EUI SCHOOL OF TRANSNATIONAL GOVERNANCE

STG Policy Papers

POLICY BRIEF

OPTIONS TO FINANCE THE PREMIUM COST OF CLIMATE-NEUTRAL PRODUCTS IN THE EU
THE POTENTIAL OF THE ETS AND DEMAND CREATION

Authors:

Jos Delbeke, Christian Egenhofer and Rebecca Lamas

School of Transnational Governance

ISSUE 2022/16
JUNE 2022

EUI SCHOOL OF TRANSNATIONAL GOVERNANCE

EXECUTIVE SUMMARY

Materials such as cement, steel and chemicals can account for up to 90% of CO_2 emissions in key value chains and industries, such as electronics, construction, automotive, food and fashion. To meet climate targets, it is necessary to develop and deploy new breakthrough technologies that can ultimately transition the supply chain towards climate-neutral production and products. As has been recognised by the European Green Deal, the market for climate-neutral materials offers growth opportunities for European industry, and the opportunity to attract a bigger share of the global clean-tech growth capital. For this to happen, Europe needs robust tools to close the cost gap.

This Policy Brief proposes two immediate measures that can address the cost gap by generating additional revenue streams: i) turning EU ETS free allocation into innovation funding, for example by including climate-neutral products in the ETS or putting EU ETS Allowances from free allocation into a Climate Investment Fund and ii) creating informed demand and ambitious timelines for climate-neutral products. Both policy tools are available to be implemented within a short time.

Authors:

Jos Delbeke | EIB Climate Chair, EUI School of Transnational Governance
Christian Egenhofer | Senior Research Associate, EUI School of Transnational Governance & Associate Senior Research Fellow, CEPS
Rebecca Lamas | Research Associate, EUI School of Transnational Governance

1. INTRODUCTION

Climate-neutral[1] materials are indispensable to achieve climate targets. Materials (i.e cement, steel and chemicals) can account for 77% to 90% of CO_2 emissions in key value chains and industries, such as electronics, construction, automotive, food and fashion. Societies are increasingly interested in starting and accelerating the transition towards climate-neutral materials, are often willing to purchase more sustainable goods and are ready to pay for a 'green premium'[2] increment.

To do so, it will have to develop and deploy new breakthrough technologies that can ultimately transition the supply chain towards climate-neutral production and products. The war in Ukraine makes it even more urgent to accelerate the green energy transition in view of reducing Europe's dependence on fossil fuel imports.

The EU is intent on playing a leading role in this transition, both from a climate and economic perspective. After a decade of successful support for low-carbon innovation (i.e. via the EU Horizon R&D programmes, the EU Innovation Fund and Member State actions), climate-neutral technologies are known and are increasingly becoming ready to be deployed at scale. The energy-intensive and materials industry is experimenting with transformative technologies, such as steel production with green hydrogen; use of bio-based or recycled plastics as feedstock to produce chemicals; chemical recycling; new types of cement and concrete; and carbon captured from industrial processes to be stored permanently or reused to make high-value products, among others. Investment in climate-neutral materials such as steel, cement, chemicals and green hydrogen represent an economic opportunity for European industry - the EU's Industrial Strategy highlights the importance of tapping into the growing market[3] for these products.

Over the last three years, more than 70 climate-neutral industrial projects[4] have been identified. However, final investment decisions are still pending for almost all announced projects. What is still required is the necessary framework conditions so that those technologies can be brought to real-world operation at an industrial scale, enabling regulation, infrastructure (e.g. carbon storage sites) and financial support. Novel approaches, tools, and procedures are currently being considered to allow early movers to compensate for the initial cost penalty ('green premium') of new breakthrough technologies, until the technology becomes mature and competitive. Equally, policy-makers are looking into novel ways of creating demand for climate neutral products.

