also provide a single and therefore simpler structure for potential investors.

In conclusion, no single option clearly scores best on all the criteria considered in this impact assessment. The final choice depends on whether limited changes implied by Option 1 are considered sufficient in light of the main operational objectives of improved transparency to ensure that the funds are used to promote real investments modernising the energy sector, while lowering the complexity and the administrative burden related to the implementation. Options 2 and 3 offer the potential for further reaching improvements, but may result in an increased administrative burden unless the governance structure of the Modernisation Fund is used.

8.4. Inter-linkages between the low carbon funding mechanisms

Three main inter-linkages can be identified between the low-carbon funding mechanisms described in this chapter.

Both the Innovation Fund and the Modernisation Fund will involve the monetisation of allowances in order to provide funds for investment. Annex 13 provides a further discussion of the relevant choices and impacts related to the timing of the monetisation, showing that the auctioning of a steady amount of the allowances between 2021 and 2030 would allow for a minimal price risk and market impact when compared to front-loading the allowances. At the same time, ensuring that both the Innovation Fund and the Modernisation Fund become operational from 2021 would require the timely monetisation of the corresponding share of the total number of allowances. A balanced approach is therefore needed to time the auctioning of allowances in such a way as to provide certainty of available funds, while also avoiding a negative impact on the carbon market.

Both the Modernisation Fund and the optional free allocation to the power sector aim to support investments to improve energy efficiency and to modernise the energy systems in 10 lower income Member States. While under the Modernisation Fund, specific investments may receive financing, the optional free allocation would directly provide free allowances from the auctioning share of the Member State concerned to operators in return for investments being carried out. Specific barriers for such investments are described in Annex 10. In order to prevent the same

investment receiving aid from two different sources, which would reduce the efficiency of the use of scarce public resources, it is proposed to include a provision on the potential accumulation between free allocation to the power sector and the Modernisation Fund. Several stakeholders indicated support for such rules as part of the consultation.

Transposition of and compliance with the measures relating to the implementation of the Modernisation Fund and the optional free allocation to power will particularly affect the 10 lower income beneficiary Member States. Adding the free allocation to allowances used for free allocation to power sector to the Member States' share in the Modernisation Fund would allow a single approach to be used for modernisation of the energy sector, avoiding the administrative burden and complexity of implementing two programmes with overlapping objectives, while taking advantage of the governance structure offered by the Modernisation Fund. For Member States with the lowest absolute number of allowances under the free allocation to power provision in particular, the ability to combine both resources may be a valuable way to ensure critical mass that can make the use of public resources more effective.

9. MONITORING AND EVALUATION

The Commission will continue to monitor and evaluate the functioning of the EU ETS in its annual Carbon Market Report, as foreseen under Article 10(5) of the ETS Directive. This covers also the impacts of the revision of the EU ETS.

Furthermore, evaluation of progress on the application of the ETS Directive is regulated in the current Article 21, which requires Member States to submit to the Commission an annual report paying particular attention to issues including the allocation of allowances, operation of the Registry, application of monitoring and reporting, verification and accreditation and issues relating to compliance.

The envisaged Energy Union integrated governance and monitoring process is also expected to make sure that energy-related actions at European, as well as regional, national and local level, including the EU ETS, contribute to the Energy Union's objectives.

Additionally, the Commission regularly carries out studies on various pertinent aspects of EU climate policy. Such examples in the past years are the studies on evidence for the occurrence of carbon leakage, the study on effectiveness of benchmarks and the study on evaluation of ETS (for more details see section 1.3.1). This approach will also continue throughout phase 4.

Several market analysts regularly closely follow various aspects of the carbon market and its functioning and the Commission will continue to monitor this work. Also, through regular contacts with stakeholders the Commission is alert to their views and concerns about the functioning of the EU ETS. There is also a dedicated forum for discussion of ETS related matters with Member States in the form of regular technical working groups.

There is also the EU ETS Compliance forum, which provides all 28 Member State Competent Authorities with a platform for sharing information, learning and experience, leading to effective implementation of EU ETS. The forum executes targeted events, such as the Compliance Forum Conference, aimed at sharing experiences and facilitating dialogue amongst Member State Competent Authorities.¹⁵²

Furthermore, the EU ETS Accreditation and Verification Forum brings together representatives of Member State Competent Authorities, National Accreditation Bodies, National Certification Bodies (where relevant) and Verifiers to share experiences and suggestions concerning effective

¹⁵² For more information, see http://ec.europa.eu/clima/events/articles/0100_en.htm

and efficient implementation of the EU ETS Accreditation and Verification Regulation, Commission Regulation (EU) No. 600/2012.¹⁵³

¹⁵³ For more information, see http://ec.europa.eu/clima/events/articles/0099_en.htm

ANNEXES

1. GLOSSARY

Auctioning: The default method of allocating allowances within the EU emissions trading system (ETS). Regulated entities have to buy an increasing proportion of allowances through auctions. Auctioning is the most transparent allocation method and puts into practice the principle that the polluter should pay.

Auction share: the part of the total amount of allowances determined by the cap that is allocated through auctioning.

Backloading: the postponement of the auctioning of 900 million allowances from the years 2013-2015 until 2019-2020 due to the surplus of allowances in the ETS.

Benchmark: a value used to calculate free allocation per installation. A benchmark does not represent an emission limit or even an emission reduction target. The benchmarks have been developed per product, to the extent feasible and do not differentiate according to the technology or fuel used, nor the size of an installation or its geographical location.

Cap: the overall volume of greenhouse gases that can be emitted by the power plants, factories and other fixed installations covered by the EU emissions trading system is limited by a 'cap' on the number of emission allowances.

Carbon Capture and Storage: family of technologies and techniques that enable the capture of CO₂ from fuel combustion or industrial processes, the transport of CO₂ via ships or pipelines, and its storage underground, in depleted oil and gas fields and deep saline formations.

Carbon leakage: term used to describe the situation that may occur if, for reasons of costs related to climate policies, businesses transferred production to other countries which have laxer constraints on greenhouse gas emissions. This could lead to an increase in their total emissions. The risk of carbon leakage may be higher in certain energy-intensive industries

Carbon leakage list: official list featuring sectors and sub-sectors which are deemed to be exposed to a significant risk of carbon leakage. These sectors receive a higher share of free allocation than other sectors. The list is established for five years, on the basis of clearly defined criteria and after extensive consultation with stakeholders. The first carbon leakage list applied to the free allocation of allowances in 2013-2014. The second for the period from 2015-2019.

Cost pass-through: describes what happens when a business changes the price of the products it sells to recuperate at least part of the costs incurred to ensure compliance with the EU ETS.

Cross-sectoral correction factor (CSCF): a backstop provision in the ETS Directive which caps the total amount of allowances that can be handed out for free to industry sectors in phase 3 (2013-2020). Because the aggregate amount of preliminary free allocation calculated by Member States in the NIMs exceeds the maximum amount of allocation available to industry, the allocation for all installations is reduced by the same proportion through the application of the cross-sectoral correction factor. According to Commission Decision 2013/448/EU, the factor is 5.7% (94.3% of preliminary allocation) in 2013 going to 17.6% (82.4% of preliminary allocation) in 2020.

EU Allowances: EU Allowances are emission credits used in the EU Emissions Trading System. Each allowances equals one tonne of CO₂ emitted.

EU emissions trading system (EU ETS): the cornerstone of the European Union's policy to tackle climate change and its key tool for reducing industrial greenhouse gas emissions cost-effectively. The first - and still by far the largest - international system for trading greenhouse gas emission allowances, it covers ca. 12,000 installations in 31 countries, as well as airlines.

First-of-a-kind (FOAK) technology: the first item or generation of a new technology and which can cost significantly more than later items or generations using that technology.

Free allocation: To address industry competitiveness issues or specific needs related to the transition to a low carbon economy, allowances can be allocated for free to industrial sectors falling under the scope of the EU ETS. The amount of free allowances for an installation is calculated according to the harmonised allocation rules outlined in the Benchmarking Decision (Commission Decision 2011/278/EU) and is in principle calculated by multiplying a benchmark value with the historic production data of the installation. If an installation also produces products not covered by a product benchmark, additional allowances will be provided based on heat or fuel used for those products or for process emissions (so-called fall back approaches). Besides, production from sectors and sub-sectors deemed to be exposed to a significant risk of carbon leakage will receive a higher share of free allowances.

Greenhouse gas (GHG): A greenhouse gas is any gaseous compound in the atmosphere that is capable of absorbing infrared radiation, thereby trapping and holding heat in the atmosphere. By increasing the heat in the atmosphere, greenhouse gases are responsible for the greenhouse effect, which ultimately leads to climate change. Greenhouse gases regulated under the EU ETS are listed in Annex II of Directive 2003/87/EC.

Gross free allocation: The amount of free allocation determined by applying the benchmark values to the production data, before the application of any further relevant factors, such as, for example, the carbon leakage factor.

Indirect carbon costs: costs incurred not because of own direct GHG emissions, but because of higher electricity prices due to the impact of the carbon price from the EU ETS passed-through in electricity prices.

Installation: according to the ETS Directive (Directive 2003/87/EC), an installation is a stationary technical unit where one or more activities under the scope of the ETS and any other directly associated activities which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution.

Internalisation of external costs: economic activities give rise to greenhouse gas emissions contributing to climate change. In contrast to the benefits, the costs of these effects are generally not borne by those causing the emissions. The internalisation of external costs means making such emissions part of the decision-making process of those carrying out relevant activities.

Intended Nationally Determined Contributions (INDCs): Under the framework of the UNFCCC, countries committed to create a new international climate agreement by the conclusion of the U.N. Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP21) in Paris in December 2015. In preparation, they have agreed to publicly outline what post-2020 climate actions they intend to take under a new international agreement.

Monitoring, reporting and verification: Monitoring, reporting and verification (MRV) of CO₂ emissions from maritime, aviation transport and stationary installations. Operators are required to establish an annual emissions report, with the data being verified by an accredited verifier. Once verified, operators must surrender the equivalent number of allowances by 30 April of each year. This annual procedure of monitoring, reporting and verification is known as the 'compliance cycle' of the EU ETS.

Market Stability Reserve: Legislative proposal from the Commission tabled in January 2014 to establish a market stability reserve in order to tackle the current imbalance between supply and demand in the EU ETS and to make the system more resilient to future demand shocks.

Nomenclature statistique des activités économiques dans la Communauté européenne (NACE): the statistical classification of economic activities in the European Community, abbreviated as NACE, is the nomenclature of economic activities in the European Union (EU); the term NACE is derived from the French title. Various NACE versions have been developed since 1970. NACE is a four-digit classification providing the framework for collecting and presenting a large range of statistical data according to economic activity in the fields of economic statistics (e.g. production, employment and national accounts) and in other statistical domains developed within the European statistical system (ESS).

National Allocation Plan (NAP): in the first (2005-2007) and second (2008-2012) trading periods, Member States had to decide how many allowances to allocate in total and to each EU ETS installation on their territory. This was done through National Allocation Plans (NAP).

New Entrants Reserve: a reserve of allowances equal to 5% of the cap that allows to provide free allocation to new installations ('greenfields') and to installations that significantly increase their capacity.

New Entrants Reserve 300 (NER300): a financing instrument managed jointly by the European Commission, European Investment Bank and Member States, so-called because Article 10(a) 8 of the Directive contains the provision to set aside 300 million allowances (rights to emit one tonne of carbon dioxide) in the New Entrants' Reserve for subsidising installations of innovative renewable energy technology and carbon capture and storage (CCS). The allowances will be sold on the carbon market and the money raised will be made available to projects as they operate.

National implementation measures (NIMs): according to Article 15 of the Benchmarking Decision (Commission Decision 2011/278/EU), Member States have to notify to the Commission the list of installations covered by the EU ETS in their territory and the preliminary amount of free allowances to be allocated to these installations for the period 2013 to 2020 calculated on the basis of the Union-wide harmonised rules for free allocation.

One product – one benchmark principle: principle applied for the determination of the benchmarks for free allocation. It means that the benchmark methodology does not differentiate according to the technology or fuel used to produce a given product, nor the size of an installation or its geographical location.

Partial cessation: reduction of an installation's level of free allocation that applies when the production/activity level of an installation was less than 50% of its historic level.

Phases 1, 2 and 3 of the ETS: The first trading period or phase 1 lasted from the launching of the ETS in 2005 until the end of 2007. The second trading period began in 2008 and ended in

2012. In phase 1 and phase 2, the amount of allowances to be allocated for free to industry was decided on national level. The main differences between phases 1 and 2 and the current phase 3 (2013-2020) is that auctioning has become the principle method for allocation and a greater harmonisation at the EU level. There is no free allocation for electricity production (with some exceptions for electricity modernisation in the new Member States) and the transitional free allocation to industry is based on EU harmonised rules outlined in the Benchmarking Decision.

PRODCOM: statistics on the production of manufactured goods. The term comes from the French "PRODUCTION COMMUNAUTAIRE". The PRODCOM headings are coded using an eight-digit numerical code, the first four digits of which are identical to the respective NACE code.

Product benchmarks: a product benchmark is based on a value reflecting the average greenhouse gas emission performance of the 10% best performing installations in the EU producing that product and used to calculate free allocation.

Small emitters: installations where emissions of CO₂ are less than 25,000 tonnes per year and that have a rated thermal input less than 35 MW; in phase 3 Member States had the possibility to exclude such installations from the EU ETS under certain conditions.

Union registry: online database that holds accounts for stationary installations as well as accounts for aircraft operators, which have been included in the EU ETS since January 2012. The registry records the NIMs, accounts of companies or physical persons holding those allowances, transfers of allowances ("transactions") performed by the account holders, annual verified CO₂ emissions from installations and the annual reconciliation of allowances and verified emissions ("surrender").

Windfall profits: unexpected profits that come to an economic actor and which by nature are not directly foreseen. Under an ETS, such profits can occur if companies pass-through the costs of allowances which they have obtained for free.

2. SUMMARY OF RELEVANT FINDINGS OF THE 2030 IMPACT ASSESSMENT

Lessons learnt and problem definition: The EU is on track to meet its -20% GHG target for 2020. Present policies are not sufficient to reach the EU's long term climate objective in the context of necessary reductions by developed countries as a group to reduce GHG emissions by 80-95% in 2050 compared to 1990.

Environmental impacts: Reduction in fossil fuel use results in significant air pollution reductions.

Impacts in the energy system (including economic impacts): For the domestic -40% reduction in GHG emissions, the additional costs of adapting the energy system compared to the reference scenario would be contained to 0.15-0.54% of GDP in 2030, with the lowest cost projected in the scenario most coherent with the agreed outcome, i.e. combining a 40% GHG target with moderate energy efficiency and renewables measures.

Macro-economic and social impacts (GDP, employment, affordability of energy): This assessment assumed that third countries do not take measures beyond the pledges they had made at the time of the 2030 IA in the context of the UNFCCC. One modelling tool, GEM E3, projects negative impact of 40% GHG reductions on GDP driven by the GHG target and carbon pricing, ranging from -0.10 to -0.45%¹⁵⁴ in 2030 compared to the reference scenario. Both E3MG and E3ME modelling tools project positive contributions of up to 0.55% in the scenario including energy efficiency policies, taking into account the positive impact of energy efficiency investments on GDP¹⁵⁵.

In terms of employment, the underlying structural changes are expected to have a relatively small positive or negative impact on the overall employment level depending on the methodology used for the assessment, but significant shifts in employment among or within sectors are expected. Such impacts will require that adequate labour market policies are implemented.

Fossil fuel prices are projected to increase irrespectively of the EU's approach to 2030 targets, and electricity prices are projected to increase significantly under the Reference Scenario.

Competitiveness of energy-intensive sectors and carbon leakage: The results indicate that the carbon price differential between the EU and other main world regions increases if the EU commits to -40% GHG emission reductions if others are not increasing their efforts too. Compared to the reference scenario, overall production losses for industrial sectors with a GHG reduction of -40% can be limited.

The impact of new GHG reduction targets on the production of industrial sectors with high energy needs, exposed to international competition, has been assessed as well. For the observed energy-intensive industrial sectors, the analysis indicates that impacts are alleviated to some extent if free allocation is continued, while other ETS features, like benchmarks and production levels, are periodically reviewed. Furthermore, strong climate actions undertaken in other regions are expected to strongly improve the competitive position of EU industries.

Differential impacts across Member States: The analysis indicates that assuming cost-effective approaches for GHG targets, RES targets and EE policies, efforts in lower income Member States are relatively larger than for higher income countries, with relatively higher increases in

¹⁵⁴ Depends on if and how carbon pricing is used, with best result with auctioning in all ETS sectors and CO₂ taxation in the non-ETS, while using the revenues to lower labour costs.

¹⁵⁵ Highest result takes into account the impact of energy efficiency investments.

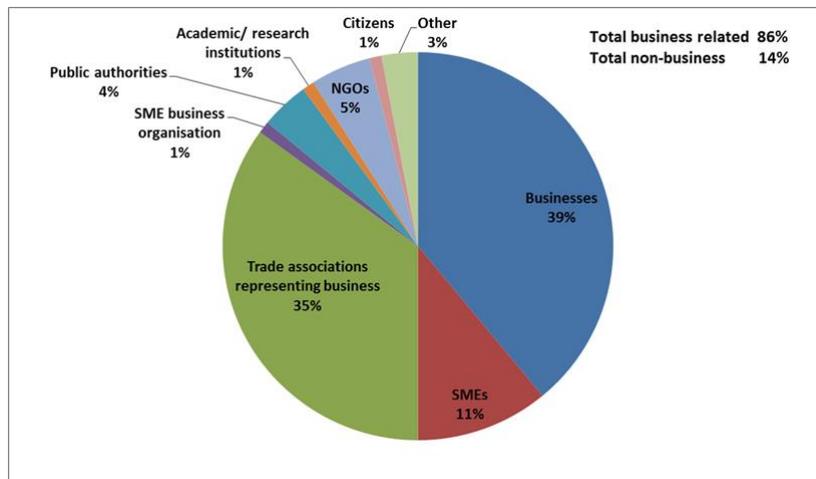
investments and system costs compared to GDP, but also relatively higher benefits in terms of fuel savings and air quality. Several distributional mechanisms are conceivable to allow for more equitable outcomes, such as the differentiation of targets, the distribution of auctioning revenues and the use of smart financial instruments, structural funds etc.

3. SUMMARY OF STAKEHOLDER CONSULTATIONS

3.1. General consultation on the ETS revision

The stakeholder consultation gathered over 500 replies from different stakeholders.

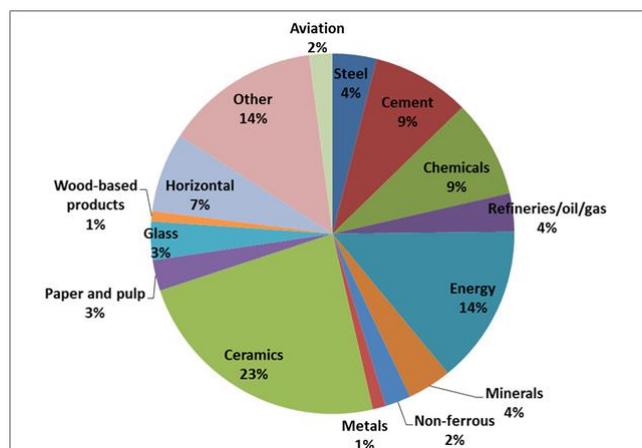
Figure 7: Stakeholder consultation responses



The submissions will be summarised by section, and within each section, by profile of respondents. Respondents were classified into three groups: industry stakeholders (including companies, trade associations representing businesses, SMEs and SME business organisations), public authorities and civil society (NGOs, academic and research institutions, citizens, trade unions and other stakeholders). This division was done based on the fact that each group has different stakes and will be similarly affected by the future system.

The prevailing majority of replies came from industry stakeholders (of which approximately 14% representing the power sector) meaning approximately 86% of the respondents are directly concerned by the elements of the future system that address the potential risk of carbon leakage, notably the options to address free allocation. Industry stakeholders are also the stakeholders most concerned, although in a more indirect way, by the Innovation and Modernisation Funds.

Figure 8: Industry stakeholders – shares of each sector replying



Submissions from public authorities (of which 17 Member States) are analysed separately since the future system has important implications also for them in terms of implementation (complexity and administrative burden aspects) and budget (auctioning revenues, funds).

Replies from academic and research institutions, NGOs, citizens, trade unions and other stakeholders are analysed in a third section under the common heading of 'civil society'.

I. Free allocation and addressing the risk of carbon leakage

The first section of the questionnaire focused on specific aspects of the future system (benchmark revision, allocation principles and cost-pass through ability). While the submissions represented different interests and positions, some views will be briefly highlighted below as they had wide support either in terms of number of replies or in terms of number of stakeholder categories.

Industry stakeholders

Concerning the allocation principles, a considerable number of industry stakeholders from across sectors (notably, steel, ceramics, glass, chemicals) support the view that best performers should get full free allocation (100% of benchmark level). This is, in turn, linked to support for a dynamic allocation system or at least one based on more recent production data and a call to eliminate reduction factors applying to the calculation of free allocation (the cross-sectoral correction factor and the linear reduction factor).

When it comes to benchmarks, industry stakeholders mostly do not challenge the 10% best approach, but many express concerns about the benchmark values and highlight the need to ensure they are technically and economically achievable; some make reference to the limits of currently available technologies. The issue of benchmark revision frequency is commonly linked with the predictability needed for long-term planning and investment decisions and many stakeholders expressed a preference for one update per trading period. Some industry stakeholders are of the opinion that benchmark revision should be done through data collection.

Many industry stakeholders underline the different approaches by Member States on the state aid schemes for indirect cost compensation and call for a more harmonised approach. Linked to this, some industry stakeholders expressed concerns that climate policies may affect energy prices, while others underline that other factors have a strong impact on energy prices (including the fragmented internal market) and call for an integrated, well-functioning internal energy market.

As regards the issue of cost-pass through (passing on the cost of allowances in product prices), many stakeholders claim it is difficult especially since the products are traded on global markets (and thus internationally priced), while others underline that determining concrete cost-pass through rates may be challenging as many factors are at play.

Other issues brought up by industry stakeholders include concerns about competitiveness linked with the call to ensure coherence between climate and industrial growth policies. They also highlight the need to ensure a level playing field both within the EU and vis-à-vis competitors in third countries.

Public authorities

Public authorities generally support the benchmark-based system (including the 10% best approach) and the need to regularly update the benchmark values. They highlight the importance of the incentive to innovate and of rewarding the best performers. There are mixed views on the frequency of the update (e.g. every trading period or every 5 years).

There is some support for using more recent production data to determine free allocation. In case cost pass-through is possible, some public authorities think there should be no free allocation for the costs passed through, to avoid windfall profits, and a few ask for the cost pass-through rate to be clearly determined.

Some public authorities call for a more focused carbon leakage list, whereas others would like a more differentiated approach that would include different carbon leakage exposure groups. While there is some agreement that indirect costs are an issue that has to be addressed, public authorities support different options: maintaining the national compensation system, increased harmonisation of such a system, or establishing an EU-wide compensation system.

Civil society

Benchmarks should be based, according to some civil society stakeholders, on worldwide best technologies available. The revision should be frequent (at least every 5 years) and should be accompanied, according to some, by a pre-determined annual improvement factor.

Most civil society stakeholders would like to see a phasing out of free allocation and thus a transition to a full auctioning system as foreseen in the ETS Directive. They argue this would ensure higher auctioning revenues which could be used to promote climate policies and would prevent over-allocation (windfall profits). Many civil society stakeholders underline that cost pass-through is possible for all companies to some extent and that the cross-sectoral correction factor should remain a key element of the system as long as free allocation continues.

Regarding the risk of carbon leakage, some call for a more differentiated approach with several exposure level groups. Others are of the opinion that the qualitative assessment should also allow removing sectors from the carbon leakage list if necessary.

II. Innovation Fund

The second section of the questionnaire focused on the Innovation Fund: whether the modalities applied in the current NER300 system require changes and whether low-carbon innovation in industrial sectors will have to be treated differently than support for CCS and renewable energy technologies.

Industry stakeholders

Many industry stakeholders are favourable to a fund for innovation support and in general to the necessity of promoting research and development. A considerable number of them are in favour of changes to the current NER300 system, in particular to ensure simplification and flexibility especially as regards procedures at Member State level, deadlines and data requirements. A few called for continuity of support to bridge the gap years between the end of NER300 and the start of the Innovation Fund.

When it comes to modalities: many industry stakeholders underline the need to ensure appropriate risk sharing, for example by linking the funding to earlier stages in the project life cycle (either upfront, or in line with milestones) and not linked only to the performance as in the current system; the approach/assessment of projects should be technology-neutral; some underline the need to allow for small-scale projects. Some stakeholders believe the limit to funding should be removed and there is wide agreement on the fact that the fund should help mitigate the risks for applicants.

Concerning the focus of the new fund, reducing the costs of renewable energy technologies, CCS, CCU and innovation were mentioned. Many replies highlighted the need for breakthrough technologies and therefore asked that more funding be given to sectors with unavoidable emissions or where further emission reductions are not feasible with available technologies.

The fact that the amount of funding available depends on the price of allowances raises some concerns about predictability, according to some stakeholders. In this context, a significant number of replies called for Member States' auctioning revenues to be used to support innovation

and to help the transition to a low carbon economy. In this sense, another concern expressed by a few industry stakeholders was that protection against the risk of carbon leakage should take precedence over support for innovation when it comes to the use of the available allowances.

Views are mixed when it comes to CCS: some think more projects/funding is needed, while others are of the opinion that there are still issues related to public acceptance and high costs.

Public authorities

Public authorities presented different views on a number of aspects of the future Innovation Fund: it should serve to fund innovative projects for which no alternative technology exists; there should be some simplification in the process; some referred to the need for an adequate geographical balance and technological diversity. The need to take into account the specificities of different technologies was underlined and some called for a technology neutral approach along with the development of specific criteria.

In order for CCS to become reality, some respondents argue that more support is needed, however the opinion is not shared by all.

While some would like to see pre-defined amounts per category of projects, others highlight the need for flexibility.

Some replies called for linking the support to earlier phases in the project life cycle (as opposed to linking it to operational performance as is currently the case) and underlined that mitigating/sharing the risk is very important.

Civil society

Many civil society stakeholders ask for increased transparency in the selection phase. Some feel that the current system is too prescriptive and should be simplified. Moreover, reference is made to the need to more strongly link projects (including improved support for CCS) with the ultimate goal of decarbonisation and the climate policy objectives. While some support a technology neutral approach, others refer specifically to the importance of ensuring support to energy efficiency improvement and renewable energy.

Concerning the design of the system some call for the 50% funding limit to be removed and for support to be linked to phases in the project life cycle; a few point out that projects should be selected only if the technologies proposed are truly innovative; some stress the importance of CO₂ reduction as a selection criterion.

A few civil society stakeholders underlined the need to provide support before 2021 as well.

III. Modernisation Fund

The third section is focused on the Modernisation Fund: 2% of total EU ETS allowances to be dedicated for the particularly high investment needs of Member States with GDP per capita¹⁵⁶ below 60% of the EU average. The questions were related to views on the governance of the fund (responsibilities of Member States, EIB and other institutions), types of eligible projects and possible criteria, accumulation rules (coherence with other funding mechanisms) and assessment.

Industry stakeholders

Regarding the governance structure for the fund, industry stakeholders (including energy sector respondents) advocate for a split of responsibilities between EU level, EIB and Member State

¹⁵⁶ 2013 GDP per capita at market prices.

level but have different views on how to divide them (e.g. at which level criteria should be specified, whether the approval of projects should be a direct responsibility of Member States, and whether the involvement of the EIB should be limited to an advisory role in project selection or more extensive). Some industry stakeholders highlight the need to minimize administrative burden and create a simple structure with clear investment criteria and independent project evaluation.

Industry stakeholders propose a wide range of projects with different priorities (e.g. energy efficiency as well as grid infrastructure, cost efficient abatement options) and some argue that the projects should contribute to the modernisation of the energy systems in the concerned Member States. Some are of the view that funding should be technology neutral and should prioritise cost efficiency and that projects should not be allowed if already accessing EU funding (concerns related to the risk of potential distortion of the energy market), while a few think the focus should be on research and development and demonstration projects.

In relation to criteria for the selection of projects, most industry stakeholders express support for cost-efficiency or cost per unit as possible options. Some propose to have requirements that are aligned with the EIB's energy lending criteria, including efficiency and emissions performance standards that are compatible with the EU's 2030 climate and energy targets. Industry stakeholders mostly agree that the level of funding should be linked to concrete performance criteria, while a few express concerns that such an approach cannot be applied to all projects.

As regards the coherence with other funding, some industry stakeholders argue that double funding of investments should be avoided. They argue that market incentives should be the main driver for investments even if public support is granted and that a mix of instruments can be considered for specific projects as long as they fulfil the relevant eligibility criteria.

On the assessment of projects, industry stakeholders highlight that it should be coherent with national climate programmes and national targets. Others think the project assessments should be monitored in the context of the 2030 governance process.

Public authorities

Public authorities believe there should be a split of responsibilities. They argue for flexibility in deciding eligible projects and that Member States should help design the criteria. There are diverging views on what the focus for the Modernisation Fund should be, according to a few of them, on final energy consumption, cost efficient energy efficiency and renewable energy. Several beneficiary Member States emphasise the need to be able to target the investments in relation to their specific national priorities, and underline the importance of simplifying the procedures for small scale projects. Member States that are not beneficiaries express generally support for a stronger involvement of the EIB. They ask for the involvement of all 28 Member States in the design of the fund, highlighting that the fund need to be transparent and to minimize administrative burden.

Most public authorities are in favour of establishing concrete criteria for the selection of projects: some mentioned cost per unit, amount of emissions reduced per unit produced and energy saved. Concerning performance criteria, public authorities in general believe they should be established only if they impose low levels of administrative burden, are selected transparently and allow for adequate flexibility of differences between Member States.

Views are mixed concerning the coherence with other funds as some public authorities think overlap should be avoided, while others think there are benefits to combining different funding sources.

Some public authorities note the governance processes should be aligned when it comes to the assessment of projects' reflecting in the forthcoming governance process (e.g. national climate programmes, plans for renewable energy and energy efficiency).

Civil society

A significant number of the civil society respondents are in favour of a governance structure that places the EU (Commission sharing responsibility with the EIB and Member States) in the fund management position.

Regarding the types of eligible projects, many civil society stakeholders underline the need to fund exclusively projects in energy efficiency and renewable energy, while a few argue for the exclusion of unabated coal and biomass co-firing.

Many civil society stakeholders are of the opinion that criteria for project selection should take into account the amount of carbon emissions reduced. Criteria should prioritise energy savings, the displacement of fossil fuel use by renewable energy, and the reduction of costs for energy saving and renewable energy technologies. Criteria should be transparent and developed through a separate, dedicated open consultation with stakeholders and the selection process should also follow an open and objective process, according to civil society stakeholders. Some advocate for criteria ensuring cooperation between Member States and regional integration occurs and that medium and small-scale projects are funded.

Civil society stakeholders indicate that while combining various sources of funding may help to enable projects, there should be rules preventing duplication of existing aid structures to ensure an efficient process.

When it comes to the assessment of projects in the forthcoming governance process, civil society stakeholders argue for a transparent, binding process, including the eligibility criteria and rules allowing timely and accurate monitoring of the progress in projects' implementation. Some stakeholders suggest that the projects should be compatible with the energy efficiency and renewable energy objectives of the Member States. In this context, civil society stakeholders argue that the Member States concerned should be required to adopt ambitious and binding low-carbon strategies for 2050 and that their investment plans should be scrutinised by the EIB.

Civil society stakeholders argue that performance criteria should be in place to determine the maximum level of funding and that they should be established transparently.

IV. Free allocation to promote investments for modernising the energy sector

Industry stakeholders

Energy-intensive industries responded that modernisation of the energy sector should be primarily taking place through private investments attracted by the internal energy market, while public funding should only provide additional and temporary support. Energy-intensive industries and energy sector representatives broadly agree that provisions concerning project selection criteria for modernisation of the energy sector are to be strengthened and uniform across the relevant Member States to avoid the risk of distortion. They also argue the criteria should be publicly available, without undue advantages for state-owned companies. Many noted that selection criteria should be technology-neutral. Energy sector responses from stakeholders active in Member States making use of the current free allocation under Article 10c of the Directive note that the current compliance measures under national investment plans already provide a solid basis for continuation of activities. Only a few respondents believe that project selection criteria should be determined on the national level, while a few others believe that individual

project selection should be transferred to the individual operators, while only framework rules are designed at a national or EU level.

In terms of coherence with other funding, most industrial stakeholders believe that no free allocation should be given to the energy sector, and that accumulation should not be allowed. However, others noted that accumulation rules are required to avoid overcompensation, while a minority feels that it could be justified in special cases.

Many industrial stakeholders argue that free allocation of allowances to power sector should be transitional and decrease over time. Some industry associations note that the free allowances should be evenly distributed over the 2021-2030 period, to ensure market liquidity and stability. However, other respondents point out the complexity and specifics of the investment cycle in the energy sector, arguing that power operators should receive the allowances in the beginning of the trading phase. Around two thirds of industrial stakeholders support the idea of having priorities guiding the Member States for areas to be supported, with priority areas of interconnectors, energy efficiency and renewable energy investments. Some respondents responded against common guiding principles for the Member States in the selection of priority areas, arguing that diversification of the energy mix is done on the national level, but noting that general eligibility criteria could be defined at the EU level.

There was a low response rate regarding the improved transparency for selection and implementation of investments within the context of free allocation for energy modernisation, but mainly noting that publication of the relevant documentation relating to all stages, from the application and the national plan to the implementation and greater openness to stakeholders would be welcome. About half of energy-industry industries that have responded believe that when the investment is not carried out within the agreed timeframe, the allowances should be added to auctioning volumes. Others argue that Member States should be allowed sufficient time for investments and freely decide on allocation of allowances. Some also propose these allowances are added to the free allocation pot for the industry. Energy sector respondents agree that a specific timeframe could be set (e.g. 2-4 years), but without a clear opinion on how unused allowances should be used.

Public authorities

The responses of several public authorities on project selection support the idea of common, EU-level criteria. They underline that value-for-money and low-carbon investments should be embedded in the selection criteria. Consistency with the 2030 climate and energy targets should also be ensured. Some beneficiary Member States support common criteria, while others from beneficiary Member States emphasise specific ideas for investments that could be supported to modernise their national energy sector. The majority of public authorities believe that accumulation rules should be applied to the energy sector. Most also argue that free allocation to energy sector should be subject to state aid provisions.

Varying opinions were expressed regarding the level of funding and the distribution over time of the free allowances for the power sector. Some feel that Member States should have the option to distribute the free allowances over the trading period in order to give security of investments to companies, while others believe that market impact should be an important consideration. The majority of public authorities also support the EU-wide priorities for selection, suggesting prioritization to energy efficiency, energy storage, smart grids and renewable energy investments and interconnectors. However, there were a few responses against priorities guiding the Member States in the selection of areas, arguing that they should have the right to choose their own energy mix.

Some beneficiary Member States express support for greater harmonisation of the administration process among all Member States applying the derogation, while emphasising that the main responsibility for project selection and allocation of allowances should remain on the Member States.

If the investment is not carried out within the agreed timeframe, most public authorities who responded agree that allowances should be added to auctioning volumes after a certain time period. While several Member States support a year-by-year allocation, to minimise impact on the carbon market, some beneficiary Member States indicate that they would prefer a greater flexibility in the timing of investments and allocation when compared to the current rules. Some Member States also mention the current practice, adopted by most beneficiary Member States, of allocating only upon proof of investment.

Civil society

Many civil society stakeholders expressed criticism of the current situation, as investments in the modernisation of the existing fossil fuel generation capacity have been supported to a greater extent than those related to diversification of electricity generation. They call for stronger degree of EU institutional oversight. They also support common project selection criteria, and often propose examples of investments which should be ineligible for financing (e.g. coal power plants or CCS).

Regarding the accumulation rules of free allocation to energy sector with other sources of funding, civil society stakeholders support the accumulation rules, provided that projects clearly contribute to EU's climate targets, are in line with eligibility criteria, state aid rules and other legislation.

Civil society stakeholders in general agree that free allowances should be used in a specific time-period (e.g. on an annual basis), in order to manage the surplus of allowances. A few note that Member States should be free to use the allowances as needed, but to ensure that excessive liquidity on the market is avoided. However, civil society stakeholders overall argue that the allowances handed out for free should decline in time, in a linear manner. The areas most often mentioned as priorities for support up to 2030 by civil society stakeholders are – in order of magnitude – smart grids, energy efficiency, renewable energy, energy storage and interconnectors.

Regarding improved transparency for modernization of projects, civil society stakeholders believe that all information regarding the implementation of the free allowances should be publicly available and published on a dedicated Member States' website. They also propose that all modernisation investments should be accompanied by environmental assessments. Civil society stakeholders have divided opinions on how unused allowances from investments not taking place should be used. Some believe they should be added to auctioning volumes, others that they could be returned for free allocation, while there are also opinions that they should be placed in the Market Stability Reserve or cancelled.

V. SMEs/regulatory fees/other

Industry stakeholders

Industrial respondents believe that the EU ETS administrative requirements can be simplified, in particular the rules for the new entrants and installation closures. In general, a more harmonised approach is proposed for small installations, both for the application of simplified rules, as well as the opt-out or exclusion from the EU ETS. A majority of industry stakeholders advocate to retain the possibility to exclude small installations from the EU ETS post-2020. While some would prefer harmonisation at EU level, others believe that the option of exclusion should be

retained by Member States. Only a few respondents would not be in favour of opt-outs. Even though there was a small response rate regarding the Union registry questions, a few respondents note that registry fees should be reduced. Most of the responses also favour aligning the registry fees at EU level, or at least more harmonisation is preferred.

Regarding the use of auctioning revenues, most industrial producers are in favour of earmarking auction revenues as much as possible, to be allocated to the development of low-carbon technologies, justifying it with carbon leakage concerns. Respondents from the power sector believe that the current provisions regarding the use of revenues are adequate.

Public authorities

Public authorities see further potential for reducing the administrative burden for small installations, for example, further simplifications of requirements for monitoring, reporting and verification. The majority of public authorities are in favour of continuing the option to exclude small installations from the EU ETS. Most of them request further harmonisation of exclusion criteria and other measures.

There was a high response rate of public authorities regarding the Registry questions. They highlight the importance of high level security, and they would find a more user-friendly interface also beneficial. There was no prevailing opinion about registry fees. Most respondents are in favour of retaining different registry fees across Member States, while only a few believe that some harmonisation (e.g. minimum and maximum) may be justified.

A few public authorities believe that Member States should have the discretion over the use of auction revenues and that earmarking should be avoided.

Civil society

Civil society stakeholders in general had a very low response rate to this section, except on the use of auction revenues. They believe that the current system of revenues allocation for climate-related purposes is not optimal. They propose more investments to be channelled to international climate change mitigation and adaptation efforts. A few suggest a special fund to be set up to direct auction revenues for this purpose.

VI. General evaluation

Industry stakeholders

The vast majority of energy-intensive industries state that ETS is fully aligned with EU's climate policy. However, they note that ETS alone cannot deliver the EU's climate objectives, and underline the need for contributions of non-ETS sectors to reach these goals. The ETS is considered as the most cost-effective mechanism for reducing emissions, and some responses note that other policy alternatives are inferior to the cap-and-trade system. Many say that emissions trading on the global scale would be an ideal approach to reach global climate objectives, but in the current situation, they underline that carbon leakage protection is essential to protect the competitiveness of industry in Europe. The need for stability and predictability is underlined as well. Some industrial stakeholders also advocate against any market interventions in the functioning of the ETS, and voice their concerns regarding the "artificial" increases of carbon prices in the long run, which would severely impact the abatement costs.

In terms of efficiency, most of the industrial stakeholders' opinion is that the costs of the system do not exceed its benefits. However, a smaller group of respondents do note the administrative costs of the ETS. Others flag the carbon costs induced by ETS to power producers and subsequently passed through to power consumers as relatively high and differing across Member

States. Industry stakeholders in general noted the benefits of a harmonised EU approach to climate policies, as well as establishment of a single carbon price.

The stakeholders from the energy sector in general consider that a market-based EU ETS is the best approach to incentivize a wide range of CO₂ abatement options. They also note it should remain technology-neutral. However, they consider it unlikely that ETS alone would be able to meet the EU's long-term climate policy objectives, as the large surplus of accumulated allowances does not provide the necessary incentives for low-carbon investments. They strongly advocate for an early adoption of the Market Stability Reserve, and some suggest extending the ETS to other sectors (e.g. cooling or transport).

Some energy stakeholders state that the EU ETS provides the basis for a level playing field and the completion of the internal energy market, by providing a single EU carbon price.

Public authorities

The public authorities also provided positive opinions regarding the EU ETS, stating it corresponds to the general GHG emission reduction targets, and as a flexible market instrument it provides the required incentives for technological development. Public authorities also noted that the EU ETS is an important element in EU climate policy, but not sufficient to meet the climate targets on its own. Linking with other carbon markets was also supported. Public authorities also assess the EU ETS as cost-effective, although the administrative burden for national authorities was mentioned (particularly during the establishment of the system).

In terms of coherence with other relevant EU legislation, a few respondents argued that the energy legislation (renewable and energy efficiency) may overlap with the EU ETS, and may consequently weaken its effectiveness.

Civil society

The large majority of civil society stakeholders responded that EU ETS is in line with core principles of EU's climate policy, but believe it was not able to deliver on its objectives yet. They underline that the investments into low-carbon technologies have been slow, and call for immediate reform of the system to urgently address the surplus of allowances and windfall profits. Nevertheless, they note the importance of an EU-wide system that internalises the negative externalities of carbon dioxide emissions. Civil society stakeholders have also noted that other sectors, such as shipping and aviation, should be to a greater extent incorporated in the EU ETS.

3.2. Consultation on carbon leakage provisions and innovation support

The stakeholder consultation gathered over 400 responses and the summary is published online.¹⁵⁷ The submissions were analysed by clustering them into three groups: business and trade associations representing business interest, public authorities and civil society. This division was done based on the fact that each group has different stakes and will be affected by the future system.

Table 10 Stakeholder consultation responses

Profile	Number	% of total
Business	224	52%

¹⁵⁷ See DG CLIMA website

http://ec.europa.eu/clima/consultations/docs/0023/stakeholder_consultation_carbon_leakage_en.pdf

Trade association representing business	158	37%
Government/regulatory authority	16	4%
Academic/ research institution	4	1%
NGO	9	2%
Citizen	14	3%
Other (trade union)	2	1%
Total business related	382	89%
Total non-business	45	11%

I. Business and trade representations of business interests

Contributions to the public consultation came from individual companies, and European and national sector associations from a wide range of sectors (steel, cement, chemicals, refineries, paper and pulp, power, lime, nonferrous metals, metals, glass, ceramics etc). Approximately 8% of replies were from the power sector and the rest from mainly energy intensive industry sectors.

a. General: competitiveness, carbon leakage and present free allocation rules

Industry stakeholders treated the first two questions of this section (i.e. a question on the potential for industry to further reduce emissions and a second on the role of EU ETS in helping industry become more efficient) as an opportunity to make general comments on many aspects of the system. Therefore the following three paragraphs reflect their broader views.

