

2030 climate target plan: extension of European Emission Trading System (ETS) to transport emissions



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Abstract

The proceedings summarise the expert presentations and discussions of the workshop on the extension of the EU ETS to transport emissions. The workshop served to prepare the ENVI Committee for the upcoming legislative “Fit for 55” package of proposals, as part of the European Green Deal. The presentations focused on options and implications of the future inclusion of road transport, shipping and aviation in the EU ETS.

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CONTENTS

LIST OF FIGURES	5
LIST OF TABLES	5
LIST OF ABBREVIATIONS	6
EXECUTIVE SUMMARY	7
1. INTRODUCTION	9
2. EXTENSION OF EMISSIONS TRADING TO ROAD TRANSPORT	10
2.1. Technical background	10
2.1.1. Main design options for integrating road transport into the EU ETS	10
2.1.2. Impacts on emissions from road transport	12
2.1.3. Social impacts, especially between Member States	12
2.2. Presentation and discussion	13
2.2.1. Summary of the presentation	13
2.2.2. Summary of the discussion	14
3. EXTENSION OF EMISSIONS TRADING TO SHIPPING	16
3.1. Technical background	16
3.1.1. Existing regulation focussing on the European level	16
3.1.2. Main design options for a maritime ETS	16
3.2. Presentation and discussion	18
3.2.1. Summary of the presentation	18
3.2.2. Summary of the discussion	19
4. AVIATION IN EMISSIONS TRADING	21
4.1. Technical background	21
4.1.1. Main design options	21
4.2. Presentation and discussion	23
4.2.1. Summary of the presentation	23
4.2.2. Summary of the discussion	23
5. IMPACTS ON THE EU ETS	25
5.1. Technical background	25
5.1.1. Abatement costs	25
5.1.2. Size of the sectors	25
5.1.3. Allowance shortage in the sector and year of inclusion	26
5.1.4. Interactions with the market stability reserve in the stationary ETS	27
5.1.5. Impact on prices	27

5.2. Presentation and discussion	27
5.2.1. Summary of the presentation	27
5.2.2. Summary of the discussion	28
WORKSHOP PROGRAMME	30
WORKSHOP PRESENTATIONS	31
SPEAKERS BIOGRAPHIES	31
THE RECORDING OF THE WORKSHOP	31
REFERENCES	32

LIST OF FIGURES

Figure 1:	Disposable income distribution and impact of CO ₂ expenditure on median income in different EU Member State groups)	12
Figure 2:	Overview of the modules (in circles) of the E3ME:FTT model and their interactions	14

LIST OF TABLES

Table 1:	Allowance prices in the stationary sector, primary auctions of EUAs	25
Table 2:	Emissions in the EU ETS, maritime and road transport (Mt CO ₂ eq.)	26

LIST OF ABBREVIATIONS

AEA	Annual emission allocations
CII	Carbon Intensity Indicator
CH₄	Methane
CO₂	Carbon dioxide
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
EEA	European Environment Agency
EEDI	Energy Efficiency Design Index
EEXI	Energy Efficiency Existing Ship Index
EP	European Parliament
EU	European Union
EUA	EU allowances
EU ETS	EU Emissions Trading System
GHG	Greenhouse gas
GWP	Global warming potential
ICAO	International Civil Aviation Organization
IMO	International Maritime Organization
MEP	Member of the European Parliament
MRV	Monitoring, reporting and verification
MSR	Market Stability Reserve
NDC	Nationally Determined Contribution
NO_x	Nitrogen oxides
R&D	Research and Development
SAF	Sustainable aviation fuels
SEEMP	Ship Energy Efficiency Management Plan
TNAC	Total number of allowances in circulation
UNFCCC	United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY

Background

As part of the preparation for increasing the EU's climate ambition in line with the European Green Deal and the enhanced national determined contribution (NDC) of the EU under the United Nations Framework Convention on Climate Change (UNFCCC), the Commission published the Climate Target Plan in September 2020. Among the proposals for revisions of relevant legislative measures to deliver on the increased climate ambition is the review of the Emissions Trading System (ETS) and its extension to the transport sectors.

Aim

In preparation for the upcoming discussion in the European Parliament, the Policy Department for Economic, Scientific and Quality of Life Policies organised for the committee on Environment, Public Health and Food Safety a workshop on the design options for an inclusion of road transport, shipping and aviation in the EU Emissions Trading System (EU ETS) in a manner that contributes to achieving the ambitious climate targets set by the EU. The event included four expert presentations:

- Dr. Dora Fazekas, Managing Director, Cambridge Econometrics, Hungary, presented the results of the economic modelling study on the inclusion of the road transport and building sectors in the EU ETS.
- Mr. Jasper Faber, CE Delft, the Netherlands, gave an overview of policy measures planned or in place for the shipping sector and detailed how the possible inclusion of shipping in the EU ETS fits in the overall policy context.
- Dr. Janina Scheelhaase, DLR, Germany, presented the current state of aviation in the EU ETS and of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).
- Mrs. Verena Graichen, Oeko-Institut, Germany, presented policy options on ways to include the transport sectors in the EU ETS and the expected impacts of the different options on stationary installations already covered by the scheme.

Main discussions

The EU ETS currently covers the emissions of large stationary installations and aviation emissions from intra-European Economic Area/European Free Trade Association flights. With the increased EU climate ambition, the scope might be extended to further sectors including road transport and shipping.

The current scope of the aviation ETS is valid until the end of 2023. One of the main issues to be decided in the "Fit for 55" package is the relationship between the EU ETS and CORSIA, developed under International Civil Aviation Organization (ICAO). The level of ambition under CORSIA is lower than that under the EU ETS; substituting (parts of) the ETS with CORSIA would lead to lower climate ambition of the EU.

Since 2018, the Monitoring Reporting and Verification (MRV) regulation for shipping has been in place. This provides the necessary data for introducing a regulatory instrument like an ETS. Limiting the scope of the shipping ETS to intra-EU routes only would have the lowest environmental impact but be the easiest to implement.

Including road transport in the ETS would increase the covered emissions by about 50%. To avoid unintended consequences, careful planning and data gathering would be needed. A uniform CO₂ price across the EU would hit poorer Member States the hardest; a form of solidarity mechanism such as a

redistribution of auctioning revenues would therefore be needed. A share of these revenues should directly benefit the affected households to avoid undue burdens.

Abatement costs in the transport sectors tend to be higher and/or demand is inelastic; an integration of these sectors in the EU ETS would likely lead to a higher CO₂ price for stationary installations. An integrated ETS might lead to lower economy-wide costs but it is most likely that emission reductions would mainly take place in the stationary installations under the ETS. A separate ETS or restrictions on the fungibility of allowances would lead to higher CO₂ prices for the transport sectors but would ensure that these sectors also reduce emissions.

The overall impact on stationary installations due to the inclusion of further transport sectors in the EU ETS depends largely on the rules for these sectors but also on the overall ETS design. If the historic surplus is removed from the market, e.g. through an enhanced market stability reserve, and the ETS is short in allowances, any net demand from transport would lead to additional reductions from the stationary sector. If the historic surplus remains or the cap adjustment is not strong enough, the transport sectors would mainly reduce an oversupply of allowances.

Two key themes of the discussion were the need for combining the ETS with additional policies. In the road transport sector additional policies would be needed to address social impacts of a carbon price on lower income Member States and households. The need for stringent emissions standards for cars was also highlighted. In aviation and shipping additional policies are needed to support a fuel transition towards carbon neutral fuels. These additional policies are required because of the high abatement costs of replacing fossil fuels with biofuels or synthetic fuels.