The EU policy and regulatory framework is being tackled in the context of the Fit for 55 package, notably the ETS reform (benchmarks and scope revision) and the proposed Carbon Border Adjustment Mechanism (CBAM). In addition, Member States are considering the use of Carbon Contracts for Differences (CCfDs) to cover the cost gap to comparable high carbon products[5] and to de-risk the projects. Several Member States including the Netherlands, France and Germany have used this instrument or are considering using it.[6] CCfDs could also be funded through the EU or a national fee could be imposed on basic materials such as steel, cement, chemicals and/or hydrogen.[7]

1 Climate neutral industrial products means i) zero GHG emission energy for all industrial/manufacturing processes, ii) zero emission raw materials and feedstock (- e.g. necessary carbon no longer coming from oil or other fossil sources), iii) as low as economically viable process emissions, and CCUS for any residual emissions, iv) as low as possible emissions after the end of material/product life, incl. via as high as economically viable re-use/recycling/upcycling, or v) developing novel products/materials that can store carbon that has been removed from the atmosphere – as permanently as possible.

2 This can relate for example to higher production costs or high upfront costs of building industrial production facilities.

3 Estimated to amount to an annual market of EUR 100 billion by 2030 (Material Economics 2022, p. 15). According to Cleantech Group (2021), EU cleantech scale-ups only attract 6.9% of global cleantech growth capital (compared to 32% for Asia, 54% for North America, and 4.8% for the UK).

4 Material Economics (2022) reports that most major steelmakers (ArcelorMittal, Liberty Steel, Salzgitter, Tata Steel, ThyssenKrupp, and Voestalpine) have launched initiatives, with 20 projects now underway across Europe. Europe is also witnessing first new entrants in decades, including the start-up H2Greensteel and LKAB. This comprises sector collaborations with electricity generators entering the supply of hydrogen, or car manufacturers investing in steel production or agreeing to long-term offtake of "green" steel. The Italian metals and mining technology company Tenova is starting to develop similar projects in China and beyond, the world's first industrial-scale carbon capture and storage (CCS) project at a cement production plant is set to open at Norcem's site in Brevik, Norway, in 2024. For details, see Material Economics (2022).

5 With a carbon contract for difference, a desired carbon price for investments can be decided ex ante, with the issuer of the CCfD (e.g., a government, or an institution delegated by the European Commission) paying out the difference between the 'strike price' and the actual carbon price (or alternatively, the recipient refunding the payment if the actual carbon price exceeds the agreed strike price).

6 See for example Sartor and Bataille (2019). EU CCfDs under the EU budget, also currently explored would equally require adaptation of budgetary rules, i.e. the EU budget. Most likely EU CCfDs would require consent by all member states (or possibly even unanimity).

7 For more details, see Johnsson and Rootzén (2021) and Neuhoff et al (2019).

While many of these ideas are promising, they all have a common factor: they may take time to be implemented. Several challenges will still need to be addressed before CCfDs can become operational at scale. This includes the required compatibility both with EU State aid rules and the WTO. In addition, rules of public budgets will very likely need to be adapted. For example to date, government budgets tend to be prohibited from taking on unspecified liabilities, which would be the case for CCfDs.[8] Adding extra subsidies to existing free allocation or other innovation support may raise political issues related to distributional effects of climate policy.

As the new policy framework will take time to evolve, two immediate measures can address the cost gap by generating additional revenue streams: turning EU ETS free allocation into innovation funding, for example by including climate-neutral products in the ETS or putting EU ETS Allowances (EUAs) from free allocation into a Climate Investment Fund and creating informed demand and ambitious timelines for climate-neutral products. Both can be agreed in the coming months and can be implemented within a few years.

