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The Road Towards a New Clean Industrial Deal

Opportunities and Limitations of Green Lead Markets

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The combination of high cost pressure and policy uncertainty is severely constraining the financing options available to emissions-intensive industries in their transition to low-emission technologies. Improving the investment conditions requires growth-friendly framework conditions as well as clear sales perspectives for climate-friendly products. Against this background, the new European Commission has announced to publish a new strategy termed "Clean Industrial Deal" within the first 100 days of its mandate. Among the measures discussed, the idea to launch dedicated green lead markets for low-emission products through a policy-induced demand-pull will play a pivotal role. This cepInput analyses the concept of green lead markets both from a general perspective and with a view towards specific implementation options.

Key results:

- Creating clear sales perspective through green lead markets is an effective way to improve the financing conditions for decarbonization investments. However, given the high information requirements and the inherent complexity of market repercussions, green lead market regulation should be limited to a few multi-purpose basic materials like cement, plastic or steel.
- In designing green lead markets, competition risks for European downstream industries need to be avoided. Regulatory measures to stimulate demand should therefore initially focus on public demand, through dedicated criteria for public procurement and renewable energy support auctions. To allow for sufficient flexibility and limit public budget risks, criteria should be defined as award criteria instead of pre-qualification criteria.
- To prepare a medium-term integration of private demand sources into green lead market regulation, the EU should start to develop a roadmap, including transparent guidelines and a scientifically sound methodology to assess the cost sensitivity of European downstream industries.

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1 Background

The task of decarbonising production processes within the timeframe set by the EU's climate change targets is an enormous challenge for European industry, especially for those still heavily dependent on fossil fuels. The technological challenge is aggravated by fierce competition in global markets. High domestic energy and labour costs, as well as the lack of a level playing field in climate policy, undermine the competitiveness of European producers in global markets, further reducing the scope for long-term decarbonisation investments. A future sharp rise in CO_2 prices threatens to achieve emission reductions at the cost of domestic value added. Against this backdrop, re-elected Commission President Ursula von der Leyen has announced the development of a new strategy to strengthen the competitiveness of European industry in the green transition. Within the first 100 days of its mandate, the new Commission will present a Communication on a "Clean Industrial Deal", which will lay the foundations for subsequent legislative proposals including an "Industrial Decarbonization Accelerator Act". The aim is to create a "growth-conducive" regulatory framework to support industry and innovation.[1]

The focus of such a framework should be to overcome barriers to investments in clean technologies in a targeted manner, while preserving the role of market price incentives. From a general point of view, three main types of problems must be addressed: high initial costs of infant clean technologies, coordination issues in the simultaneous build-up of production capacities and infrastructure for clean technologies as well as external supply chain risks in raw material procurement. Developing targeted measures to address investment uncertainty will be a core element of such a framework. With many supply-side measures already under way, the focus of the Commission has shifted to the demand side, expressed by the concept of green lead markets as highlighted in Mario Draghi's competitiveness report.[2] Their general idea is to improve sales perspectives of products derived from low-emission technologies through supporting (or even enforcing) the creation of specific market segments. In particular, so far emission-intensive basic materials like cement, steel and aluminium are in the spotlight of current plans.

As concrete steps, the Commission has announced plans to adjust the general EU-wide criteria for public tenders defined in the Public Procurement Directive. Moreover, the implementation of the EU Net-Zero Industry Act (NZIA) will bring about the introduction of new sustainability criteria for public procurement and renewable energy support auctions for the set of specific net-zero technologies covered by the NZIA.[3] This is complemented by plans for public procurement reforms at Member State level. Moreover, discussed measures are not limited to public auction schemes, but concern initiatives to strengthen private demand for low-emission products as well.

Assessing these policies and their wider economic consequences is no trivial task. Unlike instruments such as emissions trading, which address economy-wide welfare issues, they target specific technologies and markets. Their link to the risks of market failure can be ambiguous, as their implementation may remove disincentives while creating distortions in other places and markets. Against this background, the evaluation of specific measures requires a common overarching approach

1 Von der Leyen, U. (2024). Europe's Choice - Political Guidelines for the next European Commission 2024-2029.
2 Draghi, M. (2024). The future of European Competitiveness – Part B: In-depth analysis and recommendations.
3 European Union (2024a). Regulation (EU) 2024/1735 of the European Parliament and of the Council of 13 June 2024 on establishing a framework of measures for strengthening Europe's net-zero technology manufacturing ecosystem and amending Regulation (EU) 2018/1724.

that goes beyond the assessment of single market outcomes. This cepInput aims to contribute to the discussion by proposing a qualitative evaluation framework and using it to compare a range of implementation options for green lead markets.

2 The concept of green lead markets

2.1 Motivation

The need for new demand-side measures to stimulate investment in climate-friendly technologies is driven by at least two economic factors. The first is growing regulatory pressure. The future steeper reduction in the annual volume of emission allowances issued is likely to lead to significant price increases in the EU Emissions Trading Scheme (EU ETS) in the upcoming years. At the same time, as a result of the introduction of the Carbon Border Adjustment Mechanism (CBAM), the previous free allocation of allowances to product categories covered by the CBAM (aluminum, cement, electricity, fertilizers, hydrogen, iron and steel) will be gradually reduced to zero by 2034.[4] As a result, these sectors will face increasing cost pressures, particularly in export markets. At the same time, the scope for decarbonization investments is constrained by structural cost burdens. These include high electricity prices in some large Member States, such as Germany and Italy, which affect the profitability of climate-friendly electricity generation. The increased reporting requirements associated with more ambitious sustainability targets also tie up corporate resources.