Some 47% of industry stakeholders believe there is still potential for reducing emissions while 42% do not share this view (11% showed no preference for either opinion). Regarding the role of the EU ETS in helping industry become more efficient and thus contributing to competitiveness, industry stakeholders underlined a number of concerns related to this point: improvements (both in terms of energy efficiency and in terms of reducing emissions) have already been achieved; process emissions are unavoidable and existing technologies have limits – breakthrough technologies are needed (but they require investments and thus a stable, predictable, innovation-supportive framework). Industry stakeholders further stressed the relatively high energy prices, inability to pass on costs and issues resulting from the fact that competitors are not exposed to same constraints, linked with the call for an international agreement to ensure a level playing field.

Other issues mentioned in relation to the system as a whole include the problematic acceptance and development of CCS; the low carbon price; switching to renewable sources of energy depends on availability of supply, efficiency, the impact on the quality of the products; ETS design does not give additional allocation for increases in production other than those linked to capacity extensions; non-ETS sectors should contribute more to overall reduction targets; problematic access and/or prices of raw materials; the EU reduction target of 40%; need for coherence between EU policies. Several views bring emphasis to the fact that there are differences between sectors: different reduction potentials, specific issues and objectives.

The answers also stress the fact that innovation and technological development are essential for Europe's industry to remain globally competitive, especially given the potential international market for resource efficient products. Some industry stakeholders (glass sector and refineries) state that EU ETS and carbon prices are less significant relative to other costs (e.g. energy or fuel) that have a bigger impact on company decision-making.

Given the issues underlined, industry stakeholders almost all (98%) support measures meant to protect EU industry and strongly believe (88%) free allocation to be an adequate instrument in this sense. Some concerns were expressed concerning the cross sectoral correction factor (CSCF)

that is considered as more significant than the rate of improvements in carbon efficiency. Most stakeholders from the glass sector argue that a more frequent update of the benchmarks could be the counterpart for abolishing the cap on free allocation to industry. Other concerns expressed refer to the production data used as basis for allocation, with many views advocating for the use of actual or more recent production data. It is important, in the view of industry stakeholders, to ensure that the best performers receive adequate allocation.

Almost all (93%) industry stakeholders believe free allocation keeps the incentive to innovate, but underline their concerns regarding the fact that best performers may not get 100% free allocation. Some industry stakeholders (mostly refining sector) say that the biggest incentive to improve their performance is not carbon costs but rather energy costs.

Some 52% of industry stakeholders are of the opinion that the administrative burden for companies involved in ensuring free allocation through the implementation of the benchmarking provisions are proportionate to the objectives. Those who consider the burden disproportionate expressed concerns regarding the burden for smaller firms, the additional burden from having to apply several policies at the same time, and the need to simplify rules wherever possible while ensuring that the system is accurate and fair. It was also underlined that specificities of national implementation also lead to considerable administrative burden.

b. Options for post-2020 – Strategic Choices

Concerning the future share of allowances that should be dedicated to carbon leakage and competitiveness, considerable support (73% of industry stakeholders) was expressed for having no limit to free allocation for industry. A concern was the view that the current system with the application of an ever-steeper CSCF reduction is incompatible with industry stakeholders' strong support for the idea that the best performers should be fully compensated through free allocation and that growth in production beyond capacity expansion should be accommodated.

There are mixed views on the continuation of the NER300: 26% are against such future support (almost all ceramics and a few from other sectors such as chemicals and non-ferrous metals) as there are some concerns regarding CCS (seen as problematic in terms of cost, reliability, public acceptance and applicability to all sectors). By contrast, there is wide support (81%) for an instrument of funding manufacturing industrial low carbon innovation as many industry stakeholders emphasise the need for investments, notably in innovation and deployment. According to some industry stakeholders, such support would have to be more technology neutral and more flexibly managed than the current NER300.

Industry stakeholders accentuated some issues regarding the funding of such an instrument, as follows: the amount of funding depends on the price of allowances and is therefore not reliable; other instruments already support innovation (e.g. Horizon 2020) and they should be enhanced; the importance of ensuring Member States use at least 50% of the auctioning revenues for decarbonisation measures; there might be a need for a mix of public and private funding sources to ensure that low carbon innovation has the necessary support to happen; some underlined that these funds could be used to ensure cheaper loans for industry.

On the question of whether industry should have additional safeguards beyond free allocation and EU-level innovation support, most (89%) industry stakeholders answered in the positive. Suggestions point in particular towards possible adjustments/improvements of the current system rather than radical changes (e.g. improved coherence between EU policies, ensuring protection in the absence of an international agreement, removing the CSCF, indirect cost compensation, need for long-term stable regulatory framework, ensuring allocation is closer to real production etc.).

c. Options for post-2020 - Allocation modalities

On the more technical aspects of the allocation modalities there was considerable support for maintaining some of the existing features: 56% of industry stakeholders are in favour of maintaining the current two categories for sectors in terms of exposure to the risk of carbon leakage (i.e. deemed exposed or not) in order to ensure predictability, to avoid additional uncertainty and complexity. Those who believe more differentiation is needed (15%) argue that the degree of exposure is different and the rules should reflect that. Those who believe all installations should be treated as exposed (21%) highlight the fact that there is a global economy and that there are interconnections, including in terms of value chains (downstream and upstream links).

Similarly, 39% of industry stakeholders are in favour of maintaining the current carbon leakage criteria for the sake of predictability, simplicity and consistency. There are many different opinions in the case of those who argue for additional criteria: taking into account cumulative costs (indirect costs, RES-related, environmental taxes etc.), fuel mix (as well as accessibility and relative costs thereof), the impact of value chain effects, export and import competition and the possibility of using Gross Operating Surplus instead of Gross Value Added (GVA) in the calculations because of the labour costs included in the latter, which they argue penalises labour-intensive sectors. Some industry stakeholders also claim that they have an overall positive carbon footprint (in terms of their life-cycle assessment: saving more energy and GHG emissions than used in the manufacturing phase) and that this should be taken into account.

On the subject of thresholds for the carbon leakage criteria there is considerable support (57%) for maintaining the existing ones. Some industry stakeholders are concerned that stricter thresholds would lead to some sectors being removed from the carbon leakage list.

There is wide support (87%) for having a qualitative assessment to complement the quantitative assessment: industry stakeholders argue that some products are unlike the others in the same sector, that statistical data does not always accurately reflect the reality of the exposure of some sectors and that it is important when determining exposure to consider certain factors such as ability to pass on costs, value chain analysis, different levels of aggregation/disaggregation of data analysed and the positive contribution of some sectors to EU economy. There are some (7%) who believe the assessment should be based on simple metrics linked to clearly defined thresholds.

Regarding the validity of the carbon leakage list, there is considerable (68%) support among industry stakeholders to align it to the duration of the next trading phase based on the argument that it would ensure consistency and predictability for industry, taking into account the long-term investment planning. The other respondents have mixed views and expressed preferences for different timeframes (e.g. 10 years of a validity expiring only at the conclusion of an international agreement to ensure a level playing field).

Over a third (37%) of industry stakeholders want "the 10% best approach" for determining benchmarks to remain with a view to ensuring stability and predictability. 53% of the views advocate for a less stringent approach, by underlining a number of concerns: requests that the installations that comply with the benchmarks should be ensured no carbon costs, request for less strict, or so called "technically achievable" benchmarks (in this context it can be noted that benchmarks were set based on 10% best existing installations in 2007/08); that when applied together with the CSCF the allocation is too strict, and that progress happens at different pace in different sectors.

There are mixed views (44% in favour and 50% not in favour) on the updating of benchmarks in line with technological state of the art. Those in favour view this as a necessary exercise in order

to reflect GHG improvements over time and they emphasise that the update should be in line with technological developments and uptake of new technologies. On the other hand, the latter point is a reason for concern by most of those against the updating: state of the art could be difficult to determine, may be possible to implement only in new plants, might not be achievable or financially viable, may punish early movers. Stakeholders from the glass sector underline that periodically updated benchmarks could remove the need for the CSCF.

There is wide support (75%) for using more recent data to determine allocation to industry: many stakeholders would like to see *ex-post* allocation with an allocation supply reserve, i.e. a reserve that is filled up by those that produce less, and is used to provide allocation to those that produce more. The main argument in favour of this or using more recent years (e.g. previous year, previous two or three, or a rolling average thereof) is that such an approach reflects economic reality and as such would ensure flexibility and allow for production increases. Industry stakeholders also acknowledge the problematic aspects such an approach would entail, namely considerable administrative burden, ensuring the quality of data (i.e. production reported) and confidentiality of commercially sensitive information.

On the topic of possible deviations from the general harmonised allocation rules in case of particular hardship or too favourable a situation, most industry stakeholders (75%) are against such a possibility since they consider this would lead to distortions of competition. Some, however, argue that exceptional cases should be assessed individually.

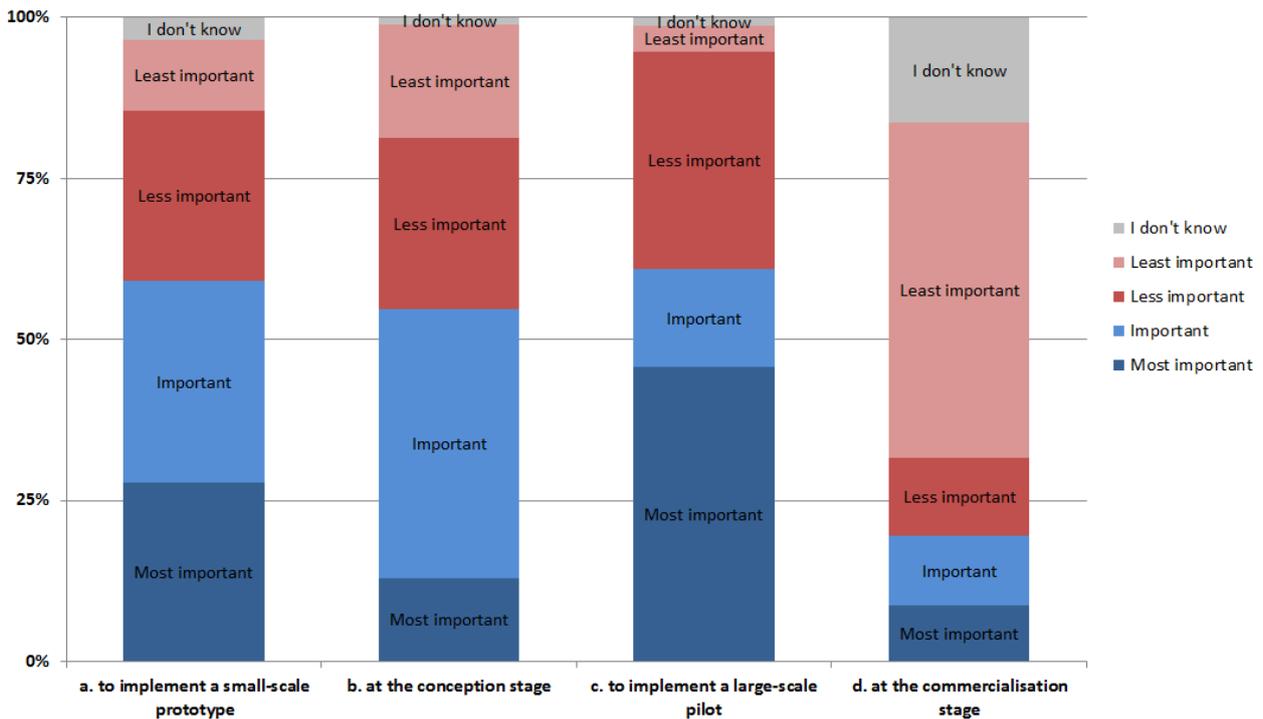
Industry stakeholders prefer (87%) indirect cost compensation taking place at EU level (either in the form of financial compensation - 51% or free allowances - 36%) in order to ensure equal competition and predictability. Those who advocate maintaining the current system argue that guidelines are already in place ensuring transparency and certainty and that there are different energy prices (which give certain signals to the market) and different fuel mixes across the EU.

d. Options for post-2020 - Innovation support

As shown above, while industry stakeholders are widely in favour of low carbon innovation support, there are some mixed views on the subject of funding sources. Many (63%) believe it should come from auctioning revenues, while others underline that both public and private sources for funding must be considered and mobilised.

Concerning the stage of the process at which innovation support is considered most important, most industry stakeholders believe this to be the stage of implementing a large-scale pilot as shown below by the graph:

In your view, at which stage of the innovation process is there a particular need to strengthen the EU's innovation support?



e. Other issues

Some 63% of industry stakeholders brought up a number of other issues they wished to underline including: importance of research and supporting legislation; the need for a clear price signal and for a clear industrial policy; taking into account the whole value chain; looking into the risk of investment leakage; need for an international agreement; call to ensure distortions are avoided when designing policies; ensuring consistency between policies. It is noteworthy that there was also an explicit call to make not only a statistical analysis of the questionnaire that served as basis for this analysis but also a qualitative one.

II. Government and regulatory authorities

Responses were received from the following governments and regulatory national or regional authorities: Czech Republic, Denmark, Estonia, Finland, Hungary, Malta, Poland, United Kingdom, Bavaria, Thüringer State, Canary Islands, City of Vienna, Flemish Region, Walloon Region, and a local authority from Spain.

a. General: competitiveness, carbon leakage and present free allocation rules

Most authorities believe there is still potential for industry to reduce emissions but underline a number of issues that must be addressed including the need to tackle the carbon price issue, the need to consider international negotiations and developments, the potential of using biomass, the need for an ambitious innovation strategy to support the development of new breakthrough technologies. Estonia emphasised the decoupling that has taken place there: a 50% decrease in GHG emissions compared to 1990 levels happened alongside a 5 times increase in GDP. Reduction potential is different depending on industry (Poland). It is also important to limit administrative burden (Denmark).

There is an overall positive view on the role of the ETS: the system needs some improvement, and it should be stressed that energy efficiency represents a benefit for companies. The UK stresses that the system is flexible in that it allows businesses to decide whether and when to invest in carbon abatement or to buy allowances.

All agree on the need to protect industry against potential competitiveness disadvantages relative to third countries with less ambitious climate policies. Measures are needed to provide focused and targeted protection to those sectors most exposed to the risk in the absence of an international agreement.

Regarding the adequacy of free allocation as a policy instrument, the general perception is a favourable one – it is seen as a good instrument for protecting industry in the absence of comparable measures by other major economies. A number of elements of the system as a whole need to be addressed: ensuring that protection is well-targeted (UK, Denmark), taking into account the ability of some sectors to pass on the carbon costs to their customers (Walloon Region).

The impact of free allocation on the incentive to innovate is considered positive by many since benchmarks provide an incentive to installations. The concern is that it may shield operators partially from the price signal (Walloon Region).

Most see the administrative burden linked to the implementation of the benchmarking provisions proportionate to the objectives. Simplification should happen wherever possible (UK, Canary Islands) to ensure the system runs appropriately.

b. Options for post-2020 – Strategic Choices

National and regional authorities had mixed views on the share of allowances that should be dedicated to carbon leakage and competitiveness. This should depend largely on international developments in terms of climate policies (Czech Republic). Poland underlined the importance of ensuring protection considering international competition and differences in energy prices. This protection however cannot be guaranteed as the free allocation available is declining unless it is targeted to those most at risk (UK).

Low carbon innovation support is seen as very important by most authorities, with a broader scope to include industry beyond CCS preferred by several. There were mixed views on the sources of such funding.

Regarding the need for additional safeguards against the risk of carbon leakage, some expressed concern at the differences in energy prices, while others stressed the importance of an international agreement to ensure a level playing field.

c. Options for post-2020 - Allocation modalities

There were mixed views on the number of carbon leakage groups (carbon leakage and non-carbon leakage as opposed to several groups differentiated based on level of exposure) with some preferring either the continuation of the current system (Czech Republic, Finland, Thüringer, Vienna) while others expressing a preference for the development of more categories (Poland, Hungary, Walloon Region, Bavaria, Canary Islands). The aspects to consider include: assessing the risk based among others on geographical location and the possibility of having risk defined as low, medium or high. A differentiated system might ensure protection to those most at risk but would require careful consideration (UK).

Regarding the criteria for determining the carbon leakage status of sectors, many indicated that they were against the rule that allow sectors to be on the carbon leakage list by complying with only one of the two criteria (carbon costs in GVA and trade intensity). Criteria should take into

account a realistic carbon price, the emission abatement potential, the ability to pass on costs to customers, trade patterns (possibly linked to geographic location) and also availability of data, as well as (according to Denmark) the fact that risk varies across EU depending on extent installations compete with companies in third countries.

There were mixed views on maintaining the qualitative assessment: some expressed a preference for having criteria based on simple metrics (Hungary, Bavaria, Vienna, Canary Islands), whereas others are of the opinion that some factors may be difficult to assess/take into account otherwise. As for the validity of the carbon leakage list, quite a few expressed support for a correlation between the validity of the list and the duration of the ETS phase (predictability, transparency, long-term investment planning) with the possibility to revise the assessment in case of comparable international climate policies or a considerably lower/higher carbon price.

On the issue of benchmark revision, some are in favour of maintaining the current "10% best approach" as it rewards the most efficient and provides incentive for the others. At the same time, most agree that benchmarks should be revised in line with technological advances (with mixed views on frequency of updating).

When it comes to updating the production data used for allocation, some would opt for 2016-2018 as the updated reference period. The Walloon Region cautions on extra administrative efforts and extra verification costs that an ex-post approach would engender. The UK indicates that more recent data would be good but only balanced with the need for manageability.

Some among the authorities are in favour of deviations from the general harmonised allocation rules, in case of hardship or too favourable a situation. At the same time, the UK expressed its concern about such deviations, stressing that a uniform system ensures certainty and that there was a risk of distortions and added complexity.

Concerning the compensation for indirect costs, maintaining the present approach based on Community state aid guidelines has support from some, while others express concerns on possible distortions in the market. On the latter, the UK stressed that compensation done at EU level would be problematic and would create considerable complexity as there are differences in electricity markets between Member States.

d. Options for post-2020 - Innovation support

There were mixed views on the stage that would most benefit from support in the innovation process, as well as on where the funding should come from (auctioning revenues or free allowances). Support should depend on the risk of the project (Poland). Some stressed the need to support large scale deployment, bringing technologies to the market.

III. Academic and research organisations, NGOs, citizens, trade unions (civil society)

a. General: competitiveness, carbon leakage and present free allocation rules

Academic and research organisations, NGOs, citizens, trade unions are generally positive (75%) about industry's ability to further reduce emissions. In order for this to happen there is a need for support from policies which should among other things protect against carbon leakage. Studies have been quoted in support of the view that industry can further improve (through changes in technologies and practices) and it was stressed they would benefit from being more energy efficient and innovative.

The ETS is perceived as an important instrument that nevertheless requires improvement: need for a strong price signal, addressing the issue of surplus of allowances, taking into account the

ability to pass on costs. It was further stressed that ambitious goals require strong incentives. In the absence of an international agreement and/or comparable climate policies/efforts, 82% of civil society respondents are in favour of measures to protect EU industry. Such measures should focus on innovation support and should be linked to the international developments (i.e. more and more countries/regions are implementing climate policies). Free allocation is seen as problematic (61%) and there are concerns about its impact on the incentive to innovate. The main reason for this is the surplus of allowances that the system led to, which in turn negatively affected the carbon price. The incentive is therefore not strong enough and the system needs to be improved.

There were no strong opinions on the proportionality of administrative burden for companies, though some respondents expressed concern for the possible issues that small companies deal with.

b. Options for post-2020 – Strategic Choices

Some 29% of civil society respondents expressed their preference for no more free allocation after 2020, while 25% believe the share of allowances dedicated to carbon leakage and competitiveness should be lower than in 2013-2020. Measures after 2020 should focus on innovation support, rewarding efficiency investments, bringing the focus to clean products/technologies – all this will provide a comparative advantage to EU industry (one stakeholder noted that EU ETS provides the opportunity to mainstream both the climate and industrial policy).

When it comes to the future financial support for innovation similar to NER300, most (79%) are in favour of it. Some respondents (20%) expressed concerns about the feasibility and acceptance of CCS. There seems to be however wide support for low carbon innovation funding that is not restricted to one technology. 50% of civil society respondents are of the opinion that the support should come in the form of a specific instrument with auctioning revenues as the funding source.

There seems to be wide support (68%) for having additional measures in place to protect against carbon leakage. Measures should be linked with an assessment of whether carbon leakage has occurred and should mainly relate to improvements of the system to ensure it prevents such risk, that it provides incentive to be climate efficient, that it supports innovation. One view put forward the possibility of developing carbon leakage measures jointly with international partners even in the absence of a global agreement, while another underlined the need to provide incentives to switch to lower carbon products.

c. Options for post-2020 - Allocation modalities

There were mixed views on the number of carbon leakage groups (carbon leakage and non-carbon leakage as opposed to several groups differentiated based on level of exposure), criteria underlying the groups and associated thresholds. 38% of civil society respondents expressed a preference for maintaining the two groups, while 24% are of the opinion that more categories should be developed. On the issue of criteria for determining the carbon leakage status, 28% of civil society stakeholders would like the current ones to be maintained, whereas 34% think additional criteria could be developed. Those who advocate for maintaining the current system call for certainty and less administrative burden. If more carbon leakage categories are developed (i.e. high, medium, low exposure status), one proposal is for a risk factor to be determined that could then be used to establish the right to access innovation support funding.

Some views ask for the elimination of the stand-alone criteria and the associated 30% threshold, with others quoting research to underline trade exposure is not a good predictor of carbon leakage vulnerability. Several civil society stakeholders underlined that what should be considered in determining carbon leakage status is ability to pass on costs, the potential to increase efficiency

and room for products substitution, as well as trade patterns (e.g. excluding third countries with comparable climate policies from the assessment).

Views expressed are also mixed when it comes to the need for a qualitative component as part of the assessment of carbon leakage status. Several NGOs indicated it could be applied in addition to the quantitative assessment to ensure that only those most in need are on the list. The assessment should therefore take into account the ability to pass on costs, profit margins, abatement potential. About a third of civil society respondents believe the assessment should be based on simple metrics. No clear view emerged on the validity of the carbon leakage list however a few respondents stressed that it could be correlated with the duration of the trading period and that it could be reviewed based on international developments.

When it comes to the updating of benchmarks, some NGOs call for a revision based on worldwide best performance and almost all civil society stakeholders (82%) agree that updates should reflect technological advances.

Concerns were expressed about the production data on which allocation is based. While some believe more recent data would perhaps allow for a better picture, NGOs stress that a 'dynamic' ex-post allocation system poses numerous problems including administrative complexity and the challenge of obtaining timely and accurate confidential information from firms.

61% of civil society respondents believe there should be no deviations from the general harmonised rules in order to avoid distortions. Views are mixed on the matter of indirect cost: 10% advocate for maintaining the present approach of state aid, 41% asked for compensation at EU level, while 38% think no compensation is necessary. NGOs stress that there is no single European energy market to have compensation harmonised across the EU.

d. Options for post-2020 - Innovation support

There were mixed views on the stage that would most benefit from support in the innovation process, as well as on where the funding should come from (auctioning revenues or free allowances). Some highlighted that such support should remain complementary to private support as improvements of any kind would represent benefits for the operator.

e. Other issues

Some civil society respondents (chiefly NGOs) underlined a number of other issues including: the need to reward best low-carbon performers, the need to address allowances surplus, the possibility of linking free allocation to efficiency and innovation requirements. Some expressed concern related to 'dynamic' allocation: in addition to confidentiality issues, complexity and the administrative burden required, the approach would negatively impact the incentive to reduce emissions.

4. SUMMARY OF EVALUATION

4.1. NER 300 - lessons learnt

4.1.1. Introduction

This document summarises the lessons learnt from implementation of the NER 300 programme as part of the Impact Assessment on the reform of Directive 2003/87/EC¹⁵⁸ (ETS Directive).

As the vast majority of NER 300 projects are not in operation yet and half of them were awarded only in July 2014, it is too early for a full evaluation of the implementation of the programme. Such an evaluation will be carried out at a later stage.

4.1.2. NER 300 principles

4.1.2.1. *Definition*

NER 300 is one of the world's largest funding programmes for innovative low-carbon energy demonstration projects. It promotes the demonstration of environmentally safe carbon capture and storage (CCS) and innovative renewable energy (RES) technologies on a commercial scale within the EU. As such, it supports first-of-a-kind plants deploying innovative RES and CCS solutions, hence it would not fund traditional wind turbines but it can fund floating offshore wind turbines.

4.1.2.2. *Legal basis*

The NER 300 programme was established by Article 10a(8) of the ETS Directive. This provision indicates that 300 million allowances in the New Entrants Reserve were to be made available until 31 December 2015 for co-financing up to 12 commercial CCS demonstration and innovative RES projects in the EU.

Commission Decision 2010/670/EU¹⁵⁹ (NER 300 Decision) outlines the rules of the funding scheme. The design of the competitive selection and disbursement process of the programme is laid down in the Decision as the Public Procurement Directives¹⁶⁰ (addressed to Member States) and the Financial Regulation¹⁶¹ do not apply (allowances do not form part of the Union budget).

NER 300 projects were awarded through two calls for proposals. The first round of awards was funded by the sale of 200 million allowances and was adopted on 18 December 2012¹⁶². The

¹⁵⁸ Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC, OJ L 275, 25.10.2003, p. 32

¹⁵⁹ Commission Decision 2010/670/EU laying down criteria and measures for the financing of commercial demonstration projects that aim at the environmentally safe capture and geological storage of CO₂ as well as demonstration projects of innovative renewable energy technologies under the scheme for greenhouse gas emission allowance trading within the Community established by Directive 2003/87/EC of the European Parliament and of the Council, OJ L 290, 6.11.2010, p. 39

¹⁶⁰ The so-called Public Procurement Directives refer to the Directives 2004/17/EC and 2004/18/EC of the European Parliament and of the Council.

¹⁶¹ Commission Delegated Regulation (EU) No 1268/2012 of 29 October 2012 on the rules of application of Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council on the financial rules applicable to the general budget of the Union, OJ L 362, 31.12.2012, p. 1

¹⁶² Commission Implementing Decision of 18.12.2012, Award Decision under the first call for proposals of the NER 300 funding programme, C(2012) 9432, amended by C(2014) 383

second round of awards, funded by the sale of the remaining 100 million allowances, was adopted on 8 July 2014¹⁶³.

The European Investment Bank (EIB) has been engaged in certain implementation tasks of the NER 300 programme¹⁶⁴. The NER 300 Decision sets out a number of tasks relating to project selection, monetisation of allowances as well as management of revenues that the EIB performed on request of, on behalf of and for the account of the Commission.

4.1.2.3. Selection of projects

Project sponsors were required to submit their proposals to the Member State in which the project were to take place. Following a pre-selection at national level, the Member States submitted the proposals to the EIB.

Eligibility check

The eligibility check was carried out by the Member States and verified by the Commission. To be eligible, projects had to fall into one of the innovative technology categories set out in the NER 300 Decision, be located in the EU, meet specific capacity thresholds and demonstrate reasonable expectations to become operational.

Furthermore, projects had to demonstrate to be innovative in comparison to state-of-the-art technologies, including evidence of being sufficiently mature for demonstration at pre-commercial scale and having a high replicability potential.

Due diligence and ranking

Member States submitted eligible projects to the EIB for a financial and technical due diligence, and the Commission checked and validated the result.

The EIB's due diligence covered technical scope, costs, financing, implementation, operation, environmental impact and procurement procedures. The NER 300 funding can cover up to 50% of the additional costs of the so-called relevant costs, which are:

- For CCS projects, investment costs borne by the project due to the application of CCS net of the net present value of the best estimate of operating benefits and costs arising due to the application of CCS during the first 10 years of operation;
- For RES projects, extra investment costs borne by the project as a result of the application of an innovative renewable energy technology net of the net present value of the best estimate of operating costs and benefits arising during the first 5 years compared to a conventional production with the same capacity in terms of effective production of energy.

Upon completion of due diligence, the projects were ranked by their cost-per-unit performance (CPUP), which is the total request for public funding plus the best estimate of the net present value of additional benefits, divided by the performance, i.e. the amount of CO₂ stored for CCS projects, and the amount of energy produced for RES projects.

¹⁶³ Commission Implementing Decision of 8.7.2014, Award Decision under the second call for proposals of the NER 300 funding programme, C(2014) 4493

¹⁶⁴ Cooperation Agreement on the implementation of Commission Decision C(2010) 7499 between the European Commission and the European Investment Bank, OJ C 358, 31.12.2010, p. 1

Confirmation and award

The Commission then asked Member States to confirm their support to the projects that had passed the selection assessment, as well as the value and structure of the total public funding. As set out in the NER 300 Decision, each Member State could confirm up to three projects taking place in its territory, with the exception of cross-border ones, which did not count towards this cap. Furthermore, no project could receive more than 15% of the total available NER 300 funding.

Once the list of projects to be awarded had been finalised, the Commission consulted the Climate Change Committee and adopted the award decisions.

Projects that passed the selection assessment but could not be awarded were placed in a reserve list. The reserve list was to be used should funds become available in case of project failure or withdrawal. The reserve list of the first call for proposals had to be closed when launching the second call, whereas the one of the second call will be closed on 31 December 2015 when the capacity to award projects in the NER 300 programme expires.

4.1.3. State-of-play

4.1.3.1. Results of calls for proposals

The NER 300 funding resulting from the sales of 300 million EU ETS allowances totals €2.1 billion. Altogether 38 innovative RES projects and one CCS project in 20 EU Member States were selected through two calls for proposals. The awarded RES projects are estimated to increase the annual EU renewable energy production by some 18 TWh and the emissions captured by the CCS project will total on average 1.8 million tons of CO₂ per year.

In the first call for proposals 79 project proposals (13 CCS and 66 RES) from 21 Member States were submitted with the total amount of requested funding totalling €11.8 billion, of which €6.6 billion for CCS projects and €5.2 billion for RES ones. Of these projects, 6 were withdrawn during the selection process, 14 were rejected (having failed the eligibility check and/or the due diligence) and 36 were either not confirmed by Member States or could not be supported due to insufficient funds. As a result, 23 projects were awarded €1.5 billion.

Of the projects awarded under the first call only three projects have been withdrawn. One of them has been successfully resubmitted under the second call. The other two have been replaced by the concerned Member State by more promising projects in the second call.

In the second call for proposals, 32 project proposals (1 CCS and 31 RES) from 12 Member States were submitted, out of which 19 were awarded. The total funding request was €1.6 billion, of which €1.3 billion for RES projects and the remaining €300 million for the CCS one. Of the remaining projects, 9 were rejected during the evaluation and 4 were not confirmed as exceeding the limit of three projects per Member State under the two rounds of call for proposals.

All available funds resulting from the monetisation of 300 million allowances are now allocated to awarded projects, with the exception of a minor surplus of €2.6 million. Table 11 presents the list of projects submitted and awarded under both calls for proposals.

Table 11: Projects submitted and awarded

Type of project	First call submitted/awarded	Second call submitted/awarded
CCS categories	13/0	1/1
CCS pre-combustion	3/0	0/0
CCS post-combustion	6/0	0/0
CCS oxyfuel	2/0	1/1
CCS in industry sector	2/0	0/0
RES categories	66/20	31/18
Advanced bioenergy	24/7	10/6
Concentrated solar power	9/3	3/2
Photovoltaics	4/0	3/1
Geothermal	3/1	4/2
Wind	15/6	3/2
Ocean	8/2	5/3
Hydropower	0/0	0/0
Smart grids	3/1	3/2

The awarded NER 300 funding in million euro and number of projects per Member State is distributed as presented in Table 12.

Table 12: Distribution of awarded NER 300 funding

	CCS	Bioenergy	CSP	Geothermal	Ocean	PV	Smart grids	Wind	Total
AT								11.3 (1)	11.3 (1)
BE							8.2 (1)		8.2 (1)
CY			106,8 (2)				11.1 (1)		117.9 (3)
DE		22.3 (1)						182.6 (2)	204.9 (3)
DK		39.3 (1)							39.3 (1)
EE		31,9 (2)							31,9 (2)
EL			86,6 (2)						86.6 (2)
ES		29.2 (1)						67.4 (2)	96.6 (3)
FI		88.5 (1)							88.5 (1)
FR		170.0 (1)		16.8 (1)	72.1 (1)			34.3 (1)	293.2 (4) ¹⁶⁵
HR				14.7 (1)					14.7 (1)
HU				39.3 (1)					39.3 (1)
IE					23.3 (1)				23.3 (1)
IT		28.4 (1)	40.0 (1)				85.0 (1)		153.4 (3)
LV		3.9 (1)							3.9 (1)
NL		199.0 (1)							199.0 (1)
PL		30.9 (1)							30.9 (1)
PT					9.1 (1)	8.0 (1)		30.0 (1)	47.2 (3)
SE		262.5 (2)						15.0 (1)	277.5 (3)

¹⁶⁵ The geothermal project is cross-border with Germany. Cross-border projects do not count towards the 3 projects per Member State cap.

UK	300.0 (1)				37.4 (2)				337.4 (3)
Tot	300.0 (1)	905.8 (13)	233.4 (5)	70.9 (3)	142.0 (5)	8.0 (1)	104.2 (3)	340.5 (8)	2,104.9 (39)
Average funding	300.0	69.68	46.68	23.63	28.4	8.0	34.73	42.56	53.97

4.1.4. Lessons learnt so far

4.1.4.1. *Geographical coverage*

24 Member States submitted proposals under the two calls for proposals and 20 of them were awarded at least one project (see table in section 4.1.3.1).

Applications and awards were evenly spread across the Member States and reflect their competitive advantages due to their geography, natural resource endowment, and/or policy priorities. The limit of maximum three projects per Member State, which was reached by 7 Member States, enabled the coverage of 20 Member States and hence a wide geographical coverage. However, it also influenced the confirmation of projects, as Member States tended to favour those with the higher budgets.

4.1.4.2. *Technological coverage*

The selected projects cover a spectrum of RES technologies, spanning all but one technology category, hydropower (see table in section 4.1.3.1). For CCS, applications were received for all technological categories; the final low coverage is due to difficulties the projects faced in securing all the necessary financing.

The technological categories of the programme represent highly innovative RES and CCS technologies. They were defined on the basis of the Strategic Energy Technology Plan (SET-Plan)¹⁶⁶, which identified a number of technologies to be supported by a European Industrial Initiative, relevant low-carbon roadmaps and technology platforms, as well as a wide stakeholder consultation.

The technology categories and subcategories approach was applied in the NER 300 to eliminate undue competition between technologies. This applies particularly to the RES group. One could, however, explore if some flexibility with regard to those categories could be applied in a follow-up scheme and whether those flexibilities could benefit the final outcome. For instance, one could consider lowering certain thresholds or allowing for technology updates in the course of the programme. For the CCS category, one could explore if lower capacity thresholds could result in more projects being submitted and implemented.

4.1.4.3. *Support to innovation*

The NER 300 eligibility criteria regarding innovativeness of projects aim at allocating limited funds to highly innovative projects.

Eligible technologies had to be innovative in relation to the state-of-the-art of the particular technology category, not yet commercially available but mature for demonstration at pre-commercial scale, require public support for demonstration due to their risks, ready to be demonstrated at a scale which is easily conducive to further scaling up and have a cost-effective CO₂ reduction potential.

¹⁶⁶ Investing in the Development of Low Carbon Technologies (SET-Plan), COM(2009) 519

The vast majority of RES and CCS submissions by Member States met the NER 300 innovation requirements. Although projects are selected on the basis of cost-effectiveness as reflected by the CPUP indicator, it is estimated that almost 80% of the NER 300 awards went to highly innovative or even potentially game changing projects. This is the result of a qualitative analysis within the eligibility check based on difference of the project's technology from existing solutions, availability of the project's technology amongst other vendors, availability of previous tests for the chosen technology, potential for scale-up and replicability and availability of resources to be used by the project.

4.1.4.4. Cost-effectiveness in the use of NER 300 funds

The €2.1 billion of NER 300 funding has mobilised €700 million from other public sources and leveraged €2.7 billion from private operators to cover investment costs. Awarded projects will also accrue over €3.1 billion in additional benefits (net present value) over the first five years of operation. These additional benefits are mainly support schemes such as feed-in tariffs but also avoided costs or existing tax incentive measures.

The funding cap of maximum 15% of total allowances per project seems to have a negative effect on the number of confirmed CCS projects. It appears that CCS projects would have benefitted from the possibility of a higher share of NER 300 funding. Due to the cap however, no more than €300 million could be awarded to the selected CCS project, which effectively covers only 34% of the relevant cost. The remaining project costs need to be provided by other sources, mainly additional public funding.

On the other hand, the RES projects were not affected by the 15% limit. In fact, on average, the awarded RES projects applied for 39% of their relevant costs to be covered by the programme, less than the possible maximum of 50%. The NER 300 funding for RES projects ranges from €7 to €203 million.

In a follow-up scheme, one could, therefore, further analyse the level of the co-funding rate and its prospective impact on the number of successful projects.

4.1.4.5. Administrative simplification

The application and submission forms were simplified before the second call for proposals following requests from stakeholders for reduction of administrative burdens. Implementation of awarded projects could be facilitated by streamlining of the knowledge sharing requirements.

Knowledge-sharing is a pre-requisite of the programme and considered essential to ensure value for funding and to encourage the spread of innovative technologies. The critical issue concerning it was defining what information should be shared, how and with whom, as onerous requirements may discourage participation from project developers cautious about IPR risks. However, a broader NER 300 goal is to support the wide-scale deployment of clean energy technologies and this necessitates that the advances made by project developers are shared more broadly.

On the basis of the experience to date, the knowledge sharing exercise could be simplified and implemented more efficiently via conferences and social media, which would encourage exchange of information between projects and with the wider public, rather than through detailed reports submitted to the Commission.

4.1.4.6. Monetisation of allowances for grants

NER 300 provides funding to innovative, first-of-a-kind projects, characterised by long planning and construction times, as well as a higher risk profile with regard to budget planning and

financing. With this in mind, the NER 300 programme was set up to co-finance projects through cash grants, which are considered the most suitable instrument for such non-commercial endeavours where equity, loans or guarantees might not be very effective.

The allowances were centrally monetised before award decisions to avoid a prospective risk of the carbon price on the project sponsor or a Member State which, in turn, could jeopardise projects.

The EIB was in charge of monetising allowances by April 2014. In terms of sales of allowances, they were executed gradually to minimize the market impact. This was achieved by spreading volumes to follow liquidity, both intra-day, daily and monthly. The average sale price of the monetisation was €7.19 per allowance, which is in line with the average market price¹⁶⁷.

Funds resulting from monetisation, awaiting their turn for disbursement, have been reinvested by the EIB, following Asset Management Guidelines. Over €23 million of interests were generated in the first year of this asset management exercise in 2014.

The entire exercise covering central monetisation of allowances and management of revenues has been seamless and efficient; the approach has proven to be non-distortive of the carbon market.

4.1.4.7. No ring-fencing

No ring-fencing was applied in the NER 300 programme. In other words, there was no ex-ante split of the amount of funding attributed to CCS and RES categories. If this would have been done, a considerable portion of the resources would probably not have been used (for example by allocating 50% of the allowances to CCS, €750 million of the €2.1 billion available could not have been awarded). Instead, the chosen approach to set targets for the share between the RES and CCS group (up to 8 CCS projects and 1 RES project per renewable category), with the possibility for a smooth spill over between both groups, allowed for avoiding a significant amount funds remaining unspent.

4.1.4.8. Number and timing of calls

Two calls for proposals were launched in 2011 and 2013 respectively, so as to have a purely competitive process first and a modified competitive process at a later stage to allow for adjustment of any technological and geographical imbalances. Projects targeting non-awarded categories were given the priority under the second call, and a cap was introduced (up to 3 projects per Member State). These goals would not have been achievable with one call only or with an open call system based on the first-come-first-serve principle.

A 2-year interval of calls received widespread support at national and project sponsor level because it created a certain continuity and stability in NER 300 funding.

A lower number of applications were received under the second call compared to the first one (32 versus 79). This could have been influenced by the fact that it was launched 4 months after the first award decision, which might not have provided project sponsors with enough time to prepare for a new call.

The first call's cycle lasted 25 months and this may seem as too long, but one has to bear in mind that the first call was also a learning curve for all involved parties. Considerable improvements,

¹⁶⁷ EIB summary report on the monetisation of 300 million allowances:
http://ec.europa.eu/clima/policies/lowcarbon/ner300/docs/summary_report_ner300_monetisation_en.pdf

due to the streamlining of the process, were made during the second call and that lead to a much shorter cycle of 15 months.

4.1.4.9. Length of preparatory phase

Of the 20 projects awarded under the first call in December 2012, two have started so far to produce energy, whereas four more reached a positive Final Investment Decision (FID). 19 projects were awarded in the second call in July 2014 and are progressing.

With regard to the implementation of the NER 300 projects, the necessary preparation phase for first-of-a-kind, commercial-scale power plants has probably been underestimated. The projects need time to obtain all necessary permits, secure the participation of all investors, obtain state aid clearance where applicable and finally complete the construction phase before they enter into operation. Furthermore, the financial crisis has jeopardized financial viability of some projects and made it more difficult to secure project financing. Therefore, a number of Member States requested extension of the deadlines for the FID and entry into operation by two years. Following that, an amendment to the NER 300 Decision was adopted on 5 February 2015.

The adopted extension of deadlines means that disbursements of NER 300 funds will be concentrated between 2017 and 2024, when the majority of projects is expected to become operational. The length of the preparatory phase should be adequately taken into account in any follow-up scheme, as experience indicates that four years from the award decision are necessary to reach the FID and six years to get into operation.

4.1.4.10. Impact of projects

NER 300 provides funding and prepares the ground for market uptake of 38 first-of-a-kind RES power and heat generation plants and 1 CCS installation. The environmental impact of these projects in terms of renewable energy production and CO₂ avoidance will make substantial contributions towards reduction of CO₂ in the period beyond 2020.

4.1.4.11. NER 300 and other financing instruments

NER 300 targets a very specific moment in the life of an innovative power generation project: the development of the first commercial-scale plant, marking the initial market uptake of a new technology. As such, it supports first-of-a-kind projects in any Member State and provides funding to endeavours in the so-called "valley of death", i.e. the gap between the end of R&D and the beginning of full commercialisation. For this reason, stakeholders and Member States have expressed interest in continuing such a scheme, as it is the only EU instrument supporting companies in this very moment of a project's lifetime through grants (the recently launched InnovFin Energy Demo Projects (EDP) pilot facility provides such support via loans and loans guarantees).

NER 300 is fundamentally different from R&D programmes, such as the EU's Seventh Framework Programme for Research (FP7) and Horizon 2020, or the other ETS funding mechanism described in Article 10c thereof, the transitional free allocation of allowances for the modernisation of electricity generation in Member States with a GDP per capita not exceeding 60% of the EU average.

NER 300 is also different from financial tools such as the InnovFin SME Guarantee Facility, launched by the Commission and the EIB under Horizon 2020 with the aim of covering losses of financial intermediaries on loans, leases and guarantees provided to SMEs.