2. TURNING EU ETS FREE ALLOCATION INTO SUPPORT FOR CLIMATE-NEUTRAL INNOVATION

It has been estimated that companies are facing a 'green' cost premium, which may well amount to the equivalent of up to €100 – €200 per tonne of CO_2. As first-of-a-kind projects proliferate and are replicated, the cost gap is expected to decrease fast. Discrepancies concerning this cost gap continue to exist. Material Economics estimates the cost gap for Europe as a whole at around €4–6 billion per year by 2030. This would be a moderate amount in comparison to subsidies which, for example, in the EU27 in 2018, amounted to around €50 billion for fossil fuels, around €15 billion for biomass, while renewable energy sources benefitted from almost a trillion euro in somewhat over a decade since the beginning of the renewables 'revolution'.[9] DECHEMA, in a study for the European chemical industry, estimates a need of between €20 to €27 billion per annum until 2050 to achieve climate neutrality by 2050.

The EU and Member States are exploring de-risking mechanisms (i.e. loan and credit guarantees) as well as tools to leverage private capital such as transition loans, venture capital, Capex grants, but also advisory services to enable a more favourable capital structure. At a CO_2 price of €60-90 per tonne, with full carbon costs pass-through as a result of the CBAM, some climate-neutral technologies are already becoming competitive. Others will benefit from costs decreases because of large-scale deployment for which initial policy support is needed.

2.1 Avoiding future carbon leakage depends on climate-neutral technologies

The EU will distribute free ETS allowances worth more than €200 billion over the next two decades. From 2024 to 2030 alone, this may amount to €180 billion (at a price of €60/t CO_2). Free allocation exists to mitigate carbon leakage risk and is seen to have worked well;[10] nevertheless current rules can put innovative climate-neutral producers at a disadvantage vis-à-vis the carbon-intensive incumbents with which they compete.

Addressing carbon leakage in the future will depend more and more on how successful European industry will be on deploying climate-neutral technologies. Unduly supporting existing plants in Europe that are efficient while using high-carbon technology and thereby crowding out new climate-neutral investments will inevitably lead to higher emissions than would be the case if replaced by climate-neutral technologies.

To date, the system of free allocation is not directed to support climate-neutral

8 The level of subsidy the government signs up by using CCfDs depends on the market price that the commodity will fetch on the global market. Hence, governments' commitments at the moment of the CCfD agreement are unknown and can vary significantly with price changes in the global commodity markets.
9 Numbers are taken from or calculated on the basic of European Commission (2020), Energy costs, taxes and the impact of government interventions on investments. Final Report Summary. Written by Trinomics.
10 To determine how many allowances each installation receives, a set of rules based on historical production levels and technical product benchmarks are used. The benchmarks are based on the 10 % most efficient installations.

production. The most efficient producers in relative terms, can still be carbon-intensive in absolute terms. New investments for manufacturing climate-neutral products need to compete with incumbents. Since some benchmarks are based on specific production processes (scope), changing and investing in a new, climate-neutral process can result in free allocation being reduced for the new investment. As explicitly recognised in the ETS revision proposal, an installation not emitting any CO_2 emissions – including intermediate products – does not receive free allocation as it no longer falls within the boundaries of the EU ETS. What results from this situation is that climate-neutral producers find themselves at a competitive disadvantage. As a consequence, the 'green' cost gap widens, which can only be closed by a significantly higher carbon price or subsidies from other sources.

2.2 Creating a revenue stream for climate neutral investments

To ensure a reward for investments in line with climate neutrality, the idea of a 'zero-carbon benchmark' under the ETS was proposed.[11] Under this concept, climate-neutral installations would have to be included in the scope of the EU ETS directive and would receive additional free EUAs, to (partly) cover their investment costs, for example by applying a multiplication factor to existing benchmark values (e.g. 1.5 or 2.0).[12] Every tonne of climate-neutral goods produced would be rewarded by this higher benchmark.[13] Not all allowances would be allocated via zero-carbon benchmarks. Some free allowances would be kept to continue to address carbon leakage risk. The cross-sectoral correction factor would ensure that the overall number of free allocations is not increased but more emphasis would be put on those sectors that are most at risk of carbon leakage.