The second factor is the prevailing market uncertainty. Switching to climate-friendly production technologies requires long-term investments, with capital tied up for 15 years or more. The long-term development of CO_2 prices, the cost of renewable energy sources and the demand for climate-friendly products are therefore key parameters for profitability. The more uncertain the forecast of these parameters, the higher the capital costs of the investments. The current climate policy regime does not address this uncertainty. The future development of CO_2 prices in emissions trading will continue to be influenced by uncertain factors such as technological progress, general economic developments and, above all, regulatory adjustments to the market framework. Emissions trading can therefore force a reduction in emissions by lowering the cap, but it cannot ensure a successful transition to profitable green business models. Forms of supply-side investment support, such as government guarantees or Carbon Contracts for Difference (CCfDs), which are designed to hedge the price of CO_2, can mitigate some of the cost uncertainty, but do alone not create revenue prospects.

Against this backdrop, there have been increasing calls to incentivize green investment through targeted policy support on the demand side. The aim is to create a sufficient and easily calculable revenue base that allows the current additional costs of using climate-friendly technologies to be passed on to the demand side. First, this will reduce the capital costs of decarbonization. Second, when including demand from private markets, it reduces the burden on government budgets to support investment. In the medium term, this demand pull should drive the scaling up of green technologies, thereby triggering cost reductions through economies of scale. The initial 'green premium' paid for climate-friendly products should therefore diminish over time. Third, by defining standards on the demand side equally relevant for domestic goods and imports, it mitigates the carbon leakage issues associated with EU-limited emissions trading without drawing on protectionist means.

[4] European Union (2023a). Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism.

In particular, producers of emission-intensive base industries such as steel, minerals and basic chemicals are pinning their hopes on such green lead markets. Although these industries have significantly reduced their emissions intensity in the past, they are still among the largest industrial emitters (see Table 1). This applies to both energy and process emissions. Demand-driven decarbonization would therefore also make an important contribution to reducing the carbon footprint of downstream industries and construction. At the same time, the available decarbonization options for base materials are currently still associated with significant increases in production costs, which require the willingness to pay a green premium.[5] In addition, the diversity of supply chains and distribution channels for many base materials means that the costs of transformation can be spread across many markets, reducing the risk of a disproportionate burden on individual market players.

Table 1: Industrial GHG emissions in the EU-27

	Sector					
	Chemical industry	Mineral industry	Iron and Steel	Non-ferrous metals	Other industries	Total industries
GHG emissions 2019 (in MT CO_2-Equiv.)						
Energetic emissions	65.80	84.75	78.03	9.36	190.99	428.93
Process emissions	56.61	104.97	67.16	8.13	106.47	343.33
Total emissions	**122.41**	**189.72**	**145.20**	**17.48**	**297.46**	**772.26**
Change GHG emissions 2005-2019 (%)						
Energetic emissions	-22.07%	-31.09%	-25.63%	-18.72%	-17.98%	-22.95%
Process emissions	-51.70%	-22.24%	-23.46%	-43.13%	30.28%	-21.24%
Total emissions	**-39.29%**	**-26.46%**	**-24.64%**	**-32.24%**	**-5.44%**	**-22.20%**
Gross Value Added 2019 (in bn EUR)	179.83	72.66	40.48	24.32	2316.18	2633.48
Emission intensity 2019 (T CO_2 / TEUR)	**0.68**	**2.61**	**3.59**	**0.72**	**0.13**	**0.29**

Sources: EEU (2023)[6]; Eurostat (2023b) [7]; own aggregations.

2.2 Steps and instruments

The development of green lead markets requires intensive cooperation between policymakers, industry and other stakeholders. The first essential step is the definition of technical standards. These enable the differentiation of green products and thus form the basis for market segmentation. They therefore have a significant impact on the accuracy and effectiveness of the instrument and the associated documentation costs. At the same time, they are per se voluntary and may not be confused with legally binding requirements on product design such as es ecodesign principles.

A fundamental decision in the formulation of green standards is whether to focus on specific technologies from the outset or to define cross-technology performance benchmarks. The advantages of directly defining standard technologies can be lower documentation costs and a high level of transparency for consumers. On the other hand, there is a risk that such restrictions will stifle innovation and market penetration of more efficient technologies with similar or even better carbon footprints. As an alternative to benchmarking, one or more performance indicators should be selected. CO_2 emissions associated with production are a typical indicator, as they allow direct alignment with

5 Limbers, J., Böhmer, M., Dismond, L., Piegsa, A. (2023). Economic evaluation of climate policy instruments – Based on the examples of cement, chemistry and steel production. Study report.

6 EEU (2023). Greenhouse gas emissions by source sector. European Environmental Agency.

7 Eurostat (2023b). Annual detailed enterprise statistics for industry (NACE Rev. 2, B-E). Eurostat.

climate policy objectives. In addition, the horizontal and vertical scope of the indicator needs to be decided.

The horizontal scope concerns the question of which products of a company are used in the calculation of the indicator value. If several products are covered, a decision has to be made whether the products have to be classified separately or whether a common aggregated assessment can be made. The vertical scope concerns the question of which stages of production are covered. Ideally, for maximum transparency and steering effect, it would include the entire supply chain, i.e. in the case of CO_2 emissions, the entire carbon footprint of the product. However, especially for complex products, there is often no precise knowledge of emissions from upstream production stages or from the transport of inputs. The use of general emission factors and allocation rules in such cases can reduce monitoring costs, but carries the risk of bias in the case of large individual variations. If upstream production stages are included, the assessment of recycled inputs is also an important element of the steering effect. In particular, potential emissions in primary production saved by utilizing recycled goods should be considered in the assessment. The decision on the appropriate scope can thus only be made on a product-by-product basis.

