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Extend the EU ETS!

Effective and Efficient GHG Emissions Reduction in the Road Transport Sector

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- The more commercial sectors covered by the EU Emissions Trading System (EU-ETS) the greater the increase in efficiency. An expansion of the EU-ETS is therefore appropriate.
- With its large number of small emitters, road transport is one of the commercial sectors outside the EU ETS which produce the highest levels of CO_2. In view of the low administration costs, upstream emissions trading is the best approach for its incorporation into the EU ETS.
- By contrast with CO_2 limits on vehicles, upstream emissions trading will ensure that the CO_2 reduction target is achieved. In addition, it also includes used cars and heavy-duty vehicles and thus brings the abatement costs in all ETS sectors into line.

CONTENT

1 Background

Europe´s vision for the future is to become a low-carbon, almost carbon-free, economy. The EU has undertaken to reduce its greenhouse gas emissions ("GHG emissions") by 20% of 1990 levels by 2020.[1] Projections show that the EU is on track to meet its GHG reduction target in 2020.[2] In January 2014, the European Commission proposed that by 2030 GHG emissions should be reduced by 40% of 1990 levels.[3] Following a discussion of this target by the Member States , the European Council agreed on the new 2030 climate and energy policy framework in October 2014 confirming the GHG emission reduction target of 40% by 2030.[4]

The main economic problem of climate protection is that neither companies nor consumers have any incentive to reduce their GHG emissions. GHG emissions are a typical example of negative external effects. GHG emissions contribute to climate change, which leads to costs resulting not only from adaptation to changing climatic conditions, but also from changes in the landscape, extreme weather events etc. These costs are not sufficiently taken into account by economic agents when making decisions so the (social) costs arising from excessive GHG production exceed the benefit generated. As a result, market results are (systematically) inefficient thus market intervention, such as GHG emissions reduction measures, may be justified in principle.

To achieve the GHG emission target by 2020, the EU opted for the European Emissions Trading System (EU ETS). Based on the ETS-Directive 2003/87/EC, the EU was a forerunner in implementing and operating a multi-jurisdictional emissions trading system in 2005.[5] The EU ETS covers certain emission-intensive industrial installations and as of 2013 the aviation sector. These sectors are responsible for almost half of all GHG emissions in the EU.[6] As the European Council pointed out, the EU ETS will remain the main European instrument for achieving the 2030 climate target.[7] To reduce the remaining GHG emissions of the sectors not covered by the EU ETS, the EU adopted the Effort Sharing Decision No. 406/2009/EC. Its key element is the determination of individual reduction contributions ("effort sharing") in the form of binding national emission targets for each Member State. Furthermore, the EU adopted a couple of other measures to reduce GHG emissions from sectors not covered by the EU ETS, such as CO_2 targets for manufacturers´ fleets of new cars.

In October 2014, however, the European Council "recalled" that even "under existing legislation"[8] Members States can unilaterally "opt to include the transport sector within the framework of the ETS".[9] This statement of the heads of state or government of the Member States is remarkable, given that it is precisely the road transport sector that causes the most GHG emissions of those sectors not included in the EU ETS. In February 2015, the European Commission, however, argued

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1 Art. 28 Directive 2009/29/EC of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community.
2 European Commission, Impact Assessment SWD(2014) 15 of 22 January 2014, p. 15 et seq.
3 European Commission, Communication COM(2014) 15 of 22 January 2014 "A policy framework for climate and energy in the period from 2020 to 2030", p. 5. See cepPolicyBrief No. 2014-19 "Climate and Energy Policy Targets for 2030".
4 European Council, conclusions of 24 October 2014, doc. EUCO 169/14, recital 2.
5 Böhringer, C. / Dijkstra, B. / Rosendahl, K.-E. (2011): Sectoral and Regional Expansion of Emissions Trading, in Wirtschaftswissenschaftliche Diskussionspapiere, V-337-11, Universität Oldenburg, p. 2.
6 European Environment Agency (2014): Annual European Union greenhouse gas inventory 1990–2012 and inventory report 2014, www.eea.europa.eu//publications/european-union-greenhouse-gas-inventory-2014 (accessed 2 March 2015).
7 European Council, conclusions of 24 October 2014, doc. EUCO 169/14, recital 2.3.
8 Art. 24 Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.
9 European Council, conclusions of 24 October 2014, doc. EUCO 169/14, recital 2.13 referring to Art. 24 ETS-Directive 2003/87/EC.

for tightening the CO_2 targets for passenger cars and vans post-2020 as well as for introducing measures to reduce CO_2 emissions from heavy duty vehicles and buses.[10]

Given the ongoing discussion about current and future instruments for the reduction of CO_2 emissions at EU-level, this paper explores whether the scope of the EU ETS should be extended to more sectors, thereby focusing on the potential for including the road transport sector in the EU ETS. In this respect, the "upstream emissions trading system" plays an essential role, as it seems to be the only practically applicable approach for the main sectors not covered by the EU ETS. The paper is structured as follows: Section 2 outlines the basic features of the EU ETS and how it works. In Section 3, we discuss the expansion of the EU ETS to other sectors. Section 4 sets out the concept of the upstream emissions trading system. Section 5 provides an overview of current CO_2 reduction measures in the road transport sector. In Section 6, we discuss and weigh up the pros and cons of both upstream emissions trading and current road transport measures on the basis of which we then submit recommendations in Section 7.