Rewarding climate-neutral production can be done in different ways. First, the definition of a climate-neutral benchmark applicable to steel, cement, fertilizer installations or green hydrogen would have to be defined, as benchmarks are already envisaged under the proposed CBAM. These could have the benefit of being defined in a technology neutral manner. NACE[14] codes or the UN equivalent[15] product categories could be the basis for such new product-focused benchmarks – only benchmarks for those products that are at risk of carbon leakage would have to be set, which would reduce the total number of benchmarks to a manageable level. Such an approach however does not yet incentivise the substitution of one product category by another. Other tools, for example in the framework of the Sustainable Product Initiative (SPI), will be required.

This change to the ETS free allocation could possibly be further developed on the basis of the European Commission's ETS revision proposal related to paragraph 12 ii,[16] which proposes 'potentially modifying the definitions and the system boundaries of existing product benchmarks' for the period 2026-2030. This has been promoted by parts of the European Parliament[17] by taking up the idea of rewarding more stringent GHG reductions through a bonus-malus system and conditionality of free allocation in the context of climate neutrality. A discussion paper by the Swedish Environmental Protection Agency, goes in the same direction, proposing (as one of five options) to align free allocation to climate neutrality by a set of new product benchmarks such as for steel, cement or hydrogen. Producers that fall under these benchmarks and meet a certain benchmark value, would receive more free allowances than traditional existing producers as reward for innovation.

11 This section of has been developed on the basis of the work of and in collaboration with Milan Elkerbout. See for details Elkerbout (2022).
12 See also Zetterberg, Elkerbout & Egenhofer (2021)
13 Ultimately, the CBAM will reduce free allocation; this will ensure carbon cost passthrough and allow Member States to auction allowances, generating substantial revenues. However, many sectors may be excluded from this new mechanism at first, while transitional periods also result in continued free allocation to many industry sectors, including materials.
14 PRODCOM codes (which are based on NACE codes) may be even more suitable as they provide for a high level of disaggregation (up to 8 digits/levels) which may be desirable for complex sectors such as chemicals.
15 CN codes: https://ec.europa.eu/taxation_customs/business/calculation-customs-duties/customs-tariff/combined-nomenclature_en
16 "In order to provide further incentives for reducing greenhouse gas emissions and improving energy efficiency, the determined Union-wide ex-ante benchmarks shall be reviewed before the period from 2026 to 2030 in view of potentially modifying the definitions and system boundaries of existing product benchmarks.", See Euroopean Commission Proposal to amend Directive 2003/87/EC, Brussels, 14.7.2021 COM(2021) 551 final, 14.7.2021, p. 46.
17 Liese Report of 24.1.2022, 2021/0211(COD) in amendement 13 that refers to recital 29 of the EU ETS preamble; In amendment 56, the Liese Report, introduced in the Europen Commission Proposal in Directive 2003/87/EC Article 10a – paragraph 1 – subparagraph 2a also introduces; including intermediate targets.

To channel free allocation into innovation, the following three options to finance the green premium have received political attention.

Climate Investment Fund

The first is the Climate Investment Fund, which would be a successor to the ETS Innovation Fund. With the ETS price having risen significantly and a greater volume of ETS allowances made available, this fund would be considerable in size, easily surpassing €100 billion. A fund of such a size comes with responsibility for those who decide how the money is spent. The governance of the fund would therefore be critical. An important success factor would also be how much the fund's support would make projects bankable.

Scope of Benchmark

A second issue is the scope of the benchmarks. Today, some of the most important benchmarks in terms of GHG emissions covered are based on specific industrial processes, not products or sectors. Some climate-neutral production methods are wholly different from past processes, even if they result in the same product, e.g. steel or cement. It is important that the scope of the benchmark captures the full potential for decarbonisation of products and sectors, not of individual processes. A Swedish non-paper proposes[18] a voluntary opt-in.