Finally, NER 300 is different from the European Economic Programme for Recovery (EEPR) which provided €1 billion for six CCS demonstration projects for investments in all stages of an integrated CCS project and related front-end engineering design (FEED) studies, permits and environmental impact studies, with a maximum contribution of €180 million per project. These two funding schemes (NER 300 and EEPR) could have been used to complement each other but the CCS project funded under NER 300 decided not to apply for financing from the EEPR. By end 2014, 4 of the 6 CCS projects financed under EEPR were terminated.

In a follow-up scheme more attention should be paid to the need of coherent use of available funding schemes that can only be beneficial to the final outcome.

4.1.5. Main challenges encountered

The main challenge encountered so far has been to ensure the complementary financing of the projects beyond the NER 300 contribution. Because of their high risk and of the current economic crisis they tend to face a number of financial barriers with the potential to compromise or slow down their implementation.

4.1.5.1. *Financial barriers*

During due diligence, the EIB identified for almost all awarded renewable projects a number of financial risks, such as lack of national co-funding, feed-in-tariffs or similar national support schemes, equity, long-term debt financing or revenues. Lack of national funding was the main reason why Member States did not confirm the 10 CCS projects that passed the selection assessment in the first call. Insufficiently developed financing plans could become the main reason why awarded projects might not reach their final investment decision, although no awarded project is currently in this situation.

NER 300 funds cover 50% of the costs of the innovation and are in principle disbursed once projects go into operation and on the basis of their performance. Upfront funding is possible. Maximum 60% of the awarded NER 300 funding can be provided as upfront funding although a Member State concerned needs to provide an appropriate guarantee. In the current NER 300 programme the Commission awarded upfront funding to six projects to the total of €210 million.

It should be noted that although not all projects that required upfront funding were granted it this has not jeopardised their implementation. (Six projects awarded under the second NER 300 call applied for upfront funding but only three received it.)

If a Member State does not provide a guarantee for upfront funding, the credit risk cannot be supported by the NER 300 programme (for instance by setting aside a portion of allowances to cover project default), because the ETS Directive stipulates that award of support must be conditional on verified avoidance of CO₂. Although the NER 300 funds cannot be used, for the same reason, to guarantee loans in a risk sharing facility, projects can additionally apply for loan finance from the Risk-Sharing Finance Facility (RSFF) managed by the EIB. The Commission steers NER 300 projects into this direction; however, no project has made use of RSFF up to now.

There is evidence that, for CCS in particular, cost estimates are very uncertain until detailed engineering design work is done, which makes proper budgeting difficult. When setting up NER 300, the Commission considered imposing a requirement for a FEED (Front End Engineering Design) for all submitted projects, but in cost and timing terms this was considered unrealistic. The cost of a FEED study is significant and requiring projects to fund this may be substantial

disincentive. An option for a follow-up programme would be to foresee refunding of portion of FEED studies required for the application process.

Financial risks for NER 300 projects are significant. In the current set-up, project sponsors would have benefited from being better informed of the possibility of receiving upfront funding, also destined for the construction phase, and combining NER 300 support with other EU and national funding sources (in line with state aid guidelines) and financial instruments, such as, for instance, the RSFF. This could help projects in mitigating those risks. Further options that may help overcome financial barriers could also be explored when designing a prospective follow-up programme.

4.1.5.2. Management structure

The NER 300 programme is managed by the Commission and the Member States, while the EIB performs its tasks on request of, on behalf of and for the account of the Commission.

The Commission has the overall responsibility for the implementation of the NER 300 programme. Its role before the award decisions includes developing the necessary legal basis, publishing calls for proposals, verifying Member States' eligibility checks and EIB's due diligence assessments, supervising the monetisation of allowances and adopting award and rejection decisions. After the adoption of awards, the Commission continues to maintain the overall responsibility for the implementation of the programme. Furthermore, it confirms compliance with the knowledge sharing requirements, approves disbursements and, if necessary, amends award decisions following significant changes to selected projects.

The work load for the Commission in implementing the programme after award decisions has proven to be significant. In order to facilitate the management of a larger number of projects in the future, tasks related to implementation could be outsourced, with the Commission retaining the overall control, supervision and coordination of the programme, including the development of its priorities and adoption of awards to ensure the geographical and technological spread in the EU.

Member States were responsible for receiving proposals from project sponsors and defining reference plants, conducting the first eligibility check, submitting proposals deemed eligible, defining the level of national co-funding and confirming projects to be supported. Following the adoption of award decisions, Member States establish the contracts with project sponsors, submit annual reports on the implementation of projects to the Commission, notify the Commission of any proposed changes to awarded projects, submit payment requests and disburse revenues. Even though the selection of NER 300 projects takes place at the EU level, the involvement of Member States proved essential to perform a pre-selection at the national level, to prepare the support at the national level and to ensure the proper management and disbursement of the NER 300 funds.

The EIB was in charge of monetising allowances and carrying out a due diligence assessment before the adoption of NER 300 award decisions. After the award decisions, the EIB manages revenues and disburses to Member States following their request and the approval of the Commission. The involvement of the EIB proved to be essential for a smooth monetisation of allowances without disturbing the carbon market, professional asset management and project selection. The EIB generated €23 million of accrued interests in 2014 alone through asset management, indicating that this exercise has the potential to cover the cost of its involvement several times over.

In summary, some simplification in the project management structure and streamlining in the role of the players can be envisaged in the future, such as, for instance, shorter due diligence by EIB,

less notification requirements for Member States, and less involvement of the Commission in project management and disbursements.

4.1.6. Conclusions

The awarded NER 300 funding totalling €2.1 billion will leverage approximately €2.7 billion of private investments and mobilise €700 million from other public sources. The average sales price of 300 million allowances was €7.19 per allowance. The monetisation did not disturb the carbon market and the funds are fully allocated through two calls for proposals to 38 innovative RES projects and one CCS project in 20 EU Member States.

There is a balanced geographical and technological coverage. In particular for RES, the NER 300 programme was effective in making awards to a spectrum of RES technologies, spanning all but one technology category. For CCS, applications were received for all technological categories and all proposals passed the capacity threshold. One may explore increasing the flexibility in technology categories to allow for future updates and streamlining of the application process bearing in mind, however, that technologies at different stages of development should not be put in competition with each other.

Targets were set for the share between RES and CCS projects (up to 8 CCS projects, 1 RES project per renewable category) in awards. However, the possibility for a smooth spill over between the RES and CCS group was crucial to avoid a significant amount of funds remaining unspent.

Almost 80% of awarded projects were deemed highly innovative or even potentially game changing.

The 2-year interval of calls created continuity and stability in NER 300 funding.

Many awarded projects face significant financial risks. The possibility of upfront funding and combining NER 300 support with other EU and national sources as well as financial instruments such as the Risk-Sharing Finance Facility could help projects to mitigate those risks. For CCS projects, the lower than expected revenues from the sale of NER 300 allowances seem to have compromised the programme's ability to fund the portfolio of CCS technologies and at the same time set a low cap for funding due to the 15% rule. This together has undermined a business case for CCS projects which in the end were not confirmed by Member States.

The roles of the various institutions, i.e. the Commission, the EIB and the Member States could be simplified in project management in the future.

It can be concluded that the existing NER 300 programme allocated limited funds efficiently to highly innovative RES and CCS projects. The smooth cooperation between Commission, Member States and EIB was crucial for the adoption of the awards. As the vast majority of NER 300 projects are not in operation yet and half of them were awarded only in July 2014, it is too early for a full evaluation of the implementation of the programme. Once such an evaluation is effectuated, one may explore streamlining and simplification of processes in any follow-up scheme.

The scope of a prospective follow-up programme should be extended to cover low-carbon innovations in industry. Also, financial barriers should be considered and reflected accordingly, in particular for CCS. Finally, interaction and division of labour between the involved institutions could be simplified.

4.2. Free allocation to the power sector

In contrast to the Modernisation Fund, free allocation to the power sector has already been applied in Member States that opted to use it since 2013¹⁶⁸. Each Member State applying free allocation to the power sector between 2013 and 2019 first prepared an application identifying the eligible installations, setting out the rules for the operators involved and a detailed National Investment Plan listing eligible investments aimed at modernising the energy sector along with an intended date of realisation¹⁶⁹. This application and the National Investment Plan were based on principles set out in a Commission guidance document¹⁷⁰. The Commission assessed these applications, asked for additional information where necessary and adopted decisions approving them in 2012, followed by a separate state aid assessment of the national plan.

The ETS Directive requires annual reporting on the realisation of the investments. Member States are required to make these reports public. Implementation of the free allocation is underway, and the first year of reporting by Member States and allocations is complete. Based on the current experience, the following interim lessons learnt can be drawn and are relevant to the continuation of the free allocation after 2020.

The transparency of the free allocation process is related both to the accessibility of the information and the level of detail of the information that is in the public domain about the preparation and implementation of free allocation to the power sector. The existing Directive requires Member States that make use of the derogation to publish annual reports on the implementation of investments from their national plans. The applications should also be published. Experience shows that the existing reports that have been published vary in content. For example, some Member States restrict the information provided on investment costs with reference to business confidentiality. Further, the format of the information provided varies by Member State from a limited overview of the numbers to a more comprehensive qualitative report, including explanatory information on the reasons for project delays and/or for the difference between original estimates and final reported costs that occurs in some cases. The underlying independent audit reports required for each operator have been published only by one Member State (the Czech Republic).

Another aspect which influences the perceived transparency is the openness of the process by which investments are selected. Several factors lower the transparency for outside parties, such as other electricity companies within the Member State or in neighbouring countries. Firstly, the fact that most Member States have included specific provisions for this process makes it difficult to compare them. In addition, the late implementation of the changes to the national legislation and the inaccessibility in some cases of the final versions of the national applications make assessing the way in which investments were selected more difficult.

While certain principles for the free allocation are established at the level of the Directive and through the guidance document, the modalities for the existing free allocation to the power sector differ significantly depending on provisions decided by the individual Member States. For example, rules relating to the selection of investments for the national plan, provisions related to the timing of the investments, rules related to the timing of the auctioning of unused allowances and the methodology used to determine the market value of allowances are all decided at national

¹⁶⁸ Article 10c of the ETS Directive created the legal basis for optional free allocation to the power sector between 2013 and 2019.

¹⁶⁹ For example, principle 5 in relation to the requirements for the national plan states that "Investments identified in the national plan should contribute to diversification, and reduction in carbon intensity, of the electricity mix and the sources of energy supply for electricity production."

¹⁷⁰ Guidance document on the optional application of Article 10c of Directive 2003/87/EC: (2011/C 99/03)

level and differ between the Member States. This fragmented approach reduces the transparency of the mechanism for outside parties and significantly increases the administrative complexity for Member States, who have the primary responsibility for monitoring and reporting, because they have to track the progress of the national investment plans over multiple years and to enforce the specific framework of rules.

The development and approval of the national applications was a time consuming process for Member States and the Commission. Since the applications were based on individual national investment plans per Member State, they required a two-step assessment to evaluate whether the application itself was in line with the provisions of the Directive and to assess the associated state aid aspects. Annual monitoring and reporting of the hundreds of investments often involved accounting for cumulative costs over several years.

The provisions in the Directive explicitly limit the use of free allocation to *existing* installations based on a cut-off date, with a view to focussing it on the *modernisation* of the energy sector rather than expanding the generation capacity in a Member State with a view to avoid distortions of competition in the power market. Based on the provisions in the Directive, installations for which Member States could demonstrate that these were "physically initiated" by this date were also eligible for inclusion in the application. Evaluating the evidence for this was a complex issue during the assessment process for the Member State applications.

Significant investment costs – for almost 400 investments with a total cost of almost € 6 billion – were reported for the first year for which full data are available for the 8 Member States concerned (2013). This represents the total expenditure that has been reported in relation to investments from the national investment plan for the period up until the end of 2013. The investment must be at least equal to the market value of allowances requested to be allocated for free for 2013. Of course, the actual investment costs can be higher than the market value of the free allocation. But they may not be lower, in order to meet the conditionality which is required by the ETS Directive in order to apply the derogation. In the first year, Member States allocated a total of roughly 133 million allowances for free.

The types of investments which have been realized under the programme vary significantly between Member States, but the largest share (about 90% in 2013) of the investments were defined as upgrading and retrofitting infrastructure (including networks), while the rest of the investments were related to investments in clean technologies or diversification of the energy mix. While the combined national plans list more than 1100 investments for the full period, including several very large scale investments in the order of magnitude of tens or hundreds of millions of euros, the large bulk of investments are much smaller in size. The average size of investments is around € 38 million while the median size is lower (€ 2 million). The national plans were subject to a state aid assessment, and there are rules preventing companies from justifying free allocation based on costs that are higher than those listed for the investments as specified in the national plans. At the same time, once the implementation is underway, it is difficult to assess based on the annual reports to which extent these investments may have also taken place without the possibility of free allocation.

There are a number of aspects which have been regulated differently depending on the provisions set by individual Member States.

All national plans foresee a decline in free allocation to 0 by 2020. However, some Member States have included more potential investments in their national plans, to allow more flexibility if not all projects are realised, while others have only specific investments which directly correspond to the market value of the free allowances for each operator. Provisions that allow for the delay of investments are included in most Member State applications and these in some cases

create a long potential time lag between the initially planned year of investment, the corresponding free allocation and the eventual auctioning of unused allowances, the extent of which can also differ between Member States. Furthermore, the distribution of the planned investments (as indicated in the national plans) over the derogation period differs between the Member States, and investment costs can be counted in subsequent years, if the value is higher than the maximum free allocation given in that year. These aspects when combined make it difficult to predict the number and the timing of auctioning of unused allowances.

With regard to the first year of implementation, roughly 18 million allowances remained unused (around 12% of the maximum amount that could be allocated for free). This quantity is likely to increase during future years, as unused allowances accumulate. The total quantity of allowances that can potentially be issued is deducted in advance from the auctioning rights of each Member State concerned, while the year in which they are allocated for free or auctioned depends on when and the extent to which the corresponding investments take place. This could be after a delay of a number of years, depending on the rules set by the Member States in their application and implementing rules. The Directive requires that allowances which are definitely not allocated for free are auctioned at the latest in 2020.

Another aspect which has been implemented differently across beneficiary Member States relates to the determination of the maximum number of free allowances per eligible installation. Within the total amount defined based on the provisions in the Directive, the potential allocation to each installation could be set either based on their historic emissions related to electricity production in the years 2005-2007 or based on an ex-ante efficiency benchmark based on a common methodology¹⁷¹. Benchmarks were applied in 6 Member States for one or more of the installations. In many cases this was done in parallel with an approach for other installations based on verified emissions. Further differentiation was applied by some Member States through assumptions on the relevant load factors which were used in combination with the benchmark to determine the allocation. Finally, in two cases the Member States made use of a benchmark based on a national fuel mix. This varied approach reduced the consistency of the basis for potential free allocation to eligible installations between and within Member States. The two Member State specific benchmarks (reflecting the national rather than the Union wide fuel mix) both resulted in a benchmark that was around a third higher than the Union average of 0,6408 tonnes of CO₂ per megawatt hour electricity produced.

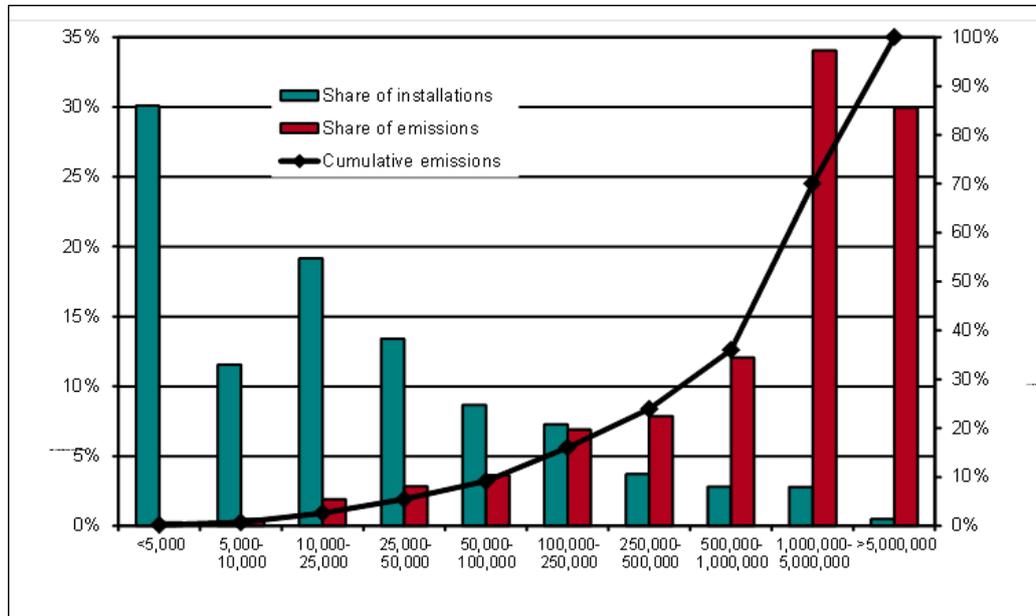
A final aspect which has been implemented differently by Member States, concerns the reference price that is used to calculate the market value of free allocation. In order to calculate the number of free allowances which can be justified based on the costs related to a specific investment, the market value of the allowances needs to be determined using a reference price. Most Member States have based this reference price on the values set out in the guidance document, which result in a price of € 14.5 per allowance in 2014 and 2015 and € 20 per allowance thereafter. A number of Member States have however included provisions in their application and implementing legislation allowing for the possibility to determine the reference price based on observed market prices, if these diverge by more than a set percentage (e.g. 20%) from the reference price. This has resulted in a divergence in the reference price used; with prices depending on the method used of almost 50% lower for the first year. These diverging approaches result in corresponding differences in the implementation between the Member States, as was for example highlighted by Poland in its consultation response.

¹⁷¹ C(2011) 1983 Commission Decision on the methodology to transitionally allocate free emission allowances to installations in respect of electricity production under Article 10c(3) of Directive 2003/87/EC

4.3. Exclusion of small emitters – lessons learnt

Currently, there are more than 12,000 installations included in the EU ETS. These installations represent a large range of emitters, from power plants to industrial installations in various sectors. Annual emissions from these installations vary from less than 5,000 tCO₂ to more than 5,000,000 tCO₂. The largest 5% of installations in the EU ETS represent 71% of total emissions, while the 20% smallest only account for less than 1% of emissions.

Figure 9: Distribution of installations in terms of amount of emissions



Source: Umweltbundesamt based on EUTL verified emissions 2013

Taking into account this distribution, the possibility to exclude small emitters was allowed in 2005-7 and is also being applied since 2013. Member States applied to the Commission by September 2011 in case they wanted to make use of the option to exclude small emitters from the EU ETS. The decision allowing the opt-out was taken by the Commission.

The main condition for the exclusion was that installations excluded are subject to measures that will achieve an equivalent contribution to emission reductions. The Directive requires emissions from excluded installations to be annually monitored and reported to check whether the relevant emission threshold is not exceeded and the installation can remain excluded.

The starting point for the analysis on excluding small emitters is the thresholds on the basis of which installations are deemed to be covered by the EU ETS. These thresholds are determined in Annex 1 of the Directive, with the main threshold being a rated thermal input of 20MW combined with a number of more activity-related criteria and thresholds. These thresholds were subject of considerable discussion and analysis ahead of the previous ETS revision in 2008 and are not put in question by stakeholders.

The threshold for allowing the exclusion of installations from the EU ETS (a rated thermal input below 35 MW and reported emissions of less than 25,000 tCO₂ per year) were also intensively discussed in 2008 and there is no reason to believe that a significant change has taken place compared to the situation when these thresholds were introduced. Therefore, these thresholds will also not be further analysed.

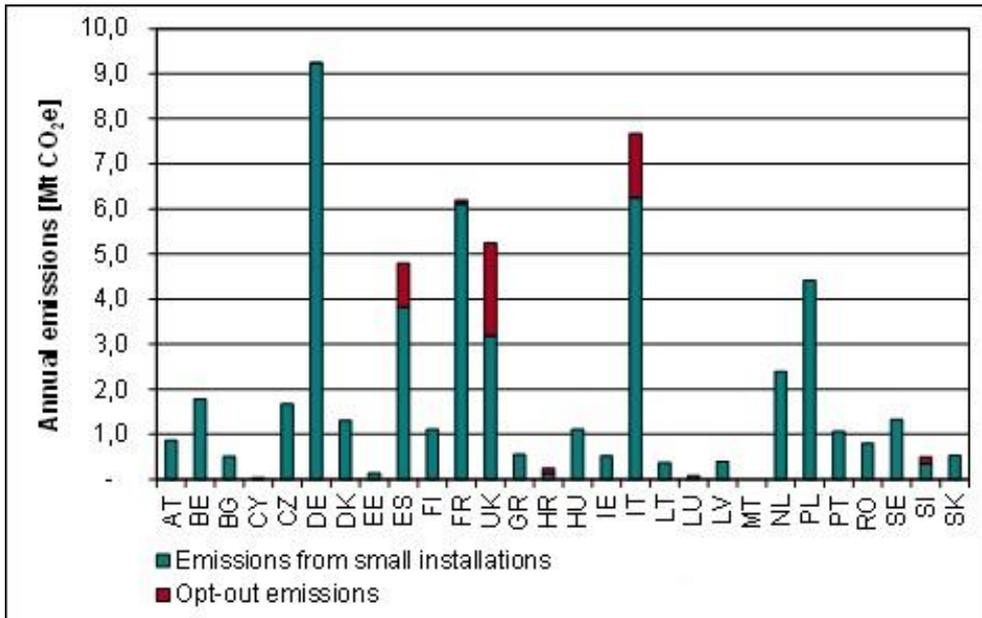
In terms of environmental effectiveness, the current combination of an emission threshold of 25.000 tCO₂ and a capacity threshold would have cut down the overall emission coverage of the

EU ETS by 2.7% if all Member States had applied. Considering the limited use of this option, currently the overall emission coverage has been reduced by 0.3%, corresponding to 2.7 Mt CO₂e. Since 2013, no installations have been brought back in the system because they exceeded the relevant threshold.

In this context, it is also important to note that small emitters as defined in the Directive may not necessarily be small installations owned by operators of small and medium-size enterprises (i.e. enterprises with less than 250 employees), notably if the activity is not very energy-intensive.

Figure 10 provides an overview of the annual emissions from small installations compared to opt-out installations.

Figure 10: Annual Emissions from small installations (installations with annual emissions < 25 kt) and from opt-out installations



Source: EUTL, Article 21 reports

As is also shown by this graph, the option to exclude small emitters from the ETS was used only to a limited extent by Member States. The reasons were probably that developing appropriate alternative measures presented drawbacks in terms of administrative complexity and costs for the Member States compared to applying the ETS. Since the start of the EU ETS, most operators of covered installations, including those with low emissions, have become used to the annual compliance cycle of monitoring, reporting and verification of emissions and surrendering of allowances. Operators have developed an understanding of the EU ETS and best-practices, they established internal procedures and hold accounts in the Union registry so that they might have been reluctant to request changing from the EU ETS to a different national system involving new administrative procedures and requirements. In particular, since the Directive requires monitoring and reporting of emissions and an equivalent contribution to emission reductions, and as ETS monitoring and reporting is in any case lighter for small emitters through the implementing legislation, this might have caused operators not seeing any additional benefits in the exclusion and therefore Member States not making use of this option. In addition, excluding installations from the EU ETS increases the stringency of a Member State's effort sharing target, which may also have played a role when considering the use of this option.

The measures presented to the Commission by the Member States varied to a certain extent. In line with the overall objective of the EU ETS, a measure was considered equivalent if it achieved

a contribution to emission reductions equivalent to those achieved by the EU ETS without causing any distortions of competition. In terms of costs per ton of CO₂ most Member States opting for this required operators to pay a specific levy based on an 'annual emission target' (equivalent to the amount of allowances the installations would have received for free under the EU ETS) multiplied with the average carbon price over a certain period.

While such systems were accepted, other proposed measures were rejected by the Commission. For instance, a measure that required the operator to improve an emission value expressed in relative terms, i.e. emissions per marketable unit of product was not considered equivalent. In terms of environmental integrity, such a measure provides no guarantee that absolute emissions from the installation actually decrease since a decline of the specific emission value may only mean that the production of the installation grows faster than its emissions.

4.4. Guaranteeing a robust and secure EU ETS (registry fees) – lessons learnt

With the move from national registries to the Union registry, many roles and responsibilities were shifted from Member States to the Commission. For example, changes to the IT infrastructure and software are implemented at the EU-level only and not separately in each Member States. At the same time, maintaining an appropriate level of security for the system has become crucial over the past years and notably after several successful fraudulent attacks on Member States' registries in 2010 and 2011. A security failure in the system which tracks the ownership of the allowances can potentially have far-reaching legal and financial consequences. The Union registry has successfully improved the overall security of the EU ETS by enforcing common security standards, but improving security is a constant task. Investments in security ought to be expanding at a rate commensurate with the growth of the European carbon market. Since the start of the EU ETS in 2005, the volume of allowances traded has been increasing from 95Mt in 2005 to 8336 Mt in 2014¹⁷². Furthermore, the Commission manages for the Member States a communication link between the EUTL and the International Transaction Log (ITL) managed by the UNFCCC for the purposes of the Kyoto protocol. The Commission thus represents all Member States in relation with the UNFCCC at a technical level and is required to maintain and add certain features to the Union registry that would otherwise not be needed.

Finally, with the shift to the Union registry, the Commission also expanded the support services to the Member States. A central helpdesk was set up to provide full-day assistance (12-hour service) to national authorities, with even longer hours during more critical periods (e.g. close to the surrender deadline for operators on 30 April). A reporting service has been established to regularly provide data extracts to Member States. Through a Change Management Board, Member States may request the Commission to make changes to the Union registry.

Despite this shift of tasks to the EU-level, the Union registry is solely financed by the EU budget. While the Commission does not charge any fees to the account holders in the Union registry, national authorities may charge fees to the account holders administered by them. These fees charged to account holders at the national level vary significantly across Member States. The reason is mainly that differences in terms of operational efficiencies and effort put into different registry activities exist. Also, the sources of funding of registry activities differ across Member States. While registry activities in some Member States are funded from additional sources, such as revenues from the EU ETS auctions, others solely rely on registry fees.

¹⁷² Compiled by Bloomberg New Energy Finance: trading figures taken from Bloomberg, ICE, EXC, Bluenext, EEX, CCX, Nordpool, other sources include UNFCCC and Bloomberg New Energy Finance own estimates.

Since 2012, costs of the Union registry have been increasing and are expected to increase in the coming years before stabilising at a certain point. Some of the costs, however, are recurring costs, in particular costs with regard to maintaining a high level of security for the system and its infrastructure. For example, to further secure the IT environment, the Commission has planned to equip all Member States' authorities with specific hardware (security token) and incurs the initial costs of acquiring the tokens, but will also incur future costs related to replacing them where necessary.

There have so far not been difficulties to secure the financial envelope for the Union registry in the EU budget. Nevertheless, over the past years, pressure on the Commission to cut back in particular administrative costs, including IT costs, has been increasing.

5. DETAILED DESCRIPTION AND SCREENING OF OPTIONS FOR FREE ALLOCATION TO INDUSTRY

For all the elements of the free allocation system (benchmarks, production levels, new entrant reserve, carbon leakage groups) and for the indirect cost compensation issue, lessons learnt and options are presented below.

5.1. Benchmarks

5.1.1. Lessons learnt from the current system in phase 3 (2013-2020)

The benchmark determines tonnes of CO₂ per tonne of product, no matter how the product is produced in terms of technology, fuel used, the size of an installation, or its geographical location.

Article 10a(1) of the ETS Directive stipulates that benchmarks should be developed for each sector and subsector, to the extent feasible. The result was 52 product benchmarks¹⁷³ and two fall-back¹⁷⁴ benchmarks. Each benchmark consists of a clear definition, and a value. Benchmark values were determined based on performance data, i.e from real-life historical industrial production in 2007-08¹⁷⁵.

Benchmarks are not a regulatory standard, but serve as a tool to calculate free allocation to installations. Nevertheless, as expressed by stakeholders, benchmarks should be seen as an indication of what is technologically feasible at a given time and of the level of performance it is possible to strive for.

The benchmarking approach as specified by the Directive has proven feasible to use for allocation. It is a clear, fair and transparent way of calculating the free allocation in a manner that rewards the most carbon efficient installations and thus provides the necessary incentives to reduce emissions, as intended by the ETS.

There is broad agreement that the benchmarking system has worked well, and there are no plausible alternatives achieving the same results in terms of environmental integrity, innovation incentives and addressing the risk of carbon leakage¹⁷⁶. The majority of stakeholders from all categories (industry, public authorities, civil society) generally support the current approach to

¹⁷³ Most of the 52 product benchmarks are based on products (and not inputs) to maximise the incentive for GHG efficient production. Exceptions from this output-based approach have been applied to traded intermediate products (e.g. in the steel, paper and chemical industry) to ensure a level-playing field for integrated and disintegrated production facilities and different permitting practises in Member States.

¹⁷⁴ Allocation based on so-called fall-back approaches for processes not covered by a product benchmark: based on the heat benchmark, the fuel benchmark or process emissions. In Phase 3, about two thirds of the available allowances are allocated for free based on product benchmarks, and one third is allocated based on fall-back approaches.

¹⁷⁵ The verified data used for setting the benchmarks was voluntarily submitted by the concerned industry sectors. This voluntary data collection with a high level of participation was carried out in 2009-2010 out prior to the determination of the free allocation to individual installations. Member States had to submit national implementation measures to determine the allocation for each installations in their territory by 30 September 2011.

¹⁷⁶ The EU opted for the use of free allowances as measures to reduce the risk of carbon leakage. While there were some initiatives to implement a border tax mechanism to tackle the risk of carbon leakage, it is considered as a significantly less appropriate tool. Such border measures would be in potential conflict with World Trade Organization's rules, and UNFCCC principle of Common but Differentiated Responsibility (CDR). The risk of retaliation and trade conflicts with third countries should also be considered. In that context, EU's focus remains on implementation of current free allocation rules, as well as strengthened carbon leakage measures in Phase 4.

setting benchmark values i.e. the average 10% best as starting point.¹⁷⁷, i.e. adhering to the current principles. Therefore, and also to ensure regulatory predictability, the European Council endorsed the continuation of the benchmark-based approach and this issue is not subject to further assessment¹⁷⁸. It is also assumed that the definitions of the existing benchmarks will remain unchanged, as this has not appeared as a concern for stakeholders.

The European Council requested, however, the regular update of the benchmark values in order to reflect technological progress. The benchmark values should be lower, leading to reduced allocation in line with lower emissions thanks to the ongoing technological development (which is to be reflected in the updated benchmark values). The question is how to update the benchmark values within existing system to ensure that the values remain up to date and continue to provide allocation efficiently and preserve incentives to innovate are avoided.

Concerns about the stringency of the benchmark values lead several stakeholders (from different sectors e.g. glass, ceramics, chemicals, steel) to call for benchmarks that are technically and economically achievable and viable.

The benchmark values for phase 3 required collecting the necessary data from industry associations. It is considered, based on recent experience, that the data necessary for setting future allocations can be complemented with some limited additional data requests needed to update the benchmark values, and this can lead to less administrative burden for industry, Member States and the Commission compared to collecting data two times – once for determining the benchmarks, and once for determining the amount of free allocation. This "two in one" approach would also ensure consistency of benchmark value determination and the allocation process.

5.1.2. Policy options for updating benchmark values for 2021-30

As outlined above, the benchmark values need to be updated to reflect the recent technological progress. Otherwise, by 2030 they would be based on data more than two decades old. Updating benchmark values is important for retaining the economic incentives for further emission reductions, thereby supporting the transition to more carbon- and fuel-efficient production, and also for a more targeted allocation where the need to apply a cross-sectoral correction factor is avoided or minimised. This was underlined by some industry stakeholders: e.g. the glass sector argued that periodically updated benchmarks could remove the need for the cross-sectoral correction factor, while the steel sector acknowledged it is justified to update the benchmark values as new technologies come to the market all the time¹⁷⁹.

There are some concerns from industry about the update of benchmark values. For example, paper and pulp stakeholders argue that an update might penalise early movers (i.e. better performance by the sector means less allocation due to a lower benchmark value); the cement sector is of the opinion that the focus of the revision should be on sectors with the widest gap between best and worst performers; the lime sector believes that an update should be undertaken only when sufficient evidence exists of technological progress (and as such that it should be preceded by an expert assessment).

¹⁷⁷ See Annex 3 – Summary of Stakeholder Consultations. Regarding the details however the views are mixed: industry stakeholders underline concerns about the limits of existing technologies, public authorities are of the opinion that it is important that the system rewards the best, while civil society stakeholders would like to see benchmarks based on worldwide best technologies.

¹⁷⁸ The 2008 ETS Directive impact assessment assessed this aspect in more detail

¹⁷⁹ See Annex 3 – Summary of stakeholder consultations

A particular case concerns the updating of the fall-back benchmark for heat. On the one hand, there is technological development in producing heat more carbon efficiently which could warrant an update of that benchmark. On the other hand, one needs to take into account that if an installation becomes more energy efficient, the amount of heat it uses (this, and not the tonnes of concrete product, is relevant to determine allocation based on the heat benchmark) will also decrease, even if the quantity of products it produces is unchanged. A right balance therefore has to be found for the updating of the heat benchmark. Similar issues also apply for the fuel fall-back benchmark. However, these details are outside the scope of this impact assessment since they are subject to implementing legislation.

Keeping in mind the above analysis, the considered options for the update of benchmark values are the following:

'Baseline A': Using existing benchmark values, i.e. no update.

'Baseline B': Continuation of the current system - update of all benchmark values based on new data once before 2021, based on actual data reported by operators of ETS installations on a mandatory basis. Benchmarks are kept constant thereafter (2021-30).

Option 1. Update of all benchmark values by the same percentage once: all benchmarks are updated once before 2021 by using a flat-rate that reflects the average relative decrease in emission intensity since 2007-08 as a result of technological development. Benchmarks are kept constant thereafter (2021-30). A variation of this option is the use of more than one flat-rate with a low, medium and high flat-rate.

Option 2. Update of all benchmark values by the same percentage regularly: all benchmarks are updated regularly based on a flat-rate that reflects the average relative decrease in emission intensity since the last update. Benchmarks are updated twice: before 2021 and before 2026 (i.e. mid-term review). Benchmarks are kept constant for five year periods (2021-2025 and 2026-2030).

Option 3. Updating all benchmark values based on new data, and then regularly updating them by a standard percentage: benchmarks are updated once before 2021 based on actual data reported by operators on a mandatory basis. Benchmark values decrease thereafter by a pre-defined rate.

Option 4. Updating all benchmark values based on new data, every five years: benchmarks are updated based on actual data reported by operators on a mandatory basis. Benchmarks are updated twice: once before 2021 and once before 2026 (i.e. mid-term review). Benchmarks are kept constant for five year periods (2021-25 and 2026-30).

The options above address the two main issues for the benchmark update – its basis (i.e. flat rate or data collection) and its frequency (once or twice in phase 4).

5.1.3. Screening

For the screening of the different options, the objective of "better alignment with production levels" is not relevant so this is not included in the screening below. Similarly, using a benchmark-based approach ensures that "incentives for industry to innovate are fully preserved" so this is not analysed further.

The Baseline A option is not in line with the European Council conclusions and is not analysed further.

Options Baseline B and 4 are the ones with a data collection update; options 1 and 2 are the ones with a flat rate update; and option 3 is mixed.

Baseline B and Option 4 both imply a new data collection to update the current benchmarks, so that they reflect the technological situation in 2015/16, i.e. some 5 years before the start of phase 4. In Option 4, there is also another update during the period. Thus, baseline B and option 4 differ in the frequency of benchmark update, not in its method.

Benchmarks based on newer data would not be possible, since the process of collection, verification and calculation of values takes approximately two years and the benchmarks should be available well in advance of the trading period (e.g. before 2019). The current benchmarks were determined based on a data collection organised by industry. To reduce administrative burden, this data collection should take place simultaneously with the data collection of production data for the allocation.

Options 1 and 2 use a flat rate approach for benchmark update and differ in its frequency (once for Option 1 and twice for Option 2). The main advantage of these options is their simplicity as no data collection is required. Furthermore, once the improvement rate is decided, these options provide an advanced degree of certainty to industry regarding the future benchmark values that would answer the repeated calls for predictability from industry stakeholders.

Based on latest emissions and production data, it is estimated that the improvement rate should be in the range of some 1.5-2.0% annually in order to properly reflect technological development since 2007-08. Historical carbon efficiency improvement rates of various sectors can be found *inter alia* in the 2050 sector roadmaps. For most sectors in the 1990 – 2010 horizon annual improvement rates have been around 2% within a range of 0.5 – 3.6%¹⁸⁰.

For technological reasons, improving carbon efficiency will be easier for some sectors and more difficult for others. Furthermore in some sectors some of the most cost effective measures may have already been implemented, even though technological development also provides for new cost effective measures. Thus, using a flat rate can be complemented with specific rules for outliers, i.e. sectors with considerably faster or slower carbon efficiency improvement rate. Such a nuanced approach can ensure that even the slowest performers contribute to some degree, but also that best performers maintain the realised profits from lowering their emissions, albeit somehow reducing the future incentives to improve.

Several sectors have expressed support for a data collection update of benchmark values, underlining the need to base it on accurate real data (e.g. ceramics, refineries, non-ferrous metals) and use a robust, transparent approach (e.g. cement) comparable among sectors (e.g. ceramics, steel).

For a flat-rate approach, some verification with the help of a data collection may be warranted to improve accuracy. Furthermore, to the extent that past and/or future technological progress differs substantially in some sectors, a single flat-rate approaches could lead to unduly different levels of ambitions of some updated benchmark values (a few stakeholders argue against using proxies or estimations to determine the updated values e.g. lime sector advocates that a "one size fits all" approach should be avoided).

These weaknesses could be mitigated by using multiple flat rates (e.g. low, medium, high). The medium flat rate is used as default and the two others are applied in case that the data collected to determine the activity levels of installations provide evidence that the medium flat rate is too high or too low.

¹⁸⁰ Improvements for refineries, cement and steel have been in the order of 1% per year; the chemical industry improved by 3.6% per year and fertiliser production by 11% per year since 2004 mainly due to the abatement of N₂O emissions.

The regular update in option 2 better reflects the continuous technological progress, while the risk of undue carbon costs for the most efficient installations might be slightly higher, and the administrative complexity is somewhat increased due to the regular changes of benchmark values. **Therefore, option 1, as the least complex and entailing least administrative burden, is used in one of the option packages.**

Options 3 and 4 score highly on most criteria as real performance of sectors is well reflected. The main difference between the two options is the further updating either by applying a flat-rate (option 3) or based on an additional full data collection (option 4). The latter increases the administrative complexity and reduces certainty to some extent, but better reflects the changes in real performance. Since the data collection for the benchmark values would be done at the same time as the other needed data collections, the future benchmark values would only be known together with the other parameters of the allocation formula (production levels and possible correction factors) which might somewhat reduce predictability for industry. **Given that option 4 shows high results in three of the four screening criteria, it is part of one of the option packages.**

Table 13: Screening of options for updating benchmark values

	Technical progress reflected	No undue costs for most efficient installations	No increased administrative complexity	Avoid windfall profits
'Baseline B'	0	0	0	0
Option 1.	-	-/0	+	-
Option 2.	0	--	0 / +	-
Option 3.	+	0	- / 0	0 / +
Option 4.	++	+	-	+

**Note on scoring:* The symbols used are indicators of the comparison between a proposed option and the Baseline B. Their meanings are: "--" much worse than baseline, "-" worse than baseline, "0" equal to baseline, "+" better than baseline, "++" much better than baseline.

In summary, for the option packages, option 1 is used for the simple packages, and option 4 for the more targeted packages.

5.2. Carbon leakage groups and criteria

5.2.1. Lessons learnt from the current system in phase 3 (2013-20)

The ETS Directive links the level of carbon leakage risk to the extent to which it is possible for sectors to pass their carbon costs into their product prices¹⁸¹. This is therefore an important element in deciding the share of emissions that can be covered by free allocation. If costs that can be passed on to consumers are compensated, this may lead to windfall profits for the industrial sectors receiving the free allocation.

Based on the ETS Directive, there are currently three categories of sectors depending on the level of exposure to the risk of carbon leakage. Each category has different levels of free allocation:

- Electricity production is not deemed to be exposed to the risk of carbon leakage, and electricity producers are typically assumed to be able to fully pass through their carbon costs

¹⁸¹ See Article 10a(14) of the ETS Directive

in increased electricity prices to their consumers. Therefore, electricity production is not eligible for free allocation in phase 3.

- Industrial sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage are identified in the 'carbon leakage list' and are given free allocation at 100% of the quantity determined based on the benchmarks¹⁸², i.e. are assumed not to be able to pass through any carbon costs.
- Other industrial sectors receive a lower (annually decreasing from 80% in 2013 to 30% in 2020) level of free allocation¹⁸³, i.e. are assumed to be able to pass through some carbon costs.

The extent to which it is possible for sectors to pass through carbon costs without losing market shares should be assessed in accordance with the ETS Directive in order to determine exposure to the risk of carbon leakage. It is difficult to accurately measure this risk in detail, so this requirement is operationalised in phase 3 by using quantifiable criteria. These criteria were deemed to provide an approximation of the ability to pass through carbon costs, and in general the exposure to the risk of carbon leakage. It was deemed important to use officially available data for the application of the criteria. This led in the current ETS Directive to the provision that a sector or sub-sector is deemed to be exposed to a significant risk of carbon leakage in case:

- the sum of direct and indirect additional costs resulting from the ETS is at least 30% of gross value added (GVA); or
- the intensity of trade with third countries is above 30%; or
- the trade intensity with third countries is above 10% and the costs resulting from the ETS amount to at least 5% of GVA¹⁸⁴.

Both trade data and gross value added can be found in official statistics, and emissions data is available via the EU ETS registry database.

The quantitative assessment based on the abovementioned criteria may be supplemented by a qualitative assessment, which is based on the abatement potential, market characteristics and profit margins of sectors where relevant data are available¹⁸⁵. Stakeholder views are mixed on the possible continuation of the qualitative assessment¹⁸⁶: some industry stakeholders argue that quantitative criteria cannot always take into account all specific situations, while others believe simple metrics would be more adequate in determining carbon leakage status. Civil society on the other hand advocates for using the qualitative assessment also to remove sectors from the carbon leakage list since at present, sectors can be added if appropriate convincing evidence is provided, but cannot be removed from the list.

The experience with both the quantitative and qualitative assessments so far has been that they increase the administrative burden as the Commission has to check that sufficient evidence exists to justify this and companies invest resources in preparing an application; and also the qualitative arguments can be interpreted in different ways which make them a difficult basis for regulatory decisions.

Based on the criteria explained above, the Commission is required to draw up the list of sectors and sub-sectors deemed to be exposed to a significant risk of carbon leakage ('carbon leakage

¹⁸² See Article 10a(12) of the ETS Directive

¹⁸³ Installations in sectors or subsectors not on the carbon leakage list but eligible for free allocation received 80% of the quantity determined based on the benchmarks and the applicable correction factor in 2013. The free allocation decreases every year and in 2020 reaches 30% of the quantity determined. See Article 10a(11)

¹⁸⁴ See Article 10a(15-16) of the ETS Directive

¹⁸⁵ See Article 10a(17) of the ETS Directive

¹⁸⁶ See Annex 3 – Summary of stakeholder consultations

list') every five years. The first carbon leakage list¹⁸⁷ was adopted by the Commission at the end of 2009 and was applicable for free allocation of allowances in 2013-14. The second carbon leakage list¹⁸⁸ was adopted in 2014 and applies for 2015-19.