2 The European Emissions Trading System

2.1 Scope

Within the EU ETS, certain emission-intensive industrial installations and aviation are obliged to acquire emission allowances in order to emit GHGs. The industrial sectors covered comprise installations for supplying electricity and heat, mineral processing, metal production and processing, paper manufacture, chemicals and installations for carbon capture and storage (CCS). Since 2013, aviation involving all flights between two EU-airports has also been included in the EU ETS. Emissions of carbon dioxide (CO_2), nitrous oxide (N_2O) and perfluorocarbons (PFCs) are subject to approval. Since 2008, Member States have been allowed to include additional sectors in the EU ETS following approval by the European Commission. Member States may exclude installations from the EU ETS which annually emit less than 25,000 tons of CO_2.[11]

2.2 Functioning

Within the EU ETS, the emission of GHGs is only permitted if the operator of a covered installation or an aircraft holds the number of allowances corresponding to its planned GHG emissions. An allowance gives its owner the right to emit one ton of CO_2 or other GHG with an equivalent global warming potential ("CO_2 equivalent"). After the GHG has been emitted, the allowances must be returned ("surrendered") and subsequently cancelled. By the end of April of each year, operators of installations and aircrafts have to hand in the number of allowances necessary to cover their GHG emissions for the previous year. Otherwise, Member States must penalise operators by imposing an "excess emission penalty" of 100 Euro for each unauthorized ton of GHG emitted.[12]

The EU ETS is characterised by its "cap and trade" approach: allowances are tradable and can be transferred to any person within the EU. Consequently, companies capable of reducing their GHG emissions cost-efficiently can profitably sell unused allowances on the carbon market. For companies in need of additional allowances to cover their GHG emissions, it is economically appropriate to purchase these allowances if the respective price is lower than the cost of emission reducing measures. This ensures that, within the EU ETS, GHG emissions are reduced where

[10] European Commission, Communication COM(2015) 80 of 25 February 2015, p. 13.
[11] Art. 2, 3a-3g, 4 and 24 Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.
[12] Art. 4, 6, 12 and 16 Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.

abatement can be achieved at the lowest cost. However, the EU ETS mechanism only works on the condition that the total amount of available allowances is limited by a "cap". The scarcity of allowances induces companies either to reduce their GHG emissions or to buy additional allowances. By restricting the maximum number of available allowances, the total amount of permitted GHG emissions can be precisely limited. In addition, a gradual reduction of GHG emissions can be brought about by reducing the cap. Ideally, the concentration of GHGs in the atmosphere can thus be stabilised at a level that does not damage the climate. Since 2013, an annual EU-cap has been set within the EU ETS which defines the total amount of permissible GHG emissions for the entire EU. By 2020, the emissions covered by the EU ETS must be reduced by 21% of 1990 levels. To achieve this reduction target the total amount of allowances has been decreased annually since 2013 by 1.74% ("linear reduction factor").[13] For the period from 2021 to 2030, the European Council has decided to reduce the total amount of allowances annually by 2.2%.[14] The total amount of allowances is allocated to the companies that are within the EU ETS either by free allocation or by auction.[15]

Within an emissions trading system, there is a risk of "carbon leakage". Carbon leakage occurs if the cost of allowances results in the reallocation of installations and their corresponding GHG emissions to countries outside the EU. To counteract this, installation operators in sectors which are exposed to a significant risk of carbon leakage have been receiving up to 100% of their required allowances free of charge since 2013. A sector is deemed to be exposed to a significant risk of carbon leakage if:

- the additional costs occasioned by the EU ETS give rise to a substantial increase in production costs of at least 5% and
- the intensity of trade with third countries, defined as the ratio between the total value of exports to third countries plus the value of imports from third countries and the total market size for the EU (annual turnover plus total imports from third countries), is above 10%.

If only one of these two criteria exceeds a threshold level of 30%, it is also regarded as a "significant risk" of carbon leakage. To prevent carbon leakage, Member States may introduce financial compensation for industries that are indirectly burdened by costs from the EU ETS due to correspondingly higher electricity prices.[16]

2.3 Inclusion of Aviation in the EU ETS

Regulation (EU) No. 421/2014 amending the ETS-Directive 2003/87/EC stipulates that from 2013 to 2016 airlines need allowances for their emissions from flights between two EU airports. The reason for the time limit is that the International Civil Aviation Organization (ICAO) during its last general assembly decided to introduce by 2016 a global market mechanism to reduce GHG emissions applicable from 2020.[17] The European Commission will consider to what extent emissions from

[13] Art. 9 Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.
[14] European Council, conclusions of 24 October 2014, doc. EUCO 169/14, recital 2.3.
[15] Furthermore, companies covered by the EU ETS can get credits for emission reductions in other countries. This applies when they finance climate change projects in countries outside the EU or in those sectors within the EU that are not covered by the EU ETS (see Art. 24a ETS-Directive 2003/87/EC).
[16] Art. 10a Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.
[17] ICAO-Resolution A38-17/2.

flights to and from airports located in countries outside the EU should be included and, if appropriate, introduce proposals.[18]

2.4 Intervention in the EU ETS

The European economic crisis of 2008 and the related poor economic development in the years that followed meant that the demand for GHG allowances has been lower than expected. Actual GHG emissions were lower than the available GHG allowances. In 2012, this resulted in a build-up of surplus allowances equal to 955 million tons CO_2, which companies may also use in the future. The fall in demand consequently led to lower allowance prices. The European Commission views this surplus as an imbalance between supply and demand which even affects the orderly functioning of the EU ETS.[19] The Commission has therefore proposed two measures: the so-called "backloading" in 2012 and the "market stability reserve" in 2014.

Backloading changes the auctioning schedule by temporarily taking 900 million allowances off the market in the period 2014–2016 which will be auctioned in 2019 and 2020 instead.[20] This temporary shift does not lead to a permanent reduction in the surplus.