1. INTRODUCTION

The European Commission published the Climate Target Plan in September 2020 (EC 2020c). Among the proposals for revisions of relevant legislative measures to deliver on the increased climate ambition is the review of Emissions Trading System (ETS) and its extension to the transport sectors. The Climate Target Plan aims to prepare the EU to increase its climate ambition in line with the European Green Deal and the enhanced national determined contribution (NDC) of the EU under the United Nations Framework Convention on Climate Change (UNFCCC).

On Wednesday, 26 May 2021, the Policy Department for Economic, Scientific and Quality of Life Policies organised at the request of the ENVI committee a workshop entitled **‘2030 climate target plan: extension of European Emission Trading System (ETS) to transport emissions’**. The workshop served as a preparatory measure for upcoming discussions on the legislative reform of the EU ETS. It was chaired by MEP Pascal CANFIN, Chair of the ENVI committee and streamed online.

The event was structured around four experts' presentations. In the first presentation, Dr. Dora Fazekas from Cambridge Econometrics in Hungary focused on options for an ETS in the road transport sector. In the second presentation, Mr. Jasper Faber from CE Delft in the Netherlands presented the options for an extension of the EU ETS to shipping. The third presentation by Dr. Janina Scheelhaase from the German Aerospace Center detailed considerations for the future of aviation in the EU ETS. The final presentation by Mrs. Verena Graichen from Oeko-Institut in Germany gave an overview of the impacts of an inclusion of the transport sectors on the EU ETS. Each presentation is complemented by a technical background. The contents of these sections are taken from the background paper prepared in advance of the workshop (Graichen et al. 2021)¹.

Emissions from road transport grew steadily between 1990 and 2007, decreased somewhat in the following five years but then rose again to almost 780 MtCO₂ in 2018 (EEA 2020b). In the scenarios included in the Climate Target Plan, these emissions need to decrease by about 25% by 2030 (EC 2020a).

Specific data on EU's maritime transport emissions (domestic and international) became available in 2018 through the implementation of the EU MRV regulation (EU 2015). Globally, greenhouse gas (GHG) emissions from maritime transport rose during the last decade (IMO 2020). In the EU, CO₂ emissions from maritime transport constituted 3% (138 MtCO₂) of overall emissions in 2018 (EC 2020b). Within the transport sector, maritime transport's share is approx. 13%. Future growth of emissions from the sector is expected as the demand for maritime transport is highly dependent on economic growth.

For aviation, the main question in the context of increased climate ambition is the relationship between the EU ETS and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) developed by the International Civil Aviation Organisation (ICAO). The Inception Impact Assessment of the European Commission for the revision of the EU ETS concerning aviation included six different options ranging from a reversal to the full inclusion of all flights to and from third countries in the scope of the aviation ETS to a replacement of the ETS by CORSIA (EC 2020d).

¹ The full paper can be accessed here: <https://www.europarl.europa.eu/committees/en/2030-climate-target-extension-of-emission/product-details/20210511WKS03563>

2. EXTENSION OF EMISSIONS TRADING TO ROAD TRANSPORT

2.1. Technical background

A carbon price raises the price of transport fuels such as gasoline and diesel and hence provides incentives for private households and road freight transport companies to adjust their fuel consumption. For example, in the short term, households or individuals can drive more economically or switch to public transport as well as non-motorised modes of transport, such as walking or cycling. In the medium term, there is also the option of buying a more efficient combustion engine, reducing the carbon-intensity of fuels (e.g. by blending it with low-carbon fuels such as biofuels or synthetic fuels taking into account sustainability implications).

In freight road transport, possible short-term adaptation consists of a higher utilisation of vehicle capacity. In the medium term, the use of low-emission vehicles, such as battery-electric or hydrogen-powered trucks, is conceivable. In the long term, routes can be avoided through shorter value chains and changed consumer behaviour, and a shift to the more climate-friendly option of railways can be achieved.

Currently, the Effort Sharing Regulation sets national targets, which include emissions from road transport. Member States have substantial freedom regarding the measures they want to use to achieve these targets. If the emission targets are missed, there is an obligation to buy annual emission allocations from other Member States that have exceeded their reduction targets. In the period up to 2020, during which a very limited amount of trade occurred, prices were low due to a significant surplus (Gores and Graichen 2021). During the period up to 2030 such off-sets – whose cost per ton of CO₂ could be significantly higher than those in the EU ETS – would impose substantial burdens on government budgets, thus creating a direct financial incentive to implement measures to achieve national emissions targets (Gores and Graichen 2018).

The European Commission has announced that it will consider including road transport in the EU ETS for the package of updated climate legislation expected in July 2021. An EU-wide emissions trading system for road transport would have the advantage of establishing a uniform price signal throughout Europe. Despite this, fuel prices would still differ due to the different fuel taxes across countries.

2.1.1. Main design options for integrating road transport into the EU ETS

Road transport might be included in the existing EU ETS or a novel trading scheme. In both cases, the most straight-forward point of regulation will be mid-stream at the distributors of transport fuels or upstream where fuels are produced/imported. The covered entity would need to surrender emissions allowances for fuels sold and/or decrease the fossil carbon content of the fuel. The permit price would then be passed on to the final consumers who would adjust their behaviour accordingly. Granting exemptions for particular activities, such as transport in the agricultural or construction sectors, could be achieved by means of special purpose distributors that only sell fuel for those targeted activities without the obligation to surrender emission permits.

A crucial issue is the size of the sector: road transport emissions are about 50% of those already covered by the ETS (EEA 2020a). This means that the assumptions and data of this sector need to be robust enough to avoid unintended consequences for the overall ETS. It will also be necessary to ensure that there is no double counting (or omission) of fuels which are supplied to stationary installations already covered by the EU ETS. Thus, setting up an ETS for road transport would most likely require a data gathering exercise and several years of planning.

Integration into the existing EU ETS

If emissions from road transport are integrated into the existing EU ETS, it can be assumed that the resulting prices will be dominated by the abatement options in the stationary sector. Estimated prices in 2030 are comparatively low with limited impacts on emissions in the transport sector. Prices currently prevailing in the EU ETS – approx. €40-50 per ton of CO₂ – would raise prices for gasoline by about 10–12 ct/l, which seems unlikely to result in large-scale changes in mobility choices. This is especially important if abatement targets are further tightened under the EU Green Deal. In this case, if transport were integrated into the EU ETS without accompanying regulation, emission reductions would take place primarily in the electricity sector, with only limited impact on road transport.