The lists have been determined by analysing all 258 manufacturing industry sectors. The outcome of the analysis is that a large majority of assessed sectors are on the carbon leakage list, and in particular almost all sectors with any significant carbon emissions (see Figure 11). In total, the current list includes activities collectively responsible for more than 97% of industrial emissions covered by the ETS. While being on the carbon leakage list is described in the recitals of the Directive as an exception, it has *de facto* become the norm.

Many companies operating installations receiving free allocation are able to pass through at least part of their carbon costs and this was acknowledged already in 2008¹⁸⁹. Although precise data is difficult to collect, it is quite clear from the growing body of empirical studies that there is a difference between sectors in this respect. However there is very limited differentiation among industrial sectors in terms of free allocation, i.e. almost all industrial activities receive the same treatment irrespective of a degree of exposure to carbon leakage risks and in the related ability to pass on costs.

A more targeted approach whereby differences in the degree of exposure to carbon leakage risk translate into differentiated allocation levels adapted to the real need of sectors could have made it possible to limit or even avoid the need to apply a cross-sectoral correction factor. It is therefore pertinent to explore the possibility of a real differentiation among sectors currently on the carbon leakage list with free allocation levels accordingly adjusted.

The ability to pass through carbon costs into product prices for final customers without losing market share has been assessed in preparation for the ETS revision. Based on an extensive literature review of theoretical and empirical studies (see Annex 9), it can be observed that the cost pass-through rates are not homogenous among different products. While it may be difficult to quantify these cost pass-through rates, it can be concluded, based on literature and stakeholders' views¹⁹⁰ that most of the carbon-intensive sectors have been able to pass through at least part of their carbon costs.

The following table gives an overview of the average estimated cost-pass-through in some industrial sectors based on the literature review. While there is not a one to one correlation to the criteria currently used in the ETS to estimate the risk of carbon leakage and ability to pass through costs, the literature nevertheless shows that cost pass through appears to be a reality. This important topic merits further analysis.

¹⁸⁷ See Commission Decision 2010/2/EU. The list was amended (i.e. additional sectors and sub-sectors were added) three times: by Decisions 2011/745/EU, 2012/498/EU and 2014/9/EU.

¹⁸⁸ See 2014/746/EU: Commission Decision of 27 October 2014 determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage, for the period 2015 to 2019 See Commission Decision 2014/746/EU

¹⁸⁹ Commission Staff Working Document, accompanying document to the Proposal for a Directive of the European Parliament and of the Council, amending Directive 2003/87/EC so as to improve and extend the EU greenhouse gas emission allowance trading system: Impact Assessment (SEC(2008) 52).

¹⁹⁰ During the stakeholder consultations, energy-intensive industrial sectors have mainly emphasized the difficulties in providing the evidence for cost pass-through. Electricity sector noted that companies able to pass on carbon costs should be excluded from free allocation. Similarly, a number of public authorities/Member States propose that the free allocation for such sectors are reduced or removed. NGOs claim that all sectors have the ability to pass through costs to a certain extent, and argue for an ex-post deduction of free allowances.

Table 14: Overview of minimum cost pass-through values found in existing literature¹⁹¹

	Minimum
Iron and steel	60%
Cement	35%
Glass	20%
Refineries	40%
Petrochemicals	25%
Fertilizers	0%

To conclude, sectors that are able to pass through a significant part of carbon costs are at a lower risk of carbon leakage, *ceteris paribus*. In the case of sectors that can pass through costs only to a limited extent, and therefore bear most of the carbon costs, it can be assumed that they face a higher risk of carbon leakage.

5.2.2. Policy options

The policy options for phase 4 build on existing principles for assessing the level of exposure to the risk of carbon leakage, i.e. carbon cost intensity in relative terms and trade intensity with other countries.

However, the existing use of carbon cost intensity used for the current carbon leakage assessments is proposed to be replaced, in all options except Baseline A and Baseline B, with a reference to carbon emissions intensity. The notions are very similar, but using emissions intensity would help avoid a recurrent debate on which carbon price to use in the assessments to determine the carbon leakage list(s).

This change implies that for the two thresholds used in the current carbon leakage assessments, the carbon cost threshold of 5% is translated into a carbon intensity of 2 kg CO₂ per € GVA. Similarly, the 30% CO₂ cost threshold is equivalent to a CO₂ intensity threshold of 12 kg CO₂ per € GVA.

The options developed are as follows:

'Baseline A': Uniform carbon leakage factor of 30% is used for all installations.

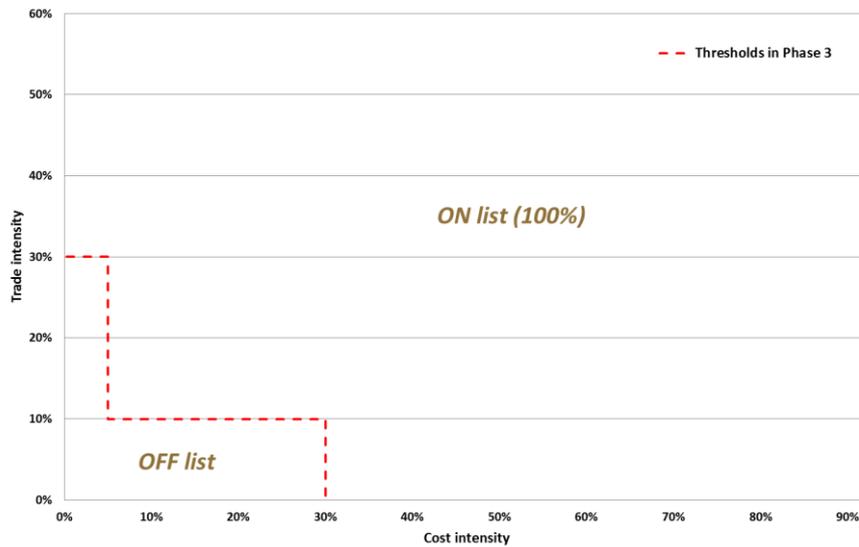
In this option there is no need for differentiating through carbon leakage groups¹⁹².

'Baseline B': Two groups based on cost intensity and trade intensity criteria.

The binary approach is maintained (i.e. sectors are either on the carbon leakage list or not). Criteria and thresholds currently in the Directive (illustrated by the chart below), including the qualitative criteria, remain.

¹⁹¹ For further details and exact references please see Annex 9. There are broadly speaking two approaches to empirical analysis of cost pass-through: ex-ante and ex-post. The former refers to the use of economic models to simulate impact of hypothetical carbon pricing. The latter refers to the use of econometrics and other tools to assess historical cost pass-through. In case of estimations at 100% or more, this is marked as full.

¹⁹² The ETS Directive only foresees an increased level of free allocation for sectors and sub-sectors on the carbon leakage list until 2020.



Option 1. No groups, uniform carbon leakage factor.

In this option there is no differentiation among sectors and activities. A uniform carbon leakage factor is used for all installations based on an estimated average cost pass-through rate. For the purpose of this impact assessment, a low generic factor of cost pass through of 10% is assumed, implying free allocation at 90%. There is no chart for this option since there are no thresholds.

Option 2. Two groups based on emissions intensity and trade intensity criteria.

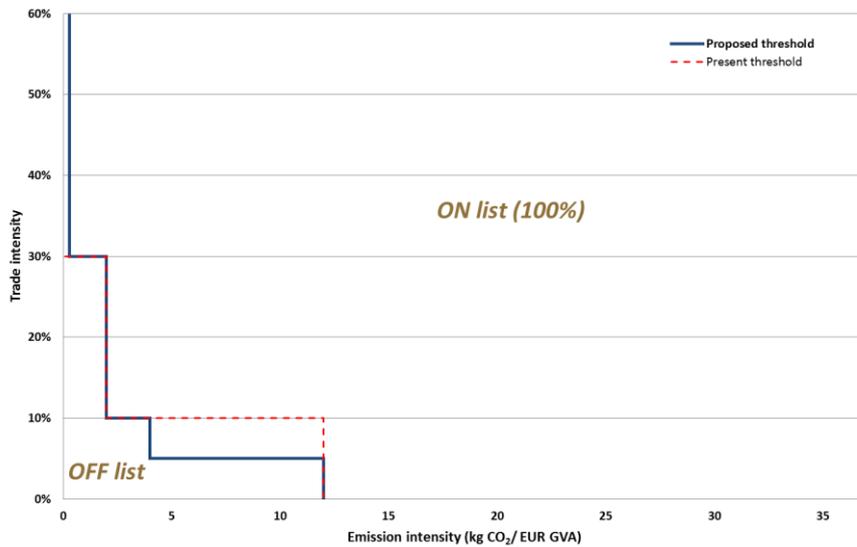
In this option the binary approach of the current system is maintained (sectors are either on the carbon leakage list or not). The option builds on the thresholds currently applied for the assessment of exposure to carbon leakage but are slightly different for two reasons.

One reason is to have a full symmetry between cost and trade intensities. The other reason is to remove sectors with very low carbon intensity from the carbon leakage list, since it can be considered that they are not much economically impacted by the ETS.

As explained above, the carbon cost criteria used in the current system is replaced by carbon emission intensity.

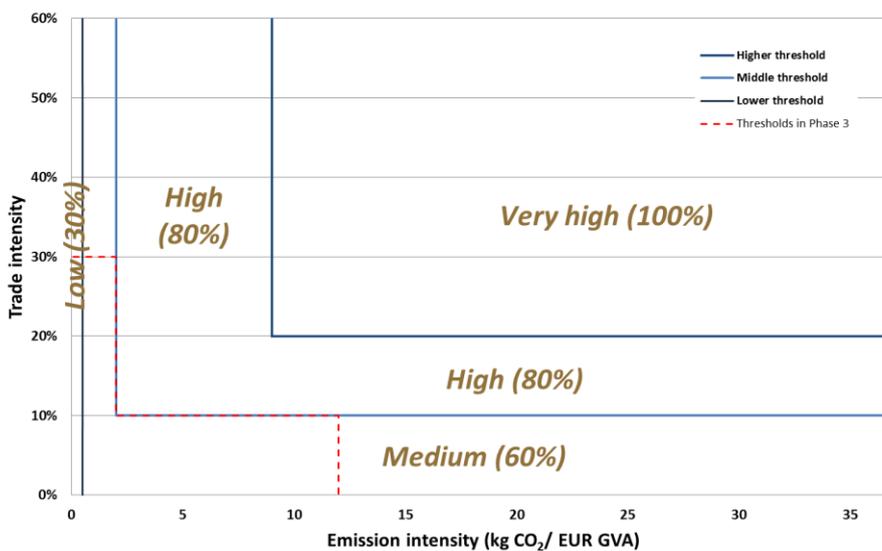
As illustrated by the chart, the option builds on the current thresholds applied for the determination of the carbon leakage list. In this option a sector is added to the carbon leakage list in case the following criteria are complied with:

- emission intensity is above 12 kg CO₂ / EUR GVA (same as 30% cost intensity) (irrespective of trade intensity), or
- emission intensity is above 4 kg CO₂ / EUR GVA (same as 10% cost intensity) and trade intensity of at least 5%, or
- emission intensity is above 2 kg CO₂ / EUR GVA (same as 5% cost intensity) and trade intensity of at least 10%; or
- trade intensity above 30% and (a new threshold to remove low emitting sectors) emission intensity is above 0.3 kg CO₂ / EUR GVA.



Option 3. Four groups based on emission intensity and trade intensity criteria:

In this option, there are four carbon leakage groups corresponding to 'Very high', 'High', 'Medium' and 'Low' level of carbon leakage risk, as illustrated by the chart below.



As explained above, the carbon cost criteria used in the current system is replaced by carbon emission intensity.

For information purposes, the current thresholds as determined by the ETS Directive are indicated by a dotted red line. The option thus builds on existing thresholds, but compared to those, puts a number of low emitting sectors in the lowest group, and provides a more targeted approach, with the highest allocation share to the most exposed sectors.

The threshold between the 'High' and 'Medium' groups is in essence equivalent to the current phase 3 threshold for the determination of the carbon leakage list (the 5% carbon cost intensity threshold is translated into emission intensity of 2 kg CO₂ / EUR GVA).

The new group called 'Very high' is intended to make further differentiation among the sectors deemed to be exposed to carbon leakage risk, with the aim of ensuring that sectors in this group get the highest protection¹⁹³. The threshold value to distinguish between these two groups was determined in order to capture only the most exposed sectors in this group. The more sectors are classified as 'Very High', the higher the likelihood of the need for a correction factor.

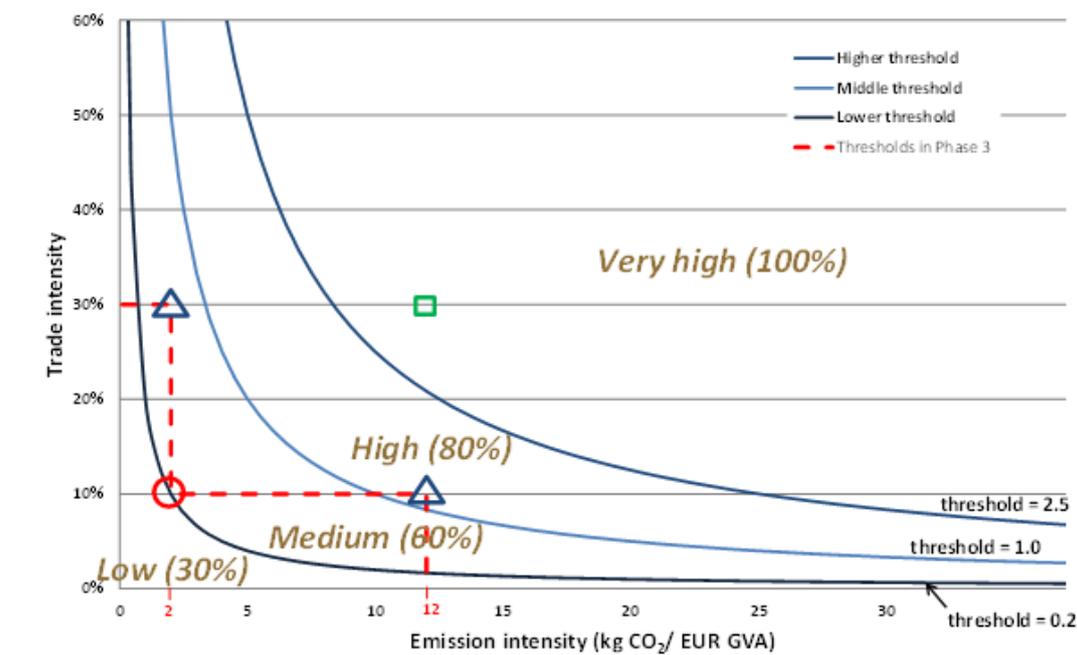
Finally, a low threshold is proposed to identify those sectors for which carbon costs represent a marginal share in their GVA, and therefore are deemed not much economically affected by the ETS. The threshold of 0.2 kg CO₂ / EUR GVA is equivalent to a CO₂ cost intensity of 0.5% in the current ETS Directive, and was selected since it is considered that below this carbon cost level the economic impact of the ETS is minimal, and thus the risk of carbon leakage very low.

Free allocation is proposed to be 100%, 80%, 60% and 30% of the benchmark in the 'Very high', 'High', 'Medium' and 'Low' groups, respectively. While 100% and 30% are values from the current Directive, the values of 60% and 80% for the new groups are determined as an approximation of the ability to pass on the carbon costs.

Option 4. Four groups based on a combined indicator resulting from the multiplication of the emission intensity and trade intensity rates:

This option also includes four groups; 'Very high', 'High', 'Medium' and 'Low' level of carbon leakage risk. As explained above, the carbon cost criteria used in the current system is replaced by carbon emission intensity.

In order to avoid the "step effects" and create a fairer system it is proposed in this option to make a system based on curves. The result of the multiplication of the two indicators, the trade and emission intensity curves are illustrated in the chart below.



Regarding the thresholds to define the borderline between the groups, following consideration could be made:

¹⁹³ A more targeted approach will reduce the risk of the application of the cross sectoral correction factor, and the distinction into more groups will thus be favourable to the sectors that would be in the "Very high" group.

- The border between the 'low' and 'medium' groups is defined by an 'anchor point' (highlighted by red circle in the graph) of the combined emission – trade intensity criterion used in phase 3 (2 kg CO₂/ GVA and 10% trade intensity) and is therefore close to the 'yes – no' border of phase 3 (red dashed line). The corresponding threshold for the multiplied emission and trade intensity is 0.2.
- The border between the 'medium' and 'high' groups is designed to be as close as possible to the two corner points of the phase 3 'yes – no' border (highlighted by blue triangle in the graph). This ensures that all sectors fulfilling all three phase 3 criteria (costs, trade and combination) are at least in the 'high' group'. The resulting threshold value is 1.0.
- The threshold of 2.5 is proposed to define the 'very high' carbon leakage group to cover about a third of industrial emissions, in line with the need of a targeted carbon leakage system.

Free allocation is proposed to be 100%, 80%, 60% and 30% of the benchmark in the 'Very high', 'High', 'Medium' and 'Low' groups, respectively. While 100% and 30% are values from the current Directive, the values of 60% and 80% for the new groups are determined as an approximation of the ability to pass on the carbon costs.

Option 5. Carbon leakage factors based on precise cost pass-through rates. In this option, a detailed methodology to assess cost pass-through rates will be developed for the 20 largest sectors, and a default pass-through rate applied to all others. This approach results in several carbon leakage groups.

The Baseline A option does not reflect the European Council, and is therefore not further assessed.

5.2.3. Screening

Reflecting technological progress in sectors, and better reflection of production levels are not relevant for the options assessed. Therefore the following objectives will be assessed: "Most efficient installations not facing undue costs", "Avoid windfall profits", and "Not increasing administrative complexity".

The objectives of ensuring that most efficient installations face no undue costs and of avoiding windfall profits are interlinked. Both of these two objectives can be achieved via well-targeted free allocation of allowances, and will below be assessed in terms of effectiveness. Such system would also minimise the need to apply (or lower the magnitude of) a cross-sectoral correction factor.

In this respect, 'Baseline B' reflects the current system: almost all industrial emissions originate from sectors that are on the carbon leakage list with the maximum allocation rate, making the differentiation among industrial sectors very limited. Option 1 and option 2 deliver a comparable result in this respect as Baseline B. Option 2 differs from 'Baseline B' as it implies removing from the carbon leakage list those sectors that have very low carbon costs. Concretely, this would result in removing some two thirds of the 156 sectors currently on the carbon leakage list. However, as the 'gross' free allocation to these sectors represents only ca 2% of all emission of industry, the overall impact on making the free allocation more targeted is very small.

The options leading to a higher level of differentiation based on the level of the risk of carbon leakage (options 3 to 5) are expected to deliver better results than Baseline B in terms of effectiveness. Notably, by creating two additional carbon leakage groups, with allocation better adapted to the estimated risk of carbon leakage and related ability to pass on carbon costs, they

reduce the risk of the application of the correction factor, and thereby improve the allocation to the sectors most exposed, while reducing the risk of windfall profits for the sectors that have the largest possibility to pass on costs.

Option 5 reflects the individual characteristics of the largest ETS sectors and thereby assures a targeted system based on established ability of sectors to pass on costs. It would therefore score very well, compared to baseline B, in ensuring that the best installations do not bear undue costs, and avoid windfall profits. However, given data limitations it remains difficult at this stage to quantify the exact rate of costs passed through per sectors or products, and it is uncertain whether such limitations could be overcome before the start of phase 4 (i.e. 2021).

In terms of administrative simplicity, option 1 scores better than Baseline B. It does not require the assessment of carbon intensity and trade intensity for all sectors as it assumes no carbon leakage lists or groups. This leads also to less data being needed and less administrative complexity when calculating the allocation to individual installations.

Options 2, 3 and 4 all require the same data collection as Baseline B to determine in which carbon leakage group a sector would belong to. Therefore that part of administrative costs would be identical. Option 5 would require a different and more complex type of data collection and therefore has a higher administrative cost compared to Baseline B.

Options 2, 3, 4 and 5 all have an increased number of carbon leakage groups compared to Baseline B, and this may lead to a somewhat higher administrative complexity of the allocation system. However, since each installation will get an allocation, and only the share of the base amount differs, the difference in administrative complexity is limited.

While option 5 can be regarded as the most appropriate from a theoretical point of view, its practical feasibility remains doubtful and its complexity considerable and thus, at this stage, it is not considered in subsequent analysis.

The screening of the options can be summarised in the table below.

Table 15: Screening of options for carbon leakage groups and criteria

	Most efficient installations not facing undue costs	Avoid windfall profits	Not increasing administrative complexity
'Baseline B'	0	0	0
Option 1.	0	0	++
Option 2.	0	0	0
Option 3.	+	+	-
Option 4.	+	+	-
Option 5.	++	++	--

*Note on scoring: The symbols used are indicators of the comparison between a proposed option and the baseline B. Their meanings are: "--" much worse than baseline B, "-" worse than baseline B, 0 equal to Baseline B, "+" better than baseline B, "++" much better than baseline B.

In summary, the Baseline is used for Baseline B package, option one for the Simple package, and option 4 for the Targeted and Limited changes package.

5.3.1. Lessons learnt from the current system in phase 3 (2013-20)

a) Production levels used for allocation

The second main element to determine free allocation to installations in a benchmark-based system is the production level of each installation.

In the current system production levels are determined in advance, for the entire 8-year period. The production data to be used was defined¹⁹⁴ as median annual historical production of a particular product at the installation level, during the 4-year baseline period (2005-08) or, alternatively, a 2-year baseline period (2009-10), depending on which value is higher. The justification for having more than one baseline period was that the crisis had a significant negative impact on production in many installations.

Several drawbacks need to be considered. In case an installation reduced production after the selected baseline period, allocation could remain at an unduly high level – until specific rules concerning reduction would be triggered (by pre-determined thresholds). Moreover, installations that increase production without increasing capacity do not get additional allocation.

These two aspects (an 8-year fixed allocation and the use of two historical baselines) led to a substantially higher cross-sectoral correction factor than would have been the case otherwise. The choice of two historical baselines increased the overall correction factor by some 5-6%. It is further estimated that if the phase 3 allocation were based on two separate decisions for 4-years each (instead of one for 8 years), the correction factor would be lower by some 7% towards the latter years in phase 3.

b) Changes in production

The current system addresses significant changes of output of installations compared to their baseline in three ways. First, installations that increase production and corresponding emissions can acquire allowances from the market. Secondly, installations can apply for free allowances from the so-called "new entrants' reserve" if there is a production increase linked to a significant capacity increase¹⁹⁵. Thirdly, there are rules to reduce free allocation to installations that either produce considerably less than in the baseline period (so-called partial cessations), or significantly reduce their capacity¹⁹⁶. These rules are based on pre-defined thresholds.¹⁹⁷

Some industry stakeholders call for *ex-post* allocation¹⁹⁸ (which they sometimes refer to as "dynamic") where allocation would be determined *ex-post* based on annual production data instead of historical production.

Those in favour of *ex-post* allocation argue this would improve the flexibility of free allocation, would facilitate long-term planning and would more closely reflect production levels.

Compared to the current system, an *ex-post* allocation would be beneficial to installations that increase production, and less beneficial for installations producing less, which may be deemed a positive feature. A system of *ex-post* allocation with annual re-calculation of allowances would nevertheless present a number of problems.

First, *ex-post* allocation could significantly undermine the emission reduction incentives for installations whose allocation is based on the fall-back benchmarks. Concretely, this means that if an installation reduced its heat consumption it would be entitled to lower allocation. Incentives to substitute carbon-intensive semi-products with less carbon-intensive ones would also be compromised, since such substitution would also lead to lower allocation. If the incentive for

¹⁹⁴ Historical activity levels were defined by the Commission Decision 2011/278/EU.

¹⁹⁵ Installations get an extra allocation after a significant capacity extension from the reserve set aside for new entrants based on Article 10a(7) of the ETS Directive.

¹⁹⁶ See Article 10a(20) of the ETS Directive.

¹⁹⁷ See Commission Decision 2011/278/EU on free allocation rules for the ETS, as well as Guidance Document n°7 on the harmonised free allocation methodology for the EU-ETS post 2012: Guidance on New Entrants and Closures.

¹⁹⁸ For example, see Ecofys report Dynamic allocation for the EU Emissions Trading System, May 2014

cost-effective emission reductions is compromised, the attainment of EU emission reduction targets becomes more costly, resulting in higher carbon price for all participants in the system.

Additionally, a fully 'dynamic' allocation system (i.e. a system where the adjustments are made annually in accordance with production data) would lead to a considerable administrative burden on installations, Member States and the Commission, since this would imply an annual recalculation of allocation for some 11,000 installations. Experience shows that the full cycle of data collection, verification, calculation and final assessment cannot be completed within less than two years¹⁹⁹. An annual system would therefore have two or three parallel processes of recalculating allocation resulting in significant administrative complexity. Moreover, the business confidentiality of data would also be an important constraint, as calculating production figures of individual installations could be easily done based on their allocation²⁰⁰.

Last but not least, an *ex-post* system would also lead to uncertainty, as the need for a correction factor would have to be determined each year, and thus operators would not know in advance the amount of free allocation for their installations. The incentive effect for installations to reduce their emissions could be seriously undermined.

A full *ex-post* dynamic free allocation system therefore does not seem realistic and able to address the concerns expressed by industry stakeholders. An *ex-ante* system with more frequent production data adjustments than the current 8-year phase, as included in some options below, would be better suited to address the need for stability, predictability and flexibility. A number of industry stakeholders also support this latter approach, highlighting the benefits of predictability as conducive to new investments. Moreover, both public authorities and civil society stakeholders hold the view that more recent data to be used for allocation is necessary in the future system²⁰¹.

5.3.2. Policy options

The considered options for production data updating are the following. They are designed to address different ways of how to do this updating, with various impacts on more precise allocation versus administrative complexity:

'Baseline A': Baseline production levels²⁰² defined once, adjustments based only on capacity reductions, closures and (partial) cessation rules (but no allocation to new capacity increases, given that no reserve for new entrants or capacity increases is foreseen in the Directive for the post-2020 period).

'Baseline B': Baseline production levels defined once, with existing rules for production changes. Under this option, the historical production levels would be based on 5 years (2013-17) for the entire 10-year period. The current rules for capacity changes and partial cessations continue to apply.

Option 1. Baseline production levels defined once, with annual adjustments for significant production changes. The baseline historical production levels would be based on 5 years (2013-17) for the entire 10-year period. Significant production increases and decreases are addressed

¹⁹⁹ It may take longer as allocation can only be finalised once the last Member State has submitted its fully verified data.

²⁰⁰ In the case of installations applying product benchmarks.

²⁰¹ See Annex 3 – Summary of the Stakeholder Consultations.

²⁰² Data collection for production levels described in all options could be undertaken jointly with data collection for updating benchmarks, in order to minimise administrative burden.

through symmetrical annual adjustments²⁰³, i.e. same thresholds for increased and decreased production. Allocation for increased production comes from the new entrants' reserve.

Option 2. Baseline production levels defined twice with annual adjustments for significant production changes. The baseline historical production levels would be defined for two 5-year periods. The basis would be 5 years (2013-17, respectively 2018-22)²⁰⁴. Significant production increases and decreases are addressed through symmetrical annual adjustments i.e. same thresholds for increased and decreased production. As in option 1 increased allocation for increased production comes from the new entrants' reserve.

Given that Baseline A does not correspond to European Council conclusions (no support for new installations), this option is not further assessed.

5.3.3. Screening

For the screening of the different options, the operational objectives of "reflecting technological progress in sectors" and "fully preserving the incentives to innovate" are not relevant for the production levels and adjustments debate. The incentive criterion is disregarded because all options are based on an ex-ante allocation system. Any ex-post allocation system would seriously undermine incentives to innovate.

'Baseline B' allows for free allocation to change for both for increases and decreases of production. Production increases have to be linked to capacity increases. The continuation of this system assumes the maintaining of the 'capacity' notion²⁰⁵ and the accompanying implementing rules, and therefore leads to higher administrative complexity than other options.

Options 1 and 2 foresee annual adjustments in both directions, i.e. both options foresee additional allocation for significantly increased production even without a capacity increase. Also new installations would get allocation based on real production data, until they have sufficient historical production data. Consequently, there is no need to calculate the capacity of installations under these options, which leads to decreased administrative complexity compared to Baseline B.

Option 2 in addition ensures better alignment of production levels by using two consecutive baseline periods, thus avoiding that allocation at the end of the period is based on production data more than a decade old. For the same reason, this option scores somewhat better than option 3 in avoiding windfall profits. However, data collection would have to take place twice in the phase requiring somehow higher administrative burden.

In addition to Baseline B, options 1 and 2 are further considered when creating different option packages.

²⁰³ The exact threshold for significant changes is to be determined in implementing legislation. For the purposes of this IA it is assumed the threshold is 15% difference compared to the baseline production level.

²⁰⁴ Data collection for production levels to be undertaken jointly with data collection for updating benchmarks, in order to minimise administrative burden.

²⁰⁵ Installations that increase their capacity are provided additional allocation. Although the rules on this are clear and specific, they nevertheless pose some difficulties in their implementation and as such an allocation system that does not use this notion of 'capacity' would allow for improved administrative simplicity.

Table 16: Screening of options for production level and adjustments

	Better alignment with production levels	No increased administrative complexity	Avoid windfall profits
'Baseline B'	0	0	0
Option 1.	+	0	+
Option 2.	++	-	++

**Note on scoring:* The symbols used are indicators of the comparison between a proposed option and the baseline. Their meanings are: "--" much worse than baseline, "-" worse than baseline, "0" equal to baseline, "+" better than baseline, "++" much better than baseline.

In summary, option 1 is used for the simple packages, and option 2 for the more targeted packages.

5.4. Reserve for new entrants

5.4.1. Lessons learnt from the current system in phase 3 (2013-20)

Over the period from 2013-20, five percent of the allowances in the ETS have been set aside at the EU level as a reserve for new entrants in order to promote growth and allow for new investments. This translates into some 480 million allowances, as the legislators have earmarked 300 million allowances for the NER300 programme. The definition of 'new entrants' in the ETS Directive: it encompasses new installations and those having capacity extensions. All such new entrants are eligible under the same allocation rules defined in implementing legislation.

Based on the rate of consumption in 2013 and 2014, the size of the reserve is expected to be more than sufficient to meet the demand for allowances throughout phase 3: actually it is expected that a significant amount of these allowances will not be used, resulting in the so-called "unallocated allowances"²⁰⁶.

Providing a reserve for 2021-30 acts as an incentive for new investments. Considering the longer phase 4 (10 years, as compared to 8 years), it is also worth exploring whether the system could be rendered more flexible, i.e. not limited by a fixed amount of allowances to ensure that there will be enough allowances available.

5.4.2. Policy options

The considered options for new entrants' reserve updating are the following:

'Baseline A': No reserve for new entrants. This is the legal baseline.

'Baseline B': New entrants reserve with fixed amount of allowances. This option continues the current rules for 2021-30, i.e. 5% of the total allowances are set aside for this purpose, which is unchanged and thus does not cover increases in production²⁰⁷. In phase 4 this would amount to

²⁰⁶ See Annex 15

²⁰⁷ 5% of total amount available, minus 300 million allowances which are available to help stimulate the construction and operation of environmentally safe CCS projects, as well as demonstration projects of innovative renewable energy technologies, i.e. NER300 (see Article 10a(7-8) of the ETS Directive). As outlined in the October 2014 European Council Conclusions, the existing NER300 facility will be renewed in the post-2020 period, and extended in scope and scale.)

some 374 million allowances (after deducting 400 million allowances to source the Innovation Fund, i.e. the successor of the NER300 programme).

Option 1. New entrants reserve with fixed amount of (phase 4) allowances and replenished with unused phase 4 allowances. The reserve is established with a fixed amount (374 million allowances), as in Baseline B, and is replenished with allowances resulting from production level decreases and installation closures in phase 4.

An alteration of this option is Option 1 developed in Annex 14, where the fixed amount to set up a New Entrants Reserve would be sourced from unallocated (phase 3) allowances in the Market Stability Reserve.

5.4.3. Screening

The operational objectives of "reflecting technological progress in sectors", "preserving incentives to innovate", and "avoidance of windfall profits" are not relevant for the analysis below.

As Baseline A is not in line with European Council conclusions, it will not be further assessed.

Baseline B proposes to set aside a fixed amount of allowances for new entrants. Phase 3 experience shows that has in principle worked. However, significant amount of allowances from the reserve are expected to remain unallocated due to *inter alia* slower than expected growth (lower consumption of allowances in the reserve and flow back of allowances from closed / partially closed installations), and thus some reflection on the optimal amount of allowances in the new entrance reserve is merited. Nevertheless, considering that phase 4 will be longer (10 years), setting aside the same amount of allowances (expressed as a percentage of the total amount of allowances) might not be sufficient and therefore could lead to uncertainty for new investments and undue costs for new entrants by the end of the period.

The reason a longer trading period has a big impact is that allocation for each new entrant is calculated for the entire trading period (e.g. if an installation enters the EU ETS in 2021, its allocation will be calculated for each year between 2021 and 2030). Basically, the longer the period, the higher the demand for new entrant allowances, as it cumulatively increases over time.

Given the above considerations, 'Baseline B' scores overall well in achieving the objectives. It does imply some administrative burden, but it is assessed based on the experience of phase 3, it should be considered as medium.

Option 1 foresees adding leftover allowances resulting from closures and partial cessations to the new entrants reserve, instead of auctioning them at the end of phase 4 as in Baseline B (as initially decided for phase 3). This mitigates the risk of a depleted reserve before the end of phase 4, and therefore reduces the possibility that the most efficient installations face undue costs. Given its advantages, option 1 scores highest and is used for three option packages. Using the unallocated allowances from phase 3 (for more details, see Annex 15) would lead to the same screening results and would in addition reduce the need / size of a correction factor in phase 4.

Table 17: Screening of options for reserve for new entrants

	Most efficient installation not facing undue costs	Better alignment with production levels	No increased administrative complexity
'Baseline B'	0	0	0
Option 1	+	+	0

**Note on scoring:* The symbols used are indicators of the comparison between a proposed option and the baseline. Their meanings are: "--" much worse than baseline, "-" worse than baseline, "0" equal to baseline, "+" better than baseline, "++" much better than baseline.

In summary, option 1 is used for all the packages.

5.5. Compensation for indirect carbon costs

5.5.1. Lessons learnt from the current system in phase 3 (2013-20)

Indirect carbon costs is the term used to describe the costs of CO₂ emissions related to producing electricity which are passed through to industrial consumers of electricity. As electricity producers in the ETS do not receive free allowances to cover their emissions (and therefore have to buy allowances on the market) and given the situation of the electricity market (i.e. almost no imports and still a high proportion of fossil fuel used), full cost pass-through is widely considered as possible.

The ETS Directive gives Member States the possibility to compensate certain electro-intensive industries for these indirect carbon costs subject to State aid control²⁰⁸. The aim is to minimise the risk of carbon leakage due to indirect costs. The State aid guidelines ensure that the aid is proportionate and that the incentives for electricity efficiency and the transition from 'grey' to 'green' electricity are maintained, as the formula used includes, *inter alia*, production levels, electricity consumption levels and specific regional CO₂ emission factors.

As it stands in 2015, some countries (the Netherlands, Germany, Greece, UK, Spain, Belgium (Flanders) and Norway) have opted to compensate for indirect costs, although not always to the full amount allowed. The low number of countries providing this aid is probably linked to relatively low carbon price which on the one hand reduce the need for the support, and, on the other, reduce the income to the Member States from auctioning allowances.

Some industries with high electricity intensity have criticised the fact that compensation of indirect costs is optional for Member States²⁰⁹. They claim this does not efficiently address the risk of carbon leakage, and highlight the risk of distortion of competition linked with the lack of harmonisation across the countries covered by the EU ETS. As a consequence, electro-intensive industries, i.e. industries using a lot of electricity, have asked that compensation of indirect costs is done through an EU-wide and harmonised system.²¹⁰

In this context, some industry stakeholders argue that the indirect cost compensation should be done by using auctioning revenues or providing additional allowances to electro-intensive industries cover the additional costs. This has e.g. been proposed by the non-ferrous metals association Eurometaux.

²⁰⁸ The current measures are assessed under the Commission's 2012 Guidelines on state aid measures related to the ETS.

[http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012XC0605\(01\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012XC0605(01)&from=EN)

²⁰⁹ These views have been also reiterated during the stakeholder consultations. A part of energy intensive industry asked for the development of an EU-wide instrument to replace the national state aid mechanisms. However, a significant number of industrial sectors have also highlighted the fragmentation of the EU energy market, noting that the impact of the ETS is marginal compared to the large variation of electricity prices across Member States. These industries have underlined the need for strengthened EU market, and competitive energy prices, as of greater importance.

²¹⁰ By 'harmonised system' in the analysis is understood a system under which all Member States compensate indirect costs to the same level.

A recent study²¹¹ concluded that indirect costs did not have a significant effect on the risk of carbon leakage in most industries, while it acknowledged that producers using a large amount of electricity may have faced some cost increase due to indirect carbon costs.

This was also concluded in the two cumulative cost assessments on the aluminium and the steel sectors²¹² prepared for the Commission services in 2013. For some electro-intensive primary aluminium plants, which did not have long-term contracts for purchasing electricity, the indirect costs reached levels in the order of 8% of production costs. Also for some electricity-based steel plants the costs were significant. Given that it was the first time such a study was done, it was difficult to determine unambiguously all the factors that could impact the costs. It should also be noted that these studies were carried for a period when the carbon price was considerably higher than today, and when State aid was not allowed. Furthermore, some of these indirect costs may have been passed through to consumers.²¹³

A difficulty with providing the same level of compensation to all eligible industries is that the actual retail power prices paid by industry are not fully known. Major consumers typically have negotiated preferential prices through long-term contractual arrangements and these do not (fully) reflect the carbon costs of electricity production. It is equally noteworthy that Member States have a very wide variety of carbon intensities of electricity production, national markets are integrated to variable degrees and a number of Member States provide significant taxes and levies exemptions for industry.

To avoid the risk of overcompensation, a harmonised EU-wide system compensating all eligible industries to the same level would require a detailed control and verification for each individual company resulting in a significant administrative burden.

A system providing compensation for indirect costs has a high risk of providing windfall profits if the allowances are distributed based on harmonised parameters across Member States, for instance in low-carbon electricity markets. As an alternative, rules can address national and regional differences and mitigate the risk of windfall profit at the expense of additional administrative complexity.

In exploring the options for full harmonisation, one approach could be to no longer allow Member States to have compensation schemes in place as this would lead to equal treatment of all installations across the EU (the level of compensation would be 0 for all). This would however entail risks of undue costs for the most efficient installations, notably in case of a higher carbon price than currently. This is not in line with the European Council conclusions and therefore is not considered in subsequent analysis.

In sum, and as analysed in the 2008 ETS impact assessment²¹⁴, the compensation for indirect costs is a complex issue including many considerations and needs to be approached with care since it might convert free allocation into production subsidies for the indirect costs concerned.

²¹¹ Ecorys: Carbon Leakage Evidence Project - Factsheets for selected sectors, September 2013.

²¹² Centre for European Policy Studies and Economisti Associati: Assessment of cumulative cost impact for the steel industry, 2013. Centre for European Policy Studies and Economisti Associati: Assessment of cumulative cost impact for the aluminium industry, 2013.

²¹³ The extent to which indirect costs are passed by the manufacturing industry into product prices depends on the general cost pass through ability of each sector. When a sector is able to pass through the costs related to the EU ETS, it does not differentiate between direct and indirect costs. In this sense, full compensation for indirect costs (as well as for direct) can lead to overcompensation as some of the costs may have been passed through to consumers.

See http://ec.europa.eu/competition/sectors/energy/impact_assessment_main%20report_en.pdf

²¹⁴ Commission Staff Working Document, accompanying document to the Proposal for a Directive of the European Parliament and of the Council, amending Directive 2003/87/EC so as to improve and extend the EU greenhouse gas emission allowance trading system; Impact Assessment (SEC(2008) 52).

5.5.2. Policy options

The considered options for indirect cost compensations differ in respect to two aspects: (1) whether compensation is optional or mandatory; (2) the source of financing, which could be national state budgets, auctioning revenues or free allowances:

Baseline: Continued optional compensation by Member States. In this option the current system of optional compensation for indirect costs at national level continues. The key features for compensation are determined at the EU level, but the decision to grant compensation is discretionary and depends on the respective Member State and is subject to State aid control.

Option 1. Mandatory Union-wide compensation scheme, financed by using national auctioning revenues. The compensation would be triggered when the carbon price exceeds a certain value, and when this situation occurs, a minimum amount of compensation is to be given by all Member States. The system would be financed by each Member State using its national auctioning revenues. Compensation would, like in baseline, be limited to certain sectors and limited to a share of the estimated carbon costs.

Option 2. Mandatory Union-wide compensation scheme financed through free allocation. Compensation is given at EU level to installations in sectors deemed at risk of carbon leakage due to their indirect carbon costs, and is financed through free allocation of ETS allowances. Compensation is provided based on similar criteria as in the Baseline.

Option 3. Mandatory Union-wide compensation scheme, financed through free allocation plus optional compensation at national level (subject to State aid control). The mandatory compensation is given at EU level to installations in sectors deemed at risk of carbon leakage due to their indirect carbon costs, and is financed through free allowances. Member States can top up the compensation from national resource subject to Commission approval.

5.5.3. Screening

Under the Baseline option, Member States may decide not to compensate for indirect carbon costs for any number of reasons, e.g. considering there is no risk of carbon leakage due to indirect costs or because of other national priorities²¹⁵. This option like all proposed options, presumes that only some of the carbon costs are allowed to be compensated, like in the State aid rules currently in force. This ensures that the incentives to innovate are preserved as the maximum aid intensity ensures only partial recovery of costs²¹⁶. All options therefore score equally on this point.

For the Baseline, the current level of administrative complexity remains unchanged. However, this option could distort intra-EU trade as company decisions regarding location of their activities could be driven by different level of State aid in different Member States instead of underlying market fundamentals.

The compensation not covering the full costs in the Baseline option in principle avoids the risk of creating windfall profits. However, since industry might be able to pass through some of the carbon costs, the options that lead to a higher amount of compensation also increase the risk of

²¹⁵ The Commissions' approval of State aid schemes is required.

²¹⁶ Otherwise, poorly targeted aid would transfer the emission reduction costs from the installations to the other sectors of the economy, and consequently limit these incentives.

windfall profits compared to the baseline. This is the reason why option 1 and 2 score somewhat worse than the Baseline, and option 3 much worse than the Baseline.

In Option 1, all Member States provide harmonised compensation for indirect costs using national auctioning revenues. At the same time, all companies could be put on equal footing since compensation would no longer depend on the Member States' decision. This option requires capacity for design and implementation of compensation schemes in each Member State, and consequently increases the administrative burden for the Commission and national authorities. As all Member States would need to grant some compensation, aggregate public spending would increase²¹⁷. At the same time, limiting market distortions have a positive impact. It should be noted that effort would not be equal across Member States as those with a high share of electricity-intensive industry relative to GDP may experience relatively more strain on public resources.