The market stability reserve will not only correct the imbalance between supply and demand, but also ensure the optimal balance between the allowance price signal and the necessary investments in low-carbon technologies ("intertemporal efficiency"). Depending on the market situation, this "stabilisation" of the allowance market will be achieved either by removing allowances from the market and placing them in the reserve, or by releasing them from the reserve and channelling them into the market. The quantity of allowances to be placed in or released from the stability reserve is determined by the volume of surplus allowances in the previous year.[21]

In principle, ad hoc interventions in the EU ETS are not justified from an economic point of view. The Commission´s opinion, that the orderly functioning of the European carbon market is affected by the surplus of allowances and their comparatively low price, is unconvincing. In fact, the contrary is true: even where allowance prices are at their lowest, the EU ETS ensures that the upper limit of the EU-wide permitted GHG emissions is not exceeded by the companies concerned. Thus the ecological effectiveness of the EU ETS remains intact. Contrary to the Commission's assumption, the low price is not caused by a dysfunction of the market. Rather, it has been brought about by the economic crisis as well as the existing energy and climate policy[22] of the EU and the Member States. The economic crisis has led to a fall in the demand for allowances and thus to a reduction in the respective price. In addition, GHG emissions have been reduced by political measures on energy efficiency and the expansion of renewable energies. By adopting and implementing such measures, politicians determine how GHG emissions should be avoided and thus take away an essential part of the incentivising function of the EU ETS.

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[18] Art. 28a Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.

[19] European Commission, Decision Proposal COM(2012) 416 of 25 July 2012 amending Directive 2003/87/EC clarifying provisions on the timing of auctions of greenhouse gas allowances, p. 2.

[20] Art. 10 Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.

[21] European Commission, Decision Proposal COM(2014) 20 of 22 January 2014 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC. See cepPolicyBrief No. 2014-22 "Market Stability Reserve for Emission Trading".

[22] The European Council decided to increase both the expansion of renewable energies and energy efficiency in 2020 by 20% compared to 1990 levels; s. European Council, conclusions of 8 March 2007, doc. 7224/1/07 REV 1.

2.5 Evaluation of the EU ETS: Effective and Efficient

To internalise the external costs of GHG emissions and to achieve its climate change targets, the EU opted for the EU ETS. The EU ETS is an ecologically effective and at the same time economically efficient instrument. It sets a reduction target for the covered sectors, thereby limiting the total amount of greenhouse gases allowed to be emitted by the installation operators or airlines concerned. If effectively monitored, only the specified total quantity of greenhouse gases will be emitted (ecological effectiveness). The EU ETS leaves it up to the companies to find out in which of the covered sectors emission reductions can be achieved at lowest cost. Therefore, their choice regarding potential reduction measures to be taken is unrestricted (economic efficiency). In terms of efficiency it is crucial for allowances to be tradable. Whether allowances are purchased or granted for free is irrelevant, as unused allowances can be sold.[23] It is up to the companies to decide to use GHG allowances or reduce their GHG emissions, either by decreasing production or by investing in GHG reduction technologies or processes. Companies opt for purchasing allowances if this is cheaper for them than taking reduction measures themselves. If measures for reducing a specific amount of GHG emissions are cheaper than the value of the corresponding allowances, either companies will not need to purchase additional allowances or they will be able to sell their excess allowances profitably on the market. As a result, the EU ETS is well placed to determine the sectors in which GHG reductions can be achieved at the lowest cost. This ensures that climate protection will not be more expensive than necessary.

3 Expansion of the EU ETS to other Sectors

Given that the EU ETS is an effective and efficient tool for climate protection, including further sectors – as the EU has already done with regard to aviation – is to be recommended. Such an expansion increases the economic efficiency of the EU ETS, since the potential for discovering more cost-effective abatement possibilities broadens when more economic sectors are included. Furthermore, the incentive to innovate is stimulated by widening the scope of the emissions trading system through the inclusion of more stakeholders.[24]

In order to make climate protection as cost-effective as possible, the costs of avoiding GHG emissions (abatement costs) should be minimised. This aim will be achieved when the abatement costs – i.e. the abatement costs required to save an additional unit of GHG – are at the same level in all sectors.[25] Within the EU ETS, the abatement costs for all companies are equal because the allowance price is identical for all companies and these companies use this price as a basis when considering whether to acquire allowances or take additional avoidance measures. This allows the avoidance of GHG emissions to take place where it can be achieved at the lowest cost.

However, since the EU ETS does not cover all emitting sectors, it cannot bring about an alignment of the abatement costs in *all* sectors. In order to achieve this, and thereby achieve the greatest possible level of efficiency, the EU ETS must be extended to all emitting sectors.[26] Aligning the abatement costs across all sectors of the economy will bring about higher gains in efficiency than

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[23] Fritsch, M. / Wein, T. / Ewers, H.-J. (2007): Marktversagen und Wirtschaftspolitik, 7th edition, p. 141.

[24] Rudolph, Sven (2011): Treibhausgasmärkte effizient gestalten, p. 16, in Interdisciplinary Research on Climate Change Mitigation and Adaption, Discussion Paper 03/2011, Universität Kassel.

[25] In this regard, and in this document, it is assumed that additional avoidance measures will become more and more expensive (rising abatement costs).