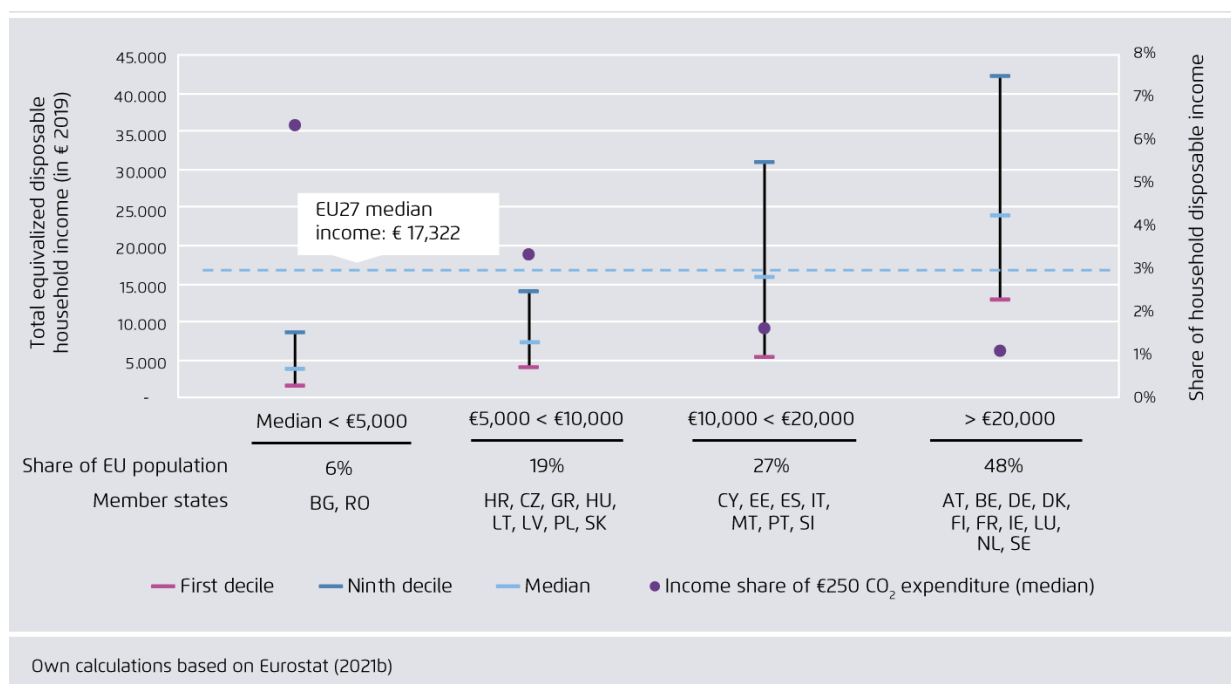
A significantly higher CO₂ price, which also provides substantial incentives for road transport, could be achieved within the EU ETS by introducing a corresponding minimum price or reducing the supply of available emission allowances. In this case, however, there would be adverse effects on energy-intensive industries in the EU ETS and the risk of relocation to regions with less stringent climate policies. Therefore, a significant CO₂ price for transport in the EU ETS only seems plausible if measures are in place to effectively prevent carbon leakage in the industrial sector. Currently, this is ensured by the free allocation of emission permits for energy-intensive industries. However, in the medium term, as we move toward net-zero emissions, there will not be sufficient allowances to provide effective leakage protection. As part of the Green Deal, the Commission is also assessing a Carbon Border Adjustment Mechanism, which would impose a CO₂ price on energy-intensive imports to create a level playing field between EU and non-EU producers.

A separate ETS for transport

An alternative to achieving a uniform EU-wide CO₂ price in transport is to create a separate ETS for transport (and possibly the building sector) in parallel to the existing EU ETS. This approach could achieve an effective EU-wide CO₂ price in transport if it were the main measure: without strong additional regulation (e.g. via CO₂ standards), a relatively high price would be expected to achieve an emissions target in line with the increased ambition. While effective, this could lead to significant additional burdens and distributional effects both within a country and between countries (Pollitt and Dolphin 2020). This is even more the case if the building sector is also included in the ETS as heating costs often account for a substantial share of expenses for low-income earners.

Figure 1 illustrates this by providing the example of an additional cost of €250 per person and year due to the introduction of a uniform carbon price across Europe. While the impact would be around 1% of the disposable income for households in the wealthier Member States, for Bulgaria and Romania the impact would be over 6%. To cushion social consequences, an EU-wide price should, therefore, be accompanied by measures to compensate poorer Member States, e.g. through direct payments or increased support through cohesion and structural funds. Revenues from auctioning emission allowances could be used to fund these measures. In this way, poorer Member States would receive a net positive revenue. However, it would be necessary to ensure that these funds benefit those most in need to prevent a regressive policy.

Figure 1: Disposable income distribution and impact of CO₂ expenditure on median income in different EU Member State groups)



Source: Graf et al. (2021).

2.1.2. Impacts on emissions from road transport

EU-wide pricing of transport emissions, whether in a separate emissions trading scheme or in the existing EU ETS, could mitigate the importance of national emissions targets or relieve Member States of the obligation to meet national emission targets. For example, national emissions targets which also cover the transport sector were introduced under the Effort Sharing Regulation primarily to ensure that EU climate targets could be met with fair burden-sharing among Member States. With an emissions cap that effectively limits transport emissions at the EU level, such national targets would at least no longer be necessary to limit EU emissions in sectors included in a cap-and-trade scheme.

One option to prevent excessive cost burdens especially for Member States with low per-capita incomes would be a cap on the CO₂ price while maintaining national targets under the Effort Sharing Regulation, even though this might generate additional complexities (e.g. whether such a measure would be regarded as a tax and require adoption by unanimity vote). If the CO₂ price set via such a cap is not sufficient to meet emission targets, further (national) instruments must be implemented. Carbon prices need to be complemented with instruments that, for example, target the purchase of low-emission vehicles, the expansion of infrastructure for electromobility, public transport and bicycle traffic, as well as the reform of environmentally harmful subsidies in the transport sector.

2.1.3. Social impacts, especially between Member States

National targets, the non-achievement of which is sanctioned, can be an important motivation to introduce additional instruments for a climate-friendly transport policy or to strengthen existing ones. However, an EU-wide pricing system makes it more difficult to rely on national targets, as CO₂ prices in an integrated system depend on economic developments as well as ambition levels in other Member States. Furthermore, an EU-wide Emissions Trading System means that additional emission reductions by individual Member States have no effect on EU emissions. Accordingly, a cap on the CO₂ price

combined with maintaining national targets under the Effort Sharing Regulation could provide an appropriate policy mix for the transport sector.

At the same time, a price cap would have the advantage of reducing distributional effects between Member States; it prevents low-income countries from assuming an excessive cost burden. Perhaps even more importantly, this approach would shield low-income households from additional costs resulting from higher prices for transport and possibly heating fuels.

2.2. Presentation and discussion

Dr. Dora Fazekas, Managing Director, Cambridge Econometrics, Hungary, presented the results of an economic modelling study on the inclusion of the road transport and building sectors in the EU ETS.

2.2.1. Summary of the presentation

The EU ETS is an appealing policy option for driving decarbonisation in the road transport sector. Advantages include that it directly prices externality costs, has a minimal interference with the operation of markets, potentially raises revenues and already has a track record of driving decarbonisation in Europe. However, there are also reasons to question whether an extension of the EU ETS to road transport would be effective in driving down emissions. These include that the demand for transport is relatively price inelastic and the potential economic impacts on low-income households across Europe.

Cambridge Econometrics used the E3ME:FTT **macroeconomic computer model to analyse the impact of different scenarios of an ETS extension**. The model was developed through the European Commission's research framework programmes and is now widely used in Europe for policy assessment, forecasting and research. It allows an assessment of whole-economy impacts using parameters estimated from past behaviour and bottom-up modelling of technology transitions. It is composed of five modules (Figure 2). Three potential options for an ETS for road transport were modelled:

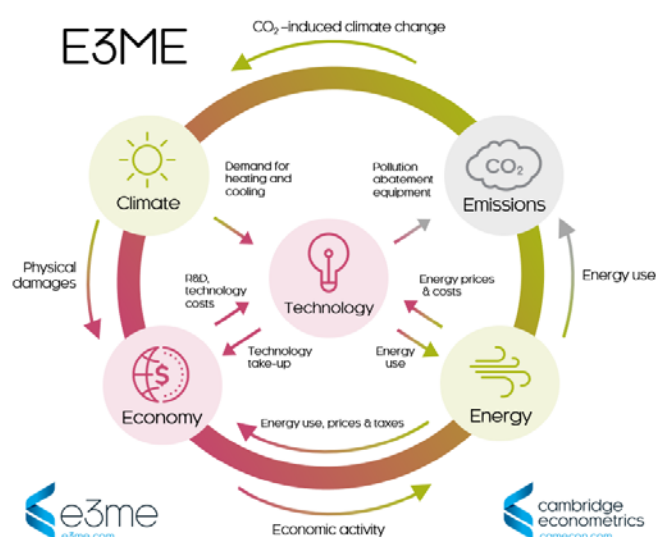
- Linked carbon markets – using the main ETS price as a carbon price in non-ETS sectors.
- Extending the ETS to include road transport and buildings.
- Constructing a parallel ETS, covering non-ETS sectors, with a separate allowance price.