Finally, the definition of thresholds for indicators allows the classification of products. Multiple thresholds can also be used to create different levels of green products. An example of such a differentiated classification system is the Low Emission Steel Standard (LESS) developed by the German Steel Association. Based on a system developed by the International Energy Agency (IEA), it defines a six-level classification system for the carbon footprint (including certain upstream emissions) of crude steel production and steel refining. When allocating emissions, plant operators are given a degree of freedom to create different classification categories for specific products (e.g. different steel grades) or production technologies (e.g. low vs. high emissions).[8]

In order to monetize compliance with standards in markets, they need to be signaled to the demand side. This is the task of certification and subsequent labelling of products. The organization of a certification system requires several institutions. There must be a central body responsible for managing the whole system. It should develop and monitor compliance with the certification rules, including the right to sanction non-compliance. It should establish and maintain a central register to document certificate holders and the results of monitoring processes. It should also appoint decentralized certification bodies to carry out the specific certification processes. These certification bodies assess individual applications for recognition of a standard and, if successful, issue a certificate to the applicant.[9] Finally, certification is documented by a label in the form of a logo or badge. It represents the link between internal accounting and external market steering. Such labels need to be informative and unambiguous without being overly complex.

The final decision step in establishing green lead markets concerns the imposition of regulatory requirements linked to green certificates. If the signaling effect of certificates alone is considered insufficient, it could be supported by binding obligations on demand-side actors. In principle, this could affect both public and private demand. Public demand can be targeted by redefining rules in public tenders in favor of products with green certificates. This mainly concerns public procurement, but also tenders for public support, e.g. in the field of renewable energy. Commitments on private demand can

[8] Wirtschaftsvereinigung Stahl (2024). Einführung eines Low Emission Steel Standard (LESS) zur Unterstützung der Transformation der Stahlindustrie. Konzeptpapier.

[9] ZINFI (2024). Glossary - Product Certification Process.

take the form of quota rules requiring downstream companies to reserve a certain share of their input mix for products with green certificates. Flexibility could be increased by making such requirements tradable, thereby providing an additional market regime alongside emissions trading to create price incentives for green products. Alternatively, demand commitments could take more stringent forms, such as absolute limits on the carbon footprint of each unit of a particular input purchased, thereby directly enforcing the phase-out of high-emission technologies.[10] In what follows, we examine these design options and their economic consequences in detail.

3 Design options

3.1 Lead markets based on public auction schemes

3.1.1 Public procurement

One way to create sales perspective through public demand is by adapting the rules of public procurement tenders to incentivize the use of low-emission products by tenderers. This requires to define specific auction criteria complementing the bid price as the (so far) central criterion. In principle, such criteria could take the form of either award criteria or mandatory pre-qualification criteria. In terms of their vertical scope, they could address only the emissions associated with the production of specific inputs used for delivering the public service or the emission balance of the bidder as a whole. At the EU level, the Commission will introduce sustainability requirements for green public procurement under the Construction Products Regulation[11] and the Ecodesign for Sustainable Products Regulation[12]. Moreover, the Net-Zero Industry Act (NZIA) foresees minimum mandatory environmental requirements for public procurement procedures where contracts involve technologies that belong to the list of net-zero technologies defined by the NZIA.[13] These requirements remain to be defined by an Implementing Act. On a more general level, the Commission has announced plans to reform the EU-wide public tender framework defined by EU Public Procurement Directive to better incorporate sustainability and resilience criteria in tendering. In defining such criteria, an important legal aspect will be coherence with WTO law, especially the principle of non-discriminatory treatment of third-country suppliers. This will require policy-makers to formulate criteria as neutral as possible with respect to production locations.

3.1.2 Renewable energy support

Another way to initiate demand through public auction schemes is by incorporating sustainability criteria in renewable energy support auctions. Internationally, a large number of countries within and outside the EU award subsidies for renewable energies in the form of auctions. Non-price-related criteria in the form of both pre-qualification criteria and award criteria are already applied in the support auctions of Member States. In particular, pre-qualification criteria are frequent. However, the national systems differ significantly with regard to numerous design aspects like allocation processes,

[10] Agora Industry (2024). Creating markets for climate-friendly basic materials. Potentials and policy options.

[11] European Union (2011). Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonized conditions for the marketing of construction products and repealing Council Directive 89/106/EEC.

[12] European Union (2024b). Regulation (EU) 2024/1781 of the European Parliament and of the Council of 13 June 2024 establishing a framework for the setting of ecodesign requirements for sustainable products, amending Directive (EU) 2020/1828 and Regulation (EU) 2023/1542 and repealing Directive 2009/125/EC.

[13] See European Union (2024a).

contract designs and auxiliary policies.[14] At EU level, the NZIA aims to implement homogeneous criteria for rewarding sustainability and resilience contributions in renewable energy support auctions, which are allowed to take the form of either pre-qualification or award criteria. These criteria will also be spelled out by a subsequent Implementing Act.[15]

3.2 Lead markets based on private demand

3.2.1 Reliance on product certification and labelling

The least invasive method of market segmentation is to rely on the signaling effect of reliable green labels. Since the introduction of eco-labels in 1992, stakeholders in the EU have gained extensive experience in the environmental certification of consumer products.[16] Targeted promotion of low-emission technologies requires separate certification of low-emission materials. The methodology for such certification can be based on the ISO 14040 standards for Environmental Product Declarations (EPDs).[17] As in all cases of environmental life cycle assessment, the validity and transparency of such a certificate depends crucially on methodological choices, in particular the choice of system boundaries and allocation rules for calculating emissions. A reliable certification system allows companies to credibly document emission reductions. It is therefore also an important basis for verifying the implementation of their voluntary emission reduction commitments, thus creating confidence in the market.