[26] Böhringer, C. and Lange, A. (2012): Der europäische Emissionszertifikatehandel: Bestandsaufnahme und Perspektiven, Wirtschaftsdienst, Springer Verlag, Vol. 92, p. 14.

the current status quo under which only a limited number of emitters are covered and therefore fewer possibilities for avoiding GHG emissions exist.[27]

The EU has opted for different instruments, however, e.g. CO_2 limits on motor vehicles based on weight (see Section 5). Using a variety of instruments for climate protection creates the problem that abatement costs for CO_2 reduction are not the same for all emitters. If, for example, sector-specific climate protection measures give rise to higher abatement costs than would arise under the EU ETS, it means that emission avoidance is more expensive than necessary. Including a sector in the EU ETS provides greater climate protection for the same cost.

4 Supplementing the EU ETS by an Upstream Approach

4.1 Concept of the Upstream Emissions Trading System

The road transport and the building sectors appear to be the obvious candidates for inclusion since they belong to those sectors outside the EU ETS that cause the highest GHG emissions in the EU. Road transport alone is responsible for almost 20% and the building sector for about 13% of all CO_2 emissions in the EU.[28] However, both sectors are characterised by large numbers of small emitters whereas the EU ETS is an efficient instrument when applied especially to large emitters. Instead of opting for one effective and efficient measure to reduce GHG emissions over all sectors, the EU decided to introduce a mix of sector specific measures to reduce GHG emissions. However, there are ways to incorporate even sectors with a large number of small emitters into the EU ETS.

The EU ETS currently represents a "downstream" emissions trading system: it is the consumers of fossil fuel, i.e. the emitters of GHGs, who have to acquire allowances. In other words, allowances have to be held not by the suppliers of fossil fuel at the top of the supply chain, but by installation operators or airlines at the bottom that actually emit the GHGs.[29] As mentioned before, the EU ETS is an effective and efficient instrument for reducing GHG emissions. Therefore, the efficiency of the EU ETS could be enhanced by extending it to other sectors with high GHG emission levels.

As the road transport and building sectors are characterised by large numbers of emitters, their inclusion into the EU ETS would pose a challenge in various respects. Given the large number of emitters, it may be practically impossible to monitor the exact amount of GHG emitted at the source. Furthermore, such an enlargement of the EU ETS could significantly increase the administrative burden and transaction costs so that these then exceed the gains in efficiency offered by the EU ETS. It is therefore advisable to find a balance between the potential cost savings achieved by expanding the EU ETS, on the one hand, and the increase in administrative costs caused by the large number of small emitters in the newly included sectors, on the other.[30]

These challenges can be overcome by applying the "upstream" approach to the emissions trading system. By contrast with the downstream approach, the upstream emissions trading system does not require the consumers of fossil fuel, i.e. the actual emitters of GHG at the bottom of the supply chain, to hold allowances, instead it obliges the suppliers – the producers and importers of oil, gas

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[27] Umweltbundesamt (UBA) (2014): Ausweitung des Emissionshandels auf Kleinemittenten im Gebäude- und Verkehrssektor, p. 94 et seq.

[28] EEA greenhouse gas – data viewer, http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer (accessed 2 March 2015).

[29] Art. 2 in conjunction with Annex I Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.

[30] Rudolph, S. (2011): Treibhausgasmärkte effizient gestalten, p. 16, in Interdisciplinary Research on Climate Change Mitigation and Adaption, Discussion Paper 03/2011, Universität Kassel.

and coal at the top of the chain – to hold them. This type of emissions trading system has several advantages over the downstream system. Firstly, even in sectors with many emitters such as transport or building, an upstream emissions trading system drastically limits the number of parties obliged to hold allowances, thereby also reducing the respective administrative costs.[31] This is a desirable scenario in terms of cost efficiency.[32] Secondly, GHG emissions can easily be monitored by focusing on the total quantity of fossil fuel designated for combustion that is sold by fuel suppliers. If monitoring is based on the existing system for monitoring fuel trading for the purpose of energy taxation, it will be relatively simple and cost-efficient.[33] Fuels for the transport sector are mostly made from mineral oil.[34] Mineral oil is refined crude oil and is sold as diesel, petrol, kerosene, liquid gas (LPG) etc. It is not possible for importers and producers of crude oil to accurately predict either how the crude oil is going to be used or the amount of CO_2 that a fixed amount of crude oil will release when combusted. Therefore, it is appropriate for the upstream emissions trading system to require refineries and importers of *mineral* oil to hold allowances. The number of companies affected is only slightly higher than the number of refineries and importers of crude oil. Hence, administrative costs will increase only marginally if at all.[35] The number of allowances refers to the amount of CO_2 that a fixed amount of fuel (e.g. one litre) releases when combusted. Each type of refined fossil fuel contains a certain amount of carbon. Since the amount of CO_2 released from a specific amount of fossil fuel is always the same, the number of allowances required is easy to determine. For example, on average, one litre diesel releases 2.64 kg CO_2, one litre petrol 2.39 kg CO_2 and one kilogram liquid gasoline 1.67 kg CO_2.[36]

The companies covered by the upstream emissions trading system will need to surrender allowances and will try to pass on the allowance costs via the fuel price.[37] In this case, the allowance price is passed on through the supply chain to the end user. This ensures that all stakeholders along the supply chain have the incentive to reduce fossil fuel consumption and the respective CO_2 emissions. Thus there is far-reaching coverage of fossil fuels and the associated emissions.[38] It also provides an incentive for designing innovations to reduce CO_2 emissions. The upstream emissions trading system is more capable of capturing all the emissions and emitters than the current downstream system.[39] There is therefore a strong case for extending it to as many sectors as possible.