All scenarios are technology neutral by design. The **key findings** of the analysis were (Stenning et al. 2020):

- Links between the ETS and non-ETS sectors, either through parallel prices or a shared pool of allowances, reduce emissions from road transport. However, the achieved reduction falls well short of the targeted minus 43% compared to 2005 levels.
- When allowances prices are allowed to float to deliver the required emission reductions in the EU 27 in each year, they reach up to € 180/t CO₂ (in 2015 prices) by 2030.
- Pricing fuel use by consumers carries a substantial risk of regressive outcomes, which need to be explicitly addressed through additional policy measures.
- All scenarios show macroeconomic benefits compared to a baseline without further decarbonisation of the road transport sector, but only if revenues from the ETS are recycled. The analysis considered tax cuts, investment in low-carbon technologies, public procurement, R&D or lump sum payments to affected households as recycling options.

- Targeting revenues to support low-carbon technologies can increase the uptake of these technologies and can reduce the ETS price.
- Distributional impacts across Member States and across households differ significantly. Low-income and middle-income households are more severely affected by increases in fuel prices, but policy options can effectively mitigate this effect. Revenue recycling via tax reductions tends to benefit higher income groups, while lump sum payments are more beneficial for lower income groups. Using ETS revenues to support R&D broadly impacts all households at the same level.
- Extending the ETS would force sectors under the current ETS to decarbonise more rapidly, while threatening their competitiveness.

Figure 2: Overview of the modules (in circles) of the E3ME:FTT model and their interactions



Source: Stenning et al. (2020).

2.2.2. Summary of the discussion

The discussion focused on the need for a policy mix for decarbonising the road transport sector considering the existing fleet and the future fleet. Policies mentioned in the discussion included strengthening regulatory measures, such as CO₂ emission standard for new cars, using revenues from the ETS to support low-income households and changing tax incentives for companies currently favouring carbon intensive cars. It was highlighted, that the European Parliament has agreed that its number one priority is to tighten CO₂ emission standards for cars. The ETS would then serve to deliver an additional price signal to consumers.

It was also noted that setting up an ETS for the road transport sector will require three to four years. Dr. Fazekas clarified that the study introduced the carbon price in 2025 to take into account the considerable delay with which the ETS would take effect.

Further details were requested regarding the impact of a CO₂ price on prices for fuel and gasoline for the final consumer. The study analysed impacts on consumer prices at the EU level and in cases studies for Germany, France and Poland. Results showed that introducing the ETS price would increase fuel prices for consumers by about a third across the EU. Dr. Fazekas also clarified that the study looked at an extension of the ETS to road transport and heating together. Results showed a faster decline of

emissions from road transport than from heating with an ETS, otherwise the obtained insights for both sectors were similar.

The study also investigated how the targeted emission reductions could be achieved without an ETS. For this purpose it considered a scenario with tightened emission standards for new passenger cars on a trajectory to ban the sale of new petrol and diesel cars from 2035 onwards, tightening emission standards for vans and heavy good vehicles and small reduction in car transport demand. It found that a policy mix including an ETS extension was most beneficial.

Regarding the role of hydrogen, the study found it to play a relevant role for lowering emissions from trucks and heavy road vehicles and not from passenger cars.

During the discussion, one MEP stressed the need to take a technology neutral approach to ensure cost effectiveness.

3. EXTENSION OF EMISSIONS TRADING TO SHIPPING

3.1. Technical background

Operational and design/technical measures can be used to reduce GHG emissions from maritime transport. Operational measures like voyage optimisation or reduction of speed (called slow steaming) can have a significant impact, especially in the short term (Healy and Graichen 2019; IMO 2020). Technical measures can improve the energy efficiency of a ship by altering the design of the ship (e.g. hull, propeller) or by improving the engine (Bouman et al. 2017). The biggest lever for reducing emissions is the switch to alternative fuel and energy sources (DNV GL 2019). Wind assistance or battery-electric propulsion of ships can contribute to a small degree and in niches. The switch to sustainable fuels based on renewable energy (so-called e-fuels) is the most promising option. It is not yet clear which e-fuel (or which selection of fuels) will be dominant in maritime transport in the future. Among the carbon-free energy carriers, ammonia has received increased attention for being among the cheaper option of e-fuels (LR; UMAS 2019). Methanol is also a promising candidate fuel and less expensive than other carbon-based e-fuels (Korberg et al. 2021).

The most cost effective abatement options are typically operational measures or smaller changes and maintenance of the hull or propeller. Technical solutions like the use of onshore power have much higher CO₂ reduction costs. Eide et al. (2011) estimated these to be between US\$ 50 and US\$ 200 per ton of CO₂. Price estimations for e-fuels vary greatly as they depend on projections of future prices of renewable electricity and direct air capture. Direct air capture is needed to provide CO₂ for carbon-based e-fuels. In 2030, fuel costs might range between €140/MWh and €210/MWh (Perner et al. 2018). The switch to post-fossil fuels is the most important abatement option in shipping.

3.1.1. Existing regulation focussing on the European level

The potential inclusion of maritime transport is part of a stepwise approach of the EU to regulate emissions from maritime transport. The EU Monitoring, Reporting and Verification (MRV) Regulation (EU 2015) requires the reporting of CO₂ emissions emitted:

- when ships are at berth,
- between the European Economic Area ports,
- between the last non-European Economic Area ports and the next European Economic Area ports (incoming voyages), and
- between the last European Economic Area ports and the next non-European Economic Area ports (outgoing voyages).

The EU MRV covers all ships calling at EU ports during the reporting period (one calendar year) above 5 000 gross tonnage except ships used for certain applications (e.g. dredging, ice-breaking, offshore installation activities, fishing, warships, government ships). The regulated entity is the shipping company defined as the ship owner or anyone who has assumed the responsibility to operate the ship like a manager or bareboat charterer.

3.1.2. Main design options for a maritime ETS

The highest environmental effectiveness would be achieved with the full **geographical scope** including all emission of ships calling at EU ports (144 Mt CO₂ in 2019) (EMSA THETIS-MRV 2020). Considering the resistance from non-EU countries and drawing on the experience from aviation, a

semi-full scope could be applied in the maritime ETS. This would cover 50% of each outgoing and incoming voyage, totalling about 99 MtCO₂ in 2019 (EMSA THETIS-MRV 2020).

A maritime ETS should cover all **GHG emissions** already monitored and reported under the EU MRV (currently only CO₂ emissions are covered). With the uptake of liquefied natural gas (LNG) and the potential introduction of biomethane as a fuel, methane (CH₄) emissions will become a relevant source in maritime transport. The EU should aim to include CH₄ emissions in the EU MRV and subsequently the EU ETS. In later reviews of the maritime ETS, black carbon and nitrous oxide (N₂O) emissions should be considered. Black carbon has a large global warming potential (GWP), especially in Arctic regions, and contributes to air pollution (Comer et al. 2017). Currently, there is an increasing interest of using ammonia as a marine fuel. There is a risk of emitting N₂O when combusting ammonia. N₂O emissions, with a GWP of 298 (Myhre et al. 2013), could, therefore, become more important in future. Following a proposal by the European Parliament, discussions are already ongoing to extend the maritime MRV system to other GHG emissions (EP 2020).