3.2.2 Individual demand quotas for low-emission inputs

The introduction of demand quotas for low-emission products is an attempt to develop green lead markets through regulation. Under certain conditions, companies are obliged to ensure that a minimum proportion of the production inputs they procure in a given period are low-emission inputs. The definition of such a rule requires several regulatory decisions. For example, the regulated downstream industry, the selection of affected inputs, the level of the quota and the criteria for defining low-emission inputs must be determined. In principle, only certain pre-defined production routes (e.g. use of recycled inputs) could be allowed from the outset to meet the quota, or environmental certification (see previous subsection) could be required. The latter would be a more technology-open approach. Examples of such quota requirements can already be found in recent EU legislation. For example, the EU Battery Regulation sets medium-term requirements for the use of recycled raw materials in the production of large industrial batteries in the form of input-specific minimum quotas.[18] In the near future, the introduction of similar quota schemes for other industrial products is conceivable within the regulatory framework created by the new Ecodesign Regulation.[19] The Commission is empowered to set such new requirements independently through delegated acts.

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[14] Haelg, L. (2020). Promoting technological diversity: How renewable energy auction designs influence policy outcomes. Energy Research & Social Science, 69, 101636.

[15] See European Union (2024a).

[16] European Commission (2023). What is the EU Ecolabel?

[17] ISO (2006). ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework. International Organization for Standardization.

[18] European Union (2023b). Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries, amending Directive 2008/98/EC and Regulation (EU) 2019/1020 and repealing Directive 2006/66/EC.

[19] See European Union (2024b).

3.2.3 Tradable green demand obligations

One way of generating private demand for low-emission products in a more flexible manner would be to allow demand quotas to be traded. As in the previous case, this concept would initially be based on the definition of demand quotas for low-emission inputs. However, the resulting demand commitments for individual downstream companies would not be individually binding, but could be traded within the group of companies concerned. Companies for which access to low-emission inputs would be particularly costly could thus be relieved of part of their obligation. They could transfer their obligation to other companies with lower input costs against payment, thereby increasing the demand commitment of these companies. Political control on the total demand-pull effect thus remains intact, while the scope for individual companies increases. A prerequisite for the tradability of demand obligations is their certification and the establishment of transparent market platforms. As in emissions trading, the companies concerned would be allocated certificates. However, these would not reflect a right but an obligation. In contrast to fixed individual quotas, the absolute quantity of low-emission inputs required for a period would have to be defined ex ante to determine the total quantity of allowances. This would require constant adjustment in line with the economic situation and technological developments, also to avoid undesired pro-cyclical effects (see Section 4).

3.2.4 Carbon footprint limits

Demand for low-carbon inputs could also be driven by carbon footprint limits on industrial inputs, rather than by sales volume requirements. This would be an indirect way of creating new market segments, as there are different ways of reducing carbon footprints along the supply chain. In principle, such a limit could be imposed either on the carbon footprint of the entire input mix of a downstream company, implying some flexibility in compliance, or on specific purchased inputs. Regulatory issues mainly concern the method of carbon accounting, in particular the system boundaries. In cases where reliable information on production pathways is not available, especially for imported inputs, alternative calculation rules based on benchmarks need to be defined. In addition, when setting emission limits, consistency with other emission-related regulations, in particular the cap in emissions trading, needs to be continuously monitored.

3.2.5 Financial demand support

Instead of relying on purchase obligations, private demand for low-emission inputs could also be stimulated by financial incentives. Several models are conceivable. One incentive could be of a fiscal nature, following the example of the US Inflation Reduction Act. Companies would be entitled to special corporate tax write-offs depending on the purchase of low-emission inputs. Alternatively, the additional cost of low-emission inputs could be reduced directly through subsidies. To reduce financing costs, a model similar to the Carbon-Contracts-for-Difference (CCfDs) used on the supply side could be implemented.[20] To this end, regulators could contractually guarantee downstream companies a certain percentage price difference between inputs from low-carbon and conventional production pathways that is lower than the actual incremental costs of low-carbon inputs in the initial phase. To this end, the additional costs on the market up to the agreed price differential would be compensated by government subsidies. As this price differential decreases over time due to CO_2 pricing and scale

[20] Richstein, J. (2017). Project-Based Carbon Contracts: A Way to Finance Innovative Low-Carbon Investments (No. 1714). DIW Berlin, German Institute for Economic Research.

economies in low-emission production, the government subsidy decreases and could even become negative, i.e. implying a repayment of subsidies. The cost to the public budget of such an instrument could be further limited by determining accepted price differentials through competitive bidding.

4 Conceptual analysis

4.1 Evaluation criteria

As a basis for our qualitative evaluation framework, we define a brief list of conceptual criteria serving to cover the variety of relevant aspect in the economic assessment of green lead markets. This starts with effectiveness, understood as the ability to create a significant demand pull for investments in climate-friendly production technologies. The second important aspect are repercussions on market efficiency. To enable a differentiated discussion of market dynamics, we split this into short-term and long-term criteria. In the short-term, the effect of allocative efficiency on existing markets is discussed. In the case of green lead markets for basic materials, potential repercussions on the existing EU-ETS (i.e. the EU-ETS I) and on markets for downstream products are of particular relevance. Moreover, we consider the (public and private) transaction costs involved in implementing the specific policy measures. As long-term efficiency criteria, we discuss potential effects on economy-wide innovation activity and the realization of scale economies over time. Finally, repercussions on public budgets as well as the question of consistency with the existing supply-side support framework are further elements of our discussions.

4.2 Evaluation

4.2.1 General concept

Irrespective of the specific form of implementation, general considerations can be made about the economic impact of the concept of green lead markets. A key positive factor is the creation of clear sales prospects for manufacturers of low-emission products. First, this improves access to the capital market for investments in green production technologies. In particular, the reduction of sales uncertainty offers the prospect of access to cheap credit, thus helping to reduce the cost of capital. Second, there is the potential for faster scaling of production. This implies the potential for faster cost reductions, especially for new green technologies with strong economies of scale. Under these conditions, green lead markets also exhibit a positive feature compared to taxation: the extent of market intervention declines over time, even without regulatory adjustment, as the price difference to conventional production decreases. Another important function, especially in the early stages, is the provision of dedicated price signals. This helps to improve the information situation for market participants and regulators alike. It makes the market impact of regulatory measures and investment decisions more transparent and thus contributes to better management of decarbonization.