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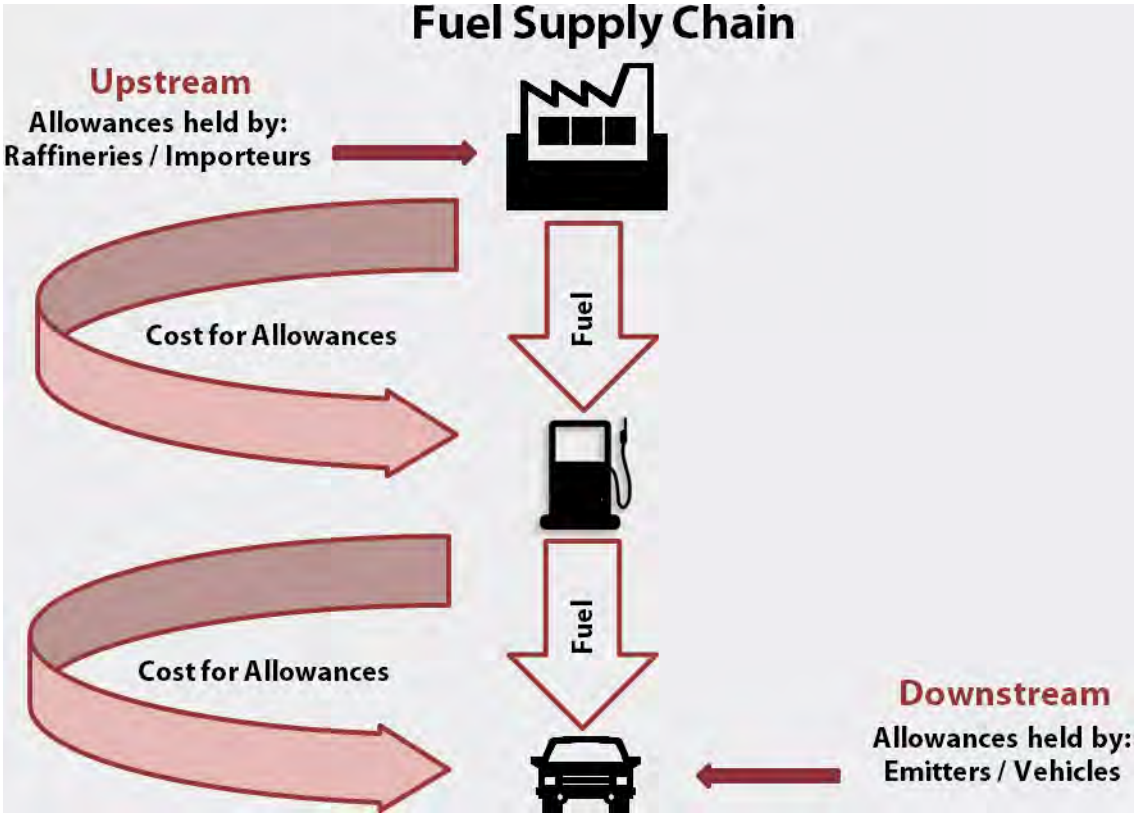
[31] European Commission, Impact Assessment SEC(2007) 52 of 23 January 2008, p. 54.
[32] UBA (2014): Ausweitung des Emissionshandels auf Kleinemittenten im Gebäude- und Verkehrssektor, p. 103 et seq.
[33] European Commission, Impact Assessment SEC(2007) 52 of 23 January 2008, p. 54.
[34] Moreover, biofuels and natural gas can be used as fuel for road transport vehicles.
[35] UBA (2014): Ausweitung des Emissionshandels auf Kleinemittenten im Gebäude- und Verkehrssektor, p. 54 et seq.
[36] Ecostore (2015): How to calculate the CO_2 emission level from the fuel consumption?, http://www.ecoscore.be/en/how-calculate-co2-emission-level-fuel-consumption (accessed 2 March 2015).
[37] Sorrell, S. (2010): An upstream alternative to personal carbon trading, p. 482, in Climate Policy, 10:4, Taylor & Francis.
[38] UBA (2014): Ausweitung des Emissionshandels auf Kleinemittenten im Gebäude- und Verkehrssektor, p. 73.
[39] Rudolph, S. (2011): Treibhausgasmärkte effizient gestalten, p. 17, in Interdisciplinary Research on Climate Change Mitigation and Adaption, Discussion Paper 03/2011, Universität Kassel.

Fig 1: Schematic Illustration of the Upstream and Downstream Approach



Source: cep

However, the EU ETS is well established and the European Council has confirmed it as the main European instrument for achieving the climate targets.[40] It therefore seems unlikely that the EU ETS will be significantly modified or replaced by another instrument in the near future. A possible solution might be to create a *hybrid system* by implementing the upstream approach for buildings and road transport while keeping the downstream approach for the sectors already covered by the current EU ETS.

This may give rise to the problem of "double counting". Double counting means that the supplier and the end user both have to pay for GHG emissions that are only released once. For instance, airlines currently have to buy allowances for actually emitted GHG (downstream approach). In addition, under a comprehensive upstream approach, the producers and importers of kerosene would also have to buy allowances for fuel that they sell to these airlines. In fact, double counting is contrary to the aim of the EU ETS, namely to allow for market-driven emission reductions in order to minimise economic costs.[41] A feasible solution for this problem is that the producers and importers of fossil fuels covered by the upstream emissions trading system only need to buy allowances for the proportion of fossil fuels that is sold to recipients that are not subject to the downstream approach. This may give rise to administrative costs as it requires fossil fuel sales to be tracked along the whole supply chain, from refineries/importers via intermediaries to final consumers.[42] However, in the transport sector these administrative costs are low because it is the refineries and importers of mineral oil that are affected. They are able to identify the further use of fuel without excessive burden – even more so since they have to inform the national authorities

[40] European Council, conclusions of 24 October 2014, doc. EUCO 169/14, recital 2.3.
[41] UBA (2014): Ausweitung des Emissionshandels auf Kleinemittenten im Gebäude- und Verkehrssektor, p. 179 et seq.
[42] Sorrell, S. (2010): An upstream alternative to personal carbon trading, p. 482, in Climate Policy, 10:4, Taylor & Francis.

about the GHG emissions of the fuels they supply for the road transport sector.[43] This includes all relevant stages from extraction to processing and combustion. Double counting therefore in fact presents no obstacle to establishing a supplementary upstream ETS for including the road transport sector in the EU ETS.