To begin with, a maritime ETS could cover all **ship types** covered by the EU MRV, including all the exemptions (see above). Any maritime EU policy should strive to include all ship types in accordance with the polluter-pays principle. The EU MRV scope would need to be extended accordingly beforehand.

The **regulated entity** should ensure compliance with the environmental requirements, be responsible for paying the fine in case of non-compliance and be able to influence the amount of emitted CO₂ (polluter-pays principle). For a maritime ETS, a range of options for a regulated entity exists, e.g. the fuel supplier, ship owner, ship operator or charterer.

An upstream approach is to make the fuel supplier the responsible entity. However, it will likely decrease the effectiveness of the ETS, because ship operators tend to bunker where fuel is cheapest and would thus bunker outside the scope of the scheme. All the other options have advantages and disadvantages. The most practical approach might be to synchronise the choice of the regulated entity with whichever definition is used in the MRV regulation. Currently, this regulated entity is the 'shipping company'. The latest proposal of the European Parliament (EP 2020) to amend the EU MRV regulation suggests a refined definition of the regulated entity under an EU ETS by defining a 'commercial ship operator', which is the entity responsible for paying the fuel bill and operating the ship, and by adding the time charterer to the previously mentioned definition of a shipping company.

A **cap** that is at least semi-open would allow regulated entities to surrender allowances from other sectors and in this way mitigate the volatility of allowance prices. The cap, determined through the linear reduction factor, should not be weaker than that for other sectors. The baseline year for determining the cap could be based on the starting year of the EU MRV, i.e. 2018.

Allocation for maritime transport in the ETS is best achieved through auctioning of allowances. A phase-in with gradual increase of the share of monitored emissions covered by the system could be an option for a limited period.

If allowances are auctioned, **revenues** could be collected. A relevant part of these should be recycled back into the maritime sector to finance investments to decarbonise the sector, e.g. facilitating the uptake of sustainable alternative marine fuels. A dedicated fund for the maritime sector that is similar to the Innovation Fund could be established. The EP (2020) already suggested establishing such a fund, calling it the Ocean Fund.

Reviews of a maritime ETS should be timed to coordinate with **developments at the International Maritime Organisation (IMO)**. Most of the candidate measures (or rather policies) foreseen in IMO's Initial GHG Strategy (IMO 2018) would not interfere and would be complementary to an EU policy. A

maritime EU ETS might add pressure and accelerate discussions on market-based instruments in the IMO.

3.2. Presentation and discussion

Mr Jasper Faber, CE Delft, the Netherlands, gave an overview of policy measures planned or in place for the shipping sector and detailed how the possible inclusion of shipping in the EU ETS fits in the overall policy context.

3.2.1. Summary of the presentation

Global **emissions for maritime transport** in 2018 were 1 056 MtCO₂e, representing 3% of total global emissions. In 2008, growth in transport work and emissions from shipping decoupled because of lower sailing speed and larger ships. According to the IMO (2020), this trend is projected to continue, and emissions are expected to grow at a much slower pace than transport demand. Transport demand could double by 2050, whereas emissions could grow by 20% to 30% or remain at current levels (optimistic scenario). This decrease would result from increased energy efficiency in shipping. The IMO has set the target to reduce emissions by at least 50% compared to 2008 by 2050. The difference between BAU emissions and the emission reduction target cannot be overcome by further efficiency improvements since these have been exhausted in the BAU scenario; they need to come from a fuel switch to low and zero carbon fuels. Maritime transport emissions in the EU were 144 MtCO₂e in 2019, representing 3% of EU total emissions.

There are three basic categories of **abatement options to reduce CO₂** emissions from shipping:

- technical efficiency options, for example wind assisted propulsion, air lubrication, counter-rotating propellers;
- operational efficiency options, for example speed reduction and advanced hull coatings; and
- fuel options, to replace fossil fuels with biofuels or green synthetic fuels like hydrogen, ammonia or synthetic methane.

In general, technical and operational efficiency options are more cost effective than fuel options. Estimated costs for fuel options range between €250/t CO₂ and €400/t CO₂. This means, that a carbon price at the same level would be needed to provide an incentive to change fuels. A carbon price below €250/t CO₂ still provides incentives to achieve improvements in the other categories and to reduce emissions, but it will not bring about the required fuel change. Abatement costs for a fuel change have also been estimated at €1000/t CO₂. This higher estimated cost reflects uncertainty around future fuel prices. An optimistic outlook on the future price of hydrogen and underlying electricity costs for producing synthetic fuels results in lower abatement costs.

The **regulatory environment** at the global level is determined by the IMO. Existing regulation includes the Energy Efficiency Design Index (EEDI), which puts in place energy efficiency standards for new ships and the Ship Energy Efficiency Management Plan (SEEMP), which is mandatory for all ships. The IMO is currently debating two additional regulations. The Energy Efficiency Existing Ship Index (EEXI) would extend the design energy efficiency standards to existing ships. The Carbon Intensity Indicator (CII) aims to extend the current carbon intensity rating for existing ships into a regulation of the carbon intensity of new ships. In the EU, two regulatory initiatives have been proposed as part of the Green Deal. The Fuel EU maritime plan aims to address carbon intensity of energy used from ships sailing to and from EU ports and the EU ETS, which would address the total CO₂ emissions from ships.

Inclusion of shipping in the EU ETS will incentivise shipping companies to implement options to improve energy efficiency, given the expected price of allowances in the EU ETS of between €50/t CO₂ to €100/t CO₂. However, this price will not be sufficient to incentivise a fuel change in EU shipping. It would be complementary to the CII and EEXI by providing a financial incentive for ships that comply or over comply. Also, the EU ETS would cap the total emissions within the overall ETS system. Additional policies are needed to incentivise the shift away from fossil fuels.

Shipping needs to use renewable low-carbon fuels to decarbonise and this change needs to start quickly to achieve net zero by 2050. Addressing energy efficiency in ships is also important because energy efficient ships lower the costs of the fuel transition. Including shipping emissions in the EU ETS has the potential to improve energy efficiency, but other policies are required to start incentivising the fuel transition soon.

3.2.2. Summary of the discussion

The discussion focused on how the ETS would be an effective instrument to reduce emissions from shipping and to drive the required fuel transition as well as on the effectiveness of the IMO instruments. Taxing fuels was mentioned as an alternative to including shipping emissions in the ETS, for example preferred by ship owners. Mr Faber considered that a tax on fuel sales is not an effective instrument. He explained that fuel taxes are generally levied on the sale of fuels and that this poses a fundamental problem to taxing fuels in the shipping sector. With one single fuel load, ships can almost sail around the world. If prices on fuel are increased in the EU, this would reduce fuel sales in the EU, but not reduce fuel consumption. Instead of bunkering in Rotterdam or Antwerp, ships would do so in any other port around the world on their route. A precedent of this development was set in California. When California introduced a tax on fuels sold in the state, the Californian bunker market collapsed, and bunker sales increased in Panama. An alternative to a fuel tax would be to levy an emissions tax. An emissions tax would be equally effective as an ETS.

As to the question of how to effectively include shipping in the EU ETS, it was clarified that in a separate ETS for shipping, it would be hard to set the reduction target at the right level. This is because shipping is a volatile industry, shaped by booms and busts in different years. If the scope of the separate ETS is larger, for example including road transport and inland shipping, the risk would be mitigated. To maximise the effectiveness of an ETS for shipping, the wide geographic scope and a high price of allowances would be required. A separate ETS for shipping would have the advantage of higher prices but there is a trade-off between price and participation. The EU ETS can only include emissions from and to EU ports, corresponding to the geographical scope of current EU MRV. However, ships could reduce their emissions covered under the scheme by making an additional port call just outside the EU. Although there are costs involved with additional stops, these become more worthwhile the higher the EU ETS price gets. Thus, the EU ETS price should not be too high to not result in avoidance of the system.