In combination with supply-side support measures such as CCfDs, the complementarity of the instruments also results in additional control potential. This applies in particular to the issue of financing industrial decarbonization. The combination of targeted supply-side support with regulatory support for lead markets enables increased flexibility with regard to the choice of financing sources - and therefore also potentially more room for a fair distribution of the initial cost burden. This is particularly important as the lion’s share of supply-side support is currently financed by a limited number of national and European funds (including innovation funds). The development of green lead

markets enables a broader distribution of the financing burden, including downstream industries if private demand is included. This can contribute to overcoming regulatory (EU debt rules) and market-side financing constraints.

From a global perspective, well-designed European green lead markets can also enhance Europe's attractiveness in the area of climate policy. The creation of separate market segments can at least partially insulate European producers from the effects of short-term supply and demand disruptions in global markets, in particular from an unexpected surge of imports from emission-intensive third countries. Lead markets can also mitigate the problem of carbon leakage to such third countries. This is because the certification required to enter Europe's green lead markets applies regardless of the place of production, including imports. With growing market siz, such markets also provide an increasing impetus for decarbonization in third countries.

In contrast to the currently implemented form of the Carbon Border Adjustment Mechanism (CBAM), the protective effect also extends to import competition in downstream industries, as the focus here is on the demand side of trade in basic materials. Growing European green lead markets can also be an important asset for the EU in its efforts to become an international climate club. This is because cooperation with third countries on climate policy harmonization becomes more attractive from the perspective of partner countries if it increases the prospect of participation in European growth markets. In addition to purchasing power, access to the EU's certification methodology and the prospect of future knowledge exchange in the joint development of green standards are important benefits.

At the same time, green lead markets pose a risk of conflict for the overall framework of European climate policy. This applies in particular to the relationship with the established EU-ETS. In particular, a lead market policy focused on a few specific product groups runs the risk of distorting the allocation effect of emissions trading. This is because, similar to the electricity market, emissions trading can be characterized by a merit order of production methods, in this case based on the level of marginal abatement costs. The existence of a single emissions price in competitive emissions trading leads to a solution where the necessary emissions reductions are achieved in those production facilities where technological abatement costs are lowest. Targeted demand-side promotion of green production pathways for individual commodities can change this merit order. The calculation of firm-specific abatement costs in the affected industries must also consider the increased potential for passing on parts of these costs via green lead markets. This increases incentives to invest in low-emission technologies in these industries not only in absolute terms, but also relative to other industries. The chronological sequence of climate investments therefore no longer has to correspond to the ranking of fundamental (i.e. technologically determined) abatement costs. As a result, the pattern of abatement would no longer be cost-minimizing in macroeconomic terms. However, the magnitude of such an effect is likely to be highly design dependent (see next subsection). In addition, favoring individual sectors through green lead markets may well serve macroeconomic efficiency from a dynamic perspective. This is particularly true if the green technologies in question offer high potential for future economies of scale, for example due to their low level of maturity.

From a trade policy perspective, in addition to the positive role of climate diplomacy, there is also the risk of countervailing policies by emission-intensive third countries. The risk of trade disputes is smaller than for resilience-based demand targets, such as direct discrimination against dominant trading partners. However, even with WTO compatibility being ensured, trading partners may still feel

challenged and respond with their own, potentially disproportionate, protectionist measures. This would affect the global sales prospects of domestic low-emission products, thus partially negating the desired effect of green lead markets. This risk is also highly design dependent. Moreover, like the CBAM, green lead markets do not provide a solution to a missing level playing field in export markets vis-à-vis emission-intensive countries with low climate ambition.

In general, it should be considered that the development, monitoring and compliance with green criteria, as well as the subsequent certification process, can entail significant administrative costs for companies and public authorities. In contrast to existing reporting requirements, such as those set by the Corporate Sustainability Due Diligence Directive[21] or by CBAM, the burden of documentation falls primarily on the suppliers of green inputs.

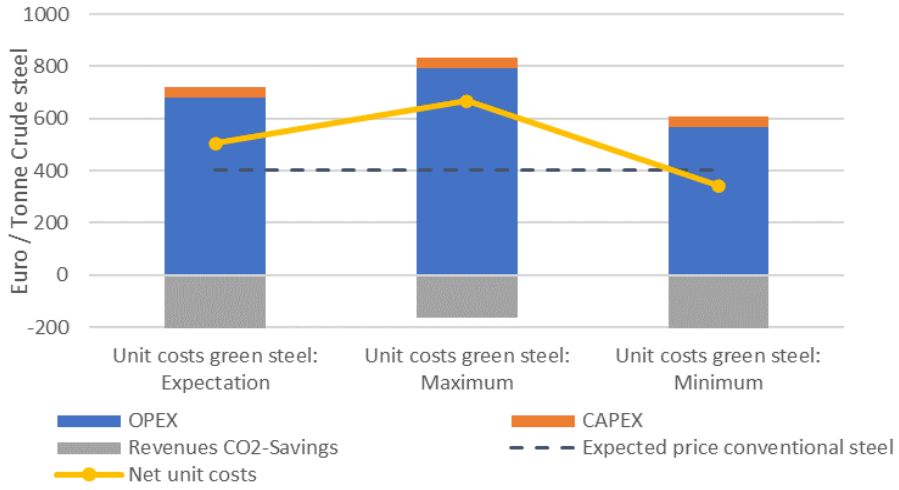
A distinction must also be made between short- and medium-term potential. In the short term, regulatory demand support could allow the first movers in a market for low-emission product to set prices that include an oligopolistic profit mark-up in addition to compensating for additional costs. This is because the delayed reaction of other producers (length of investment cycles) would mean that there would be no immediate erosion of returns as a result of market entry. In the medium term, i.e. once the effects of entry are felt, prices should nevertheless move towards a fair cost-covering level, provided that the certification criteria do not encourage the formation of monopolistic structures. The price difference between the two sub-markets will then correspond exactly to the difference in production costs (taking into account the return from CO_2 savings).