A further question that has to be taken into account in the upstream approach is the need to distinguish between fossil fuels used for combustion and those used for other purposes. For instance, chemical companies convert oil products into plastic products. As no GHGs are released here, there should, of course, be no obligation to pay a climate change levy. However, as chemical companies are, in principle, covered by the EU ETS (see section 2.1) and, therefore, refineries/importers should not need to buy allowances for oil sold to chemical companies, this is only a minor problem.[44] However, at the level of refineries and importers of mineral oil, the way in which fuel is going to be used or whether fuels will be combusted is determined. Therefore, the erroneous inclusion of oil which is not for combustion does not in fact constitute a problem as regards incorporating the road transport sector into the EU ETS.

4.2 Increasing the Amount of Allowances

When the EU ETS is extended to other sectors the total number of available allowances in the carbon market should be increased.[45]Additional allowances are needed otherwise the extension will make it more difficult to meet the GHG reduction target. The number of additional allowances should correspond exactly to the actual emissions from each sector to be included and to the EU-wide reduction target of 40% by 2030.[46]

In the road transport sector, for example, the number of additional allowances could be based on the actual emissions for the year in which the sector is included in the EU ETS ("grandfathering"). The number of additional allowances should be reduced annually so that it complies with the overall emissions reduction target of 40% of 1990 levels by 2030.[47]

A side effect might be that the current surplus of allowances, which the European Commission views as a major problem (see section 2.4), will be reduced due to the fact that road transport has been one of the few major sectors in the EU with increasing GHG emissions in recent decades. CO_2 emissions from road transport rose by nearly 23% between 1990 and 2010.[48] Setting the number of additional allowances as described above – taking today's emissions as a basis – means that future growth of the transport sector will, *ceteris paribus*, not be incorporated. Thus, by 2030, additional allowances for emissions from road transport will only cover half of today's emissions from road transport. This implies that in the carbon market the additional demand of the road

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[43] Art. 2 and 7a Directive 98/70/EC of 13 October 1998 relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC.

[44] When plastic products cease to be used, they can in principle be disposed of in three ways: by recycling, by depositing or by combusting in waste incineration plants. Plastic products that are recycled or deposited do not emit GHG. Combustion is different. It could well be included in the EU ETS. Currently, however, it is not. Certainly, if waste incinerating plants are included in the EU ETS, the fact that plastic is only a fraction of the total amount of waste will need to be taken into account. These plants also combust biodegradable waste which is regarded as being CO_2-neutral.

[45] This also applies to Member States that unilaterally extend the EU ETS to sectors within their country, s. Art. 24 Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.

[46] European Council, conclusions of 24 October 2014, doc. EUCO 169/14, recital 2.

[47] Alternatively, the number of additional allowances could be set by counting backwards from the 40%-target in 2030. In the year in which the EU ETS is extended to the road transport sector, the number of additional allowances should be just high enough that – with an annual reduction of allowances by currently 1.74% and subsequently by 2.2% as of 2021 – the number of additional allowances in 2030 will reflect a reduction of CO_2-emissions by 40% of 1990 levels.

[48] European Commission, http://ec.europa.eu/clima/policies/transport/vehicles/index_en.htm (accessed 2 March 2015).

transport sector for allowances might exceed the additional supply of allowances, depending on the development of actual CO_2 emissions in the road transport sector. Hence, ceteris paribus, the total demand for allowances will increase, the surplus will be reduced, and their price will rise.

5 Current Regulation in the Road Transport Sector

The transport sector with its four modes – road, rail, aviation and shipping – is responsible for about a quarter of total GHG emissions within the EU, 71% of which is caused by road transport alone.[49] Electrified rail transport and aviation are covered by the EU ETS. By contrast, shipping and road transport are not covered. Instead, the Member State levy taxes on diesel and petrol.[50]

While there is no EU regulation at all on the reduction of GHG emissions for shipping or for heavy-duty road vehicles with a total weight exceeding 3.5 tons, the EU did adopt such regulation for passenger cars and light-duty vehicles: As of 2012, all passenger car manufacturers must ensure that the average CO_2 emissions from their newly manufactured passenger cars do not exceed a manufacturer-specific CO_2 target. This CO_2 target results from a fixed basic amount and a variable additional amount which either increases or reduces the basic amount. The basic amount – 130 grams of CO_2 per kilometre (g CO_2/km) – does not actually refer to each single new passenger car, but to the average CO_2 emissions of the fleet of new passenger cars produced by a single manufacturer. The additional amount depends on the weight of the manufactured passenger cars. If the mass of a passenger car is more (less) than the "reference mass" of 1,372 kilograms (kg), the basic amount is increased (reduced) by an additional amount of 0.0457 g CO_2 per kg mass.
As of 2020, the basic amount and the additional amount will be reduced: the basic amount will be 95 g CO_2/km instead of 130 g CO_2/km, and the additional amount that either increases or reduces the basic amount will be 0.0333 instead of 0.0457 g CO_2 per kg mass. Where manufacturers exceed their specific CO_2 target, the Commission will impose an excess emission fine on them. Excess fines will be increased from 2012 to 2018. As of 2019, the excess fine will be 95 Euros for each gram CO_2/km which exceeds the sum of the basic and the (manufacturer-specific) additional amount multiplied by the number of the manufacturer's passenger cars newly registered in the respective year.[51]