Options 2 and 3 could also increase the pressure on the total amount of allowances available for free allocation (used for direct emissions) thus requiring more stringent rules for free allocation and possibly increasing exposure to the risk of carbon leakage for many industrial installations²¹⁸. This problem would not occur if the system would be financed from allowances intended to be auctioned by the Member States.

To conclude, a harmonised system (any of the option 1, option 2 and option 3) can reduce distortions in competition between Member States, though with increased administrative burden. While financing compensation through free allowances could limit the impact on national auctioning revenues (State budget), it would also reduce the amount available for compensation of direct ETS costs. Due to the abovementioned shortcomings of options 2 and 3, along with their relatively low overall scoring, only the Baseline and Option 1 are included in the policy packages.

Table 18: Screening of options for compensation for indirect cost

	Fully preserve innovation incentives	Most efficient installations not facing undue costs	Avoid windfall profits	Not increasing administrative complexity
Baseline	0	0	0	0
Option 1	0	+	-	-
Option 2	0	+	-	-
Option 3	0	++	--	--

**Note on scoring:* The symbols used are indicators of the comparison between a proposed option and the Baseline. Their meanings are: "--" much worse than baseline, "-" worse than baseline, 0 equal to baseline, "+" better than baseline, "++" much better than baseline.

In summary, the Baseline is used for the simple packages, and option 1 for the targeted package.

²¹⁷ Auctioning revenues as a potential source of funding may also be used for a variety of objectives, including compensation for indirect costs (currently optional). For example, Member States may use revenues from auctioning of allowances, between 2013 and 2016, to support the construction of highly efficient power plants, including new power plants that are carbon capture and storage (CCS)-ready. In general, at least 50 % of auctioning revenues or the equivalent in financial value of these revenues need to be used by Member States for climate and energy related purposes.

²¹⁸ In the hypothetical case of a fully harmonised system, industry itself has estimated a need of 2.3 billion allowances in 2021-30, or 36% of all allowances available for free allocation in this period. This would lead to a very high cross-sectoral correction factor for direct emissions.

6. FURTHER IMPROVEMENTS TO THE CURRENT SET OF RULES

While the current architecture of the EU ETS is relatively recent, based on experience gathered, certain limited changes to the current set of rules in the ETS Directive should also be considered for the period post-2020. Since these changes may be seen as politically less sensitive, they are not referred to in the European Council conclusions. Nevertheless, they concern core aspects of the ETS, such as the validity of allowances, the Union registry or its scope. They offer the opportunity to enhance the smooth operation of the European carbon market driving cost-efficient emission reductions for all participants, including the smallest.

6.1. Validity of emission allowances

6.1.1. Problem definition

The ETS Directive defines the allowance as a right to emit one tonne of CO_{2eq} during a specified trading period. The allowances can be surrendered in any year within the period they are valid for. For instance, the allowances issued from 2013 onwards are valid for emissions during eight-year period beginning in 2013. Four months after the beginning of each period, allowances from the previous period which are no longer valid for the current period, and have not been surrendered or deleted are replaced by allowances for the current period. This process is referred to as "banking" of allowances.

Taking the example of the transition from the second (2008-2012) into third trading period (2013-2020), this meant that technically the ETS Directive did not allow the use of allowances from the second period for compliance in the third one. However, it did ensure the banking of allowances held in user accounts from the second period to the third one, which took place in 2013.

In practice, the banking of allowances was carried out in 17350 registry account in accordance with the Registries Regulation²¹⁹. The process required important changes in the operations of the Union Registry and a planned downtime of the Union Registry for four consecutive working days, implying a suspension of the spot market during this period. Furthermore, despite the ETS Directive being clear, the sole process of replacement of one type of allowances (phase 2) with another type (phase 3) allowances could have contributed to perceived uncertainty at the market. If this solution remains for the future, the market uncertainty could be even higher taking into account the calculation of the allowances in the Market Stability Reserve.

Making these technical arrangements more effective can be achieved primarily at the level of the implementing rules, i.e. the Registries Regulation. Nonetheless some changes may be needed at the level of the ETS Directive, in particular to allow any allowance to remain valid for any period after it was issued. The Commission has no intention of considering any changes related to the general ability of the allowances to be used in different trading periods. This is central to price formation and a long-term price signal to drive investment in less-carbon intensive capital stock and innovation. However, certain (negative) impacts of the technical implementation of banking may be alleviated in the future.

²¹⁹ COMMISSION REGULATION (EU) No 389/2013 of 2 May 2013 establishing a Union Registry pursuant to Directive 2003/87/EC of the European Parliament and of the Council, Decisions No 280/2004/EC and No 406/2009/EC of the European Parliament and of the Council and repealing Commission Regulations (EU) No 920/2010 and No 1193/2011, OJ L 122, 03.05.2013, p. 1.

6.1.2. Operational policy objective

The operational objective is to remove any temporary uncertainty concerning the use of allowances in subsequent phases associated with the need to carry out the replacement in the Union Registry.

6.1.3. Policy options

Baseline: Replacement of allowances at the end of each trading period.

Option 1: Continued use of phase x allowances beyond that phase x. This would imply same treatment of allowances notwithstanding of when they were issued.

6.1.4. Analysis of impacts

Banking of allowances (baseline option) took a number of weeks of technical preparatory work and more than €10,000 cost under the contract signed by the Commission for the purpose of implementing the Registry related provisions of the ETS Directive. Although to an extent what was developed for the end of phase 2 might be reused for the subsequent transitions into new phases, it is again expected to entail some preparatory work and temporary closure of the Union Registry. The banking process also meant significant uncertainty for market participants and exchanges offering allowance contracts.

The current Registry infrastructure is designed based on trading periods. If continued use of phase x allowances (option 1) would be implemented, it will require new one-off technical preparatory work with respective associated costs for the technical adjustment. This is estimated to be an effort comparable to that related to the preparatory work for banking of allowances at the end of phase 2. While it is challenging to assess the precise cost, for the new adjustment, it is clear that it would be indeed a one-off solution and would avoid additional cost for the subsequent phases. Concerning temporary the suspension of the Registry, downtime would no longer be needed, as the relevant changes could already be integrated in one of the envisaged regular upgrades of the Registry well before the end of phase 3. Continued use of allowances would simplify the operations for market participants, exchanges and authorities. Most importantly, this could in turn avoid possible perceived regulatory risk at the end of trading periods.

Other than that, no major economic, social or environmental impacts can be expected from the choice of baseline or alternative option 1.

6.1.5. Comparing the options

With respect to the objective of avoiding any perceived risk due the need to replace allowances, the continued use of allowances (option 1) would effectively address the issue of the validity of allowances once and for all. Achieving the objectives efficiently, at lowest administrative burden and Registry temporary closure time, is also best ensured by continued use of allowances. Overall, this option is expected to bring simplification to the system and will be more consistent with the general principle of continuous application of the main elements of the EU ETS, beyond the period(s), including the linear reduction factor. It would give a fully coherent signal to the market that allowances once issued are a valid instrument for the EU ETS. In terms of coherence with other EU policies, neither of the options is likely to have any negative impacts.

Table 19: Comparison of options

	Effectiveness	Simplicity	One-off cost	Ongoing cost	Registry suspension	Coherence
Baseline: Replacement of allowances	0	-	+ (possible partial reuse of what was developed for phase 2)	- (new cost every phase)	- (still required)	0
Option 1: Continued use of allowances	+	+	- (cost of new changes)	+ (no cost)	+ (not needed)	+ (continuation of EU ETS beyond phases)

6.2. Optional exclusion of small emitters

6.2.1. Problem definition and general objective

Currently, there are more than 12,000 installations included in the EU ETS. These installations represent a large range of emitters, from power plants to industrial installations in various sectors. Annual emissions from these installations vary from less than 5,000 tCO₂ to more than 5,000,000 tCO₂. Today, the largest 5% of installations in the EU ETS emit 71% of total emissions, while the 20% smallest only account for less than 1% of emissions. Smaller installations in the system thus have generally higher transaction costs²²⁰, i.e. higher costs arising from monitoring, reporting and verification of emissions as well as Registry costs. An overview of the number of installations and their share in total emissions can be found in Annex 4.3.

To increase the cost-effectiveness of the EU ETS for small emitters, at the start of phase 3 (2013-2020), Member States were allowed, but not obliged to exclude installations with a rated thermal input below 35 MW which reported emissions of less than 25.000 tCO₂ for the years 2008-2010 and hospitals provided that they could demonstrate that their installations were subject to equivalent measures. Additional flexibility for installations with low emissions was also introduced in the implementing legislation on monitoring, reporting and verification. Small emitters may thus, for example, submit a simplified monitoring plan and are exempt from a number of documentation requirements.

However, the use of this option to exclude small emitters provided by the ETS Directive, however, is currently limited. Only installations notified by the Member States to the Commission until 30 September 2011 can be excluded. Unless their emissions exceed the threshold of 25.000 tonnes in a given year, they remain excluded in future trading periods, but Member States do not have the possibility to exclude additional installations in later periods. In 2011, most Member States have chosen not to use this option²²¹ so they cannot exclude installations in phase 3, nor in later periods.

While not many Member States are using the option, there remains an unequal relation between the contribution of certain installations to overall emissions and their transaction costs. Other measures applying to installations with low emissions can reduce not only the administrative

²²⁰ In contrast to compliance costs relating to the need to buy allowances to cover annual emissions.

²²¹ Seven Member States use this option. These are Croatia, France, Germany, Italy, Slovenia, Spain, and United Kingdom. Iceland is also making use of this option.

burden on the operators, but also enhance the cost-effectiveness of the emission reductions they nevertheless have to realise. Care had to be taken when designing alternative measures. To ensure that the excluded installations contribute to the overall emission reduction targets of the EU, equivalence in terms of environmental integrity needs to be ensured. To avoid distortions of competition within the national boundaries or across EU the costs per ton of CO₂ emitted for excluded installations and the ones that remain under ETS should be similar.

6.2.2. Operational policy objective

The operational policy objective relates to maintaining the cost-effectiveness of the system, including for installation with low emissions and to provide a possibility for small emitters to find the most cost-efficient system for the regulation of the greenhouse gas emissions they emit. While it is important to preserve the environmental integrity of the system to achieve the EU's agreed emission reduction targets, it is equally important to ensure that these emission reductions are realised in a cost-efficient manner.

6.2.3. Policy options

The main options that are assessed relate to the continuation of the possibility for the Member States to exclude small emitters whilst ensuring that the equivalent measures taken at Member States level are coherent so as to avoid distortions of competition. In this regard, it is proposed to maintain the definition of small emitters in the ETS Directive, i.e. the thresholds on the basis of which installations are deemed to be covered by the EU ETS. These thresholds, and thus the environmental effectiveness, were subject of considerable discussion and analysis ahead of the previous ETS revision in 2008. While most stakeholders agree that Member States should continue to have the possibility to exclude small emitters, only a few argue for changing the thresholds. Some would like to change them upwards, others downwards. The lessons learnt from the application of the exclusion also do not indicate that the thresholds need changing (see Annex 4.3).

Baseline: Maintain exclusion only for installations already excluded in phase 3 (2013-2020).

Option 1: Continuation of the current option as set out in Article 27 of the ETS Directive with a renewed possibility for Member States to decide towards 2020 whether they would like to make use of this option and exclude additional installations from the ETS.

Option 2: As in option 1, Member States would be again given the possibility to make use of the option towards 2020; with a view to avoid fragmentation of national equivalent measures and their potential rejection, the ETS Directive would define in more detail these measures. This option entails more precision regarding the measures applying to installations (such as taxation or a levy based on an annual emissions target) so as increase transparency and avoid market distortions.

6.2.3.1. Assessment of the options

The impacts of the two options can be described as follows:

Environmental effectiveness: When excluding installations with low emissions from the ETS, a variation in the level of contribution to emission reductions poses the biggest risk in terms of environmental integrity. Under the baseline and both options, Member States would be required to put in place measures ensuring that excluded installations contribute to an equivalent extent to emission reductions as if they remained under the ETS. All options are thus expected to deliver the same environmental effectiveness.

Administrative costs: Operators of installations included in the ETS incur a large range of administrative costs that mainly relate to fees for the use of the registry – different in the Member

States – as well as costs for compliance, in particular for monitoring, reporting and verification of emissions. In general, costs vary depending on the size and the complexity of the installation concerned. Under the baseline scenario, administrative costs for excluded installations cannot be entirely avoided. As indicated above, the operators of excluded installations remain required to monitor and report emissions, in line with the simplified rules on monitoring and reporting for small emitters included in the ETS, to ensure equivalence of the measures and to control that the conditions for exclusion are still fulfilled. Savings in terms of administrative costs can therefore in particular be realised with regard to the registry costs and with regard to the required third-party verification of emissions. While the savings per installation are likely to be similar under all options, it is expected that the overall amount of cost reductions emerging from option 1 and 2 would be higher since Member States may exclude additional installations from the ETS. It is however likely that option 2 achieves a more comparable level of cost savings across the Member States due to the greater harmonised approach regarding the measures that apply instead of the ETS.

Impact on competitiveness, competition and internal market: As indicated above, transaction costs are considerably higher for small installations than for larger installations. This difference in transaction costs generally implies, in particular in heterogeneous sectors that encompass installations of different sizes that distortions of competition may arise. Considering that the measures put in place by Member States since 2013 require equivalent environmental efforts from the operators excluded whilst reducing administrative costs, the competitiveness of small emitters has already been strengthened. Since option 1 would provide Member States with another possibility to exclude small emitters and has thus the potential to reduce the transaction costs for additional installations, it is likely to strengthen the competitive situation of more small emitters than is currently the case. Option 2 would have the same effect.

The impact on competition and the internal market mainly depends on the equivalence of the economic incentives to reduce emissions provided by the alternative measures that Member States put in place and the costs per ton of CO₂ emitted. If these differ either compared to competitors of the same sector who remain included in the ETS or compared to competitors located in a Member State not providing for the option of being excluded, distortions of competition and of the internal market may arise. In the current situation, Member States have taken similar approaches when defining equivalent measures or the Commission has rejected any measures, which could not be deemed equivalent. Option 1 would allow Member States to exclude additional installations, but also to revisit within the framework set by Article 27 of the ETS Directive the equivalent measures. Avoiding any adverse impact on competition and the internal market would again need to be ensured when the corresponding applications are approved by the Commission. Option 2 would provide for more harmonised rules on equivalent measures and therefore tackle the root cause for any distortions of competition that may arise due to the exclusion of certain installations from the ETS.

Employment: It is likely that the sector most affected by the exclusion of additional installations pursuant to option 1 and 2 compared to the baseline is the verification business. Impacts for other sectors are negligible.

No major economic and other social impacts can be expected.

6.2.3.2. *Comparing the options*

With respect to the objective of maintaining the cost-effectiveness of the system also for installations with low emissions, both option 1 and 2 would be effective since they allow Member States to remove a number of installations from the ETS besides those that are already excluded. The baseline would not provide this possibility and limit exclusions to those having already made

use of this option. In terms of efficiency, both options entail new costs compared to the baseline if Member States pursue further opt-outs since Member States would have to select installations for exclusion. While the efficiency of option 1 would depend on the concrete provisions that Member States would put in place and may require a new learning process for operators, option 2 would ensure a higher degree of harmonisation and thus relieve the operators concerned from administrative burden to the same or at least similar extent in the Member States. In terms of coherence, both options 1 and 2 would require Commission scrutiny and approval of the applications from Member States as well as some degree of oversight regarding the implementation in the Member States. With regard to other EU policies, it is thus unlikely that they have any negative impacts.

Table 20: Comparison of the options in relation to relevant problems and objectives

	Effectiveness	Administrative costs	Competitiveness, competition and internal market	Employment	Coherence
Baseline	0/+	0/+	+	0	+
Option 1: renewed exclusion	+	+	+	0	+
Option 2: renewed exclusion with harmonised equivalent measures	+	++	++	0	+

6.3. Guaranteeing a robust and secure EU ETS (registry fees)

6.3.1. Problem definition and general objective

In 2005, at the start of the EU ETS, 25 Member State registries and the Community Independent Transaction Log ('CITL') were put in place to hold accounts for installations, record allowance transactions, annual verified emissions from installations and verify each year whether the total cap is respected. These registries have initially operated successfully and efficiently. However in 2010 and 2011, several national registries reported security incidents involving phishing attacks on operators and unauthorised access to accounts. Thereafter, the Commission and Member States took immediate measures by means of adopting enhanced security requirements.

To improve the cost-effectiveness of this system that required the maintenance of a costly and secure IT-infrastructure in each Member State and at the Commission, it was decided to set up a Union-wide single registry (Union registry) for the EU ETS and shift important responsibilities to the EU level. In addition, the Commission also accepted to consolidate in place of the Member States the operations of the national registries relating to the Kyoto Protocol obligations of the Member States so as to allow the full consolidation of all former national registries. As successor of the CITL, today the European Union Transaction Log (EUTL) automatically checks, records, and authorises all transactions that take place between accounts in the Union registry.

The Union registry is successfully and securely operational since June 2012. It is managed efficiently and directly controlled by the Commission in close cooperation with the Member States. While compared to a situation with 28 Member State registries and 3 EEA-EFTA states

registries²²² that would otherwise be necessary today, the Union registry delivers its services at a lower cost to the regulated community, both in terms of IT infrastructure and human resources.

Since 2012, the overall annual costs of the Union registry were around €6 million. These costs relate to IT development, support and services, staff as well as infrastructure and security and are currently fully borne by the general EU budget. This is because the legal framework of the EU registry specifically foresees that Member States are allowed to charge the operators fees, but does not currently provide for EU-level costs being covered by such fees or being shared by Member States. However, over the past years, the EU budget has been subject to different constraints, including budgetary constraints in the Member States. The annual EU budget is adopted each year within the ceilings set by the Multi-annual Financial Framework and covers a bulk of activities in different policy areas.

The Union registry needs a stable and reliable financial source. Together with the EUTL, it constitutes the backbone of the emissions trading system without which the environmental integrity of the EU ETS could not be maintained. Despite their essential role in the EU ETS accounting, these IT systems are often perceived as a technical feature. Hence, they are facing the risk of being relegated to the background compared to other policy initiatives put forward in budgetary negotiations. It thus cannot be excluded that new priorities prevent the implementation of registry policy priorities in certain years. Therefore, to ensure financial continuity, sustainable funding sources should be considered.

Considering the crucial importance of the Union registry, it is paramount to guarantee its adequate financing on a sustained basis. The annual EU budgeting procedure may not be appropriate in this regard. In order to ensure continued improvement of the system, in particular with regard to technological development and potential security threats, the system should in financial terms run as a self-sufficient system and not being dependent on the available budget at EU-level. As the details of a registry system are currently laid down in the relevant Commission Regulation on the registry required by the ETS Directive, the revision of the Directive should limit itself to the framework provisions provided in the ETS Directive. Detailed rules of the registries system should continue to be provided by Commission regulation.

6.3.2. Operational policy objectives

The policy objectives are:

- Sustainable and reliable finance the Union registry system, such that the Commission is able to provide the same level of service to operators and Member States both in terms of robust and secure infrastructure and human resources, without being dependent on the EU budget and changing budget and expenditure patterns.
- To provide the Union registry with an independent financial envelope reflecting the EU's commitment to maintain a secure and stable registry infrastructure underpinning the EU carbon market, and thereby supporting cost-efficient emission reductions through emissions trading.

6.3.3. Policy options

The main options are assessed are:

- **Baseline:** Maintain the financing of the Union registry by the general EU budget.

²²² Iceland, Norway and Liechtenstein also participate in the EU ETS and use the infrastructure of the Union registry.

- **Option 1:** Share EU-level costs relating to the operation of the Union registry between Member States
- **Option 2:** Charge the operators as users of the Union registry to cover EU-level costs of the Union registry

6.3.3.1. *Screening of the options*

With respect to the objective of maintaining sustainable financing of the Union registry with an independent financial envelope, both options 1 and 2 would be effective since they would decouple the financing from the EU budget. The baseline would not change this. Both options would not necessarily incur new costs, but shift costs from the EU budget to either Member States or operators. Only the baseline would preserve the status quo. It needs to be borne in mind, however, that the EU ETS generates income for Member States through the revenues of auctions and through registry-related fees, which are already high in certain Member States. Instead, under option 2, operators would face additional costs and potentially face further administrative burden. It could not be excluded that operators are charged twice for the same service, once by the Member State and once by the Commission. This may in particular impact small and medium-sized enterprises under the EU ETS who may then face disproportionate costs compared to larger businesses. The baseline and option 1 would not adversely affect other EU policies or objectives. Option 2 may be difficult to reconcile with the Commission's aim to lower administrative burden and costs for EU industries, in particular for small and medium-sized enterprise as set out in the Small Business Act for Europe²²³.

Consequently, option 2 is discarded, while option 1 compared to the baseline will be further analysed.

6.3.3.2. *Analysis of impacts*

Under the baseline option, the dependency of the Union registry on funding from the general EU budget would remain. Funding would not be stable, but would need to be continuously secured each year with the risk of coming increasingly under pressure because of budgetary cuts running the risk of compromising the security of the registry and being exposed to undue vulnerabilities.

Option 1 would fully recognise the nature of the Union registry as a system that serves the operators under the EU ETS, but also the Member States. It would establish the basis for financial independence of the Union registry from the EU budget and thus support that the EU ETS runs as a financially more autonomous system. Since Member States would be required to share the EU-level costs of the Union registry, this would have an impact on their national budgets. Member States currently have around €3.5 billion revenues from auctioning allowances under the EU ETS. Current Union registry costs of €6 million therefore constitute a tiny fraction of these revenues. The Directive specifically foresees Member States using auction revenue to cover administrative expenses of the management of the EU ETS²²⁴.

Option 1 bears the risk that Member States pass on their share of the costs of the Union registry to the operators. While this cannot entirely be excluded, the incentive for Member States seems to be rather low. Revenues from auctions give Member States a source of income from the EU ETS which they can use to cover their shares of the Union registry costs. The Directive could establish a specific link between the auction revenues and the costs of the Union registry. At the same time, the Commission regulation laying down detailed rules on the Union registry could provide that these costs may not be directly recovered from the operators.

²²³ COM(2008)394

²²⁴ Article 10(3)(i)

No major impacts on competitiveness, competition and the internal market or economic and other social impacts can be expected.

Table 21: Comparing the options in relation to relevant problems and objectives

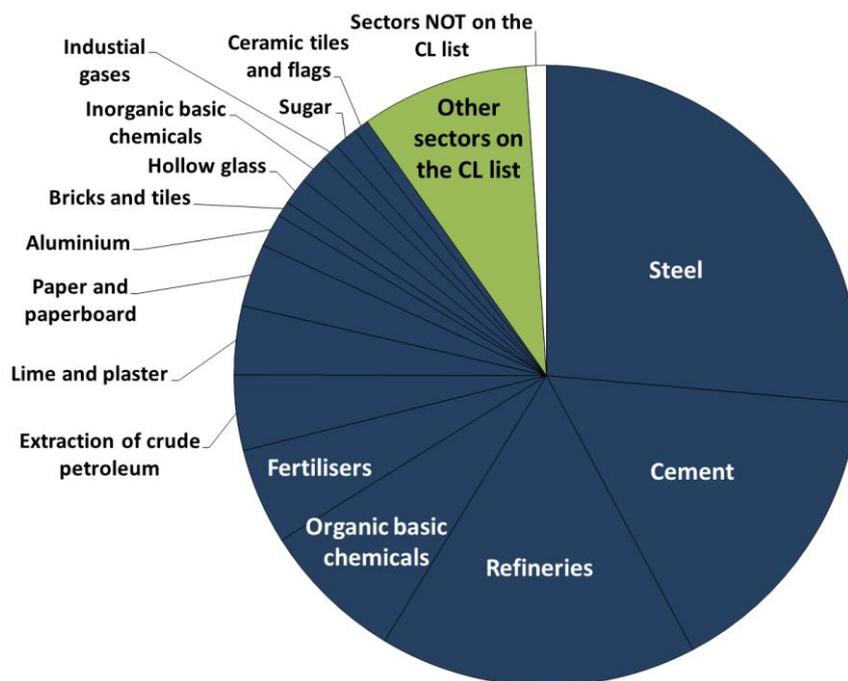
	Stable financing of the Union registry	Administrative costs/ burden	Member States' auction rights	EU budget
Baseline	-	- (EU level)	0	-
Option 1: Member States sharing EU-level costs	++	0/- (MS level)	0/-	+

7. IMPACTS OF DIFFERENT OPTION PACKAGES FOR FREE ALLOCATION ON INDIVIDUAL SECTORS

Detailed analysis of the economic impacts of the 40% greenhouse gas emission reduction target, including sectoral impacts, was carried out in 2014 and is presented in the Impact Assessment for the 2030 Climate and Energy Framework. The analysis concluded that free allocation of allowances is an effective tool to reduce the risk of carbon leakage. It also notes that understanding different levels of cost pass-through is crucial for well targeted carbon leakage measures that provide adequate safeguards, but avoid over-compensation of industry for costs recovered in the market.

The analysis below estimates the impacts of option packages on the biggest industrial sectors included in the EU ETS²²⁵, and compares the outcome under each option package to 'Baseline B'. Figure 11 shows the ranking of sectors in terms of emissions in the EU ETS and their carbon leakage status according to the present carbon leakage list in phase 3.

Figure 11: Ranking of sectors in terms of emissions in EU ETS



Certain elements of the free allocation provisions may be determined in implementing legislation and furthermore the quantities to be provided depend on future data. The following analysis uses some assumptions for the carbon leakage status of sectors, technological progress and production level changes based on the best available data at the time of the analysis. The results therefore have to be regarded as purely indicative.

²²⁵ The five sectors with the highest amount of emissions are analysed: iron and steel, cement, refineries, chemicals and fertilisers. These five sectors account for around three quarters of industry emissions covered by the EU ETS.

7.1. Effect of carbon leakage groups on sectors

Option packages 'Baseline A' and 'Simple' do not foresee differentiation among sectors in terms of level of carbon leakage risk. All installations receive 30% of the 'gross' free allocation²²⁶ under 'Baseline A', and 90% under the 'Simple' option package.

The other three option packages foresee a differentiation among sectors, and correspondingly different levels of free allocation.

'Baseline B' and 'Baseline Bbis' reflect the continuation of the current approach where sectors are either deemed to be exposed to a significant risk of carbon leakage (in which case they are added to the 'carbon leakage list'), or not. Under these option packages, it is expected that the carbon leakage list would continue to include sectors covering the vast majority of industrial emissions, and consequently the demand for free allocation, the so called 'gross' free allocation, would result in a higher risk of applying the correction factor.

'Baseline Bbis' delivers similar results as 'Baseline B' except for those sectors with very low carbon intensity that will change into the 'low' risk group. This will have a very small impact on the gross free allocation as these sectors together represent around 2% of total industrial emissions. In order to avoid repetition to the extent feasible, the outcome of the 'Baseline Bbis' package is spelled out separately in the analysis below only for those aspects where there are differences compared to the 'Baseline B'.

The 'Limited changes' and 'Targeted' option packages translate into four carbon leakage groups: 'Very High', 'High', 'Medium' and 'Low' level of carbon leakage risk. The two graphs below illustrate these two approaches and indicate in which group the biggest sectors would be based on 2009-2011 data²²⁷. For the purposes of this analysis, carbon leakage factors of 100%, 80%, 60% and 30% is applied for the 'Very high', 'High', 'Medium' and 'Low' carbon leakage groups, respectively.

While the current classification of sectors into risk groups is based on quantitative criteria at sector level, the final composition of the carbon leakage groups may also be affected by assessments at sub-sector level (individual assessments of products within sectors, leading to parts of certain sectors eventually ending up in a higher carbon leakage group) or possible assessments based on qualitative criteria²²⁸ (again leading to a classification in a higher risk group). Consequently, the sectoral analysis results presented in this annex for the 'Limited changes' and 'Targeted' packages are lower bound estimates for the expected level of free allocation (see also discussion below in this annex).

²²⁶ The amount of free allocation determined by applying the benchmark values to the production data, before the application of any further relevant factors, such as, for example, the carbon leakage factor.

²²⁷ For the Aluminium, Fertilisers and Inorganic chemicals sectors the effect of ETS scope change as of 2013 is taken into account, as these sectors have been heavily affected by this scope extension. The graphs are purely indicative, as any actual assessment against the criteria will be based on more recent (for the time being: future) data. Furthermore, this analysis takes into account the NACE rev.2 classification (valid since 2008) without prejudice to future revisions of these classifications

²²⁸ To avoid the cross sectoral correction factor (see point (b) below), some quantified limitations to the eligibility for qualitative assessments might need to be introduced.

Figure 12: Indicative carbon leakage groups in the 'Limited changes' option package based on 2009-2011 data

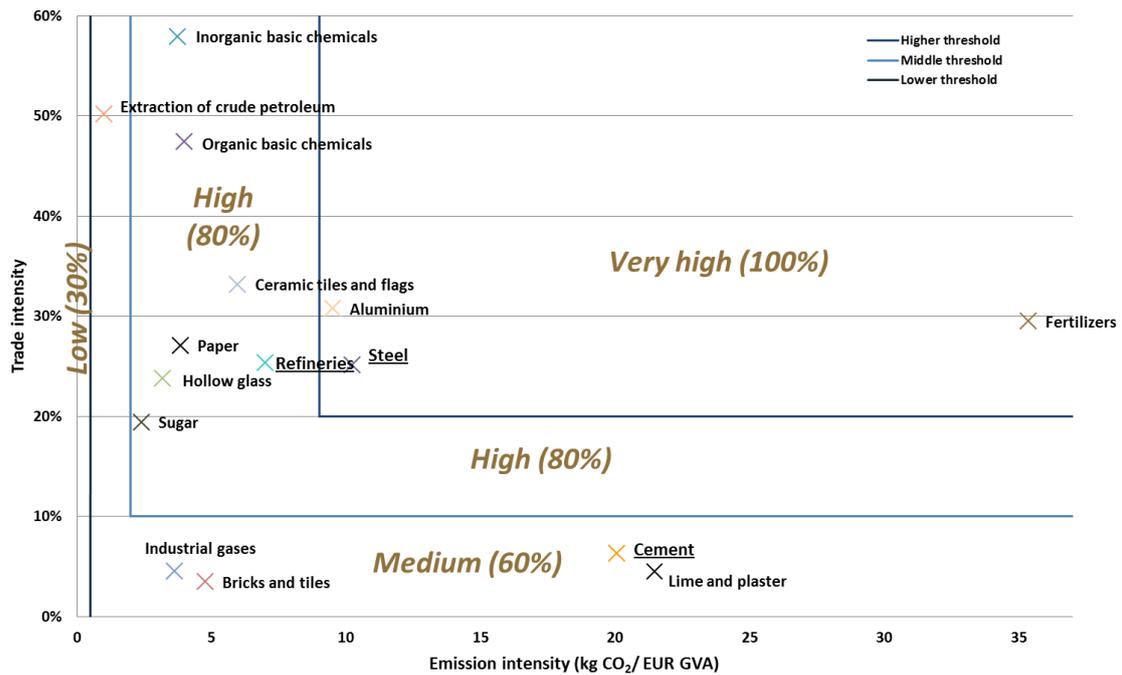
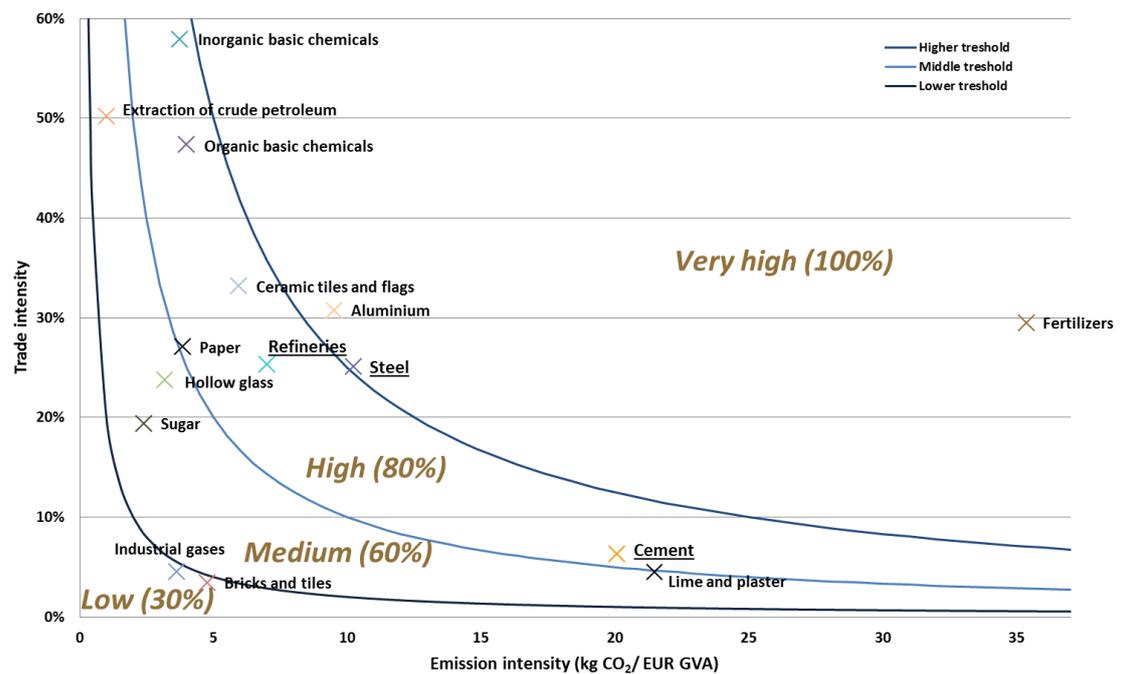


Figure 13: Indicative carbon leakage groups in the 'Targeted' option package based on 2009-2011 data



The following two tables demonstrate the level of differentiation by the four option packages with more than one group.

below indicates how many sectors, and what share of 'gross' free allocation and gross value added (GVA) would be in the different groups following a sectoral analysis based on the quantitative criteria foreseen in these packages.

Table 22 below indicates how many sectors, and what share of 'gross' free allocation and gross value added (GVA) would be in the different groups following a sectoral analysis based on the quantitative criteria foreseen in these packages.

Table 22: Estimated number of sectors, share of gross free allocation and GVA in the different groups

	Baseline B			Baseline Bbis			Limited changes			Targeted		
	# sectors	'gross' allocation	GVA	# sectors	'gross' allocation	GVA	# sectors	'gross' allocation	GVA	# sectors	'gross' allocation	GVA
Very High	150	95%	66%	54	93%	18%	4	33%	2%	5	33%	2%
High							12	32%	5%	9	49%	5%
Medium							42	32%	10%	21	11%	5%
Low	86	5%	34%	182	7%	82%	178	3%	83%	201	8%	88%

The table below shows in which group the 15 industrial sectors with the highest emissions would be, based on 2009-2011 data, for the option packages containing more than one carbon leakage group²²⁹. In Baseline B and Bbis 'on' means included in the carbon leakage list, 'off' means excluded.

Table 23: Estimated carbon leakage status at sectoral level based on past data

Code	Activity description	Baseline B	Baseline Bbis	Limited changes	Targeted
24.10	Manufacture of basic iron and steel and of ferro-alloys	On	On	Very high	Very high
23.51	Manufacture of cement	On	On	Medium	High
19.20	Manufacture of refined petroleum products	On	On	High	High
20.14	Manufacture of other organic basic chemicals	On	On	High	High
20.15	Manufacture of fertilisers and nitrogen compounds	On	On	Very high	Very high
06.10	Extraction of crude petroleum	On	On	Medium	Medium
23.52	Manufacture of lime and plaster	On	On	Medium	Medium
17.12	Manufacture of paper and paperboard	On	On	High	High
24.42	Aluminium production	On	On	Very high	Very high
23.32	Manufacture of bricks, tiles and construction products, in baked clay	Off	Off	Medium	Low
23.13	Manufacture of hollow glass	On	On	High	Medium
20.13	Manufacture of other inorganic basic chemicals	On	On	High	High
20.11	Manufacture of industrial gases	On	On	Medium	Low
10.81	Manufacture of sugar	On	On	High	Medium
23.31	Manufacture of ceramic tiles and flags	On	On	High	High

²²⁹ As said above, the table is only indicative, as any actual assessment against the criteria will be based on more recent (for the time being future) data. In addition, parts of sectors will be in a higher carbon leakage group based on assessments at sub-sector (Prodcum) level.

7.2. Cross sectoral correction factor

It is estimated that three out of the six option packages are not likely to trigger a correction factor in phase 4:

- In 'Baseline A' all installations would receive 30% of their 'gross' allocation for free, and thus only a relatively limited share of the allowances available for free allocation would be actually allocated. The correction factor would not be triggered in this case.
- The 'Limited changes' and the 'Targeted' would lead to a relatively focused allocation system²³⁰ and therefore the correction factor would not be triggered in these cases either.

Under 'Baseline B' and 'Baseline Bbis' the total amount of "gross allocation" is estimated to exceed significantly the amount available, by an average factor of some 10-20% over phase 4, leading to some 30% by 2030.

Also under the 'Simple' package the total amount of "gross allocation" is estimated to exceed the amount available, but to a lesser extent. The correction factor could be triggered from around 2024 onwards in this case, with an average of some 5-10% over phase 4 and reaching some 20% by 2030.

In conclusion, it is estimated that in three of the six option packages (Baseline A, Limited changes and Targeted) a correction factor in phase 4 may be avoided.

7.3. Estimated level of free allocation for biggest sectors in phase 4

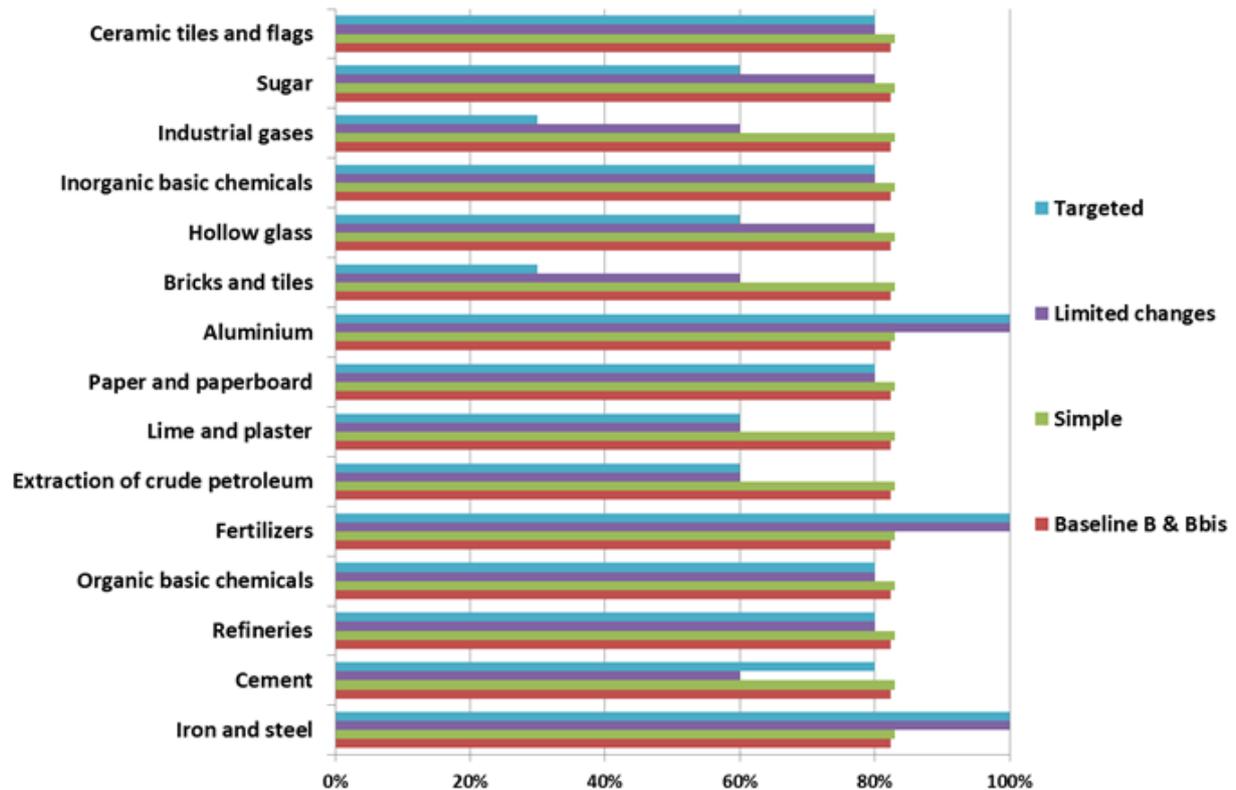
The estimated level of free allocation resulting from the option packages is analysed below for the main ETS sectors. The analysis is done on the sectoral level, and therefore the end-result for individual installations might be different. The sectoral level results presented below are indicative of the estimated situation for the average installations in each sector. More efficient installations are expected to have a better outcome, while installations less efficient than the average can have a less favourable outcome than what is indicated below.

The graph below illustrates the estimated combined effect of the carbon leakage groups and the correction factor based on 2009-11 data²³¹.

²³⁰ For the purposes of the analysis it is assumed that some quantified limitations to the eligibility for assessments based on the qualitative criteria will be introduced.

²³¹ See point (a) and (b) above. As data from the (currently: future) baseline period for any actual future carbon leakage assessment are not yet available at the time this estimation is prepared, the graphs should be interpreted purely as a rough indicator of the possible outcome of the option packages. The final outcome of the actual carbon leakage assessment, i.e. to which group each sector will belong, can be similar to the situation illustrated by the graphs below in case the main indicator values (emission intensity and trade intensity) in the future will be similar to the ones based on 2009-11 data.

Figure 14: Estimated combined effect of carbon leakage groups and the correction factor under different option packages²³²



Free allocation depends, in addition to the effects of carbon leakage groups and a potential correction factor, also on benchmarks. The combined effect of these three elements is assessed below, and the estimated free allocation per sector is compared to the estimated emissions²³³.

In the 'Simple', 'Limited changes' and 'Targeted' packages free allocation is closely aligned with actual production levels. This implies that in case production in a sector increases compared to the baseline level, both emissions and free allocation will increase. Similarly, in case of a production decrease, both emissions and free allocation will decrease.

Therefore, under the 'Limited changes' and 'Targeted' packages, the difference between emissions and free allocation is predominantly driven by the stringency of the benchmarks²³⁴ and the carbon leakage factor. In the 'Simple' package, the difference between emissions and free allocation will depend on the stringency of the updated benchmarks²³⁵, the 90% carbon leakage factor applied for all sectors, and the correction factor.

²³² The table is of a purely indicative nature, as any actual assessment against the carbon leakage criteria will be based on more recent (for the time being future) data. In addition, the final composition of the carbon leakage groups might also be shaped by assessments at sub-sector (Prodcod) level and possibly also assessments based on qualitative criteria.

²³³ Future emissions of sectors are based on the estimate in the Impact Assessment for the Communication on the climate and energy policy framework up to 2030, SWD(2014)15. This includes output growth changes consistent with the modelling done for the 2030 Climate and Energy framework, including assumptions for factors such as technological development.