Under these conditions, quota-based green lead markets perform a similar hedging function for investors as CCfDs. Uncertainties on the cost side and price fluctuations (e.g. the price of hydrogen) can be compensated for on the revenue side by the market price, in principle for all cost components. However, technological risks in the cost development of important inputs do not disappear, but are reflected in the price premium of low-emission over conventional products, and are thus merely passed on to customers. For the example of crude steel produced through direct reduction by employing renewable hydrogen, Figure 1 gives an impression of the variability of such a mark-up estimated for the year 2030.[22] The difference to the expected price of conventional steel would be around +25% in the expected range and would reach a level of +65% in the maximum range (i.e. at the upper end of the expected price ranges for electricity and hydrogen and at the lower end for CO_2).

[21] European Union (2024c). Directive (EU) 2024/1760 of the European Parliament and of the Council of 13 June 2024 on corporate sustainability due diligence and amending Directive (EU) 2019/1937 and Regulation (EU) 2023/2859.

[22] Wolf, A. (2023). Market Instruments for a Climate-neutral Industry. cepInput No.7/2023.

Figure 1: Estimated price range of hydrogen-based steel on European green lead markets in 2030



Source: Wolf (2023).

In other aspects, the impact of green lead markets may exhibit opposing tendencies. One illustrative example is the interaction with overall economic innovation activity. Green lead markets which are constructed in a technologically open manner offer the prospect of accelerated refinancing of development costs via the green premiums generated on the market. From this perspective, green lead markets should have a favorable effect on R&D investment in climate-friendly production technologies. However, technologically narrowly defined product criteria or product criteria that generally favor certain suppliers also carry the risk of creating unwanted barriers to market entry, thereby slowing down long-term competition for the best technological solutions.

4.2.2 Specific implementation modes

From a government perspective, implementing green lead markets by adapting **public procurement rules** is the most direct way to stimulate demand and offers the most flexible options for targeted design. Hence, it is not surprising that national and European policymakers place great confidence in this instrument.

However, the effectiveness is also limited in some aspects. Firstly, the demand for goods in public procurement is determined by the legally defined public services and does not include all the sales channels relevant for emission-intensive basic materials. In any case, there would be a strong focus on the construction sector and its dominant commodities such as steel and cement. Second, the focus on public demand limits the scope for financing. Compared to supply-side investment support, other types of public funds are involved. However, the instrument does not change the fundamental one-sidedness of the burden-sharing between the public and private sectors. In addition, the fact that a significant proportion of public procurement is not at national level, but at regional and local level, can pose a problem for practical implementation. In Member States such as Germany, which have a strong federal structure and severe funding constraints at regional level, high up-front costs for green building materials could limit the scope for infrastructure investment and thus exacerbate existing public investment backlogs. This is particularly true if, in the short term, there is some degree of market dominance by individual suppliers of low-emission products (see Subsection 4.2.1), which further increases the cost of meeting sustainability criteria in the provision of public goods and services.

Another specific problem with developing lead markets through public procurement is the comparatively low cost and price transparency. The diversity of publicly procured services makes it extremely difficult to monitor the effectiveness and cost impact of green lead markets. In addition, the sustainability of production is only one of several award criteria, alongside the bid price and other qualitative criteria (e.g. compliance with collective labor agreements). Even where the weighting of individual criteria is binding, it is not necessarily transparent to the outside world what direct influence sustainability criteria have on the award decision and how this has influenced the amount of the winning bids. Strong cost pressures and limited human resources in public administrations may mean that sustainability criteria are not sufficiently considered in the practical awarding of contracts. In addition, the lack of transparency implies that such markets do not send clear price signals for low-emission products. Especially in the early stages, specific market prices are important as a benchmark for investors and financial markets.

By contrast, the promotion of green lead markets through **renewable energy support auctions** offers greater transparency. The scope is generally much more focused. In addition, funding is usually provided at national level only. This implies better control for Member States and easier monitoring compared to public procurement schemes. At the same time, they share the advantage that private downstream markets are unlikely to be significantly affected, as the use of green materials only raises the fixed costs of electricity production. Given the critical role of green technologies in the energy sector, it also makes sense to link market incentives to national ambitions for renewable energy. At the same time, however, the limited scope also limits the overall economic demand stimulus. This is particularly true as support for renewables is only partly awarded through tenders. In many Member States, small electricity producers are still subsidized through lump-sum grants or price guarantees. Moreover, tenders for supporting electricity production do not adequately cover all emission-intensive products (e.g. cement).

Among the measures to promote private green lead markets, **reliance on product certification** is generally associated with the lowest risk of distorting market allocation. This is because there is no direct intervention in price formation. Instead, reliable certification reduces barriers related to incomplete information. This can be particularly important in the context of voluntary industry commitments. Voluntary commitments by companies to purchase environmentally friendly products are a form of self-commitment that reduces information barriers and helps to mitigate the problem of time inconsistency in corporate decision-making (e.g. when there is a change of CEO). However, if they are not backed by independent and reliable green certificates, they are unlikely to create a level playing field and entail a risk of greenwashing. Publicly backed certificates can enhance the market-creating function of industry commitments by making them more credible.