Manufacturers of light-duty vehicles have to comply with the CO_2-regulations as of 2014. The regulations applicable to them are quite similar to the regulations for car manufacturers, as they also have to ensure that the average CO_2 emissions of their newly manufactured light-duty vehicles do not exceed their manufacturer-specific CO_2 target. The reference mass for light-duty vehicles is 1,706 kg, the basic amount is 175 g CO_2/km and the additional amount is 0.093 g CO_2 per kg mass. As of 2020, the basic amount will be reduced to 147 g CO_2/km and the additional amount raised slightly to 0.096 g CO_2 per kg mass.[52]

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[49] Scharschmidt, A. and Lippelt, J. (2012): Kurz zum Klima: Transport und Emissionshandel in Europa, ifo Schnelldienst 9/20012, p. 26.
[50] Aral (2015): Preise in Europa, http://www.aral.de/kraftstoffe-und-preise/kraftstoffpreise/preise-in-europa.html (accessed 2 March 2015).
[51] Art. 1, 5a, 8 and 9 Regulation (EU) No. 333/2014 of 11 March 2014 amending Regulation (EC) No 443/2009 to define the modalities for reaching the 2020 target to reduce CO_2 emissions from new passenger cars.
[52] Art. 1 Regulation (EU) No. 253/2014 of 26 February 2014 amending Regulation (EU) No 510/2011 to define the modalities for reaching the 2020 target to reduce CO_2 emissions from new light commercial vehicles.

6 Comparison and Evaluation of Different GHG Reduction Measures

6.1 Extension of the EU-ETS to Road Transport vs. CO_2 Targets

The EU's political target of reducing harmful CO_2 emissions in road transport cannot be questioned per se. However, specific CO_2 targets for passenger cars and light-duty vehicles are mandatory limits. Mandatory limits or, in general, rules and bans linked to sanctions in the case of infringement, should only be applied where instruments in line with the market system are not available for achieving objectives. With the establishment of the EU ETS, the EU has an instrument at its disposal which can achieve a politically prescribed reduction in CO_2 emissions accurately while imposing less restriction on people's freedom of choice. In addition, the mere setting of mandatory limits per kilometre driven cannot guarantee the overall reduction of CO_2 emissions because this depends both on the number of emitting passenger cars and their driving behaviour, particularly the actual kilometres driven. Although the mandatory CO_2 limits provide an incentive for building engines that emit less CO_2 per kilometre, they have little more than a steering influence on buying behaviour, and no effect on the driving behaviour of the individual drivers. Ultimately, however, it is the driving behaviour, in particular the kilometres actually driven, which determine the overall CO_2 emissions from road transport. This is particularly relevant because, in the lifecycle of vehicles, 77% of their emissions are caused by the actual use of the vehicle, not by its production.[53]

In addition, ease of compliance with specific CO_2limits will vary between individual manufacturers. Thus, where instruments other than emissions trading system are used, even companies within one sector may be subject to different abatement costs. For example, it is considerably easier for a compact car manufacturer than for a manufacturer of large-engine sports cars to meet its CO_2 targets, as the latter emits substantially more CO_2, but the manufacturer-specific CO_2 limit is nevertheless based exclusively on vehicle weight (see Section 5).

The situation is further aggravated by the fact that the CO_2 limits under the current system only apply to new vehicles. In 2011, the total number of cars in the EU was approx. 245 million of which 13 million vehicles were newly registered in that year. Thus the annual CO_2 limits for cars only apply to 5% of all cars in the EU so a large proportion of vehicles is not (yet) participating in climate protection.[54] In addition, older cars generally consume more fuel and are therefore more harmful to the climate than new ones.

All these deficits will be rectified if the emissions trading system is extended to include road transport. Since with the emissions trading system, it is the actual fossil fuel consumption which is relevant, all car users will be involved in climate protection if it is introduced. The contribution of each car driver to climate protection is proportional to fuel consumption and does not therefore depend on whether or not the vehicle is new. As the appropriate allowances must be used for the emissions from all vehicles, the emissions from all trips and from all vehicles are also de facto equally harmful / harmless. Due to the predefined cap, no additional GHG emissions in excess of the cap will be discharged as a result of individual trips. Every additional GHG emission from a vehicle will have to correspond to an emission reduction from another emission source within the EU ETS.

An additional advantage of the expansion of the EU ETS to road transport is the fact that the entire road transport sector is covered by a single climate protection measure. Thus, for the first time,

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[53] Scharschmidt, A. and Lippelt, J. (2012): Kurz zum Klima: Transport und Emissionshandel in Europa, ifo Schnelldienst 9/20012, p. 27.

[54] Kurte, J. and Esser, K. (2013): Nutzen des Pkw-Verkehrs in Europa, in ADAC Studie zur Mobilität, p. 12. et seq.

climate protection regulations also apply to heavy-duty vehicles. In this regard, it must be taken into account that, in the case of heavy-duty vehicles, for which currently no CO_2 limits apply, fuel consumption also constitutes the most significant cost factor; a view also taken by the European Commission[55]. Consequently, buyers of heavy-duty vehicles are already demanding fuel-efficient vehicles and technologies insofar as these actually reduce their costs. Emissions trading will increase this incentive and, in addition, contribute to ensuring that no additional emissions will result from larger traffic volumes in the road haulage sector in the EU.