²³⁴ I.e. the difference between the average emission intensity of production in a sector vs. the average emission intensity of the 10% best performers in the same sector.

²³⁵ i.e. the relation between the average emission intensity in a sector vs. the updated benchmark value

Finally, as under current rules, sectors may be re-classified in a higher carbon leakage group as a result of assessments based on qualitative criteria, and sub-sectors may be re-classified in a higher carbon leakage group as a result of Prodcom-level assessments. However, due to data limitations, the outcome of analyses based on qualitative criteria and Prodcom-level assessments is currently difficult to assess. Consequently, the sectoral analysis results presented in this annex are lower bound estimates for the expected level of free allocation under the 'Limited changes' and 'Targeted' packages²³⁶.

One general result valid for all sectors is that the legal baseline ('Baseline A') would lead to substantially lower free allocation compared to 'Baseline B'. It is estimated that less than a third of the sectors' emissions would be covered by free allocation under 'Baseline A'. The results from 'Baseline Bbis' are similar to 'Baseline B' except for those ca.100 sectors that would be removed from the current carbon leakage list, but as noted above, the total quantity of emissions from these sectors is small, in the order of 2% of industrial emissions.

Therefore, the outcome of the 'Baseline A' and 'Baseline Bbis' packages is not separately described per sector below. The estimations on how large share of the respective sector's emissions will be covered, outlined below, are determined from the values in Figure 14 above, combined with estimations on the stringency of the benchmarks.

Iron and steel sector

The iron and steel sector would be in the 'Very high' carbon leakage group under both 'Limited changes' and 'Targeted' packages²³⁷.

Overall, the steel sector is expected to receive the highest free allocation under the 'Limited changes' and 'Targeted' packages, and a significantly higher free allocation than under 'Baseline B', as these packages would put the sector in the 100% group but still not trigger a correction factor since some other sectors receive somewhat less than in Baseline B. Free allocation under the 'Simple' package is estimated to be similar to the outcome of 'Baseline B'.

Free allocation is expected to cover at least some two-thirds of the sector's emissions eligible²³⁸ for free allocation, including also the additional emissions (due to the higher carbon content of waste gases than that of natural gas) taking place in installations importing waste gases from the steel sector, under all the four packages discussed above.

Cement sector

The cement sector would be in the 'Medium' carbon leakage group under the 'Limited changes' package, and in the 'High' group under the 'Targeted' package based on historic data²³⁹.

²³⁶ The possibility of product-level assessments does not affect the outcome of the other option packages for the sectors analysed in detail: under 'Baseline B' all of them are on the carbon leakage list anyway, and under the 'Simple' package there is no carbon leakage differentiation

²³⁷ For the purposes of the analysis it is assumed that the values of the benchmarks relevant for the steel sector would be reduced by 12% on average if recalculated based on new performance data. It is also assumed that production will moderately increase compared to 2014 level (last available data at the time of the analysis), but will not reach avg. 2005-08 levels by 2017.

²³⁸ Emissions from electricity production are not eligible for free allocation with the exception of emissions exceeding the emissions related to the fuel replaced by waste gases.

²³⁹ For the purposes of the analysis it is assumed that the values of the benchmarks relevant for the cement sector would be reduced by 6% on average if recalculated based on new performance data. It is also assumed that production will moderately increase compared to 2014 level (last available data at the time of the analysis), but will not reach avg. 2005-08 levels by 2017.

Overall, the cement sector is expected to receive the highest free allocation under the 'Baseline B', 'Simple' and 'Targeted' packages. The 'Limited changes' package is expected to offer a somewhat lower free allocation to this sector due to the sector possibly being in the 'Medium' carbon leakage group.

Nevertheless, free allocation is expected to cover the majority of the sector's emissions under all four packages.

Refineries

The refineries sector would be in the 'High' carbon leakage group under both 'Limited changes' and 'Targeted' packages based on historic data²⁴⁰.

Overall, the refineries sector is expected to receive a similar level of free allocation under all four option packages described, with the 'Simple' package possibly offering somewhat higher free allocation than the other packages. Free allocation is expected to cover at least some two-thirds of the sector's emissions under all four packages.

Chemicals

The chemical sectors would also be in the 'High' carbon leakage group under both 'Limited changes' and 'Targeted' packages²⁴¹.

Overall, the chemicals sector is estimated to receive a somewhat higher free allocation under the 'Simple' package than under the other option packages. At the same time, the difference between the estimated free allocation under the four packages is limited. In case some chemical products would be re-classified to the 'Very high' carbon leakage group following product level assessments (which is deemed probable), the free allocation offered by the 'Limited changes' and 'Targeted' packages could be higher than free allocation under the 'Baseline B' and 'Simple' packages.

Free allocation is expected to cover at least some three-quarters of the sector's emissions under all four packages.

Fertilisers

The fertilisers and nitrogen compounds sector would be in the 'Very high' carbon leakage group under both 'Limited changes' and 'Targeted' packages²⁴².

Overall, the fertilisers sector is expected to receive the highest level of free allocation under the 'Limited changes' and 'Targeted' packages, and significantly higher than under 'Baseline B'. The 'Simple' package is estimated to have a similar outcome as 'Baseline B'.

Free allocation is expected to cover at least some three-quarters of the sector's emissions under all four packages.

²⁴⁰ For the purposes of the analysis it is assumed that the values of the benchmarks relevant for the refineries sector would be reduced by 15% if recalculated based on new performance data.

²⁴¹ For the purposes of the analysis it is assumed that the values of the benchmarks relevant for the chemicals sector would be reduced by 15% on average if recalculated based on new performance data. It is also assumed that production levels in 2013-17 will be similar to those experienced in the baseline years in phase 3.

²⁴² For the purposes of the analysis it is assumed that the values of the benchmarks relevant for the fertilisers sector would be reduced by 15% on average if recalculated based on new performance data (a significant reduction is assumed for the nitric acid benchmark due to the significant reductions of N₂O emissions experienced in recent years, and a moderate reduction is assumed for the ammonia benchmark). It is also assumed that production levels in 2013-17 will be similar to those experienced in the baseline years in phase 3.

Glass

The hollow glass sector would be in the 'High' carbon leakage group under the 'Limited changes' package, and in the 'Medium' group under the 'Targeted' package, whereas the flat glass sector would be in the 'High' group in both cases based on historic data²⁴³.

Overall, glass production is expected to receive the highest free allocation under the 'Baseline B', 'Simple' and 'Limited changes' packages. The 'Targeted' package is expected to offer a somewhat lower free allocation due to the hollow glass sector possibly being in the 'Medium' carbon leakage group.

Free allocation is expected to cover at least some two-thirds of the sector's emissions under all four packages.

Paper

The paper sector would be in the 'High' carbon leakage group under both 'Limited changes' and 'Targeted' packages²⁴⁴.

Overall, the paper sector is expected to receive the highest free allocation under the 'Simple' option package. The 'Limited changes' and 'Targeted' packages are estimated to offer somewhat lower free allocation than 'Baseline B'. Nevertheless, free allocation is estimated to cover at least some 90% of the sector's emissions under all four packages, due to a high use of biomass.

Aluminium

The aluminium sector would be in the 'Very high' carbon leakage group under both 'Limited changes' and 'Targeted' packages²⁴⁵.

Overall, the aluminium sector is expected to receive the highest free allocation under the 'Limited changes' and 'Targeted' packages, and under both packages the sector is expected to receive a significantly higher free allocation than under 'Baseline B', as these packages would not trigger a correction factor. Free allocation under the 'Simple' package is estimated to be similar to the outcome of 'Baseline B'.

Free allocation is expected to cover at least some three-quarters of the sector's emissions.

General findings for all sectors covered by EU ETS

It can be concluded that the 'Simple' package offers a similar level of free allocation as 'Baseline B' for the industry sectors currently on the carbon leakage list. In the 'Simple' package there are some limited differences among sectors in terms of free allocation compared to 'Baseline B', because of the different effects of the flat-rate benchmark update for different sectors, due to different rates of emission intensity reductions resulting from technological improvements and investment cycles.

²⁴³ For the purposes of the analysis it is assumed that the values of the benchmarks relevant for the glass sector would be reduced by 6% on average if recalculated based on new performance data. It is also assumed that production levels in 2013-17 will be similar to those experienced in the baseline years in phase 3.

²⁴⁴ For the purposes of the analysis it is assumed that the values of the benchmarks relevant for the paper sector would be reduced by 15% on average if recalculated based on new performance data. It is also assumed that the average production levels in 2013-17 will be similar to those experienced in the baseline years in phase 3.

²⁴⁵ For the purposes of the analysis it is assumed that the values of the benchmarks relevant for the aluminium sector would be reduced by 6% on average if recalculated based on new performance data. It is also assumed that the average production levels in 2013-17 will be similar to those experienced in the baseline years in phase 3.

At the same time, the 'Simple' option package would lead to significantly higher free allocation than 'Baseline B' for those sectors currently not on the carbon leakage list, such as district heating and some other services (e.g. gas compression, storage and transport).

For the 'Limited changes' and the 'Targeted' packages the level of free allocation compared to 'Baseline B' highly depends on the carbon leakage group of a sector. Both packages lead to a higher free allocation than 'Baseline B' for the sectors in the 'Very high' group, because it is estimated that no correction factor would apply due to the more targeted approach.

For sectors (and sub-sectors) in the 'High' carbon leakage group, the total amount of free allocation under the 'Limited changes' and the 'Targeted' packages would be similar to allocation under 'Baseline B'. This is because the difference in carbon leakage factors (80% instead of 100% under 'Baseline B') is estimated to be in the same order of magnitude as the estimated average correction factor under 'Baseline B' over phase 4. The distribution of free allocation within the period would be different though: somewhat lower level of free allocation at the beginning of phase 4 under these two option packages than what 'Baseline B' would offer, and vice versa towards the end of the phase.

For sectors (and sub-sectors) in the 'Medium' and 'Low' groups, free allocation under the 'Limited changes' and the 'Targeted' packages would be lower or significantly lower, respectively, than under 'Baseline B' provided that they would be on the carbon leakage list under 'Baseline B'. For sectors not on the carbon leakage list, such as district heating, free allocation would be similar for the 'Low' group, and higher for the 'Medium' group.

7.4. Estimated compliance cost per sector, taking into account cost pass through

The total cost of allowances to be purchased by sectors can be estimated based on the difference between emissions and free allocation as well as the expected carbon price.

The compliance costs borne by sectors are also affected by the share of costs passed through by sectors to their customers. In other words: the actual compliance cost for sectors is ultimately dependent on their ability to pass through carbon costs to their customers without losing market share. Furthermore the ETS Directive already recognises that the level of carbon leakage risk possibly faced by sectors depends on the extent to which it is possible for these sectors to pass through their costs without losing market share.

Although there is general understanding that most carbon-intensive sectors are able to pass through at least a part of the carbon costs, it remains at this stage difficult to quantify the exact rate of costs passed through per sectors or products. In addition, the ability of sectors to pass through costs might not be stable over time: as market conditions change, the extent to which it is possible to pass on costs by sectors might also change.

A thorough overview of available empirical evidence, complemented by recent research (described in section 7.3.5.1. and Annex 9), illustrates a wide range of different cost pass-through rates for different industrial sectors and different products. These empirical data based on 10 years of operation of the EU ETS are indicative of the potential cost pass-through in the future.

It is recognized that some industrial sectors may face increasing competitive pressure on the international markets, potentially making it more challenging for them to sustain existing pass-through rates. At the same time, it is reasonable to assume that climate policies will become more significant in third countries over time, which could lead to increased, or at least stable, cost pass-through rates.

Following the sectoral analysis above, it seems that free allocation will not fully cover sectors' emissions. At the same time, while the difference between free allocation and emissions varies

across option packages and sectors, in most cases the free allowances are estimated to cover the majority of projected emissions.

Considering that a share of carbon costs is likely to be passed through, this significantly reduce the total compliance costs. Combined with free allocation, several sectors can be expected to have hardly any direct carbon costs under most option packages. There may even be a risk that the compliance costs are more than fully alleviated which might lead to windfall profits in some cases.

The two-step analysis below covers the biggest sectors.

First, the difference between forecasted emissions²⁴⁶ and free allocation is estimated, and multiplied by an expected average carbon price in phase 4 (€ 25). This indicates the estimated **maximum** compliance cost per sector, i.e. in case they are not able to pass through any carbon costs to their customers. This estimated maximum compliance cost is also compared to the sector's present turnover²⁴⁷ as an indication of the relative importance of compliance costs in the overall cost structure of the sector concerned.

As a second step, the same indicators are calculated based on the lowest estimated cost pass-through rates found in existing literature²⁴⁸. Given the methodological difficulties to estimate the cost pass-through rates per sector, these results should be regarded only as indicative.

Iron and steel sector

Assuming no ability to pass on any carbon costs to its consumers, the iron and steel sector is estimated to face direct carbon costs of some € 1.5 billion per year on average in phase 4 in the 'Baseline B' scenario. This equals to around 1% of the sector's turnover.

The 'Simple' package is estimated to lead to some € 100 million per year savings compared to 'Baseline B'.

The 'Limited changes' and 'Targeted' packages are estimated to lead to a saving of some € 650 million per year compared to 'Baseline B' for the sector, due to the increased free allocation, decreasing maximum direct carbon costs to ca. 0.5%-0.6% of the turnover.

Using the weighted average minimum cost pass-through rate identified in the literature for the sector, the sector is expected to be able to pass-through all its compliance costs to its customers.

Cement sector

Assuming no ability to pass on any carbon costs to its consumers, i.e. in the worst case scenario for the sector, the cement sector is estimated to face compliance costs of some € 680 million per year on average in phase 4 in the 'Baseline B' scenario. This equals to around 4% of the sector's turnover.

The 'Simple' package is estimated to lead to some € 80 million per year additional costs compared to 'Baseline B', leading to some € 760 million, or 4.5% of the turnover in total.

The 'Limited changes' package is estimated to lead to maximum some € 580 million additional costs per year, increasing compliance costs up to about 7.6% of the turnover. The 'Targeted'

²⁴⁶ Emission forecasts are based on the Impact Assessment accompanying the policy framework for climate and energy in the period from 2020 up to 2030

²⁴⁷ For this analysis, the average 2011-2012 turnover is used, i.e. data from the two most recent years for which Eurostat data on turnover are available at the time of the analysis. The option of also comparing the compliance costs with Profit margins have been considered, but due to its large variations over the year it was deemed not to be an adequate indicator.

²⁴⁸ For more information please see Table 33 in Annex 9.

package is estimated to lead to additional costs of some € 80 million per year for the sector, compared to 'Baseline B', increasing compliance costs to some 4.5% of the turnover.

Using the weighted average minimum cost pass-through rate identified in the literature for the sector (35%), the compliance costs the sector might be facing are estimated to maximum about € 270 million, or 1.6% of the turnover, under the 'Limited changes' option package²⁴⁹. Under the other option packages the sector would be estimated to pass on all compliance costs to its customers, using the cost pass-through rates found in literature for the estimation.

Refineries

Assuming no ability to pass on any carbon costs to its consumers, the oil refining sector is estimated to face direct carbon costs of some € 950 million per year on average in phase 4 in the 'Baseline B' scenario. This equals to around 0.1% of the sector's turnover.

The 'Simple' option package is estimated to lead to a saving of about € 130 million for the sector compared to 'Baseline B'.

The 'Limited changes' and the 'Targeted' packages are expected to lead to some € 50 million and some € 80 million additional costs per year, respectively. Compliance costs are expected to stay below 0.2% of the turnover in both cases.

Using the weighted average minimum cost pass-through rate identified in the literature for the sector, the sector is expected to be able to pass on all compliance costs to its customers under all four option packages.

Chemicals

Assuming no ability to pass on any carbon costs to its consumers, the chemicals sector is expected to face direct carbon costs of some € 290 million per year on average in phase 4 in the 'Baseline B' scenario. This equals to around 0.2% of the sector's turnover.

The 'Simple', 'Limited changes' and 'Targeted' packages are estimated to lead to similar results as 'Baseline B', with direct carbon costs reaching some 0.2% of the sector's turnover in all cases.

Using the lowest cost pass-through rate identified in the literature for the sector, the sector is expected to be able to pass on all compliance costs to its customers under all four option packages.

Fertilisers

Assuming no ability to pass on any carbon costs to its consumers, the fertilisers sector is expected to face compliance costs of some € 250 million per year on average in phase 4 in the 'Baseline B' scenario. This amounts to around 1% of the sector's turnover.

The 'Simple' option package is expected to lead to a saving of some € 40 million per year for the sector compared to 'Baseline B'. The 'Limited changes' and 'Targeted' packages are expected to lead to some € 130 and € 120 million savings per year, respectively, thanks to the increased free allocation, decreasing compliance costs to some 0.5% of the turnover.

Using the weighted average minimum cost pass-through rate identified in the literature for the sector, which is 0, the results are identical.

²⁴⁹ This is the high estimate. In reality, clinker production might be added to a higher carbon leakage group at Prodcos-level, leading to higher free allocation for the sector – and consequently lower compliance costs under this options package, as well.

Glass

Assuming no ability to pass on any carbon costs to its consumers, the glass sector is estimated to face direct carbon costs of some € 90 million per year on average in phase 4 in the 'Baseline B' scenario. This equals to around 0.4% of the sector's turnover.

The 'Simple' and 'Limited changes' packages are estimated to lead to additional costs of some € 10 million per year compared to 'Baseline B'. The compliance costs would reach some 0.5% of the sector's turnover in these cases.

The 'Targeted' package is estimated to lead to additional costs of some € 50 million per year for the sector compared to 'Baseline B', increasing compliance costs to some 0.7% of the turnover.

Using the weighted average minimum cost pass-through rate identified in the literature for the sector, the sector is estimated to be able to pass on the majority of compliance costs to its customers under all four option packages. Nevertheless, the sector is estimated not to be able to pass on some € 60 million per year (some 0.3% of the turnover) under the 'Targeted' package, if using the lowest cost pass-through rate identified in literature.

Paper

Assuming no ability to pass on any carbon costs to its consumers, the paper and paperboard sector is estimated to face compliance costs of some € 30 million per year on average in phase 4 in the 'Baseline B' scenario. This amounts to less than 0.1% of the sector's turnover.

Compliance costs of the sector are estimated to stay below 0.1% of the sector's turnover under all four option packages, thanks to the extensive use of biomass.

Using the lowest cost pass-through rate identified in the literature for the sector, which is 0²⁵⁰, the results are identical.

Aluminium

Assuming no ability to pass on any carbon costs to its consumers, the aluminium sector is estimated to face direct carbon costs of some € 70 million per year on average in phase 4 in the 'Baseline B' scenario. This amounts to around 0.2% of the sector's turnover.

The 'Simple' option package is estimated to lead to additional costs of some € 10 million per year compared to 'Baseline B'. The 'Limited changes' and 'Targeted' packages are estimated to lead to some € 50 million savings per year, thanks to the increased free allocation, decreasing compliance costs to below 0.1% of the turnover.

Using the lowest cost pass-through rate identified in the literature for the sector, which is 0²⁵¹, the results are identical.

In conclusion, for seven of the eight sectors analysed (excluding cement), compliance costs are estimated up to 1% of turnover under all option packages, assuming no cost pass through. Using the conservative assumption of the lowest cost pass-through rate from the literature, the part of the compliance costs faced by sectors (i.e. not passed-through to customers) is lower, in many cases even fully absorbed by the customers. Using the highest cost pass-through rates found in literature, all sectors analysed would be expected to gain windfall profits.

²⁵⁰ Data for paper sector not included in Table 33 in Annex 9

²⁵¹ Data for aluminium sector not included in Table 33 in Annex 9

Table 24 Overview table on estimated compliance cost per sector, taking into account cost pass-through rates

		Additional compliance cost ²⁵² compared to Baseline B (million €)	Without Cost pass through rates		With lowest cost pass through rates	
			compliance cost (million €)	% of turnover	compliance cost (million €)	% of turnover
Steel	Baseline B	0	1.530	1,0%	-1.300	-0,8%
	Simple	-100	1.430	0,9%	-1.400	-0,9%
	Limited changes	-680	850	0,5%	-1.990	-1,2%
	Targeted	-630	900	0,6%	-1.930	-1,2%
Cement	Baseline B	0	680	4,1%	-310	-1,9%
	Simple	80	760	4,5%	-240	-1,4%
	Limited changes	580	1.260	7,6%	270	1,6%
	Targeted	80	760	4,5%	-230	-1,4%
Refineries	Baseline B	0	950	0,1%	-190	0,0%
	Simple	-130	820	0,1%	-320	-0,1%
	Limited changes	50	1000	0,2%	-140	0,0%
	Targeted	80	1.030	0,2%	-110	0,0%
Chemicals	Baseline B	0	290	0,2%	-100	-0,1%
	Simple	-80	200	0,1%	-190	-0,1%
	Limited changes	40	320	0,2%	-70	0,0%
	Targeted	50	340	0,2%	-50	0,0%
Fertilisers	Baseline B	0	250	1,0%	120	0,5%
	Simple	-40	210	0,8%	80	0,3%
	Limited changes	-130	110	0,4%	-20	-0,1%
	Targeted	-120	130	0,5%	0	0,0%
Glass	Baseline B	0	85	0,4%	10	0,0%
	Simple	10	95	0,5%	20	0,1%
	Limited changes	10	95	0,5%	20	0,1%
	Targeted	50	140	0,7%	60	0,3%
Paper	Baseline B	0	30	0,0%	30	0,0%
	Simple	-40	-10	0,0%	-10	0,0%
	Limited changes	20	40	0,1%	40	0,1%
	Targeted	20	50	0,1%	50	0,1%
Aluminium	Baseline B	0	70	0,2%	70	0,2%
	Simple	10	80	0,2%	80	0,2%
	Limited changes	-50	10	0,0%	10	0,0%
	Targeted	-50	20	0,0%	20	0,0%

7.5. Sensitivity analysis

A sensitivity analysis is performed on two parameters.

²⁵² Negative values indicate savings

1) Carbon price. The estimates presented above are based on an estimated average price of € 25 over phase 4. The sensitivity analysis is performed for a price range of € 10 and € 40 (i.e. +/- € 15). The results indicate that compliance costs to be faced by sectors are estimated to stay under 2% of turnover for four (out of eight) of the sectors analysed, and would reach some 12% of the turnover for the cement sector in the worst case scenario in case the sector is not able to pass through any carbon costs to its customers.

Table 25 Sensitivity analysis of compliance costs compared to sector turnover at different carbon prices

		Without cost pass-through			With lowest cost pass-through rate		
		€ 10	€ 25	€ 40	€ 10	€ 25	€ 40
Steel	Baseline B	0,4%	1,0%	1,5%	-0,3%	-0,8%	-1,3%
	Simple	0,4%	0,9%	1,4%	-0,3%	-0,9%	-1,4%
	Limited changes	0,2%	0,5%	0,8%	-0,5%	-1,2%	-2,0%
	Targeted	0,2%	0,6%	0,9%	-0,5%	-1,2%	-1,9%
Cement	Baseline B	1,6%	4,1%	6,5%	-0,7%	-1,9%	-3,0%
	Simple	1,8%	4,5%	7,3%	-0,6%	-1,4%	-2,3%
	Limited changes	3,0%	7,6%	12,1%	0,7%	1,6%	2,6%
	Targeted	1,8%	4,5%	7,3%	-0,6%	-1,4%	-2,2%
Refineries	Baseline B	0,1%	0,1%	0,2%	0,0%	0,0%	0,0%
	Simple	0,1%	0,1%	0,2%	0,0%	-0,1%	-0,1%
	Limited changes	0,1%	0,2%	0,2%	0,0%	0,0%	0,0%
	Targeted	0,1%	0,2%	0,3%	0,0%	0,0%	0,0%
Chemicals	Baseline B	0,1%	0,2%	0,2%	0,0%	-0,1%	-0,1%
	Simple	0,0%	0,1%	0,2%	0,0%	-0,1%	-0,2%
	Limited changes	0,1%	0,2%	0,3%	0,0%	0,0%	-0,1%
	Targeted	0,1%	0,2%	0,3%	0,0%	0,0%	0,0%
Fertilisers	Baseline B	0,4%	1,0%	1,5%	0,2%	0,5%	0,7%
	Simple	0,3%	0,8%	1,3%	0,1%	0,3%	0,5%
	Limited changes	0,2%	0,4%	0,7%	0,0%	-0,1%	-0,1%
	Targeted	0,2%	0,5%	0,8%	0,0%	0,0%	0,0%
Glass	Baseline B	0,2%	0,4%	0,7%	-0,1%	-0,1%	-0,2%
	Simple	0,2%	0,5%	0,8%	0,0%	-0,1%	-0,1%
	Limited changes	0,2%	0,5%	0,7%	0,0%	-0,1%	-0,1%
	Targeted	0,3%	0,7%	1,1%	0,0%	-0,1%	-0,1%
Paper	Baseline B	0,0%	0,0%	0,1%	0,0%	0,0%	0,1%
	Simple	0,0%	0,0%	0,0%	0,0%	0,0%	0,0%
	Limited changes	0,0%	0,1%	0,1%	0,0%	0,1%	0,1%
	Targeted	0,0%	0,1%	0,1%	0,0%	0,1%	0,1%
Aluminium	Baseline B	0,1%	0,2%	0,3%	0,1%	0,2%	0,3%
	Simple	0,1%	0,2%	0,3%	0,1%	0,2%	0,3%
	Limited changes	0,0%	0,0%	0,1%	0,0%	0,0%	0,1%
	Targeted	0,0%	0,0%	0,1%	0,0%	0,0%	0,1%

2) Production levels. Since in the 'Simple', 'Limited changes' and 'Targeted' packages free allocation is closely aligned with actual production levels, under these packages the changes of production level will influence less the relative outcome of compliance costs compared to turnover. This is because in case production in a sector increases compared to the baseline level, emissions, free allocation and turnover will all increase. Similarly, in case of a production decrease, emissions, free allocation and turnover will all decrease.

It can thus be concluded that the results are not sensitive for production level changes.

Finally, the dissemination of new technologies over time may well result in a step-change in some sectors and will in general bring down costs. However, it is difficult to estimate when such technologies would be generally available for sectors, and therefore no sensitivity analysis is performed on the effect of possible future breakthrough technological improvements.

8. IMPACTS OF DIFFERENT OPTION PACKAGES FOR FREE ALLOCATION: ADMINISTRATIVE BURDEN AND SOCIAL IMPACTS

8.1. Analysis of administrative burden

For the purpose of the impact assessment, administrative costs are defined as the costs incurred by operators and regulators to maintain the system. These do not include compliance costs required for purchasing allowances.

A summary of the administrative cost assessment is available below, focusing on the operators and regulators (public authorities) at Member State and Community level, compared to 'Baseline B'.

In terms of methodology, the level of administrative complexity was quantified using the EU Standard Cost Model. The assignment of sectors and sub-sectors into carbon leakage groups is a one-off exercise based on European statistics. Based on previous experience, it can be estimated that this requires resources in the order of magnitude of up to 2 million € (same order of magnitude as NIMs data check, see below).

It can be assumed that the update of benchmark values (either by uniform factors or collected performance data) has hardly any impact on administrative costs if the data collection is combined with the NIMs data collection.

Table 26: Estimated administrative costs for additional NIMs exercises:

Activity	Actor	No of actors	No. cost units	unit	unit cost	total cost
data collection & reporting	installation	11.000	10	person-day	€ 300	€ 33.000.000
verification	installation	11.000	2	person-day	€ 800	€ 17.600.000
data check & allocation decision	Competent authorities	28	10	person-year	€ 100.000	€ 28.000.000
data check & (non-) rejection	Commission	1	10	person-year	€ 150.000	€ 1.500.000
Total costs						€ 80.100.000

Table 27: Estimated additional annual administrative costs for production level adjustments

Activity for annual adjustments	Actor	No. of actors	No. cost units	unit	unit cost	total cost
data collection & reporting	installation	2.000	2	person-day	€ 300	€ 1.200.000
verification	installation	2.000	0,5	person-day	€ 800	€ 800.000
data check & allocation decision	Competent authorities	28	2	person-year	€ 100.000	€ 5.600.000
data check & (non-) rejection	Commission	1	2	person-year	€ 150.000	€ 300.000
Total annual costs for annual adjustments						€ 7.900.000
Activity for capacity changes						
data collection & reporting	installation	300	10	person-day	€ 300	€ 900.000
verification	installation	100	5	person-day	€ 800	€ 400.000
data check & allocation decision	Competent authorities	28	1	person-year	€100.000	€ 2.800.000
data check & (non-) rejection	Commission	1	1	person-year	€ 150.000	€ 150.000
Total annual costs for capacity changes						€ 4.250.000
Activity for partial cessations						
data collection & reporting	installation	500	2	person-day	€ 300	€ 300.000
verification	installation	500	0,5	person-day	€ 800	€ 200.000
data check & allocation decision	Competent authorities	28	1	person-year	€ 100.000	€ 2.800.000
data check & (non-) rejection	Commission	1	0,5	person-year	€ 150.000	€ 75.000
Total annual costs for partial cessations						€ 3.375.000

Table 28: Estimated administrative costs for harmonised rules for indirect cost compensation (additional costs compared to national compensation currently applied in 6 MSs as baseline)

Activity	Actor	No of actors	No. cost units	unit	unit cost	total cost
data collection & reporting	installation	700	5	person-day	€ 300	€ 1.050.000
verification	installation	700	2	person-day	€ 800	€ 1.120.000
data check & compensation decision	Competent authorities	22	2	person-year	€ 100.000	€ 4.400.000
approval	Commission	1	2	person-year	€ 150.000	€ 300.000
Total one-off costs						€ 6.870.000
Annual adjustments						
data collection & reporting (capacity changes)	installation	70	2	person-day	€ 300	€ 42.000
verification (capacity changes)	installation	70	0.5	person-day	€ 800	€ 28.000
data check & compensation decision (capacity changes & allowance price)	Competent authorities	22	1	person-year	€ 100.000	€ 2.200.000
approval	Commission	1	0.2	person-year	€ 150.000	€ 30.000
Total annual costs						€ 2.300.000
Total costs						€ 27.570.000

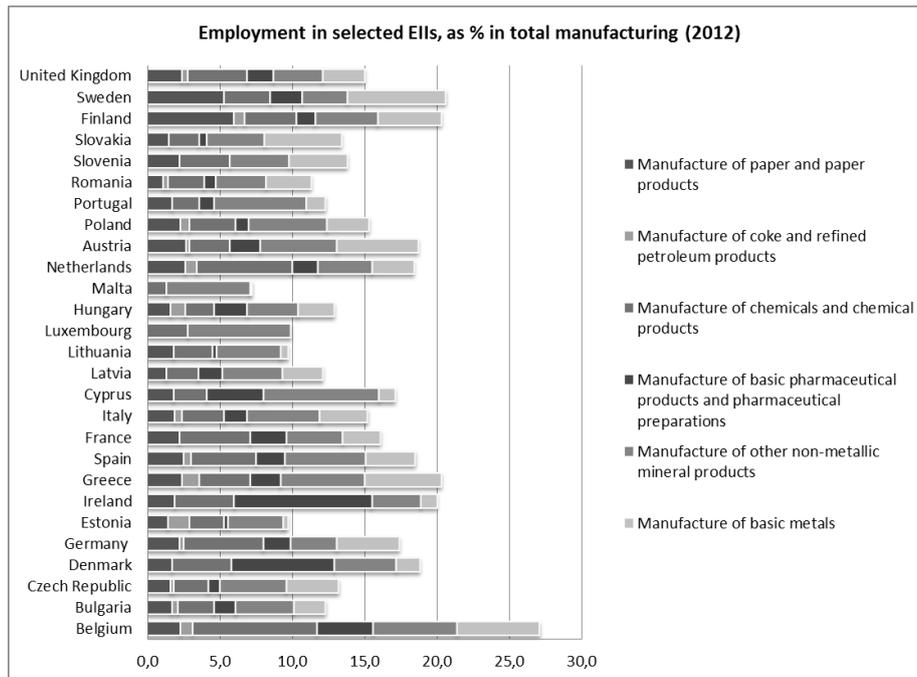
In conclusion, the option packages 'limited changes' and 'targeted' lead to higher costs compared to baseline B (82 million € for 'limited changes' and 110 million € for 'Targeted') reflecting a higher level of administrative complexity (due to additional NIMs exercise). The annual adjustment for significant production level changes is not expected to trigger substantial additional administrative costs as they replace the activities required for baseline B (capacity changes and partial cessations). For that reason, the administrative costs of the 'Simple' package' and baseline B are not expected to differ significantly. The 'Targeted' package shows the highest administrative complexity due to the mandatory financial support for indirect cost compensation.

8.2. Analysis of social impacts

8.2.1. Employment

In order to put the analysis into context, the figure below demonstrates the level of employment by selected energy-intensive industries in the Member States.

Figure 15: Employment in selected energy-intensive industries



Source: Eurostat

For the assessment of impacts of different policy option packages on employment in the sectors concerned, following method is applied²⁵³:

- Consideration of direct costs for all sectors as compared to 'Baseline B'. A sector-specific analysis is not considered feasible and proportionate given the expected rather limited impacts.
- Two main impacts on employment are considered: the results of additional carbon costs absorbed by the sectors, and the results of decreasing sales due to passing through of costs in higher prices (i.e. costs not absorbed by the sector).
- Data on employment, labour costs and cost pass through for the most relevant sectors covered by the ETS sectors are considered to be a good estimate of the related figures for the ETS sectors as a whole.
- Impacts of direct costs on production levels are estimated using the price elasticity of demand. Changes in production levels lead to changes in employment.
- Estimating the impacts of direct costs not passed through is very difficult as these costs could be absorbed by companies – depending on their individual profitability and business strategy – reducing profits and/ or labour costs by reducing employment. For the purpose of this impact assessment, it is assumed that 100% of the additional costs after the provision of free allowances are absorbed through reducing employment. This is a high estimate of the real impacts.

This methodology is expected to deliver estimates at the high end of the likely order of magnitude of the impacts due to the rather simplifying underlying assumptions, e.g. that labour costs could be easily reduced in reaction to costs not passed through.

²⁵³ A detailed description of the methodology and data used is provided in the ICF International, Umweltbundesamt, SQ Consult, Ecologic Institut, Vivid Economics and ZEW on-going work.

The results of these estimates are summarised for costs passed through and not passed through in the two following tables.

Table 29: Estimated employment impacts of policy option packages compared to baseline B from the pass through of additional costs (annual average for 2021 – 2030, underlying assumptions in italics)

	Baseline A	Simple	Limited changes	Targeted
Additional direct costs (M€)	7668	-1263	-883	-658
<i>% of costs passed through</i>	<i>78%</i>	<i>78%</i>	<i>78%</i>	<i>78%</i>
Costs passed through (M€)	5981	-985	-689	-513
Increase in costs (prices) in %	0.43%	-0.07%	-0.05%	-0.04%
<i>Demand price elasticity</i>	<i>-0.336</i>	<i>-0.336</i>	<i>-0.336</i>	<i>-0.336</i>
Changes in sales (M€)	-2010	331	231	172
Changes in jobs from cost pass through	-4180	688	481	359
Changes in jobs as % of total jobs	-0.10%	0.02%	0.01%	0.01%

Table 30: High estimate of employment impacts of policy option packages compared to baseline B from additional costs absorbed (annual average for 2021 – 2030, underlying assumptions in italics)

	Baseline A	Simple	Limited changes	Targeted
Additional direct costs (M€)	7668	-1263	-883	-658
<i>% of costs absorbed</i>	<i>22%</i>	<i>22%</i>	<i>22%</i>	<i>22%</i>
Costs absorbed (M€)	1687	-278	-194	-145
Changes in jobs from costs absorbed (high estimate)	-29211	4811	3364	2507
Changes in jobs as % of total jobs	-0.73%	0.12%	0.08%	0.06%

The total employment impact is estimated by summing the two employment impacts described above. The employment impact is largely determined by the choices made by the companies to

absorb those costs that cannot be passed on through higher prices. It should also be noted that underlying assumptions for the figures in Table 30 lead to rather high estimates.

Nevertheless, the estimated impacts are very limited. For the option packages 'Simple', 'Limited changes' and 'Targeted', small positive impacts on employment compared to baseline B are expected in the order of magnitude of up to 5000 jobs, representing an increase of 0.1%.

The employment impact of Baseline A is slightly negative reflecting the additional cost for companies. In the worst case where all absorbed costs are reflected in a reduction in wages, the option results in a loss of employment of some 30,000 jobs as average of the 2021 – 2030 period, equivalent to 0.8%.

In the lower estimate case, where all absorbed costs are reflected in changed profits, the total employment impact will reflect the consequences of the costs passed through. In this case, the employment impacts are negligible.

8.2.2. Energy prices for households

The focus of this assessment is on energy prices in terms of heat (in particular district heating) rather than electricity, as these policy option packages do not directly affect the power sector.

For the assessment of impacts of policy option packages on heat prices for private households following method is applied²⁵⁴:

- Forecast of heat demand based on results from the PRIMES model (Reference Scenario 2013);
- Application of heat benchmark and applicable carbon leakage factor for the heat producer (lowest carbon leakage group);
- Use of heat prices from Euroheat 2013 country survey, with prices scaled up to average during Phase 4 period using natural gas price trends from above document; and
- Full cost pass through assumed.

The results compared to package Baseline B are presented in table below.

Table 31: Analysis of impacts of policy option packages on the district heating sector 2021-30

Parameter	Units	Baseline B	Baseline A	Simple	Limited changes	Targeted
EU heat production	Mtoe/yr	56	56	56	56	56
	PJ/yr	2352	2352	2352	2352	2352
EU heat prices (baseline)	€/GJ	28	28	28	28	28
Heat benchmark	tCO ₂ /TJ	53.0	62.3	53.0	53.0	51.7
Avg. carbon leakage factor	%	30%	30%	90%	30%	9%
Avg. cross sector correction factor	%	15%	0%	7%	0%	0%
Free allocation	MtCO ₂ /yr	32	44	104	37	11

²⁵⁴ A detailed description of the methodology and data used is provided in the ICF International, Umweltbundesamt, SQ Consult, Ecologic Institut, Vivid Economics and ZEW on-going work.

Parameter	Units	Baseline B	Baseline A	Simple	Limited changes	Targeted
Value of free allocation	€M/yr	795	1099	2608	935	274
Difference in free allocation vs Baseline B	€M/yr	-	+304	+1814	+140	-521
Impact on heat prices vs Baseline B	€/GJ	-	-0.13	-0.77	-0.06	+0.22
Impact on heat prices vs Baseline B	% of price	-	-0.5%	-2.8%	-0.2%	+0.8%

Overall, the estimated impacts of the 'Simple' and 'Limited changes' option packages, as well as of baseline A compared to Baseline B, are reductions in heat prices of € 0.77/GJ (almost 3% of baseline price) for 'Simple' and less significant reductions for 'Limited changes' and baseline A. Only the 'Targeted' package is expected to increase the heat prices of € 0.22/GJ (0.8% of baseline price).

The 'Simple' option package results in the highest reduction due to the significantly more generous carbon leakage factor compared to Baseline B which outweighs the effect of a reduced benchmark value. The limited cost reduction for 'Limited changes' and Baseline A results from the fact that no cross-sectoral correction factor is expected for these options.

The 'Targeted' option package only grants very limited free allocation to district heating due to the declining carbon leakage factor, which is on average only 9% in phase 4.

9. LITERATURE REVIEW ON COST-PASS THROUGH RATES²⁵⁵

The cost pass-through rate can be generally described as the change in output price in response to a change in input costs and serves in the literature as a means to assess competitiveness effects and potential output or carbon leakage. Cost pass-through influences two main elements of competitiveness: profit margins and market shares (IEA, 2008).

The discussion about cost pass-through in product prices started shortly after the introduction of the EU ETS in 2005. Already in 2005, Sijm et al. (2005) conducted empirical analysis showing that the opportunity costs of freely obtained allowances in the electricity market seemed to have been passed through to consumers resulting in windfall profits for electricity producers. These, and other, studies have resulted in the decision (made in 2008) that in Phase 3 electricity producers would no longer receive free allowances.

Since the publication of the revised EU ETS Directive in 2009, a few empirical studies have indicated that not only power producers but also energy intensive industries would pass through the opportunity costs of their freely obtained allowances into the product prices. While this initial research efforts show results that are relevant for the way the EU ETS addresses carbon leakage, they are also preliminary and suffer from methodological and data issues. However, they show that to some extent cost pass-through of freely obtained allowances seemed to have happened in the industry as well.

The literature overview in this Annex is oriented on cost pass-through in the EU ETS, with a special emphasis on cost pass-through in industrial sectors. This literature can be categorized in three different areas:

- i. Theoretical studies on cost pass-through;
- ii. Ex-ante empirical studies on cost pass-through; and
- iii. Ex-post empirical studies on cost pass-through.

The theoretical studies often deal with the conditions under which firms can pass through their costs and the impact of a change in these conditions on the cost pass-through rates.

Empirical assessments for cost pass-through have been attempted from different angles:

- ex-ante research, which employs calibrated partial or general economic models to simulate the impact of hypothetical carbon pricing;
- ex-post studies, which use econometrics and other tools, including industry surveys, to assess historical cost pass-through.

Ex-ante modelling studies aim to assess the future effect of unilateral climate policies and mostly have the advantage to account for (global) economic interaction (in case of whole economy models) or include detailed technology choices to meet a given demand (partial models). Unless they are macro-econometric models they require data for one base year only and are based on number of specific assumptions relating to producer and consumer behaviour (supply and demand elasticities) and production technologies (input substitution, technological progress) which in themselves influence the outcome of the modelling exercise.

In contrast, ex-post studies have the benefit of using historical data to assess real-world phenomena. Ex-post studies would either require an econometric approach to reveal the cost pass-through ratio or to use surveys. Both of these methods have their pros and cons.

²⁵⁵ Based on the Interim Report of the Study on different pass-through factors to assess the impact of the EU ETS carbon cost., CE Delft, Oko-Institut, 2015 (ongoing work)

Econometric approaches tend to be precise but require a sufficiently large set of either time series or cross-sectional data and a careful specification of the model equations. Moreover, econometric analysis is oriented on hypothesis testing which may limit interpretations. Most of the econometric analysis is involved in rejecting the null hypothesis of no-cost pass-through. If this hypothesis is rejected, it is clear that there is evidence of cost pass-through. However, if this hypothesis is not rejected it is not a direct evidence that the costs are not passed through.

The alternative would be to apply qualitative methods such as surveys and interviews. These are capable of capturing key trends or developments that are often more difficult to obtain via the use of simplified indicators. However, depending upon the research question, the advantage of qualitative approaches can also be a limitation as it is difficult to make assumptions beyond the opinions captured for a specific group of participants. Moreover, strategic behaviour in responding and adverse selection are among the two most important problems that plague studies based on surveys.

9.1. Theoretical studies on cost pass-through

Cost pass-through is a widely debated topic in the field of unilateral climate policies. First, this is because unilateral climate policies may impose costs to industries which would make them less competitive. Unilateral climate policies may then lead to impacts on profit margins and/or market shares. If costs are not passed through, then firms need to bear the additional costs and their profits will fall potentially affecting investment decisions and competitiveness in the longer term. If costs are passed through and result in higher product prices, this may affect production and competitiveness (market shares) as follows: domestic demand may be lost as consumers may decide to buy alternative and less expensive domestic substitutes or imported products (only the latter effect is associated with carbon leakage); and export shares may be lost to countries that are not subject to comparable policies (Graichen et al., 2008).