Prices at a level that would lead to fuel change would result in massive evasion behaviour. It is thus necessary to complement any inclusion of shipping in the EU ETS with additional measures such as a limit on the lifecycle GHG emissions of fuel used on voyages to and from the EU (fuel EU maritime). A specific fuel policy is also needed to prompt the fuel transition. Tackling the fuel transition requires that ships sailing on clean fuels enter the fleet by 2025 or 2030 due to the long lifetime of ships.

Full auctioning should be the preferred option for distributing allowances in the shipping sector. Determining how to distribute free allowances in the shipping sector is very challenging, because of the nature of shipping. Most ships usually wait to pick up cargo and then sail to the required destination. Ships or shipping companies operating the ships would not continuously be part of the

ETS, they may do business in Europe in one year and in the next sail outside of the EU and vice versa. Because of this trait of the shipping sector, it is not possible to rely on historical transport work to determine the level of free allowances. It would lead to giving free allowances to companies that do not have emissions under the ETS in a given year, whereas companies that do have emissions would not receive free allowances.

The -40% efficiency target at fleet level proposed by the EP was hard to implement at the time it was proposed, because of the lack of operational efficiency baselines. However, operational efficiency baselines are being discussed under the IMO as part of the CII and this would allow the EU to implement an efficiency target. Given that each ship would need to comply with the efficiency target, it would mainly promote slow steaming which is a very effective way for fuel saving.

Regarding the effectiveness of IMO instruments, it was clarified that the EEDI is not different from other instruments to establish standards. There is a potential to game the system. Yet, EEDI ships are more efficient, have less powerful engines and sail at slower speeds; the index will have a positive impact albeit not as large as the proposed effect. The CII is currently only a rating scheme that labels ships. There is a review clause for 2026 and the EU is hoping for stronger enforcement by then. For example, ships with a low-level label could lose their IMO certificate.

4. AVIATION IN EMISSIONS TRADING

4.1. Technical background

Since 2012, the aviation sector has been included in the EU ETS. Its full scope covers all flights starting and/or landing in airports in the European Economic Area. Due to strong international resistance and the ongoing negotiations on a global regime for aviation in the International Civil Aviation Organisation (ICAO), a derogation until the end of the year 2023 limits the scope to flights within the European Economic Area only. The main features of the aviation ETS are (EC 2020e):

- A cap of 5% below the average emissions in the years 2004 to 2006 until 2020; from then onwards, the linear reduction factor of the stationary sector will also be applied to aviation. Under the current ETS legislation, the cap in 2030 would be 27% below the reference period.
- 82% of allowances are allocated for free based on a benchmark. An additional 3% are allocated for free from a special reserve for new and fast-growing airlines; the remaining 15% of all aviation allowances are auctioned. Over the third trading period, allowances allocated for free covered 56% of the verified emissions.
- Until 2020, aviation allowances could only be used by the sector itself. In the fourth trading period, these allowances are fully fungible and can be used for compliance of stationary installations as well.

The implementation of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) began in 2021. This scheme was developed under the ICAO and intends to halt the net growth of CO₂ emissions from international aviation (ICAO 2018). To do so, CORSIA contains a basket of measures including increased energy efficiency, the use of sustainable fuels and offsetting through other sectors. Countries can decide whether they intend to participate during the pilot phase 2021–2023 and the first phase 2024–2026; from 2027 onwards participation becomes mandatory with exceptions for Least Developed Countries, Small Island Developing States and Landlocked Developing Countries. Emissions from flights between participating countries are covered by CORSIA independently of the flag of the carrier. CORSIA only addresses emission growth above a baseline value. For the pilot phase, only 2019 emissions are used as the baseline. Very little to no offset demand is expected during the pilot phase (Schneider and Graichen 2020).

4.1.1. Main design options

As part of the “Fit for 55” package, the Commission will also publish proposals for the reform of the aviation ETS. The crucial elements impacting the environmental effectiveness are the relationship with CORSIA/scope of the aviation ETS, the cap, the share of auctioning and the treatment of non-CO₂ emissions and aviation-induced cloud formation. The inception impact assessment includes six different policy options for the relationship between the EU ETS and CORSIA:

1. return to full ETS scope without application of CORSIA,
2. continuation of the reduced scope; CORSIA is not applied,
3. CORSIA replaces the EU ETS,
4. continuation of the ETS in its current scope, CORSIA is applied on routes to/from third countries,
5. ETS remains in the current scope but is limited to emission below the CORSIA baseline; CORSIA is applied to emissions growth and routes to/from third countries, and

6. ETS remains in place for European operators in the reduced scope, CORSIA for external operators and routes to/from third countries.

These options have already been evaluated in the assessment pursuant to Art. 28b of the ETS Directive (ICF Consulting et al. 2020). Options 1 and 2 are not in line with the Council Decision to participate in CORSIA taken in June 2020. In terms of emissions from the sector, the impact assessment concludes that all six options lead essentially to identical emissions. The level of ambition of these options is mainly determined by the quantity of offset units/ETS allowances that need to be bought and the quality of these units. In terms of net emissions, options 3 scores the worst; options 4 to 6 would lead to a CO₂ emission decrease of 2.2% compared to the CORSIA-only scenario and option 1 would be the most ambitious. These calculations assume that the CORSIA offset units lead to additional emission reductions, which is questionable – especially for the pilot phase. This is because eligible units can come from projects that were already in operation prior to the start of CORSIA and other weaknesses in the eligibility criteria, e.g. that permanence of forestry projects is only required for 20 years. The impact assessment concludes with regard to the level of ambition that CORSIA “is misaligned with, and weaker than, the global level of ambition required to keep within the temperature goals of the Paris Agreement” and also weaker than the level of ambition of the EU ETS. Replacing “coverage of aviation from the scope of the EU ETS with CORSIA therefore risks weakening EU climate targets”.

Concerning the cap, if the current approach is continued, i.e. the cap for the aviation ETS declines in parallel with the stationary ETS, the resulting cap would be a reduction of about 48% below the reference period 2004–2006. While this is a steep reduction compared to the historic growth rates, the impact on the overall supply and demand in the ETS would be very limited (Graichen and Graichen 2020). In terms of operational costs, the auctioning share has a much higher impact on airlines and ticket prices. For the stationary ETS, the approach to free allocation is based on the potential of carbon leakage: sectors which are deemed at risk due to an ambitious carbon price receive a share of the required allowances for free. In this way, the competitive disadvantage compared to installations in countries without a carbon pricing scheme is minimised. Sectors with a low risk of carbon leakage receive no free allocation. For aviation, demand is geographically fixed: passengers will want to depart/arrive close to their home; there is very limited potential to evade the EU ETS in aviation. Especially for intra-EU flights – which are covered by the ETS – there are no viable alternative routes with a stop-over outside the ETS. Following the logic of the stationary ETS, there should be no free allocation for airlines. However, on routes to third countries with a stop-over either within or outside the ETS, the situation is different (e.g. Rome – Paris – Bangkok versus Rome – Doha – Bangkok). In such cases, the flight without a stop-over within the scope of the ETS would have an advantage compared to the route on which one leg is covered by the ETS. The assessment pursuant to Art. 28b modelled five different options for the future auctioning share, ranging from the status quo to direct full auctioning from 2023 onwards. The difference between these options is estimated to impact ticket prices by 0.6% per one-way flight within the scheme, which amounts to less than 1 Euro. The assessment concludes that there is a low risk of carbon leakage even if full auctioning is applied but it could lead to reduced profits by airlines.