The introduction of CO_2 limits for heavy-duty vehicles under the system which currently applies to other vehicles, would however result in massive inefficiencies. In order to be able to set efficient CO_2 limits, the price increases in respect of these vehicles resulting from the introduction of CO_2 limits would have to be balanced out by savings in fuel consumption. This is not possible, however, because no-one knows the exact level of additional costs that will be incurred by all vehicle manufacturers as a result of the CO_2 limits – including the legislator. Added to this is the fact that heavy-duty vehicles are used in different ways and not generally sold directly by the vehicle manufacturer to the end-customer. As a rule, heavy-duty vehicles have various different superstructures depending on the customer's requirements. Irrespective of the vehicle construction, a single model of commercial vehicle may, for example, be fitted with a crane and saw for forestry use or with a refrigeration unit for foodstuffs. Since vehicle construction has a significant influence on fuel consumption, the CO_2 emissions released may also differ considerably according to vehicle construction. This also makes it impossible to establish an efficient CO_2 limit for heavy-duty vehicles.[56]

6.2 Extension of the EU-ETS to Road Transport with Continuing CO_2 Targets

The inclusion of the road transport sector in the emissions trading system is preferable to CO_2 limits for new vehicles in particular due to its effectiveness. Since inclusion is sufficient to allow a politically prescribed GHG reduction target to be reached, it makes CO_2 limits obsolete. Ideally, therefore, the existing CO_2 limits should be abolished because they represent an additional hindrance to the inclusion of road transport into the EU ETS without bringing any benefit. It is, however, unlikely that the EU will withdraw the finalised CO_2 limits entirely as it has already established the limit for the period after 2020 (see Section 5).

Nevertheless, even if the already effective CO_2 limits continue to apply, expanding the EU ETS to include road transport will still increase efficiency because the range of possibilities for finding and using more cost-effective avoidance measures will be increased. This is firstly because expansion of the EU ETS will not only incorporate new vehicles into the climate protection strategy but also all used cars. And secondly, the inefficiencies and corresponding costs, resulting from the current CO_2 limits, cannot be reversed. The vehicle manufacturers have already undertaken the necessary investment in research and innovation and adapted their production and vehicle fleets to these regulations. Thus they have already borne some of the additional costs brought about by the CO_2 limits. However, including road transport in the EU ETS ensures that future incentives for cost-effective CO_2 avoidance are in place.

If CO_2 limits were to be further tightened when the road transport sector is incorporated into the EU ETS, it would have the effect of once more distorting abatement costs. This would result in the

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[55] European Commission, Communication COM(2014) 285 of 21 May 2014 "Strategy for reducing Heavy-Duty Vehicles' fuel consumption and CO_2 emissions", p. 4. See cepPolicyBrief No. 2014-40 "Reducing CO_2 Emissions from Heavy Duty Vehicles".

[56] Although individual models of car have varying optional extras, the variation in fuel consumption is much less than in the case of the wide variety of optional extras available for heavy-duty vehicles.

loss of an important characteristic of the EU ETS, namely the aforesaid cross-sectoral alignment of abatement costs. If, after expanding the EU ETS, the EU wants to bring in stricter climate protection measures which go further than the targets that have already been agreed, it should therefore only reduce the overall volume of permitted emissions. Separate climate protection measures in individual sectors covered by the EU ETS are not necessary, even for the purposes of climate protection, because, for the climate, it is ultimately irrelevant in which sector CO_2 emission reduction takes place. Instead, concurrently with the expansion of the EU ETS, existing national taxes on fuels should be reduced – ideally by an amount equal to the financial burden arising from the allowance obligation. Otherwise expansion of the EU ETS will amount to double taxation for the road transport sector.

7 Recommendations

An EU-wide expansion of the EU ETS to as many sectors as possible is the best way of achieving ecologically effective and economically efficient climate protection.

The road transport sector, in particular, which is responsible for almost 20% of GHG emissions, should be incorporated into the EU ETS. Since the road transport sector covers a large number of small emitters, an upstream approach to incorporating this sector into the EU ETS is recommended. It is easy to implement and at the same time – particularly due to the low administration costs – cost-effective.

If, despite all the advantages, no political majority in favour of this approach can be achieved in the foreseeable future, individual Member States should at least make use of their already existing ability under EU law to incorporate their own country's road transport sector, and possibly other sectors, into the EU ETS.[57] Here too, the principle also applies that the more emitters covered by the EU ETS, the greater its impact on efficiency. These countries should then also speak out against any future tightening of climate protection standards in the affected sectors. The experience of unilateral ETS expansion which they thereby gain could motivate other Member States to follow their example.

In this study, we have looked at the possibility of extending the EU ETS using the road transport sector as an example. The same arguments, especially the alignment of abatement costs, apply in favour of extending it to other sectors such as buildings and, in principle, also agriculture which is, after all, responsible for 10% of all GHG emissions in the EU.[58] In this case, however, existing taxes on fossil fuel consumption should – as with road transport – be reduced in order to avoid double taxation.

In light of the decision of the European Council[59], it would be logical to expand the EU ETS to road transport. The emissions trading system would then in fact become the most important European instrument of climate protection policy. Such an opportunity for climate protection must not be missed.

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[57] Art. 24 Directive 2003/87/EC of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.

[58] EEA greenhouse gas – data viewer, http://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer (accessed 2 March 2015).

[59] European Council, conclusions of 24 October 2014, doc. EUCO 169/14.

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