However, cost pass-through has most fiercely been discussed in relation to opportunity costs of free allowances. It has been argued that companies that receive free allowances up to the benchmark would still pass through the opportunity costs of these allowances forward into product prices. From an economic perspective this may even seem rational. Firms are engaged in marginal cost pricing (and not in average cost pricing). Firms that price in an additional unit of production may therefore, on average, need to pass in the carbon costs as the ETS guarantees that there is an individual carbon constraint for each company. In economic theory, one could show that firms that do not pass through the marginal costs of production increases have a larger risk of being uncompetitive (see e.g. CE Delft, 2010).

This result can be generalized to the fact that, according to economic theory under perfect competition, industries should pass-through their costs. However, the amount and conditions under which firms pass through their costs may be dependent on a number of conditions.

Cost pass-through rates depend on the market structure and the elasticities of demand and supply (Sijm et al., 2009). Extending the theoretical discussion further to estimate cost pass-through for unilateral cost increases, CE Delft (2010) argues in the context of the EU ETS that even if initially the additional carbon cost is fully passed through, the impact of imports from other countries will ultimately lower the total price increase in sectors that are exposed to international competition. This argument is based upon the 'Law of One Price' principle, which assumes that markets are perfectly integrated with identical commodities having the same price internationally. However, as indicated by Armington (1969) perfectly integrated markets rarely occur as products produced in different countries are often imperfect substitutes due to product differentiation and transportation costs.

In the real world of less than perfect competition (and less than perfectly integrated markets and uncertainty over supply and demand elasticities) an empirical analysis is necessary in order to translate theory of cost pass-through into reality.

Sijm (2009), CE Delft (2010b) and Varma et al., (2012) outlined the main factors influencing whether, and to which extent, costs may be passed-through:

- **Market structure** (or market power) refers to the number of firms in the market and the level of state intervention either by regulation or direct ownership. The structure of the market determines the level of competition between firms and influences the ability of firms to pass on additional CO₂ costs without losing market share. Sijm et al. (2009) derive the result that in general cost pass-through in competitive markets can be higher than in monopolistic markets. The monopolist aims to maximize profits and is therefore willing to sacrifice output. On oligopolistic markets the ability to pass-through the costs will depend on the pricing strategy and the utilisation rates (CE Delft, 2010b). If capacity is fully utilized, full cost pass-through is likely. It is also conceivable that price increases are not immediately passed over to the customers, but price decreases of inputs are then used as balancing mechanism (Conforti, 2004).
- **Supply and demand elasticities** refer to the degree to which supply or demand of a product responds to a change in price. If the demand elasticity of a product is zero (i.e. rigid demand) then additional CO₂ costs can be passed through with no risk of a firm losing market share.²⁵⁶
- **Exposure to international trade** may also influences the ability of a firm to pass-through additional CO₂ costs (Varma et al., 2012). For example, if the exposure of a firm to international trade is low, higher product prices due to passing through additional costs may not impact the competitiveness of the firm. However, the trade exposure might actually differ within the EU, as for production located in the centre of the EU demand might exclusively be within the EU while for production located at the periphery competition with less expensive production units outside the EU is much stronger.

Reinaud (2008) provides an overview of further factors driving cost pass-through: market tightness, for example, refers to the availability of production capacity outside of the EU for supply to the EU. Spare capacity outside of the EU might be employed to provide cheaper products if European producers pass-through cost. On the other hand, if foreign production capacity is tight domestic cost pass-through might not affect the market share of European producers. Furthermore, demand and supply cycles affect the ability to pass-through costs: In case demand exceeds supply (positive cycle) companies may pass-through cost. Independent of carbon policies, industry commodities prices have shown cyclical variations. Product differentiation is closely related to the above mentioned demand elasticities and also affects cost pass-through. If products are homogenous, then demand will react sensitive to any change in price whereas in the case of specialty products, higher prices may not divert demand. Similarly, contractual agreements might inhibit cost pass-through for the term of the contract, but companies may take account of this and agree to shorter term contracts only.

9.2. Ex-ante empirical studies on the EU ETS

The majority of ex-ante studies in the literature in the context of the EU ETS tend to focus on the economic effects of the unilateral climate policy, in particular on impacts on regulated industrial sectors (i.e. iron and steel, cement and aluminium). Ex-ante top-down modelling analyses were

²⁵⁶ Under iso-elastic demand curves, cost pass-through can be higher than 100%.

used in the Energy and Climate package (2008) impact assessment to assess effects on GDP, value added, employment, structural changes and trade in response to a more stringent cap on ETS emissions. Bottom-up modelling was used to derive industry specific results on the future energy mix, technology choice and sectoral production. Moreover, modelling exercises are devoted to assessing the risk of output or carbon leakage with the estimates showing a substantial range depending upon the modelling approach adopted, the underlying assumptions applied (i.e. trade elasticities, carbon price) and the specific design of the policy scenario (i.e. emission reduction target, inclusion of preventative measures) (Kuik and Hofkes (2010), Carbon Trust (2010), Ponssard and Walker (2008), Demailly and Quirion (2006), Demailly and Quirion (2008), Summerton et al. (2010)).

Not many ex-ante studies have been devoted to explicitly assessing cost pass-through rates in response to unilateral carbon pricing. Most studies look into competitiveness and subsequent potential carbon leakage and only indirectly touch the issue of cost pass-through by either assuming specific pass-through rates or taking assumptions on elasticities for demand, supply and trade and for the market structure. Most recently Vivid Economics (2014), however, provided an estimation of cost pass-through rates based upon an ex-ante analysis using a bottom-up partial modelling approach.

Ex-ante studies outside the EU tend to develop scenarios for climate policies and their impact on specific sectors, such as Bassi and Yudken (2009) for the chemicals sector in the US or Morgenstern et al. (2007) for the manufacturing sector in the US.

To keep the focus of this literature review explicitly on cost pass-through rates we only highlight the approaches and results from those ex-ante studies that provide explicit estimates of cost pass-through although we are aware that the literature on carbon leakage rates is closely linked. There are two studies that have provided empirical estimates of cost pass-through rates among a variety of sectors: McKinsey (2006) and Vivid Economics (2014).

An initial assessment of cost pass-through rates was provided by McKinsey (2006) in a study that was meant to provide input for the design of Phase 2 of the EU ETS. In McKinsey (2006) a change of the international competitiveness is taken as a change in operating margin approximated by the percentage cost increases of the end products. Assuming a competitive power market with a full pass-through of CO₂ costs into electricity prices and assuming that 95% of the required allowances are grandfathered, McKinsey investigated to what extent the additional carbon costs could be passed through in product prices. Without detailed information how they arrived at their conclusions, they presented a range of cost pass-through ratios for a number of sectors²⁵⁷.

A more recent and more comprehensive study estimating cost pass-through, output and production leakage rates has been conducted by Vivid Economics (2014) based upon an ex-ante analysis using bottom up models. They analyse 24 sectors (thereof ten in detail) and specifically model cost pass-through as a function of the inside markets share (that is, market share of firms affected by the cost change) and an indicator for market structure which they call inverse competitiveness and which yields higher cost pass-through as the market becomes perfectly competitive and which reduces pass-through as the market becomes first oligopolistic and then collusive.

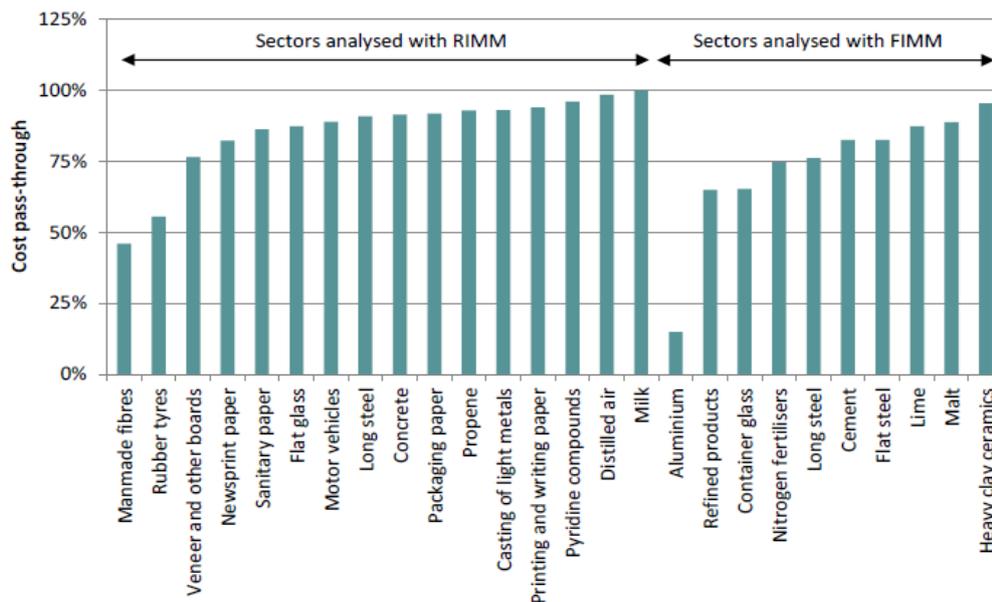
²⁵⁷ Steel: BOF: 6% , EAF 66% of the additional cost can be passed through to customers; Pulp & paper production: 50% of the additional costs can be passed through in chemical pulping; 0 to 20% for paper from integrated processes can be passed through to customers. Cement from dry process: 0 to 15% of the additional cost can be passed through to customers. Refining: 25 to 75% of the additional cost can be passed through to customers. Aluminium: 0% of the additional cost can be passed through to customers.

They conclude that cost pass-through rates vary significantly by sector. Specifically, “the rate of cost pass-through is one if there are no outside firms and the market is perfectly competitive. As inside firms are introduced, the cost pass-through rate falls. If margins are high for the number of firms present, the cost pass-through rate falls further. Less than perfect competition occurs in most markets, and may reflect a concentration of ownership of firms (many firms having the same owner, that is, being associated firms), product differentiation, or a small number of firms” (Vivid Economics, 2014).

In particular, they find that the aluminium sector is associated with low levels of cost pass-through (absorb more than 80% of the cost increase) due to the fact that the commodity is 1) traded on a global market 2) has a very low weight to value ratio and 3) there is sufficient global capacity. In contrast, the malt sector is identified as being able to fully pass-through their carbon costs as a consequence of the absence of non-EU competition. As shown in

Figure 16, the majority of the other sectors considered in the study were estimated to have cost pass-through rates above 75%, however it is noted within the study that high pass-through rates do not necessarily prevent firms from experiencing cost shocks that impact upon their competitiveness. In addition, simplified assumptions within the modelling (i.e. all firms treated the same regardless of geographical location) means that in reality cost pass-through rates may be lower for firms located on the coast or nearer to non-EU borders. The authors stress that their results represent upper bound estimates.

Figure 16 Cost pass-through rates derived by Vivid Economics (2014) in sectors investigated in reduced and full detail (2020, € 15/tCO₂)



Source: Vivid Economics

Note: RIMM refers to their Reduced Industrial Market Model while FIMM refers to their Full Industrial Market Model.

9.3. Ex-post empirical studies for the EU ETS

Given the relatively short time period that the EU ETS has been in operation, the amount of empirical data remains limited but is growing and recently published articles have been attempting to verify the findings of ex-ante modelling. Based upon different sources of empirical data (i.e. trade data, employment data, qualitative data) and different ex-post analysis techniques (i.e. econometric analysis, surveys) several authors have attempted to assess the impact of the EU

ETS on various aspects of competitiveness (i.e. trade, employment, innovation) and leakage, including cost pass-through.

Based upon empirical data from the first two phases of the EU ETS attempts have been made in the literature (Alexeeva-Talebi, 2010; Oberndorfer et. al., 2010; CE Delft, 2010; Walker, 2008) to estimate the extent to which costs have been passed through into product prices. These price based studies either look into the correlation of industry-specific input costs and prices (cost-price approach) or into the correlation of industry-specific prices in the EU versus countries outside of the EU (e.g. USA) and carbon prices (market equilibrium approach). While prices on output are usually available on a monthly or even weekly basis, input costs for specific industries are more challenging to obtain.

Applying the cost-price approach, Alexeeva-Talebi (2010) finds that producers of cement, lime & plaster are capable of passing through the majority of additional costs and also identify a wide range of cost pass-through rates that exist across the different sectors (i.e. 0 to 75%), see Table 32. In another study, Alexeeva-Talebi (2011) estimates that EU refineries fully passed-through the price of allowances on petrol prices between 2005 and 2007.

Using the same approach, Oberndorfer et al. (2010) show for the UK that industries passed-through additional costs in a wide range from 0% (container glass) up to 100% (LPDE) and more (ceramic goods), using weekly data for 2005-2006 for refineries and monthly data for the period 2001-2007 for others. A pass-through rate of larger than 100% might result from certain market characteristics and can be interpreted as a complete pass-through of policy induced carbon costs.

The studies by Alexeeva-Talebi (2010) and Oberndorfer et al. (2010) calculate different cost pass-through rates for hollow glass, which reflects the use of different data, different lengths of their time series and/or different specification of their estimated equations (i.e. which input costs the authors consider in their estimation on the one hand side and which commodity prices (retail, consumer) are to be explained). Walker (2008) also employs the cost-price approach to look into cost pass-through for the cement sector in various EU MS. He finds that cost pass-through is lowest in countries on the periphery Portugal (0%), Italy (<10%) and Greece (<11%) and higher in more centrally located countries as well as UK. These studies and their results are summarised in Table 32.

Employing the market equilibrium approach and monthly price data from 2001 until 2009 CE Delft (2010) finds that energy-intensive industries such as iron and steel, refining and chemicals actually passed through a large fraction of the allowances price to product prices, compare Table 32.

Other ex-post econometric studies do not specifically tackle cost pass-through rates but estimate the impact of the EU ETS on employment, output or revenue using panel or cross sectional data (e.g. Abrell et al. 2011; Commins et al., 2011; Anger and Oberndorfer, 2008), and are not further investigated in this review.

Another strand of literature employs survey or interview techniques with individual firms to assess the effects of the EU ETS. These surveys or interviews usually cover a wide range of questions related to the EU ETS ranging from abatement activities, implementation, organisational set-up to shifts in production or capacity utilization, effects on profit, production location or carbon leakage. Explicit questions on cost pass-through were not addressed or answered. A very nice and comprehensive summary of these studies can be found for example in Dechezleppre et al. (2014).

Table 32 Estimate of cost pass-through rates from ex-post econometric studies

Study	Study scope	Method	Regression	Dependent variable	Explanatory variable	Country	Time Period	Sector	Sector/Product	Cost pass - through
Alexeeva-Talebi (2010)	Cost pass-through in energy intensive industries	Econometric analysis	Cost approach: domestic producer price as function of foreign producer prices and domestic costs (labor, material, electricity - carbon price not included)	Domestic producer price index	<ul style="list-style-type: none"> - Import producer price index CIF (4-digit level) - Labor costs: gross wages indexed (2-digit level) - Energy: electricity producer price index - Material cost index 	DE	Monthly data from January 1995 to December 2008	Paper	Paper and Paperboard	0%
									Household and toilet paper	>38%
								Chemicals	Dyes and pigments	37%
									Other basic inorganic chemicals	10%
									Fertilizer and nitrogen compounds	16%
									Plastic in primary forms	42%
									Perfumes and toilet preparations	0%
								Glass	Other rubber products	75%
									Hollow glass	>60%
									Glass Fibres	27%
Cement	Other glass, processed, incl.	24%								
	Cement Lime and Plaster	73%								
Alexeeva-Talebi (2011)	Cost pass-through in EU petroleum markets	Econometric analysis	Cost approach, output price as function of EUA, oil price, exchange rate	domestic output price: Euro-95-unleaded petrol	Input prices: <ul style="list-style-type: none"> - EUA - Crude oil price (Brent) - Exchange rate" 	AT, BE, CZ, DK, FR, DE, GR, HU, IT, LT, NL, PT, ES, SE	Four weekly data: phase 1, 16/09/2005 to 22/03/2007, second trading period Jan2008 to 2012 (Dec.??)	Refineries	EU-95 unleaded petrol	likely full (100%)
CE Delft (2010)	Cost pass-through in energy intensive industries	Econometric analysis	Market approach: assumes that price of inputs and output are globally linked through trade flows, thus prices in different regions depend on each other	Output price EU	Output price USA, long-term equilibrium bw EU and US product prices, CO ₂ price, exchange rate, crude oil price, DOW Jonas and AEX stock indices	EU	Weekly (monthly for steel) data from 2001 to 2009 (Chemicals from 2005 to 2009); CO ₂ price second quarter 2005 to 2009	Refineries	Gasoline	500%
									Diesel	350%
								Chemicals	Polyethylene (PE)	100%
									Polystyrene (PS)	33%
									Polyvinylchloride (PVC)	100%
								Steel	Hot rolled coil	120%
Cold rolled coil	110%									
Walker (2008)	Cost pass-through in cement	Econometric analysis	Cost approach	output price	input prices	France Germany Italy UK Greece Portugal Spain	Annual 1995-2004	Cement		<30%
										<30%
										<10%
										<31%
										<11%
										0%
										<37%
Oberndorfer (2010)	Cost pass-through in energy intensive	Econometric analysis	Cost approach: for products other than diesel and gasoline carbon price not	Output price	Input prices/costs (see column data and data sources)	UK; EU for chemicals	Weekly data on gasoline and diesel for 2005-2006; glass and	Refineries	Diesel	50%
									Gasoline	75%
								Chemicals	LPDE	100%
									Ammonium	50%

Study	Study scope	Method	Regression	Dependent variable	Explanatory variable	Country	Time Period	Sector	Sector/Product	Cost pass - through
	industries		included (cost shock on other input costs)				ceramics; chemicals monthly data 2001-2007	Glass	Hollow glass	20-25%
									Container glass	0%
								Ceramics	Ceramic goods	>100%
									Ceramic bricks	30-40%

In terms of methodological approach, the empirical literature on measuring cost pass-through in product prices of energy intensive sectors in EU ETS, can roughly be demarcated by whether a cost-price approach is used or whether a market equilibrium approach is used. Examples of the former are Alexeeva-Talebi (2011, 2010), Oberndorfer (2010) and Walker (2006). Examples of the latter are CE Delft (2010a, b). For both approaches, a measure of the elasticity of the price of an output in an energy intensive sector with respect to the price of CO₂ is estimated using econometrics techniques on ex post data. To obtain an indicator for the extent of cost pass-through, this elasticity then is compared to a measure for the CO₂ intensity of production. The indicator for the extent of pass-through of CO₂ costs into product prices can be calculated as the ratio of the estimated elasticity divided by the CO₂ intensity in production.

9.4. Conclusions

Cost pass-through has been analysed primarily in the context of unilateral climate policies. The topic of cost pass-through has been analysed from a theoretical, ex-ante and ex-post perspective. From a theoretical perspective, cost pass-through is likely for profit maximizing firms, but the exact cost pass-through rates may depend on market power, elasticities of demand and supply and international competition. Most of the economic models (e.g. E3ME, Ginfors, GEM E-3) that have been used in the climate-policy arena indeed assume that costs can be fully passed through, independent of whether these are accounting costs or opportunity costs. A few studies have ex-ante bottom-up analysed to what extent cost pass-through is likely. These studies show that there seems to be some room for cost pass-through but that this is below the 100%.

Five of the presented studies have provided evidence for cost pass-through from an ex-post perspective using econometric techniques. The studies show that a correlation analysis aiming at singling out the effect of CO₂ pricing on product prices still provides a major challenge. However, across all studies, it is evident that costs have been passed through in the majority of sectors, with the exact pass-through rates varying across studies.

The table below presents a weighted average of cost pass-through rates from ex-ante and ex-post literature. Based on the literature review, several factors can be considered to influence the extent of cost pass-through:

- Market Conditions, such as the amount of competition in the markets, trade intensities of the sectors that operate in these markets, price differentials in input-costs between EU and non-EU companies (e.g. energy costs) and/or price differentials in output prices.
- Demand elasticities refer to the degree to which supply or demand of a product responds to a change in price. If the demand elasticity of a product is zero (i.e. rigid demand) then additional CO₂ costs can be passed through with no risk of a firm losing market share.
- Exposure to international trade also influences the ability of a firm to pass-through additional CO₂ costs.
- Product characteristics, such as costs of shipment of these products (to analyse transport costs).
- Capacity utilization rates, e.g. expressed as utilisation rates (actual production over maximum production possible given technologies).

Table 33 Overview of the range of average cost pass-through in selected sectors from literature

Sector	Product	Minimum	Maximum	# of studies	Estimated in
Iron and steel sector	Flat products	60%	100%	3	McKinsey(2006); Vivid Economics (2014); CE Delft (2010)
	Long products	66%	80%	2	McKinsey(2006); Vivid Economics (2014)
Cement	Portland cement, white cement	35%	70%	4	McKinsey (2006); Vivid Economics (2014); Walker (2008); Alexeevi-Talebi (2010)
Glass	Container glass	20%	50%	2	Vivid Economics (2014); Oberndorfer (2010)
	Hollow and other glass	30%	80%	3	Vivid Economics (2014); Oberndorfer (2010); Alexeevi-Talebi (2010)
Refineries	Petrol	60%	120%	5	McKinsey(2006); Vivid Economics (2014); CE Delft (2010); Alexeevi-Talebi (2011); Oberndorfer (2010)
	Diesel	40%	70%	4	McKinsey (2006); Vivid Economics (2014); CE Delft (2010); Oberndorfer (2010)
Petrochemicals	Plastics, PE, PVC, PS	25%	80%	3	CE Delft (2010); Alexeevi-Talebi (2010), Oberndorfer (2010)
Fertilizers	Fertilizer and nitrogen compounds	0%	75%	2	Alexeevi-Talebi (2010), Oberndorfer (2010)

The values from this table must be interpreted with caution. They provide a range of average expected cost pass rates through based on a review of the literature. In this literature both ex-ante and ex-post estimates have been treated as a single observation from which an average has been calculated. No attempt has been made to correct for the number of regression estimates in the literature.

The literature also shows that actual cost pass-through rates – even within sectors - may greatly vary from product to product and country to country.

References

- Abrell, J. et al. (2011): Addressing the impact of the EU ETS using firm level data. Bruegel working paper. 2011/08
- Alexeeva-Talebi, V. (2011) 'Cost pass-through of the EU emissions allowances: Examining the European petroleum markets'. *Energy Economics*, Volume 33, Supplement 1, December 2011, Pages S75-S93.
- Alexeeva-Talebi, V. (2010): Cost Pass-Through in Strategic Oligopoly: Sectoral Evidence for the EU ETS. Discussion Paper No. 10-056. Centre for European Economic Research (ZEW), Mannheim, Germany ub-madoc.bib.unimannheim.de/3005/1/dp10056.pdf
- Anger, Niels; Oberndorfer, Ulrich (2008): Firm performance and employment in the EU emissions trading scheme: An empirical assessment for Germany. In *Energy Policy* 36 (1), pp. 12–22. DOI: 10.1016/j.enpol.2007.09.007.
- Armington, P.S. (1969): A theory of demand for products distinguished by place of production. *Staff Papers - International Monetary Fund*. Vol. 16, No. 1 (Mar., 1969), pp. 159-178. www.jstor.org/stable/3866403
- Reinaud, Julia (2008): Issues behind Competitiveness and Carbon Leakage - Focus on Heavy Industry, checked on 11/17/2014.
- Bassi, A. and Yudken, J. (2011) 'Climate policy and energy intensive manufacturing: A comprehensive analysis of the effectiveness of cost mitigation provisions in the American Energy Security Act of 2009'. *Energy Policy*, Volume 39, Issue 9, September 2011, Pages 4920-4931.
- Carbon Trust (2010): Tackling carbon leakage: Sector-specific solutions for a world of unequal carbon prices. http://www.centre-cired.fr/IMG/pdf/Carbon_Trust_Tackling_Carbon_Leakage.pdf
- Carbonnier (2005) 'Is Tax Shifting Asymmetric? Evidence from French VAT reforms, 1995-2000'. PSE Working Papers n2005-34. 2005.
- Carbonnier (2006) 'Who pays commodity taxes? Evidence from French reforms, 1987-1999'. PSE Working Papers n2006-13. 2006.
- CE Delft (2010a) 'Does the energy intensive industry obtain windfall profits through the EU ETS?'. Report
- CE Delft (2010b) 'Will the energy-intensive industry profit from EU ETS under phase 3?'. report
- Ceglowski (2010) 'Has pass-through to export prices risen? Evidence for Japan'. *Journal of the Japanese and International Economies*, Volume 24, Issue 1, March 2010, Pages 86-<http://www.sciencedirect.com/science/article/pii/S088915830900048398>
- Clausing (2013) 'Who Pays The Corporate Tax In A Global Economy?' *National Tax Journal*, National Tax Association, vol. 66(1), pages 151-84. March 2013.
- Commins N., S. Lyons, M. Schiffbauer, and N. C. Tol. Climate policy & corporate behavior. *The Energy Journal*, 32(4), 2011.
- de Bruyn, Sander; Markowska, Agnieszka; Jong, Femke de; Bles, Mart (2010): Does the energy intensive industry obtain windfall profits through the EU ETS? Delft, C. E., checked on 10/30/2014.

Dechezleprêtre, Antoine; Gennaioli, Caterina; Martin, Ralf; Muûls, Mirabelle (2014): Searching for carbon leaks in multinational companies. Grantham Research Institute, checked on 11/2/2014.

Delipala & O'Donnel (2001) ###

Demailly, D. and Quirion, P. (2006): CO2 abatement, competitiveness and leakage in the European cement industry under the EU ETS: grandfathering versus output-based allocation. Author manuscript, published in "Climate Policy 6, 1 (2006) 93-113" hal.archives-ouvertes.fr/docs/00/63/93/27/PDF/Demailly_quirion_Climate_Policy_2006.pdf

Demailly, D. and Quirion, P. (2008): European Emission Trading Scheme and competitiveness: A case study on the iron and steel industry. Energy Economics, Elsevier, vol. 30(4), pages 2009-2027, Issue (Month): 4 (July)

Fuest et al. (2012) 'Which Workers Bear the Burden of Corporate

Taxation and Which Firms Can Pass It On? Micro

Evidence from Germany.' Working Papers 1216, Oxford University Centre for Business Taxation.

Graichen, V. et al (2008): Impacts of EU ETS on industrial competitiveness in Germany. Research Report. UBA Climate Change: 10-08. www.umweltdaten.de/publikationen/fpdfl/3625.pdf

Kuik O. and Hofkes M. (2010): Border adjustment for European emission trading: Competitiveness and carbon leakage. Energy Policy, Elsevier, vol. 38(4), pages 1741-1748, Issue (Month): 4 (April)

Oberndorfer; Ulrich; Alexeeva-Talebi, Victoria; Löschel, Andreas (2010): Understanding the competitiveness implications of future phases of EU ETS on the industrial sectors. ZEW Discussion Paper No. 10-044.

Ponsard, J.P. and Walker, N. (2008): EU Emissions Trading and the cement sector: a spatial competition analysis, Climate Policy (2008) Volume: 8, Issue: 5, Publisher: Earthscan, Pages: 467-493

Mandal et al (2012) 'Is the oil price pass-through in India any different?' Journal of Policy Modelling, Volume 34, Issue 6, November-December 2012, Pages 832-848.

Mirza and Bergland (2012) 'Pass-through of wholesale price to the end user retail price in the Norwegian electricity market'. Energy economics, Volume 34, Issue 6, November 2012, Pages 2003-2012.

Morgenstern, R.D.; Aldy, J.E.; Herrnstadt, E.M.; Ho, M.; Pizer, W.A. (2007) Competitiveness Impacts on Carbon Dioxide Pricing Policies on Manufacturing; Resources for the Future: Washington, DC, USA.

Sijm, J. et al (2009): The impact of power market structure on the pass-through of CO2 emissions trading costs to electricity prices – A theoretical approach. Energy Economics, Elsevier, Vol. 34, Issue 4, July 2012, Pages 1143-1152 www.webmeets.com/files/papers/EAERE/2009/613/Sijm,%20Hobbs%20and%20Chen%20%282009%29%20EAERE%20paper%20.pdf

Summerton, P. et al. (2010): Assessment of the degree of carbon leakage in light of an international agreement on climate change. A report for the Department of Energy and Climate Change DECC
www.decc.gov.uk/assets/decc/what%20we%20do/global%20climate%20change%20and%20energy/tackling%20climate%20change/emissions%20trading/eu_ets/news/471-carbon-leakage-ce-report.pdf

Jouvet & Soulier (2013) 'An overview of CO2 cost pass-through to electricity prices in Europe', Energy Policy, Volume 61, October 2013, Pages 1370-1376

Varma, Adarsh; Milnes, Rob; Miller, Karen; Williams, Evan; Bruyn, Sander de; Brinke, Linda (2012): BIS cumulative impacts of energy and climate change policies on carbon leakage. Department for Business, Innovation and Skills, checked on 11/30/2014.

Vivid Economics, Ecofys (2014): Carbon Leakage Prospects Under Phase III EU ETS. Vivid Economics, Ecofys, checked on 10/29/2014.

Walker, N. (2008): An Empirical Approach to Quantify the Impact of EU Emissions Trading on Cement Industry Competitiveness. University College Dublin.
<http://www.ucd.ie/gpep/publications/archivedworkingpapers/2006/06-10.pdf>

Zachmann and von Hirschhausen (2008) 'First evidence of asymmetric cost pass-through of EU emission allowances: Examining wholesale electricity prices in Germany'. Economic letters, Volume 99, Issue 3, June 2008, Pages 465-469

10. DESCRIPTION OF FINANCIAL BARRIERS FOR ENERGY SECTOR: POWER GENERATION, ENERGY EFFICIENCY AND NETWORKS

Energy networks

Investments in energy networks are primarily made by regulated network companies: (i) Transmission System Operators (TSOs) invest in the high-voltage transmission network, or gas transmission network; and (ii) Distribution System Operators (DSOs) invest in the distribution network. Typically both invest under a so-called regulated asset base model, i.e. once an investment is approved by the regulator, network user charges should be set at a level that will cover depreciation and a return on the regulatory asset value.

Investments in energy networks face a mix of regulatory, technical and financial barriers. The technical barriers relate to companies not always having the capacity to prepare and structure high quality projects to the satisfaction of financial institutions. The financial barriers relate to the financial viability of the projects, which may be affected by the financial situation of some of these companies and the lack of co-financing means, particularly in lower income Member States.

In this context, it is useful to highlight barriers concerning rehabilitating district heating networks (and associated investments in CHP). Particularly in low-income Member States, these networks typically suffer from high heat losses but investments are nevertheless limited due to the difficult financial situation of the district heating companies (which is aggravated by falling demand as users may switch to other sources like individual boilers). However, beneficiaries struggle in some cases to scale the project to the financial capacity of the promoter, as well as prepare the project with sufficient quality to achieve financial close.

Concerning cross border connections, national TSOs are usually less disposed to invest given the additional difficulties in terms of coordination, justification, permitting and social acceptance, which translates into higher risk for an identical rate of return.

Energy efficiency

For energy efficiency, the barriers are predominantly financial and could be addressed with credit enhancement mechanisms (i.e. financial instruments) to facilitate the provision of finance to projects.

Energy efficiency improvements in particular in buildings do not generally entail technically complex investments, but the projects are highly fragmented across multiple and often small beneficiaries. The fragmentation problem can be mitigated through, for instance, national schemes to help municipalities and other responsible public sector entities to group/pool investments. However, public authorities particularly in lower income Member States may lack the capacity to set up such schemes by themselves. Technical assistance (i.e. grants) is therefore required to help across all stages of the project – from identification to monitoring of the impacts after completion.

The lack of incentives barrier is more complex. Even though there is a strong economic rationale for the investment – the financial pay-back period for this type of investments is often too long to make them attractive to apartment and house owners. Cash constraints and limited creditworthiness, in particular in lower income groups (and hence most relevant in low-income countries) can imply that loans cannot be provided on terms that are agreeable to both financial institutions and borrowers without some form of public intervention (i.e. financial instruments). In some cases even a preferential (subsidised) interest rate on a loan for comprehensive dwelling renovation may not be sufficient for the final beneficiaries and an investment grant may be required.

In the case of small-scale energy efficiency investments in SMEs, the same type of reasoning used for buildings applies: the projects may be highly desirable from the economic point of view but not necessarily so attractive from the purely financial point of view due to the long pay-back periods, or other investment priorities that do not take into account the full energy efficiency benefits.

Power Generation

Power generation investments – both in renewable and conventional technologies – are made by private companies acting within a liberalised European energy market, even if existing support systems have tended to shelter renewable power generation from market dynamics.

Investments in power generation tend to be medium to large scale infrastructure projects. Power generation projects can be delayed or deterred through: (i) financial constraints of large energy companies; (ii) regulatory uncertainty, currently impacting on new RES investment and, to some extent, to disinvestment decisions on conventionals ; (iii) permitting risk from public opposition which in particular tend to delay investment decisions; (iv) technology risks and associated costs; and (v) uncertainty of revenues due to the unpredictable load factors for conventional technologies.

Reduction in demand, coupled with lower wholesale prices, has hindered the ability of companies to recover capital costs, leading companies to mothball plant and write down losses. It remains to be seen how wholesale prices evolve over the medium term, together with policy development concerning capacity markets. However, in the short term, many corporates face balance sheet constraints which prevent undertaking new investment in power generation – renewable or conventional. Lower income Member States are in a particularly difficult situation as they have increasingly obsolete conventional generation fleets. The investment challenge is further aggravated for such Member States by the relative underdevelopment of their financial markets and hence possible scarcity of financiers.

RES projects, which tend to be more capital intensive than conventional technologies, are particularly exposed to regulatory risk regarding future revenue streams. Reduction of the incentives over the last few years (e.g. in terms of the level of the feed-in tariff) including in some Member States through retroactive changes (i.e. affecting projects already in operation) has undermined investors' confidence and impacted the cost of capital of projects.

Looking forward to the period 2021 to 2030, as technology costs fall, it is expected that support schemes will increase the degree of exposure of projects to wholesale reliance on support schemes largely outside of the electricity market will diminish. For continuous investment in RES an increase of the carbon price under the ETS will become more important. Projects are likely to be more exposed to wholesale prices, in many cases offset by long-term power purchase agreements. Securing such agreements may be a challenge for smaller independent power producers.

11. IMPACTS OF CREATING THE MODERNISATION FUND COMPARED TO THE BASELINE

The environmental, social and economic implications of the creation of the Modernisation Fund are driven by the European Council decision which determined the number of allowances allocated for the creation of the fund, the criteria based on which Member States are determined as eligible, the methodology for allocation among Member States and the type of project supported.

This section assesses the impacts of the creation of the Modernisation Fund compared to the baseline scenario.

Economic Impacts

Based on analysis for the 2030 climate and energy impact assessment, the average investment needs (excluding the transport sector) for the decade 2021-2030 for the 10 beneficiary Member States is € 28.6 billion per year. Approximately 15% of the total investment needs relate to power grids and networks, 26% of the investments are for power generation, including for renewable energy sources, while the remaining 59% are for energy efficiency improvements in buildings and in industry. Out of the total € 28.6 billion per year, approximately € 8.4 billion per year is additional due to the 2030 climate and energy framework while the remaining amount reflects the need to energy system modernisation to replace ageing infrastructure, even without ambitious climate and energy policies.

The Modernisation Fund is expected to have positive economic impact in the beneficiary Member States as it will facilitate investments in energy efficiency and modernisation of the energy systems. In order to optimise the use of the available financial support, the setting up of the Modernisation Fund needs to be accompanied by an enabling regulatory environment, well-functioning energy market and a strengthened carbon market, which would mobilize private investments.

The Modernisation Fund will be created with the proceeds of 2% of EU ETS allowances, or roughly 310 million allowances that will be available for the decade 2021-2030. The European Council concluded that the beneficiary Member States will receive a share of the allowances based on 50% 2013 GDP and 50% verified emissions. Table 34 compares allowances to be allocated to the Member States under the baseline scenario and the option of creating the Modernisation Fund. This clearly indicates that the beneficiary Member States receive from the remaining 18 EU Member States some 223 million allowances over 2021-2030, representing a 2.5 fold increase. On individual basis, the beneficiary Member States receive between 4 million and 98 million additional allowances for support their energy modernisation and improve energy efficiency, which represents between 135% and 690% increase compared to the baseline.

Table 34: Comparison under baseline and creation of the Modernisation Fund for allocation of 2% of total allowances, 2021-2030²⁵⁸

Member State	Mn allowances under baseline, 2021-2030	Mn allowances under MF creation, 2021-2030	Change in Mn between baseline and MF creation	% Change between baseline and MF creation
Bulgaria	7,7	18,1	10,4	135%
Czech Republic	14,2	48,3	34,1	240%
Estonia	2,4	8,6	6,2	258%
Croatia	1,5	9,7	8,2	547%
Latvia	0,6	4,5	3,9	650%
Lithuania	1,2	8,0	6,8	567%
Hungary	4,3	22,1	17,8	414%
Poland	37	134,6	97,6	264%
Romania	13,7	37,1	23,4	171%
Slovakia	4,6	19,0	14,4	313%
Total 10 beneficiary Member States	87,2	310,0	222,8	256%
Total 18 remaining Member states	222,8	0,0	-222,8	-100%

The quantitative estimate of the funds available based on an allocation per country indicates that 7 out of 10 beneficiary Member States would have a share of 7% or less of the total allocation available for the Modernisation Fund (See Table 35). This would translate to relatively small proceeds on an annual basis and the effective administration of the proceeds to make a tangible contribution to modernisation becomes critical.

Table 35: Modernisation Fund allocation shares per beneficiary Member States, 2021-2030

Member State	% of Total MF Allowances
Bulgaria	5,84%
Czech Republic	15,59%
Estonia	2,78%
Croatia	3,14%
Latvia	1,44%
Lithuania	2,57%
Hungary	7,12%
Poland	43,41%
Romania	11,98%
Slovakia	6,13%
Total 10 beneficiary Member States	100%

In addition to the number of allocated allowances, there are two aspects that affect the level of investments triggered through the Modernisation Fund: 1) the amount of proceeds raised through

²⁵⁸ Under the baseline scenario, the 2% of the total allowances (310 million allowances) are distributed according to the distribution methodology for allowances to be auctioned as indicated by the European Council, namely: 10% are redistributed from Member States with high per capita income to those with low per capita; the remaining 90% of the allowances are distributed on the basis of the Member State's share of verified emissions under the EU ETS. Under the MF creation scenario, the allowances from the Modernisation Fund are allocated among the beneficiary Member States based on 50% GDP (Eurostat, 2013 market prices) and 50% verified emissions.

the monetisation of the EU ETS allowances for the creation of the Modernisation Fund; and 2) the way the these proceeds are used, which will impact how much will be invested in projects.

The proceeds raised from the monetisation of the allowances are uncertain and will depend on the underlying carbon price at the time the allowances are monetized. Given the uncertainties involved, only a broad estimate can be given. Based on the current prevailing carbon price, this could result in proceeds of around € 2.1 billion. Most market analysts expect higher carbon prices in 2021 to 2030 so this amount could be higher (e.g. € 7.75 billion assuming average carbon price of € 25).

The estimated range for the proceeds covers less than 3% of the total investment needs in the beneficiary Member States for 2021-2030, thus there is no risk that it would crowd out other sources of funding. On the other side, the estimated range covers between 3% and 9% of the additional investments needed related to the 2030 climate and energy framework. With these proceeds, the Modernisation Fund is expected to mobilise additional private capital to realise larger number of investments. The eventual level of leveraged investments depends on the chosen governance structure, the type of eligible investments and the type of instrument used to fund these.

The Modernisation Fund would trigger important investments in the beneficiary Member States that would contribute towards the key aspects of creating a strong European Energy Union with a forward looking climate policy. It is expected to contribute not only towards cost-effectively reaching the 2030 climate and energy objectives, but also towards diversifying the energy mix, improving security of supply and lowering import dependency, key aspects identified in the European Energy Union strategy. This may be a particular important for the beneficiary Member States. Most of the beneficiary Member States have among the highest energy intensity, ranging between 1.5 to 4.3 times the EU average²⁵⁹. Accordingly, these beneficiary Member States generally have among the highest greenhouse gas intensity ranging between 1.4 and 4.4 the EU average²⁶⁰. Additionally, these Member States are more vulnerable to energy security of supply concerns since they are less integrated and connected and more exposed to a single supplier.²⁶¹

Beyond an effect on the energy sector in the lower income Member States, the Modernisation Fund and the investments it triggers will have an important indirect effect on the economies of the beneficiary Member States. It will help the citizens and businesses in the lower income Member States have access to competitive, secure and sustainable sources of energy is fundamental to economic growth and competitiveness.

Environmental Impacts

The Modernisation Fund is expected to have a positive environmental impact in the beneficiary Member States²⁶². Through facilitating investments in energy efficiency, the fund would contribute to lowering greenhouse gas emissions in the beneficiary Member States under the non-ETS sectors. The fund would also address modernising the power sector, which is covered by the EU ETS. Since the EU ETS cap sets a binding ceiling on the emissions within the sectors covered by the system, the Modernisation Fund would not impact in absolute terms the EU level greenhouse gas emission reduction, which would be achieved in any case. The creation of the Modernisation Fund has additional environmental and health benefits for the beneficiary Member

²⁵⁹ Based on 2013 Eurostat data on gross inland consumption of energy divided by GDP (kg of oil equivalent per 1000 EUR).

²⁶⁰ Based on 2012 EEA data.

²⁶¹ The European Energy Security Strategy communication identified the Baltic states and Eastern Europe as particularly vulnerable to security of supply issues. COM(2014) 330 final.

²⁶² The environmental benefits would depend on the types of projects selected in the fund. The overall impact of the fund should be in line with other EU policies such as air pollution.

States. Through lowering fossil fuel consumption, health conditions in the beneficiary Member States will be improved through lower emission of pollutants. Additionally, lower emission of air pollution also lowers the costs to control them.

The Impact Assessment of the 2030 climate and energy framework estimated the monetized health benefits from achieving the 2030 climate and energy objectives and the decrease in costs of air pollution control compared to the reference scenario of continuing with existing policies. The estimates (see Table 36 and Table 37) demonstrate that achieving the 2030 climate objectives has a larger positive benefit on health and reducing air pollution costs in the beneficiary Member States compared to EU average.

Table 36: Monetised health benefits in 2030 as a percentage of GDP

Health benefits in 2030 as % of GDP	2030 policy scenarios deviation from the Reference Scenario level, in percentage points	
	Range scenarios with -40% GHG reduction	
	Min.	Max.
EU28	0,03%	0,18%
Bulgaria	0,18%	0,86%
Czech Republic	0,06%	0,46%
Estonia	0,00%	0,25%
Croatia	0,04%	0,25%
Latvia	0,03%	0,36%
Lithuania	0,04%	0,34%
Hungary	0,08%	0,47%
Poland	0,15%	1,59%
Romania	0,15%	0,92%
Slovakia	0,05%	0,33%

Source: Mortality impacts based on IIASA (2013), Health benefit valuation uses valuation of mortality (value of life year lost) used for the Thematic Strategy on Air Pollution of €57700 (low estimate) and €133000 (High estimate).