Two factors are crucial for the effectiveness of voluntary climate labels: trust and willingness to pay. Consumers of certified products must be able to have confidence in the climate friendliness signalled. Tough certification criteria and a reliable monitoring system reduce the incentive for producers to cheat.[23] Under these conditions, certificates can develop a guiding effect with requirements becoming a point of orientation for all suppliers in the decarbonization of their processes and thus defining a new technology standard. The prerequisite is the widespread existence of an increased willingness to pay for green products, which allows producers to refinance the costs of the technology change as

[23] Hamilton, S. F., & Zilberman, D. (2006). Green markets, eco-certification, and equilibrium fraud. Journal of environmental economics and management, 52(3), 627-644.

early as possible. For instance, surveys show that around 30 % of electric vehicle consumers could be willing to pay more for sustainably produced car batteries[24] and that car buyers would be willing to pay a price premium of around EUR 2,000 for a 20 % reduction in the CO_2 emissions per kilometre[25].

However, empirical research also shows that the willingness to pay a "green premium" varies greatly between products and population groups.[26] For basic materials, the length and complexity of supply chains threatens to dwarf the environmental benefits of climate-friendly upstream production from the perspective of end users. For instance, the use of low-emission steel in a complex high-tech product like a car is unlikely to exert much additional attraction on car buyers, as (unlike the battery example) it is not related to critical product properties. A resulting price increase would still negatively affect demand. Relying on certification alone thus limits the capacity of green lead markets to provide clear sales perspectives.

Instead, a support scheme based on **mandatory demand quotas** creates such sales prospects by design. By requiring that quotas be met by specific downstream industries, regulators are able to steer demand towards specific green feedstocks and production pathways. This certainty would, in turn, open up opportunities for targeted exploitation of economies of scale in low-emission technologies, helping to close the price gap with conventional technologies more quickly.

However, a rigorous quota system for green base materials entails the highest cost risks for downstream industries among all discussed instruments. Especially export-intensive industries acting on competitive global markets might not be able to pass on the additional input costs to their buyers. This impairs the level playing field and thus the efficiency of downstream markets. It can also provoke evasive behaviour through production relocation or a general switch to input materials not covered by green lead market regulation. For instance, mandatory green steel quotas could induce carmakers to replace steel by aluminium for some car components. This would negatively affect exactly those sectors that are already most difficult to decarbonize, and thus limit the financing scope to combat hard-to-abate emissions. Its specificity is also likely to create the biggest distortions to the merit order of emission abatement in the EU-ETS (see previous subsection).

Introducing **tradable green demand obligations** in the form of certificates can mitigate some of the issues discussed. Downstream companies under strong cost pressure could pay companies with lower pressure to take over parts of their obligations. As the required payments will be lower than the costs of complying with the obligation, this market mechanism would reduce incentives for input substitution and limit distortion on downstream markets, while maintaining the aggregate demand effect. However, such a mechanism would further add to the regulatory complexity of decarbonization policies. It would establish another certificates market in parallel to the existing EU-ETS, with future price developments on both markets being relevant parameters for firms' decarbonization decisions. Even though both markets are connected through their joint dependence on abatement costs, their different delimitations imply that prices will not completely move in parallel, thus raising uncertainty and decision-making costs on the side of firms.

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[24] Gehlmann, F., Haustein, S., & Klöckner, C. A. (2024). Willingness to pay extra for electric cars with sustainably produced batteries. Transportation Research Part D: Transport and Environment, 128, 104110.

[25] Costa, E., Montemurro, D., & Giuliani, D. (2019). Consumers' willingness to pay for green cars: a discrete choice analysis in Italy. Environment, Development and Sustainability, 21, 2425-2442.

[26] Wei, S., Ang, T., & Jancenelle, V. E. (2018). Willingness to pay more for green products: The interplay of consumer characteristics and customer participation. Journal of Retailing and Consumer Services, 45, 230-238.

Moreover, in macroeconomic perspective, prices on markets for demand obligations can be expected to evolve procyclical, not anticyclical like prices on the EU-ETS, as an economic downturn implies a general decline in basic material demand. Avoiding such unintended procyclical effects requires a constant adjustment of the number of circulating obligation certificates (e.g. through reserve mechanisms), further raising the management costs of such a system.

Compared to the previous variants, the introduction of **carbon footprint limits** entails the advantage of higher flexibility. Unlike quota solutions, fulfilment does not require switching to low-emission solutions for specific inputs, but is targeting the input mix as a whole. This reduces regulatory complexity, as it requires policymakers only to decide on general thresholds across different inputs. The higher degree of technology openness associated with a cross-input target in comparison to input quotas also provides a wider room for innovative technologies. Moreover, provided that emission accounting in input production corresponds to the principles and boundaries applied in the EU-ETS, this instrument would not distort the merit order of abatement options in the EU-ETS. However, effectively binding carbon limits would impose a distortion on downstream markets, as some firms would be forced to cut back emissions further than expected CO_2 price levels would incentivize. Moreover, the necessity to document emissions of the whole input mix (instead of just the purchase of specific certified inputs) implies high administrative costs for downstream firms.

Finally, providing **financial demand support** to downstream companies could in principle be an effective means to create positive demand incentives. However, as it is targeted at the purchase of specific inputs, it will typically not be neutral towards the complete social set of decarbonization options. Moreover, it also affects the allocation on downstream markets, to the extent that it favours downstream producers with more input-intensive technologies. The most important distinction from other instruments targeting private demand is that it involves a direct burden on public budgets. It thus hardly contributes to a fairer distribution of the costs of decarbonizing basic materials between the public sector and downstream firms. Table 2 summarizes our evaluation scheme.