Investment bonus and the Cross-Sectoral Correction Factor

A third issue is the potential bonus given to low-carbon producers. It has been proposed that any producer beating the benchmark will get a small bonus (10%) in extra allowances. An alternative is to give a larger bonus, but only if producers are (very close to) climate-neutral. Giving some producers extra free allowances might mean that the overall volume of free allocation increases. The cross-sectoral correction factor can ensure that a politically determined volume is not exceeded. If this cross-sectoral correction factor is not applied to producers beating the benchmark, the impact will be greater for producers not beating the benchmark, who will then receive fewer allowances. This creates a dynamic redistribution from carbon-intensive to low-carbon producers.

The policy discussion on free allocation, will be greatly facilitated through the definition of a simple and clear benchmark of what precisely is meant by climate-neutral steel, cement or green hydrogen. Discussions are already emerging. For example, in the context of the green taxonomy, green hydrogen was defined as hydrogen below the benchmark of 3kg of CO_2 per kg of hydrogen. Even if the discussion on benchmark values is continuing, it gives clear and simple guidance. As such, defining relatively simple zero-carbon steel, cement or other material benchmark values, could be considered.

The benefit of such clear and simple benchmarks is that they could serve not only in the context of free allocation, but also other policies such as the CBAM, state aid, the green taxonomy and the related disclosure of carbon emissions, thereby creating a coherent approach across all policies.

3. CREATING DEMAND FOR CLIMATE NEUTRAL PRODUCTS

The described level of public support will indeed be needed until a competitive green market is created. In the meanwhile, initiatives – private and public – emerge to create demand for climate-neutral technologies. Companies in automotive, packaging, construction and other sectors have reported that the additional cost of the final products they put on the market, even those that are fully decarbonised, can be relatively small. In some proven cases, just 1 to 2% increases on the 2030 sales price are being anticipated, provided that the power and energy sectors are nearly fully decarbonised.[19] For Sweden where the power sector is near-zero carbon, a 1% production cost increase was estimated for a residential building when

18 Government Offices of Sweden, Ministry of the Environment (2022), "Swedish Amendments: Low and Zero Emission Installations in EU ETS", Memorandum 28 April 2022 M2022

19 See Material Economics (2022).

using low-carbon cement.[20] The same order of magnitude seems to hold for steel, as for example, a car using green steel. To cover the projected increases in steel production costs, the retail price of a mid-sized European passenger car would go up by approximately €100–125, i.e., less than 0.5% (at a carbon price of 100 €/tCO_2).[21]

Policy can support this nascent market by aiming for 'green' materials production by 2030. This will require tools that define and differentiate green, breakthrough materials in a reliable manner and therefore would allow for a market premium to be earned, enabling the covering of the cost gap related to their production. At the same time, one can think of public and private initiatives that drive demand for low-CO_2 materials, such as the limits for CO_2 content of construction materials now being introduced by some European countries.

3.1 Greening Procurement

The most concrete policy tool is **public procurement,** for example, by adding a carbon content or circularity requirement in the procurement specification.[22] An example for the potential of public procurement is the Belgian Railway Infrastructure company procuring "green" sleepers made of concrete based on sulphur, which are fully recyclable. There is also the French labelling scheme or the Environmental Cost Indicator (ECI) shadow pricing model, while in the Netherlands, we find examples of how green public procurement can drive low carbon solution in construction. However, the complexity of the instrument should not be underestimated. Aligning the interests of different layers of government, conflicting business interests and the high administrative burdens may constrain the widespread use of the instrument.[23]

A bigger demand could possibly be generated by **private procurement initiatives.** A plethora of voluntary commitments is being undertaken by mainly large corporations committed to scope three climate neutrality targets such as Microsoft, Volkswagen, Apple, Volvo[24] and many others.

The European Commission's Sustainable Product Initiative (SPI) goes in this direction. It covers final products, going beyond the production of basic materials or basic material components. According to the proposal, each life cycle phase impact will be accounted as kg CO_2, with the aim of bringing simplicity and harmonisation on single metrics and accounting.[25] Green claims will need to be substantiated. If successful, a harmonised EU approach could potentially make redundant the more than 100 labels that to date are actively used in the EU.[26]

In order to create greater demand, another step will be required: setting performance standards (benchmark values), for example by defining what is 'green' and what is 'climate-neutral'.[27] This is a precondition to speed up investment, avoid greenwashing, and incentivise early movers.