A parallel study assessed the options to reduce the impact of non-CO₂ emissions from aviation on the climate. The overall contribution of aviation to global heating is three times that of CO₂ alone, mainly through aviation-induced cloudiness and NO_x emissions (D.S. Lee et al. 2021). The policy options in the assessment include financial measures (NO_x-levy and inclusion of NO_x into the ETS), fuel-based measures and air traffic management (EC 2020a). Fuel-based measures focus on the quality of the fuel to reduce soot whereas the intention of traffic management is to avoid zones with a high likelihood for

aviation-induced cloud formation. All these measures would need some time for implementation with most requiring 5 to 8 years according to the authors.

4.2. Presentation and discussion

Dr Janina Scheelhaase, DLR, Germany, presented the current state of aviation in the EU ETS and CORSIA.

4.2.1. Summary of the presentation

Global aviation contributes relatively little to anthropogenic radiative forcing, but this contribution is expected to increase in the future and thus requires action. Only one third of the climate impact of aviation results from CO₂. The other two thirds of net radiative forcing from aviation result from other effects, especially through aviation induced cirrus clouds.

EU Directives 2008/101/EC and 2009/29/EC define the legal framework for aviation in the EU ETS. Until 2023, only intra EU flights are regulated. From 2013 to 2020, the CO₂ emissions cap was set at 95% of historical emissions defined as the 2004-2006 average. From 2021 onwards, a linear reduction factor of 2.2% will apply. At the global level, ICAO has introduced CORSIA, which will become mandatory in 2027. CORSIA addresses global civil aviation but excludes domestic flights. The baseline emissions for CORSIA are those of 2019; emissions above this level must be compensated. Obligations under CORSIA are less strict than under the EU ETS.

The revision of the EU emissions trading scheme could be an important means to achieve climate neutrality in the EU by 2050 and the intermediate goal of -55% by 2030. The following key challenges need to be addressed in the revision:

- the relationship between the EU ETS for aviation and CORSIA;
- the geographical scope of the EU ETS for aviation;
- setting the right level of auctioning, considering it is currently set only at 15%;
- adjusting the level of the emissions cap; and
- how to address non-CO₂ emissions.

Additionally, there will be a need for incentives to promote the transition towards sustainable aviation fuels (SAF). The ETS price will not be sufficient to drive this transformation and further political support will be required.

4.2.2. Summary of the discussion

One question raised in the discussion was how to address carbon leakage related to international flights to EU airports by routing through extra-EU aviation hubs. Dr. Scheelhaase considers that excluding flights that go to an international hub within the EU from the ETS would be inadequate. In her opinion, a more practical option could be to reduce the price for flights landing in international hubs. In her view, measures are required to avoid that the EU ETS leads to redirecting air traffic to international hubs outside the EU, i.e. Istanbul or Dubai, as this would have no environmental effect. Combining the EU ETS and CORSIA will help addressing carbon leakage, but specific solutions for international hubs are required.

CORSIA will be insufficient to address international flights. It can only be considered as a first step and additional international negotiations are necessary to address aviation emissions from transatlantic flights.

Answering the question of whether using a multiplier would be a suitable solution to address non-CO₂ aviation emissions, Dr. Scheelhaase indicated that this approach is unspecific and does not provide the right incentives. Her institute is working on developing a specific scheme applicable to individual flights and individual non-CO₂ emissions.

Dr. Scheelhaase considered that the introduction of a mandatory quota for the use of carbon neutral synthetic fuels, e.g. produced using CO₂ direct air capture, would be a good option. However, airlines will not voluntarily start using synthetic aviation fuels if the prices are above those of kerosene. Government funding could be used to lower the price of synthetic aviation fuels. In Germany, funds could come from the German air tax. There is also the need for further research on synthetic aviation fuels. Some airports are running pilot projects and there is ongoing research on how to specifically address non-CO₂ emissions from different flights.

Abatement costs in the aviation sector range from €-700/t CO₂, for example for improved air traffic management) to €1 200/t CO₂, for example for aircraft replacement. Dr. Scheelhaase considered that additional auctioning in the aviation sector will have a small effect on the ETS. However, with the current reduced scope and 100% auctioning, European airlines would face competitive disadvantages, compared to airlines outside of the EU.

5. IMPACTS ON THE EU ETS

5.1. Technical background

If further sectors are included in the ETS, this will impact stationary installations, depending on design choices. The impact on the supply of allowances for the stationary ETS depends largely on i) whether the new sectors can use EU allowances (EUAs) for compliance, and ii) the net supply/demand of these sectors.

If sectors were not allowed to use EUAs for compliance, separate systems will evolve, and different CO₂ prices are to be expected. There would be no impact on supply to the stationary sector. Unlimited trade and use of EUAs for compliance will have the largest impact on the stationary sector.

The demand for allowances depends on how abatement costs in the sectors compare to allowance prices. If abatement is cheaper than in the stationary sector, transport emissions are reduced. If abatement is more costly, operators will opt to purchase EUAs rather than undertaking reduction efforts. The aviation sector is a buyer of allowances from the stationary sector to cover its emissions that exceed the aviation cap.

The demand of transport sectors for allowances from the stationary sector depends on:

- abatement costs compared to EUA prices,
- the size of the sector, and
- the allowance shortage in the sector and the year of inclusion.

5.1.1. Abatement costs

The EUA price for one ton of CO₂ was only €6 on average in the years 2013-2017, a price too low to trigger significant abatement measures (see table below). Since 2018, the price has risen from €15 in 2018 to around €25 in 2019/2020. Prices increased even more since then, hitting an all-time high of €50 beginning of May 2021. Projections on future prices levels vary. In the modelling supporting the climate target plan, CO₂ prices in the ETS sector range from €32 to €65 (2015 prices) in 2030 depending on the scenario (EC 2020c). Policy scenarios that assume carbon pricing in transport sectors expect prices ranging from €44 to €65 (2015 prices).

All three transport sectors assessed are expected to face higher marginal abatement costs than in the stationary sector and higher than projected CO₂ prices in the climate target plan. While part of the GHG reductions are expected to take place in the transport sectors (e.g. operational measures), it will be more economical to purchase emission allowances when larger investments are required, or e-fuels come into play.

Table 1: Allowance prices in the stationary sector, primary auctions of EUAs

Year	2013	2014	2015	2016	2017t	2018	2019	2020
Price in €	4	6	8	5	6	15	25	24

Sources: Nissen et al. (2020) for 2013-2019, EEX (2020) for 2020.

5.1.2. Size of the sectors

In 2021, the EU ETS covers emissions from installations of the energy sector and industry as well as from flights in and between European Economic Area countries. Emissions from the stationary ETS have

declined in recent years mainly due to emission reductions in the power sector. In 2020, the stationary sector emitted 1 354 Mt CO₂eq (EEA 2020c). Aviation emissions were exceptionally low in 2020 (25 Mt CO₂), which is even below free allocation levels. In the years preceding the COVID-19 pandemic, aviation emissions were increasing year by year, reaching 68 Mt CO₂ in 2019. Emissions are expected to increase again to similar levels when travel restrictions are lifted and the industry has recovered.

Total emissions from maritime transport amounted to 144 Mt CO₂ in 2019 if intra-EU voyages as well as voyages to and from non-European Economic Area ports were included in the EU ETS and 99 Mt CO₂ if only half of voyages to/from non-European Economic Area ports were covered and only intra-European Economic Area voyages fully (EMSA THETIS-MRV 2020). If maritime emissions were added to the current EU ETS, it would still be dominated by stationary emissions. This would change if road transport emissions were included as the sector would add substantial emissions: in 2018, EU 27 reported 777 Mt CO₂ from road transport in the inventory.

Table 2: Emissions in the EU ETS, maritime and road transport (Mt CO₂eq.)