Table 2: Summary of instrument evaluation

		Short-term efficiency impact		
	Effectiveness	Allocation EU-ETS	Allocation private downstream markets	Level of transaction costs
Public auctioning				
Public procurement	High, but limited in scope			
Renewable energy support	High, but limited in scope			
Private demand				
Reliance on certification	Low to Medium			
Individual demand quotas	Medium to High			
Tradable demand obligations	High			
Carbon footprint limits	Medium			
Financial demand support	High			

		Long-term efficiency impact		Repercussions on	
	Regulatory complexity	Exploitation of scale economies	Innovation incentives	Public budgets	Supply support
Public auctioning					
Public procurement	High				
Renewable energy support	Medium				
Private demand					
Reliance on certification	Low				
Individual demand quotas	High				
Tradable demand obligations	High				
Carbon footprint limits	Medium				
Financial demand support	Medium				

Source: own representation; Categories: Negative; Slightly negative; Neutral; Slightly positive; Positive.

5 Recommendations

The previous discussion of pros and cons of different implementation options has highlighted some important aspects, which we summarize in the form of recommendations for strategic priorities in designing green lead markets.

1. Focus on a limited set of emission-intensive basic materials

Given the considerable effort required for certification and monitoring, as well as the inherent complexity of market repercussions, it is prudent to limit the implementation of green lead markets to a few economy-wide significant and historically emission-intensive basic materials, such as cement, plastic and steel. These products occupy a pivotal role at the outset of numerous industrial supply chains, and the promotion of low-emission market segments can prove instrumental in achieving a comprehensive decarbonisation of industrial production.

2. Start with gathering experience through public auctions at the national level

When choosing implementation options, priority should be given to avoiding competition risks for European downstream industries. Regulatory measures to stimulate demand should therefore initially focus on public demand. In order to better monitor implementation and to avoid a budgetary burden for regional authorities, implementation should initially take place through an adjustment of the award criteria in public auctions at the national level. To ensure a balance between the objectives of market

promotion and the preservation of financing potential for other urgent matters such as infrastructure investment, sustainability criteria should preferably be designed as award criteria only and not as mandatory pre-qualification criteria. In addition, limits should be set on the maximum level of additional costs caused by applying sustainability criteria. In addition to national public procurement, renewable energy support auctions are a particularly useful lever to synchronize the development of the market for low-emission products with the ambition to promote renewable energy.

3. Align sustainability criteria in auctions with certification methodologies

The formulation of sustainability criteria in public auctions should be closely linked to certification frameworks for low-emission production of the basic materials concerned, to ensure transparency in the evaluation. Conversely, the development of new certification methodologies should always consider their applicability as evaluation criteria in tenders. For example, when defining thresholds for environmental criteria such as emission limits, a multi-stage model is particularly useful to allow assessment on a differentiated scoring scale.

4. Develop quantitative guidelines for the medium-term involvement of private demand

To increase the pull effect of green lead markets and limit the burden on public budgets, clear roadmaps should be developed for the medium-term complementation of measures to strengthen private demand. To avoid competitive risks for downstream industries, such an expansion must be based on transparent and scientifically sound guidelines. To this end, a monitoring methodology needs to be developed that takes into account factors such as the market position of EU companies in the respective downstream segment, their export intensity and technical substitution relationships between inputs. In this context, the potential role of financial demand support to downstream industries as a way to create a level playing field should be analyzed on a market-by-market basis.

5. Combine market roll-out with intensified supply-side support

An increased focus on demand-side measures must not tempt policy-makers to neglect the development and implementation of well-designed supply policies. This concerns, firstly, the creation of framework conditions to strengthen industrial competitiveness, in particular by reducing energy costs, removing administrative barriers and strengthening innovation capacity. Second, supply-side measures are still needed to reduce regulatory investment risks in the transition phase. Again, market orientation is a prerequisite for sound regulation. In particular, auction-based CCfDs are a sensible option to reduce CO_2 price risks for investors. Combining CCfDs with green lead markets can enable a more balanced distribution of the costs and downside risks of the transformation across stakeholder groups. This avoids one-sided cost burdens and contributes to social acceptance of climate policies.

6 Conclusion

The combination of high cost pressure and policy uncertainty is severely constraining the financing options available to emissions-intensive industries in the course of their transition to low-emission technologies. Improving the investment conditions requires growth-friendly framework conditions as well as clear sales perspectives for climate-friendly products. Against this background, the new European Commission has announced to bring forward a new strategy termed “Clean Industrial Deal” within the first 100 days of its mandate. It will consist of measures complementing (and potentially adjusting) the existing Green Deal legislation with respect to the goal of strengthening competitiveness of European industries in the transition phase. Among these, the idea to raise demand for climate-friendly products, especially decarbonized basic materials, through dedicated green lead markets will play a pivotal role.

This cepInput analyses the concept of green lead markets both from a general perspective and with respect to specific implementation options. It develops and applies an evaluation methodology facilitating a conceptual discussion. It argues that the management of expected repercussions on related markets and the overall consistency with the climate policy framework are crucial parameters for the success of green lead markets. This speaks for a targeted and risk-oriented application strategy. In particular, in the current stage characterized by major upheavals on global markets, cost risks for downstream industries should be minimized. An initially limited and gradual implementation of demand-side measures is therefore recommendable. It should first focus on introducing new sustainability criteria in public procurement and renewable energy support schemes, exploiting the demand-pull potential of public auctions. These should be well aligned with current initiatives to develop certification methodologies for climate-friendly basic material production. In the medium-term, this should be complemented by well-dosed regulation to strengthen private demand. This requires already now the development of transparent guidelines for assessing the cost sensitivity of downstream industries and markets, as well as innovative instruments to lower their cost risks. To ensure consistency with the principles of the internal market, the European Commission should push for a homogeneous application across Member States. Given the unequal financing restrictions across Member States, this will further nourish the debate on a future European Competitiveness Fund.

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