3.2 Sector-specific policies

More demand may come from sector-specific policies, for example in construction. In the buildings sector somewhere between 10-20% of the EU emissions derive from the production of building materials, construction,

20 This is based on a detailed analysis by Rootzén and Johnsson (2016) which analyse differnet value and materials flow as well as technology pathways and carbon costs. Allocating costs of CO2 abatement to the end-users (of cement) would neither alter the cost structure nor increase overall project costs significantly.

21 See Rootzén and Johnsson (2016).

22 The present EU legal framework for public procurement is underpinned by two EU directives that open the way for the inclusion of environmental and social objectives in government tender requirements, although they do not include any mandatory provisions on GHG emissions or resource efficiency/circularity.

23 See Kadefors et al., 2021; Núñez Ferrer, J. 2020

24 Microsoft has declared in January 2020 to be carbon negative by 2030, and to remove by 2050 'from the environment all the carbon the company has emitted either directly or by electrical consumption since it was founded in 1975' including those from 'direct emissions and for … entire supply and value chain'. In July 2020 Apple committed to become 'carbon neutral for its supply chain and products by 2030', i.e. 'across its entire business, manufacturing supply chain, and product life cycle'. According to Apple, this means 'that by 2030, every Apple device sold will have net zero climate impact.' As to materials, non-ferrous metals, in 2018 Apple announced a joint venture with aluminium company Alcoa Corporation and Rio Tinto Aluminium to commercialize patented technology that eliminates direct greenhouse gas emissions from the traditional smelting process, a key step in aluminium production. Similarly, companies such as Volvo or Volkswagen have committed to procure green. ArcelorMittal is offering so-called 'green steel certificates' with guaranteed Scope 3 emissions reductions from recycled and renewably produced products.

25 Sustainable Product Initiative - proposal for a regulation COM(2022)142 30 March 2022, page 4

26 According to the European Commission currently 457 voluntary environmental labels exist worldwide Sustainable-products-initiative-Special-Report.pdf (euractiv.eu)

27 For example, for the case of buildings, those cap references could be added as CO2 kg/sqm for each key type of building (I.e., residential, commercial, industrial, etc), targeting a cap for new buildings by 2030 (light green), 2040 (dark green) and eventually climate-neutral buildings by 2050 within i.e., the EPBD or the SPI (having buildings as a product).

renovation, and demolition processes – the so-called building´s embodied carbon. As European buildings become more energy efficient, emissions from embodied carbon will increasingly become more important. In Denmark where the housing stock is already highly efficient, "up to 75% of buildings' CO2 emissions are embodied emissions".

Yet it is still rare that governments focus on embodied carbon. In the EU to date, only five countries regulate "whole-life carbon emissions, addressing both operational and embodied emissions": Denmark, Finland, France, the Netherlands and Sweden. "Only 5 EU countries – Sweden, Denmark, France, Finland, and the Netherlands – have introduced regulation on whole-life carbon emissions, addressing both operational and embodied emissions". The European Commission's revised proposal for an Energy Performance Building Directive (EPBD) only requires Member States to account whole-life carbon for new buildings from 2030 onwards and completely disregards capping new buildings' embodied carbon footprint. The same limitation is encountered in the EU Green Taxonomy, which only looks at carbon footprint accounting of large buildings[28].

4. CONCLUSIONS

To date, EU climate policy combined with innovation support - both by the EU and Member States - has successfully helped industry in Europe to develop climate-neutral technologies. Many of these technologies are already proven and tested as pilots. These technologies are now being brought to industrial scale, for example as first-of-a-kind projects, but they still require an important level of initial public support. As more such investments are being deployed and technologies mature, public support can be gradually reduced. Nevertheless, for European Industry to remain globally competitive in the long term, a technology-neutral business environment is required, based on horizontal regulation, carbon pricing and appropriate infrastructure for low-carbon electricity and hydrogen, CO_2 transport and storage or re-use and recycling facilities.