Table 37: Reduced air pollution control costs by 2030 as a percentage of GDP

2030 reduced percentage points air pollution control costs as % of GDP	2030 policy scenarios deviation from the Reference Scenario level, in 2030 reduced air percentage points	
	Minimum for GHG -40% scenarios	Maximum for GHG- 40% scenarios
	EU28	0.01%
Bulgaria	0.08%	0.18%
Czech Republic	-0.01%	0.03%
Estonia	-0.01%	0.08%
Croatia	0.00%	0.03%
Latvia	0.01%	0.08%
Lithuania	0.01%	0.05%
Hungary	0.01%	0.03%
Poland	0.05%	0.07%
Romania	0.04%	0.07%
Slovakia	0.00%	0.02%

Therefore, through contributing towards realizing investments to facilitate the transition towards a low carbon economy for the beneficiary Member States, the Modernisation Fund can help

realizing cost effectively these important environmental benefits, resulting in significant savings of monetized health benefits and prevented air pollution costs.

Social Impacts

The Modernisation Fund is expected to have a positive impact on job creation in the beneficiary Member States.

The Impact Assessment of the 2030 climate and energy framework estimated the employment impacts of additional investments in the power sector and retrofitting energy efficiency in buildings, key sectors that would contribute towards lower greenhouse gas emissions.

The sectoral assessment evaluated how many jobs will be created in key sectors directly through the investments to achieve the 2030 climate and energy objectives²⁶³. Table 38 present the expected effect on employment at EU level. The largest increases in employment are related to investments realized for energy efficiency, representing a 49% increase compared to the reference scenario. The increase in jobs for renewable energy sources reflects the shift in investments to renewables from conventional energy sources, which see some decline in employment.

Table 38: EU28 jobs associated with investments in the power sector and energy efficiency, 2011-2030

Average annual employment 2011-2030 related to investments	Reference	GHG 40%	Change compared to Reference	
			GHG 40%	
	('000)	('000)	('000)	% change
Nuclear	46	47	1	2%
Wind	152	170	18	12%
Solar	69	72	3	4%
Coal	26	26	1	2%
Oil	2	2	-0	-13%
Gas	31	26	-5	-17%
Biomass	18	21	3	16%
Total Power Generation Investments	345	365	20	6%
Residential	295	408	113	38%
Tertiary	110	196	86	78%
Total Energy Efficiency Investments	405	604	199	49%
Total	750	968	219	29%

Since the Modernisation Fund would contribute to realizing investments to facilitate the energy sector modernisation and improve energy efficiency in the beneficiary Member States, it is expected to have a positive impact on employment for the beneficiary Member States. The final impact will depend on the amount of realized investments and at what specific sectors these are targeted at.

²⁶³ It does not include impact on operational expenditure in the power sector and the resulting job changes.

12. MORE COMPREHENSIVE OVERVIEW OF IMPACTS FOR DIFFERENT OPTIONS FOR CREATING THE MODERNISATION FUND

The table below gives a more detailed overview of the assessment of the relevant impacts for different options assessed for the creation of the Modernisation Fund, as described in Chapter 8.

Table 39: Overview of impacts for different options for creating the Modernisation Fund

	Instruments	EU-added value	Small-scale projects	Role of actors	Transparency	Market distortions	Administrative burden
Option 1	Both financial instruments and grants available but more likely use of grants Grants: Centralized organization of calls for proposals with EIB due diligence expertise and achieving scale Fragmented set up of financial instruments.	Support tailored to national priorities with risk of sub optimal diversification within beneficiary MS	Local banks with better knowledge of risk profile of small scale projects	Risk of misalignment with internal rules of EIB; strong alignment with national priorities	Risk of more limited transparency Fragmented national approach complicates investments by international investors	Beneficiary MS discretion in investments decisions has potential to distort the EU energy market	Higher burden to set up financial instruments, further increased due to fragmented national approach Lower administrative burden for national project promoters, in particular addressing small scale projects
Option 2	Increased use of financial instruments Grants: as option 1 Financial instruments: Enhanced EIB role, achieving scale and risk diversification	EU-value added projects more likely, while national priorities still considered	Work with intermediaries for small scale projects. Allows aggregating small scale projects to diversify risks across beneficiary MS	Balanced role for all actors ensures alignment of interest at EU and MS level	Better transparency through EU level monitoring mechanisms More clarity and visibility through standard approach on project selection for investors	Less distortive as specific investment decisions are delegated to the Commission and the EIB	Higher burden to set up financial instruments but standardized approach Small scale promoters work with local intermediaries, but setting up intermediary structures may increase burden at fund level
Option 3	Grants would limit leverage and private investments, with	Combination of COM with project pipeline approval by beneficiary	Targeted calls for proposals for small scale projects	Strong role for the Commission with beneficiary MS	High level of transparency in setting fund rules in	Grants have higher potential to distort competition but grant	More limited administrative burden related only to

	<p>only certain limited sectors covered</p> <p>Grants: as option 1</p> <p>Assumed no financial instruments</p>	<p>Member States ensures EU value added and addressing national priorities</p>		<p>involvement addresses national and EU level considerations</p>	<p>implementing legislation</p> <p>Clear investment criteria and simplified rules for investors</p>	<p>schemes are less distortive as decisions are delegated to the Commission</p>	<p>organizing calls for proposals and pre-approving a project pipeline</p> <p>Targeted calls for small scale projects</p>
--	--	--	--	---	---	---	---

13. TIMING AND APPROACH TO THE MONETISATION OF ALLOWANCES FOR THE INNOVATION FUND AND MODERNISATION FUND

The resources for the Innovation Fund will be 400 million allowances between 2021 and 2030 and the resources of the Modernisation Fund will be provided by 2% of the allowances over the same period (about 310 million allowances).

The following operational aspects can affect the outcomes of this monetisation:

- When the allowances are monetised: starting before or in 2021.
- How the volume of the monetisation is distributed: concentrated in a few years or evenly spread out (e.g. between 2021-2030)

The timing and the approach used to monetise the allowances can affect the level of funds raised as well as the potential impact on the carbon market. Furthermore, the timing of the monetisation can have consequences for when the Funds can become operational because sufficient certainty about the available funding may be needed in advance to be able to take firm decisions involving financial commitments.

Existing experience using the NER 300

To monetise the allowances providing the resources for the NER 300, the EIB sold 210,55 million allowances between December 2011 and September 2012 and the remaining 89.45 million allowances between November 2013 and April 2014²⁶⁴, through a mixture of "Over The Counter (OTC)" transactions, screen trades, and auctions. This mixture was inter alia used as no auction platforms were operational at the time the monetisation was initiated.

This early monetisation was deemed necessary to provide certainty about the available resources and to allow the necessary calls for proposals to take place before end 2015, as foreseen in Article 10a (8) the ETS Directive. The EIB carried out the monetisation and sale of these allowances. The cooperation agreement between the Commission and the EIB foresaw that the EIB "shall perform the monetisation of allowances with the objective of minimising any impact on the market for EU emission allowances". To this end, the agreement required the monetisation method to respect five principles²⁶⁵. Beyond this, while it is not possible to quantify the direct price impact of the monetisation of the 300 million allowances from the NER 300 during 2012 and 2013 the addition of these 300 million allowances contributed to additional supply on the market at a time of a growing imbalance between supply and demand.

²⁶⁴ EIB, NER 300 Monetisation Monthly reports, http://www.eib.org/attachments/ner_summary_report_en.pdf

²⁶⁵ Cooperation agreement on the implementation of Commission Decision C(2010) 7499 between the European Commission and the European Investment Bank (2010/C 358/01)

(a) Monetisation of at least 200 million allowances shall be concluded no later than 10 months after the allowances have been transferred to the EIB and made available for the settlement of transactions.

(b) Monetisation shall take place periodically at least every second week. Monetisation volumes should be spread as evenly as possible over the monetisation period. Volumes and timing of monetisation may be adjusted to minimise any impact on the secondary market;

(c) The EIB shall ensure that the monetisation prices do not deviate significantly from the relevant secondary market prices over the monetisation period;

(d) Reports setting out at least the overall volume and aggregated prices of the monetisation shall be published on the website of the EIB on a monthly basis, within two weeks of the end of each month over the monetisation period;

(e) Monetisation shall be effected in accordance with applicable laws in respect of money-laundering, terrorist financing and market abuse and accordingly counterparties acting on the EIB's behalf shall be required to demonstrate their compliance with such laws.

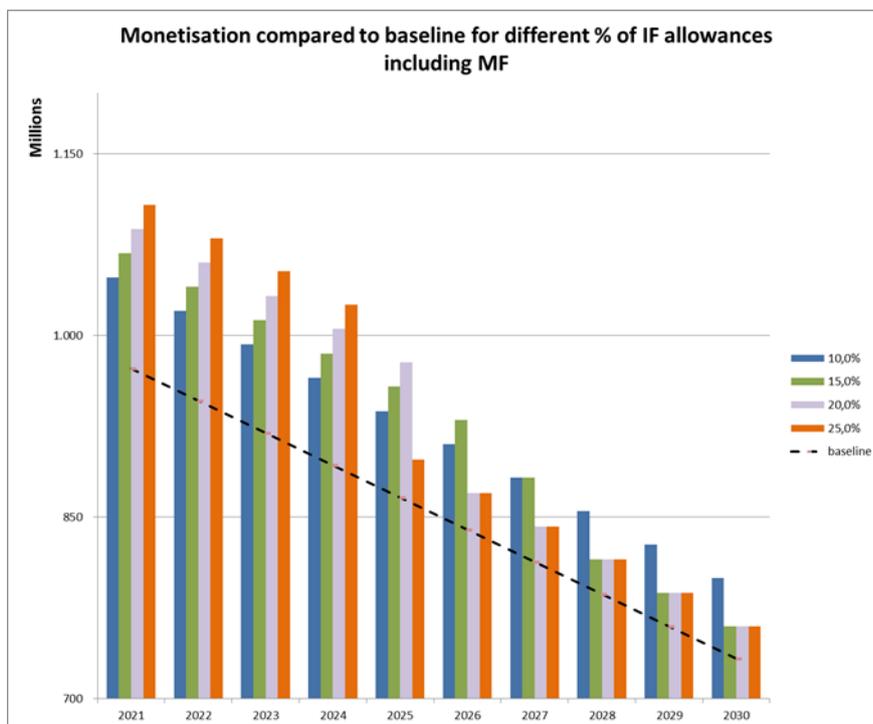
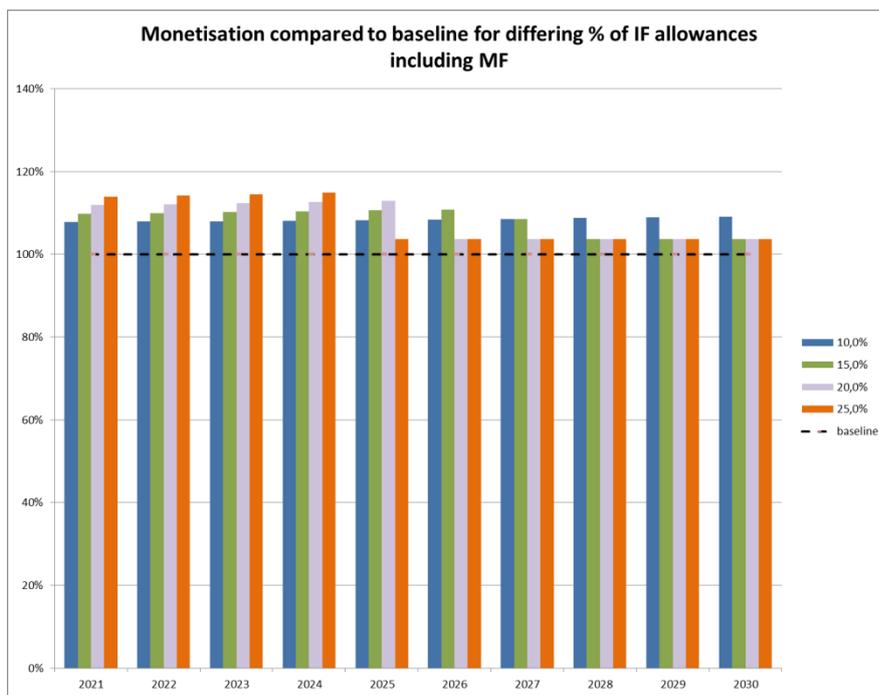
Issues to consider in relation to the timing of the monetisation

The following considerations are relevant to the timing:

- Monetising allowances via auctions can ensure a high level of transparency and predictability for market participants, based on the provisions in the ETS Directive and the Auctioning Regulation.
- Monetising allowances involves a price risk, because the carbon price varies over time. An even spread of the monetisation over a longer period of time can minimise this price risk compared to a tighter concentration during a shorter time period.
- For the Modernisation Fund, a timely start of the support to investments has been underlined by many of the Member States concerned, with a view to the high level of investment required in the energy sector and the contribution such modernisation can make to delivering the 2030 targets.
- Starting the operation for the Innovation Fund in 2021 would reduce the period during which no support is provided for low carbon innovation at a European level when compared to a later start. This would be in line with a more consistent provision of support for decarbonisation. At the same time, experience with the NER 300 mechanism shows that because of the time required to reach a final investment decision and for projects to become operational, it will take several years before the benefits from the Innovation Fund can be reaped.
- An even distribution of the volume of allowances being monetised would have a lower impact on the carbon price compared to an approach involving the monetisation of allowances at an early stage ("front-loading").

Based on these four considerations, the monetisation through auctioning of a steady amount between 2021 and 2030 would allow for a minimal price risk. The level of funds raised would then be expected to reflect the average secondary market price during these years.

The quantity of allowances to be monetised is shown compared to an estimate of the total quantity to be auctioned below, both in absolute numbers and as a percentage. (Please note that for ease of viewing, the vertical axis starts at 700m allowances in the graph showing absolute figures). The Modernisation Fund allowances are assumed here to be spread evenly over the years 2021-2030. The quantity of allowances to be monetised for the Innovation Fund is varied between 10% and 25% per year, resulting in the monetisation of 40-100 million additional allowances on a yearly basis. (Note that this estimate does not take into account the possible effects of the Market Stability Reserve, which if agreed could lead to reductions to the amount being auctioned in the years considered. As a result, the relative impact of monetisation for the Innovation Fund could be higher.)



Use of auctions for monetisation

With regard to the Modernisation Fund, the European Council Conclusions of October 2014 (2.7) state that the allowances should be auctioned according to the 'same principles and modalities as for other allowances'. These principles and modalities are set out in the provisions of the Auctioning Regulation. Consequently, making use of these as well for the Innovation Fund would allow for a consistent approach. The large volume of allowances that are auctioned through the Common Auction Platform allow for an even spread over the year (about 140 auctions per annum), thus reducing the (price) risk for each individual auction - for example, if the auction result is impacted by a low level of participation on a given auction day, or a price drop on that day - in particular in a situation of volatile market prices. Spreading the fixed costs over a higher

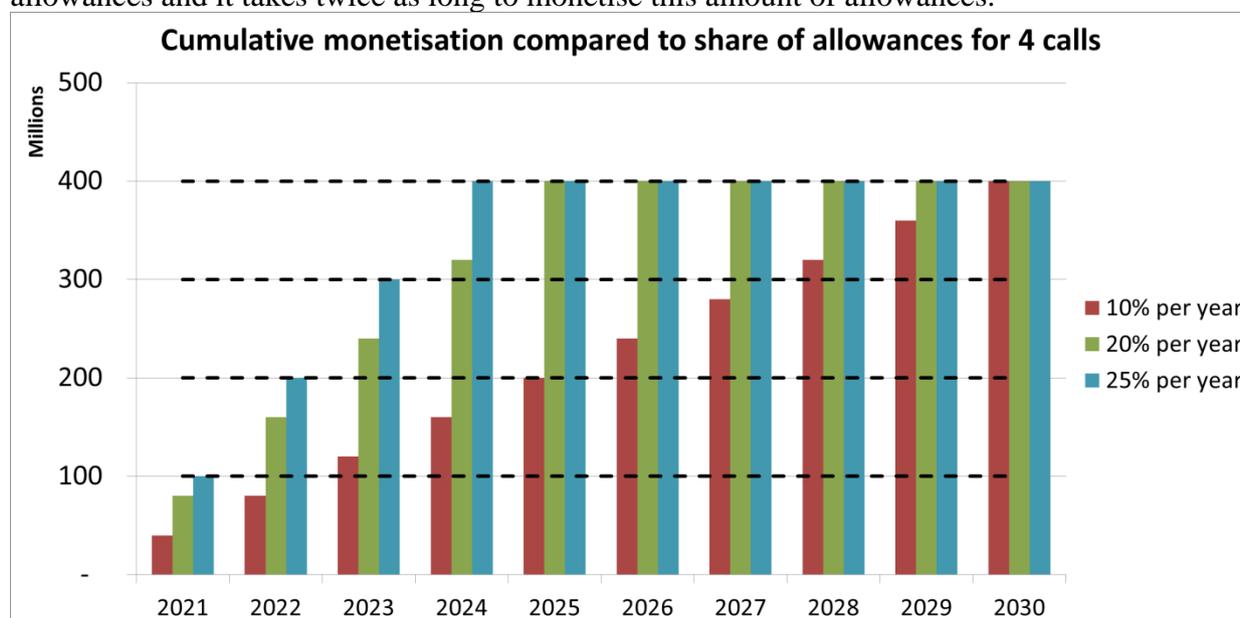
number of allowances also ensures that the administrative costs per allowance auctioned are minimised. Auctioning is therefore considered to be the most suitable approach for the monetisation of the allowances for both the Innovation Fund and the Modernisation Fund.

Level of monetisation in relation to financial commitments

To be able to make the financial commitments involved in awarding grants or providing other forms of financial support to companies, sufficient certainty is required concerning the level of available funding.

If full certainty in advance is required, the auctioning of a steady amount of allowances on an annual basis would allow for the practical organisation of a more limited number of 2-4 calls for proposals between 2021 and 2030 only after the monetisation of the same proportion of allowances has taken place. More calls would result in a lower amount of funds to be awarded per round; while a low number of calls in combination with a start of the Innovation Fund in 2021 would result in a higher proportion of the funds being awarded early in the period 2021-2030. Assuming that part of the work related to organising a call for proposals must be carried out independently of the number of proposals submitted, a higher number of calls is expected to result in a somewhat higher overall administrative burden. At the same time more calls give potential bidders for funds more flexibility to choose when to apply for funds.

If all calls involve an equal number of allowances, organising 2-4 calls would imply total funds corresponding to 25%-50% of the allowances. The proportion of allowances monetised per year will then determine the time needed to monetise a corresponding share of the allowances. In other words, a higher number of calls for proposals would then reduce the percentage of allowances that needs to be monetised at an early stage. This is illustrated below. If 4 calls would be organised, each call would involve 100 million allowances. If monetisation would be spread evenly over 2021-2030, 10% of the allowances would be monetised each year and it would take 3 years to monetise a corresponding share of the allowances. If 25% are monetised every year, the same level is reached in one year. If by contrast 2 calls are organised, each call will involve 200 million allowances and it takes twice as long to monetise this amount of allowances.



Degree of uncertainty in relation to the type of support provided

If support is provided via a financial instrument, such as a loan, equity or guarantee, the monetisation of the allowances for the Innovation Fund would not be tied to a fixed number of calls for proposals, but would rather take place in proportion to the commitment of funds. Such a "first come, first served" basis for the operation of the Innovation Fund could in theory provide for

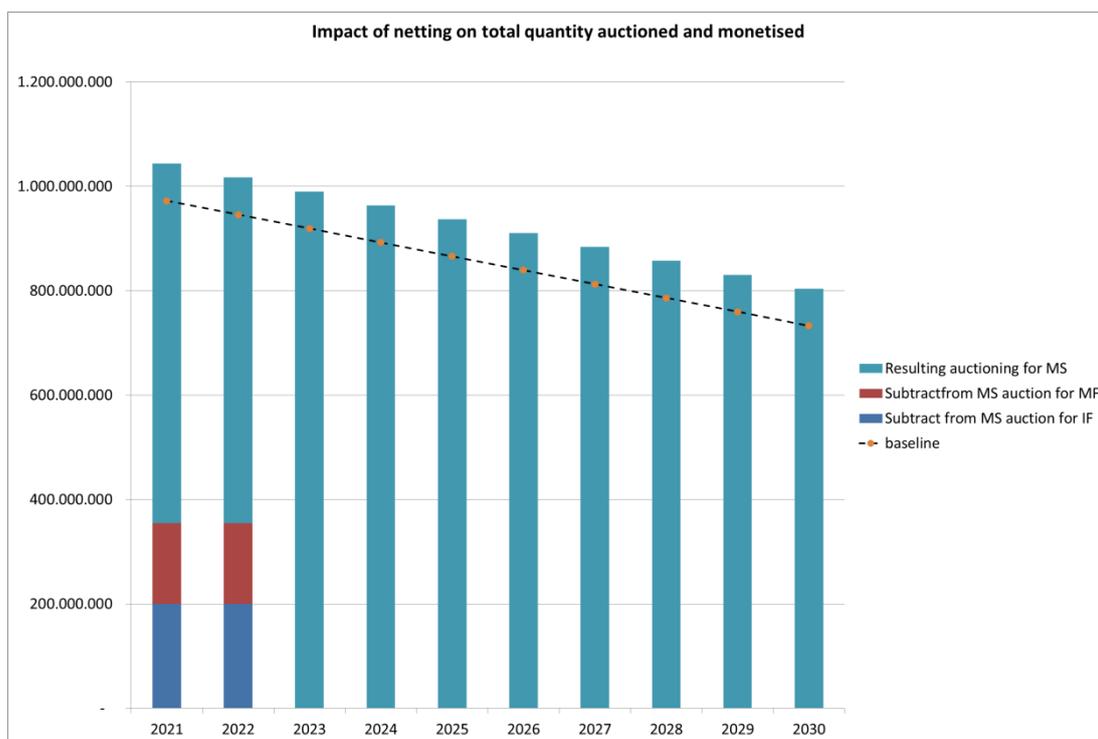
a higher flexibility regarding the timing of the monetisation process, allowing it to be carried out as the application pipeline develops. While this would reduce the need to monetise allowances long before the funds are disbursed, a disadvantage would be that it could lead to lower predictability with regard to the timing and volume of allowances being monetised, resulting in uncertainty for the market. If there is a high take up of the support offered, a correspondingly high number of allowances may still need to be monetised early on. For the Modernisation Fund, depending on whether this is operationalised using financial instruments or grants, similar considerations apply as for the Innovation Fund, although the total number of allowances is about 90m lower.

Solutions for an early start of the Innovation Fund

Given the time limits that apply to the NER 300 mechanism, a start of the Innovation Fund in 2021 would minimize the time period between the two support mechanisms for low carbon innovation. To allow for this, two possible solutions could be considered:

1. Monetisation from 2021 onwards, with a high % of allowances monetised per year and netting to prevent a rise in the total auctioning quantity
2. Initiate first call ahead of monetisation

Monetisation from 2021 onwards, but with a relatively high % of allowances monetised per year could also allow for a start in 2021. However, this would introduce the risk of a higher potential market impact because of the "front loading" of the allowances when compared to an even spread of the monetisation over 2021-2030. An approach to mitigate this impact would be to introduce a link to the number of allowances to be auctioned on behalf of Member States, ensuring the total quantity being auctioned in any year remains stable. This "netting" of the number of allowances would ensure that the number of allowances in circulation would not temporarily increase as a result of front loading. However, the potential price risk relating to the level of funds raised would still remain higher compared to an even distribution of the monetisation of the allowances over 2021-2030. This is shown below in a stylised example, taking into account the Modernisation fund. (Note that this estimate does not take into account the possible effects of the Market Stability Reserve, which if agreed could lead to reductions to the amount being auctioned in the years considered. As a result, the relative impact of monetisation for the Innovation Fund could be higher.)



As explained above, with a view to guarantee that sufficient funds will be available to honour the financial commitments, the financial value of the monetised allowances should be known before these resources are committed to individual projects. However, it could nevertheless be envisaged to start the first call before the monetisation of allowances. This first call could be undertaken with a pre-defined financial commitment at or below expected market value of allowances. In particular if the first call is based on a small share of total allowances (e.g. 100 million or less) the risk of not being able to honour the financial commitments for the first call will be very small, if not zero: in case that the auctioning of the first 100 million allowances achieves lower than expected revenues it would still be possible to draw on the auctioning revenues of the remaining 300 million allowances. In the worst case, the volume of the last call would be reduced by the amount of allowances that were necessary to finance the shortfall of the first call.

Finally, it could be considered to increase the volume of the calls over time (e.g. a distribution of 75, 85, 100, 140 million over the period from 2021 to 2030). This "staggered approach" could also reduce the price impact of a concentrated monetisation (in view of expected reduction of the surplus over time as the MSR becomes fully operational).

For the Modernisation Fund, similar dynamics apply with regard to the need to balance a timely start with minimal impact on the carbon market and a low price risk, although the quantity of allowances is smaller.

Potential interactions between monetisation and the Market Stability Reserve

If the Market Stability Reserve (MSR) is operational during the period in which the allowances for the Innovation and Modernisation Fund are monetised, it can reduce the effect of any potential front loading. However, this effect will only partially compensate for the extra volume, as the MSR reduces the number of allowances to auction by 12% of the total number of allowances in circulation, and this reduction applies to the quantity to be auctioned with a time lag. As a result, if the monetisation is considered to represent an extra volume of allowances being added to the total number of allowances in circulation, the additional reduction as a result of the MSR will be limited and it will not happen directly. The year in which the MSR comes into effect will also influence the extent to which it interacts with the monetisation of the allowances.

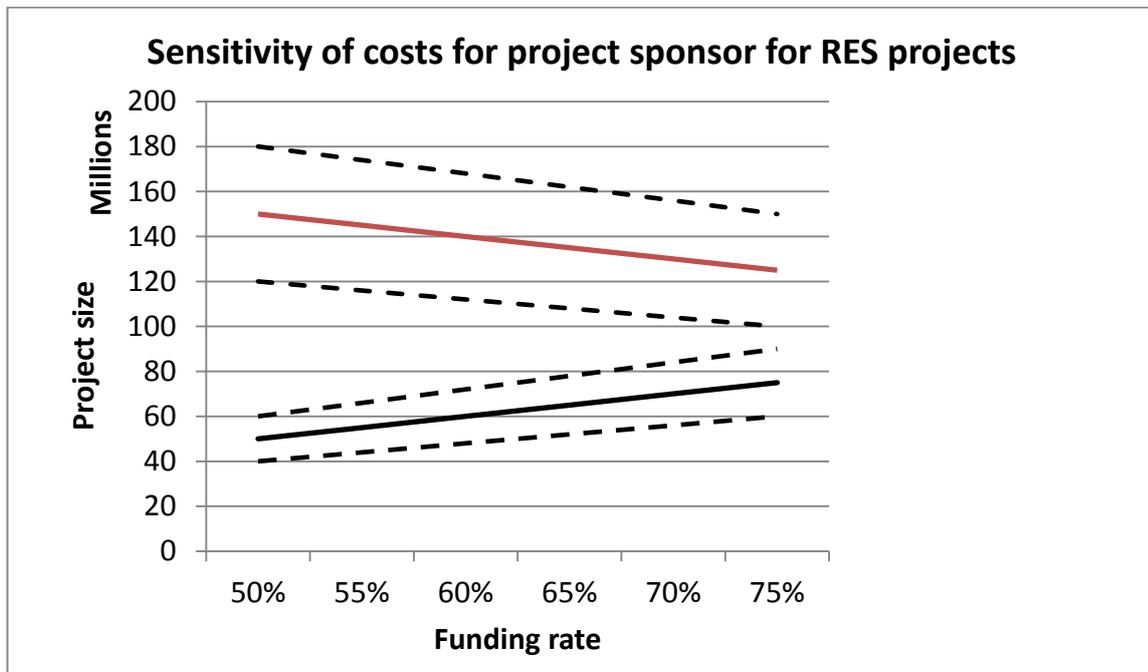
Aspects which are not varied: form of support provided: monetisation versus allowances

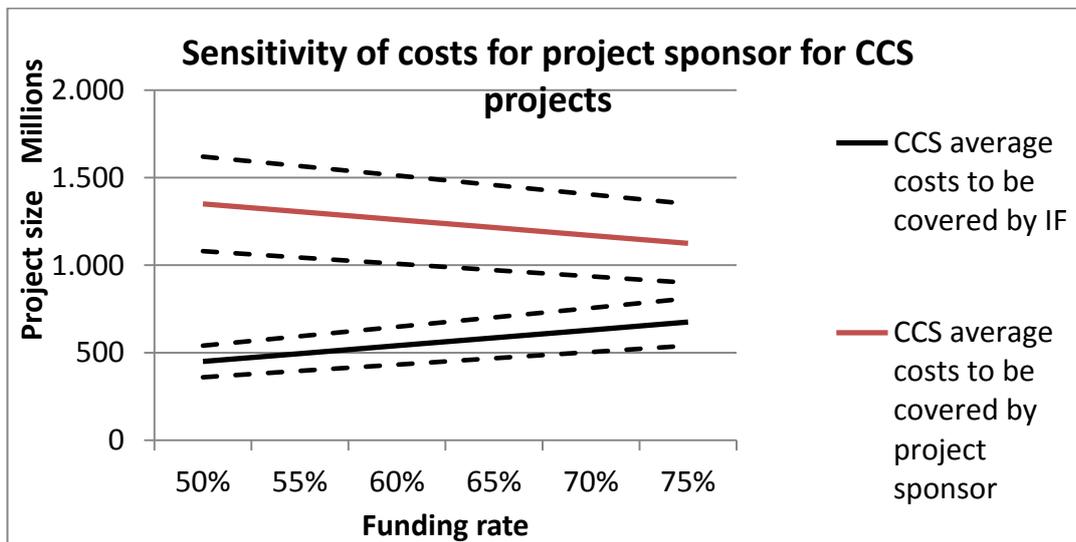
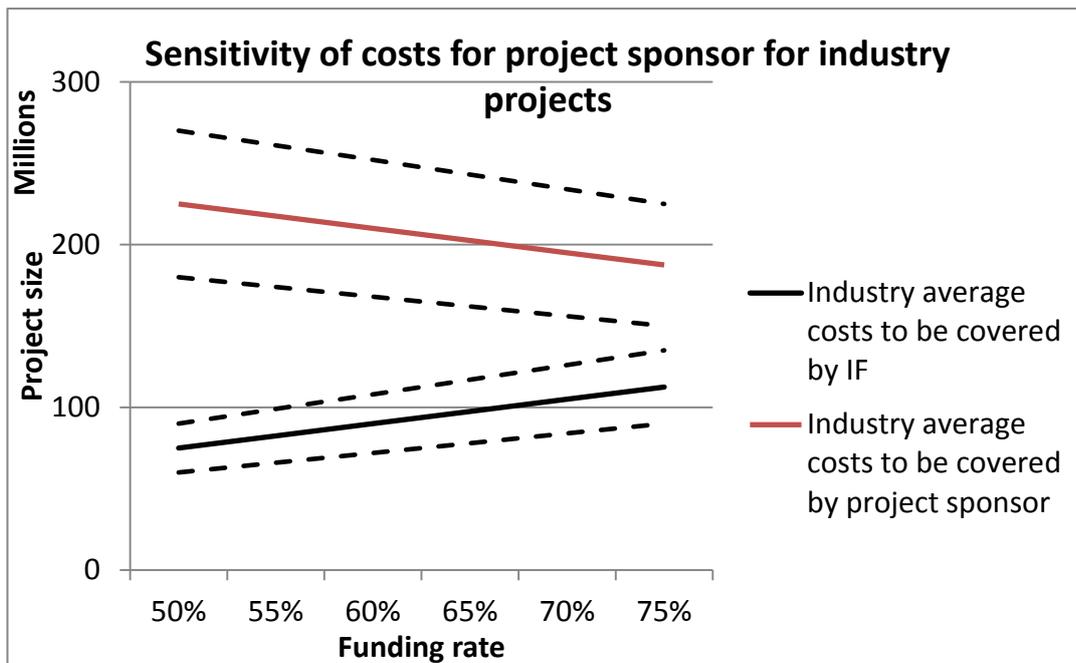
One possible alternative to monetisation applicable only to the Innovation Fund would be to provide the support in the form of free allowances rather than money. While this would avoid the need to monetise the allowances to have advance certainty with regard to the available funds, this would result in a number of important disadvantages. It would involve a transfer of an additional form of (price risk) in relation to the value of the allowances to the project sponsor, which would be counterproductive given that the Innovation Fund aims to address financial barriers related to a high level risk for low carbon investments. Furthermore, such an approach may have the unintended effect of favouring larger existing companies over small or new companies, as these are generally better able to manage price risks given their better understanding of the carbon market. Finally, risk managers in companies who need to account for the uncertain future value of such allowances may be expected to apply discounts, limiting the expected investment which can be triggered by using a given number of allowances when compared to providing direct funding. Given the risk nature of innovative low-carbon investments and the degree of risk aversion such discounts can be quite considerable and the higher the discount the lower the amount of innovation triggered by the available 300 million allowances. Such an approach is therefore not further developed in this Impact Assessment.

14. SENSITIVITY ANALYSIS FOR POSSIBLE FUNDING RATES FOR THE INNOVATION FUND

As is described in the chapter on low carbon funding mechanisms (section 8.1.3.4), changing the existing funding rate of 50% of the additional costs applied in the NER 300 could be considered for the Innovation Fund. However, as the existing information of the application of the NER300 programme is limited to only a few years of implementation and in scope when compared to the proposed Innovation Fund, it is not possible to simulate the effect of higher funding rates based on current experience with the NER 300. The specific needs should therefore be assessed separately for RES, CCS and industry through more extensive market testing in the context of preparing the implementing legislation for the Innovation Fund. Comparing a range of options which include varying the current maximum rate of 50% to an increased maximum rate 75% can give a first indication of the potential range of effects.

To give a first assessment of what outcomes this could produce in minimal funding requirements for the project sponsors technology categories that could be supported by the Innovation Fund, the resulting costs to be borne by the project sponsor are shown for a range of funding rates in the graphs below. The graphs show that with an increasing funding rate, the relative and absolute size of the funds that have to be provided by the project sponsor is reduced.





The tables below show the underlying costs. Estimates were based²⁶⁶ on NER 300 project costs for renewables and CCS, while for industry a stylised example is given assuming a total cost of €200 mln. To give an upper or lower range, the estimated amount was varied by +/- 20%.

In practice, the experience is that the NER 300 average covers more than 30 projects, including many projects that are much smaller in scale and have also been awarded funding under NER 300. Such smaller projects can also be facilitated under the Innovation Fund, for example by wider use of the existing derogations for capacity thresholds for small scale projects.

²⁶⁶ For renewables, the total relevant project costs were estimated using the average costs awarded under the existing NER 300 mechanism, varied by +/- 20% to give a lower and upper bound. Total costs are assumed to be twice the additional costs. This should thus be considered a conservative estimate of the costs that may need to be raised by project sponsors.

Table 40: Sensitivity of amount to raise by RES, CCS or industry project sponsor to funding rates and project size

	Amount to raise by sponsor (million Euro)		
maximum rate of funding	Lower bound RES (-20%)	Average RES	Upper bound RES (+20%)
50%	120	150	180
55%	116	145	174
60%	112	140	168
65%	108	135	162
70%	104	130	156
75%	100	125	150

	Amount to raise by sponsor (million Euro)		
maximum rate of funding	Lower bound Industry (-20%)	Average industry	Upper bound industry (+20%)
50%	180	225	270
55%	174	218	261
60%	168	210	252
65%	162	203	243
70%	156	195	234
75%	150	188	225

Finally, a rough estimate of the 15% "funding cap" limit can be estimated for a range of possible carbon prices.

Table 41: Sensitivity of 15% to price of carbon

Price of carbon (EUR / allowance)	10	15	20	25
Total available IF funding (400+50m allowances)	4.500	6.750	9.000	11.250
15% of total (million EUR)	675	1.013	1.350	1.688

15. OPTIONS FOR UNALLOCATED ALLOWANCES

In the agreement on the Market Stability Reserve (MSR) co-legislators decided that unallocated allowances should be transferred into the MSR in 2020. The Commission undertook to review options for the further use of unallocated allowances from phase 3. This concerns allowances that could have been allocated for free in phase 3, but have in practice remained unused. Market analysts²⁶⁷ estimate that around 550 to 700 million allowances could remain unallocated by 2020.

There are three main sources of unallocated allowances:

- Allowances that remain unallocated because of the closure or partial cessation of installations: In 2013, some 35 million allowances remained unallocated due to partial cessations and significant capacity reductions²⁶⁸.
- 5% of the overall amount of allowances in phase 3 was set aside for new entrants (i.e. new installations or new capacities in existing installations) and, based on the experience to date it seems a significant share of this will not be used by new entrants. As of January 2015, some 70 million allowances have been used²⁶⁹ from the roughly 480 million allowances available for new entrants.
- A third category of de facto "unallocated" allowances stems from the application of a carbon leakage factor for sectors not on the carbon leakage list²⁷⁰, which the legislator has not directed to the MSR. Based on the current composition of the carbon leakage list some 145 million allowances would accumulate under this header by 2020.

Options for further use of these unallocated allowances are analysed below:

Policy options

Baseline: Unallocated allowances remain in the Market Stability Reserve and are subject to general MSR release rules.

Option 1: use for new entrants in phase 4. Unallocated allowances are used to set up a New Entrants Reserve – which is currently not foreseen by the EU ETS Directive – to provide free allowances for new investments and production increases in phase 4. Allowances from partial cessations and closures in phase 4 feed back into the reserve to improve its flexibility (see section 7.3.3.)

Option 2: supplement existing resources to support low carbon innovation. Unallocated allowances are used to supplement existing resources to support innovative low-carbon projects, including industrial innovation projects.

Following the call of the co-legislators²⁷¹, 50 million allowances could be added to the 400 million allowances already foreseen for the Innovation Fund. These resources could be

²⁶⁷ Bloomberg New Energy Finance, Thomson Reuters, ICIS

²⁶⁸ http://ec.europa.eu/clima/policies/ets/cap/allocation/docs/status_table_ner_cessation_2013_en.pdf

²⁶⁹ Including allowances to be handed out up to 2020 to new entrants based on the decisions made until January 2015. For further details please see: http://ec.europa.eu/clima/policies/ets/cap/allocation/docs/status_table_ner_en.pdf

²⁷⁰ Sectors not on the carbon leakage list received 80% of their allowances for free in 2013, a proportion that decreases in linear fashion each year to 30% in 2020.

²⁷¹ Co-legislators requested the Commission to consider the possibility to use up to 50 million unallocated allowances for such purposes with projects in all Member States including small-scale projects (see recital 3b of the Market Stability Reserve draft decision

http://www.europarl.europa.eu/meetdocs/2014_2019/documents/envi/dv/ets_msr_annex_/ets_msr_annex_en.pdf).

supplemented by funds left over from the NER 300 programme, i.e. funds from asset management and any funding becoming available from cancelled projects²⁷².

A first call for proposals under the Innovation Fund could be organised with the remaining funds from the NER300 programme as well as the proceeds from the monetisation of the 50 million allowances, once the legislative framework and the management structures for the Innovation Fund are in place but still before 2021.

Option 3: use for indirect cost compensation in phase 4. Unallocated allowances are used to compensate indirect carbon costs (via increased electricity prices) of energy intensive industry.

3a: recycling industries are eligible for compensation in order to promote the circular economy.

3b: sectors exposed to the risk of carbon leakage due to indirect carbon costs are eligible for compensation.

Option 4: cancel unallocated allowances. Unallocated allowances are cancelled.

The outlined options are not mutually exclusive as it is possible to split the available amount of unallocated allowances between the different options and it is also possible to keep the baseline for part of the unallocated allowances.

Comparison between the options

Based on the agreement by co-legislators, unallocated allowances will be placed in the MSR in 2020, preventing an auction supply peak at the end of phase 3.

Several stakeholder groups have suggested differing possibilities to use the unallocated allowances. Some call for using the unallocated allowances to further reinforce measures against the risk of carbon leakage, while others would favour strengthening the environmental ambition either directly through the cancellation of these allowances or indirectly by using these resources to co-finance innovative projects.

The main dimensions for assessing the options are: avoiding negative impacts on the functioning of the market stability reserve, environmental impacts, further protection against the risk of carbon leakage (no undue costs for most efficient installations) and administrative complexity.

Table 42: Comparison of options for further action with unallocated allowances

	Impact on MSR functioning	Environmental impact	No undue costs for most efficient installations	No increased administrative complexity
Baseline	0	0	0	0
Option 1.	-	0	+	0
Option 2.	--	+	0	0
Option 3a	-	+	0/+	--
Option 3b	-	0	0/+	--
Option 4.	+	++	0	0

Option 1 has a low impact on the functioning of the MSR, as unallocated allowances would gradually be put in circulation in phase 4, i.e. throughout a period of ten years under this option

²⁷² The amount of funds returned from cancelled projects would be known in July 2018 when the deadline for making the final investment decision for the NER 300 projects will have expired.

(in line with the additional needs for free allocation due to industrial growth). It can increase the protection against the risk of carbon leakage, as fewer phase 4 allowances would need to be reserved for new entrants, thus lowering the magnitude or contributing to avoid the need for applying a correction factor to free allocation beyond 2020. The option has no further differences compared to the Baseline (the additional administrative complexity is deemed insignificant).

Option 2 is light in terms of administrative burden because the unallocated allowances would just be transferred into the Innovation Fund and no additional administrative procedures would be necessary. An early call in this decade would limit the gap between the current NER300 programme and the start of the Innovation Fund²⁷³. All Member States would be in an equal position to apply for funding.

A balanced approach is however needed with regard to the time of monetising the allowances in such a way as to provide certainty of available funds, while also minimising the negative impact on the functioning of the MSR.

Option 3 is similar to option 1 in terms of having only a low impact on the functioning of the MSR compared to the baseline, as unallocated allowances would gradually be put in circulation in phase 4 in this option, as well. The promotion of recycling is in line with the circular economy objectives and is considered to be more environmentally beneficial compared to the same level of compensation to all electro-intensive industries, so option 3a receives a better score than option 3b²⁷⁴. The cost impact on installations depends on whether or not Member States already use State aid to compensate indirect carbon costs. In case that Member States already provide State aid, there may only be a substitution effect and the total amount of compensation remains unchanged for the companies. If the additional amount is used to top up existing measures there will be a positive effect on cost compensation.

However, a compensation of indirect costs out of unallocated allowances, which is provided in addition to the existing State aid programmes, leads to the biggest administrative complexity (due to reasons detailed in Annex 5) and risks creating double regulation.

Option 4 positively impacts the functioning of the MSR, as under this option unallocated allowances are cancelled permanently and thus their coming to the market is avoided. This option somewhat increases the environmental benefits delivered by the EU ETS.

²⁷³ This was highlighted by stakeholders as an issue to be addressed in the context of setting up of the Innovation Fund.

²⁷⁴ Providing increased compensation to recycling could also lead to more reductions of unintended market distortions, as providing a higher level compensation for indirect costs assumed by recycling industries reduces the disadvantage they encounter in some sectors (e.g. steel) vis-à-vis primary producers, which are entitled to a very high level of compensation for their direct carbon costs.