For the time being, climate-neutral breakthrough technology investments need financial support, in addition to suitable regulation and investment in energy and other infrastructures. The proposed Climate Investment Fund would generate such a revenue stream. An additional option is to provide innovative companies with additional free EU ETS allowances (EUAs). For this to happen, a small number of additional product benchmarks would need to be set. This would allow innovating companies to opt into the ETS and to overcome the disadvantage that climate-neutral producers face in not receiving any allowances. A further incentive could be a bonus to climate-neutral producers in line with their emissions reductions and/or exempt them from the application of the cross-sectoral reductions factor. These options on their own or in combination have the double effect of both supporting innovators and avoiding that free allocation to existing efficient, yet still high-carbon intensive installations do not crowd out new climate-neutral investments. This may be particularly important for green hydrogen, a key technology for climate-neutral innovation.

A share of free allocation can still be used for protection against carbon leakage, at least for those sectors that are not part of the CBAM. This gradual shift of ETS free allocation to the benefit of climate neutral investments could be implemented starting with a political decision in the course of 2023 in the context of the Fit for 55 EU ETS reform, with secondary legislation being put in place by 2025.

A second fast-track measure is to leverage demand for low-carbon or climate-neutral products. On the one hand, corporations' climate targets can be expected to generate demand for climate-neutral materials - just the same way as it did and still does for renewable energy, for example, under the RE100 initiative, where large corporations are sourcing renewable energy without a regulatory obligation. On the other hand, demand for climate-neutral materials can also be stimulated

28 For buildings larger than 5000 m2, the life-cycle Global Warming Potential (GWP)286 of the building resulting from the construction has been calculated for each stage in the life cycle and is disclosed to investors and clients on demand. Construction of new buildings - EU Taxonomy Compass | European Commission (europa.eu)

by public procurement or government regulation that defines carbon footprint performance targets. A recent example of the latter are the embodied carbon footprint benchmarks for buildings - currently being proposed or implemented by Sweden, Denmark, France, Finland, and the Netherlands. A reliable and transparent carbon accounting framework is a significant help to give assurance to regulators and confidence to investors that the claimed carbon reductions are credible. In this way demand for climate-neutral materials will be generated and allow for an additional revenue stream for investing in climate-neutral products and production. Payments for a 'green premium' will materialise and through an increasing market size, potentially a *de facto* climate-neutral standard for products will emerge.

REFERENCES

Agora Energiewende (2020): "A Clean Industry Package for the EU: Making sure the European Green Deal kick-starts the transition to climate-neutral industry"

Cleantech Group (2021), "Seizing the EU's man of the moon moment". Cleantech for Europe.

DECHEMA (2017), "Low-carbon energy and feedstock for the European chemical industry". DCHEMA Technology Study, 2017

Elkerbout, Milan (2022), "Can ETS free allocation be used as innovation aid to transform industry?", CEPS Policy Brief 2022-1, January

Government Offices of Sweden, Ministry of the Environment (2022), "Swedish Amendments: Low and Zero Emission Installations in EU ETS", Memorandum 28 April 2022 M2022

Fossil Free Sweden (2020), "Roadmaps for fossil free competitiveness".

Johnsson and Rootzén (2021), "A transition fund to foster deep emissions cuts in the basic materials industry," in: Zetterberg, Lars, Filip Johnsson, and Helena Larsson (eds), *Accelerating the Climate Transition – Key messages from Mistra Carbon Exit,* November 2021, pp. 46/4

Kadefors, A., Lingegård, S., Uppenberg, S., Alkan-Olsson, J., and D. Balian (2021), "Designing and implementing procurement requirements for carbon reduction in infrastructure construction–international overview and experiences", *Journal of Environmental Planning and Management,* 64(4), 611-634.

Neuhoff, K., Chiappinelli, O., Gerres, T., Haussner, M., Ismer, R., May, N., Pirlot, A., Richstein, J. (2019), "Building blocks for a climate-neutral European industrial sector". Climate Strategies report (https://climatestrategies.org/wp-content/uploads/2019/10/Building-Blocks-for-a-Climate-Neutral-European-Industrial-Sector.pdf)

Núñez Ferrer, J. (2020), ''The EU's Public Procurement Framework - How is the EU's Public Procurement Framework contributing to the achievement of the objectives of the Paris Agreement and the Circular Economy Strategy?'', Briefing Requested by the IMCO committee, European Parliament.

Material Economics (2022), "Industrial Transformation 2050", Material Economics, Stockholm

Rootzén, J. and F. Johnsson (2016), "Paying the full price of steel - Perspectives on the cost of reducing carbon dioxide emissions from the steel industry, *Energy Policy*, Vol. 98, pp. 459-469.

Rootzén, J. and F. Johnsson (2017), ''Managing the costs of CO2 abatement in the cement industry'', *Climate Policy,* Vol. 17, pp. 781-800.

Sartor, O. and C. Bataille (2019), "Decarbonising basic materials in Europe: How Carbon Contracts-for-Difference could help bring breakthrough technologies to market", IDDRI Study No 6 October 2019 (https://www.iddri.org/sites/default/files/PDF/Publications/Catalogue%20Iddri/Etude/201910-ST0619-CCfDs_0.pdf)

Wharton University (2021), "The state of consumer spending – Gen Z influencing all generations to make sustainability-first purchasing decisions", First Insights, June

World Economic Forum – In Collaboration With Boston Consulting Group (2021). "Net-Zero Challenge: The supply chain opportunity", INSIGHT REPORT, January

Zetterberg, Lars, Milan Elkerbout and Christian Egenhofer (2021), 'Next steps for the EU ETS – the role of free allocation needs and overhaul ', in: Zetterberg, Lars, Filip Johnsson, and Helena Larsson (eds), *Accelerating the Climate Transition – Key messages from Mistra Carbon Exit,* November 2021, pp. 39-41

The School of Transnational Governance (STG) delivers teaching and high-level training in the methods, knowledge, skills and practice of governance beyond the State. Based within the European University Institute (EUI) in Florence, the School brings the worlds of academia and policy-making together in an effort to navigate a context, both inside and outside Europe, where policy-making increasingly transcends national borders.

The School offers Executive Training Seminars for experienced professionals and a Policy Leaders Fellowship for early- and mid-career innovators. The School also hosts expert Policy Dialogues and distinguished lectures from transnational leaders (to include the STG's Leaders Beyond the State series which recorded the experiences of former European Institution presidents, and the Giorgio La Pira Lecture series which focuses on building bridges between Africa and Europe). In September 2020, the School launched its Master-of-Arts in Transnational Governance (MTnG), which will educate and train a new breed of policy leader able to navigate the unprecedented issues our world will face during the next decade and beyond.

The STG Policy Papers Collection aims to further the EUI School of Transnational Governance's goal in creating a bridge between academia and policy and provide actionable knowledge for policy-making. The collection includes Policy Points (providing information at-a-glance), Policy Briefs (concise summaries of issues and recommended policy options), and Policy Analyses (in-depth analysis of particular issues). The contributions provide topical and policy-oriented perspectives on a diverse range of issues relevant to transnational governance. They are authored by STG staff and guest authors invited to contribute on particular topics.

School of Transnational Governance
European University Institute
Via Camillo Cavour 65, Firenze, FI 50129
Email: stg.publications@eui.eu

www.eui.eu/stg

Co-funded by the
Erasmus+ Programme
of the European Union

The European Commission supports the EUI through the European Union budget. This publication reflects the views only of the author(s), and the Commission cannot be held responsible for any use which may be made of the information contained therein.

doi: 10.2870/441061
ISBN:978-92-9466-227-9
ISSN: 2600-271X
QM-BA-22-016-EN-N