Year	2013	2014	2015	2016	2017	2018	2019	2020
Stationary ETS	1 908	1 814	1 803	1 750	1 755	1 682	1 530	1 354
Aviation ETS	53	55	57	61	64	67	68	25
Maritime transport (50% of voyages to/from non-EEA ports)						95	99	
Road transport (EU 27)	728	725	733	747	764	777		

Source: Emissions from ETS include all 30 EU ETS countries and are based on (Nissen et al. 2020) for the ETS emissions years 2013-2019 (all 30 EU ETS countries) and (EEA 2020c) for 2020. Maritime emissions include emissions from voyages between EEA ports and when at berth (EC 2020b; EMSA THETIS-MRV 2020). Road transport emissions are based on GHG inventory for the EU 27, CRF category 1.A.3.b road transport (EEA 2020b).

5.1.3. Allowance shortage in the sector and year of inclusion

The demand for allowances from the stationary sector depends on the extent to which the transport sectors face a shortage and on the year in which they are included. The cap of the stationary ETS reflecting the increased climate ambition is not published yet. Based on the modelling of the climate target plan, stationary ETS emissions are expected to amount to approx. 720 MtCO₂e in 2030 (scenario MIX).

It can be expected that all three transport sectors will purchase allowances from the stationary sector and thus contribute to higher EUA prices. In the scope currently discussed, aviation and maritime transport are small emission sectors compared to stationary installations and even though they are expected to cover a substantial part of their emissions by EUAs, the impact on the stationary ETS is manageable. If they were to cover 50% of their pre-pandemic emissions with EUAs, demand would be around 80 Mt annually.

If the road transport sector is included in the ETS, it may generate substantial demand for allowances both due to its sheer size and the obstacles which cannot be overcome by CO₂ pricing alone (e.g.

infrastructure requirements). The road transport sector would add to demand towards the end of the fourth trading period, when allowance supply in the stationary sector is also expected to have declined substantially. Therefore, it would impact prices more strongly than the other two transport sectors.

5.1.4. Interactions with the market stability reserve in the stationary ETS

The stationary ETS currently has an oversupply of allowances, which has accumulated since the start of the second trading period. More emission allowances (including international carbon credits) were put into circulation than were needed to cover the emissions of stationary installations. To reduce the imbalance in the market, the market stability reserve was introduced. If the total number of allowances in circulation (TNAC) exceeds a pre-defined threshold, auctioning volumes are reduced. If it falls below the lower threshold, allowances from the MSR are added to auctioning volumes. From 2023 onwards, allowances in the MSR exceeding the auctioning volume of the previous year are invalidated. The MSR is set to be reviewed together with the "Fit for 55" package.

Currently, aviation demand is not included when the TNAC is calculated. This approach should also be followed if further transport sectors are included, otherwise the ability of the MSR to reduce the surplus accumulated in the stationary sector would be dampened and affect the environmental effectiveness of the scheme (Zaklan et al. forthcoming).

5.1.5. Impact on prices

CO₂ prices of the different sectors will align if units from different sectors are fully fungible. Assuming that abatement costs in transport sectors are higher, the inclusion of further sectors will lead to higher prices in the stationary ETS. This leads to emission reductions in the stationary sector instead of the more costly options in the transport sectors.

Stenning et al. (2020) expect the EU ETS price to increase substantially if road transport and buildings are included in the EU ETS. Whereas they model very moderate prices in a stand-alone ETS in the stationary sector (below €20 in 2030) if those sectors are fully included in the ETS prices of about €80 are modelled. The modelling underlying the climate target plan determines EUA prices of €32 in the base case and €60 in the carbon price scenario.

5.2. Presentation and discussion

Mrs. Verena Graichen, Oeko-Institut, Germany, presented policy options for including the transport sectors in the EU ETS and the expected impacts of the different options on stationary installations already covered by the scheme.

5.2.1. Summary of the presentation

Impacts on the stationary sector in the EU ETS only arise if the transport sector is allowed to use stationary allowances for compliance. If not, there are no effects. The question is thus, how the sectors will be linked. There are **three main options how to integrate the transport sector in the EU ETS**:

- The first option is to integrate the transport sector in the EU ETS with a separate cap for road transport and shipping and to allow units to be fully fungible. In this case, there would be one CO₂ price for stationary installations and transport sector emissions.
- The second option is to establish a one-way trade, as seen for aviation in the EU ETS until 2020. The transport sector could be allowed to buy stationary allowances, but not vice versa. As long as the sector with the higher demand for allowance is allowed to buy, prices across sectors will align. If this is not the case, prices will diverge over time.

- The third option is to allow the use of allowances of the other sector but only to a limited extent. With this option, the sector with the higher abatement costs faces higher prices. The impact on the CO₂ price for the other sector is limited.

The **impact on the carbon price for the stationary sector** will depend on the demand from aviation, road transport and shipping. If the transport sectors are net buyers, stationary installations will face higher CO₂ prices and more abatement will be triggered.

The magnitude of the demand from transport is difficult to estimate. It depends on the abatement costs in the sector compared to EU allowance prices, the size of the sectors included in the ETS, the ambition of the cap set for the sector and the year of inclusion. But it is generally expected that the transport sector will be a net buyer because abatement costs in shipping, aviation and transport are much higher than the expected CO₂ prices in the ETS and the inelastic response of transport demand.

Transport sector emissions have increased or remained stable in the past. Their share in overall EU emissions is increasing relative to stationary emissions, which have seen a stable decline. The impact of COVID-19 is an exemption in the observed trends in the sector. A stringent cap for the transport sector will generate a higher demand for allowances and thus have a higher impact on the stationary sector.

The starting time of the ETS for each of the transport sectors will also differ. Aviation is already included in the ETS, thus changes to the system could be completed relatively quickly. Technical preparations for the shipping sector would take longer, but they can build on the existing MRV data and lessons learned from the aviation sector. The inclusion of road transport in the ETS would require thorough technical preparation because an upstream system faces separate challenges and there is no emissions data at a level of detail needed for an ETS. The earlier the inclusion of the transport sectors in the ETS takes place, the larger the expected impact on the stationary sector.

The aim of the **market stability reserve** (MSR) is to reduce the historic oversupply in the stationary sector and to prevent future imbalances. The COVID-19 crisis proved the usefulness of this approach for reacting to unforeseen emissions developments. The MSR will be reviewed as part of the “Fit for 55” package. It will also need to be reviewed in light of the impacts of the pandemic. A specific level of the total number of allowances in circulation (TNAC) serves to activate the MSR. Aviation is not included in the calculation of the TNAC. If shipping and road transport are included in the ETS, they should also be excluded from the calculation of the TNAC. Otherwise, the capacity of the MSR to absorb excess allowances will be reduced. Rather than triggering more reductions in the stationary sector, excess allowances would be bought up by the transport sector.

5.2.2. Summary of the discussion

Several MEPs highlighted the potential social implications of including road transport in the EU ETS if differences between EU Member States and income groups are not adequately taken into account. While a low CO₂ price would reduce potential social implications, it would not be effective to drive down emissions. Conversely, a high CO₂ would be effective from a climate perspective, but risk creating a division between EU Member States. A way to address this challenge would be to use revenue generated by the ETS to address social issues. The key insight is that only including the road transport sector in the ETS without additional regulatory measures, would lead to emission reductions in other sectors and not drive the change needed in road transport to achieve climate neutrality.

On whether command and control measures would be enough to address transport emissions, especially from the existing fleet, it was noted that a carbon price from the ETS would serve as an incentive. However, the introduction of a carbon price for road transport and mitigating negative side

effects would require improving the availability and affordability of low-carbon options. This would make sure that the income poor can switch to these options and discourage the use of emissions intensive technologies.

It was also highlighted that the marginal abatement costs of the three sectors differ and that this needs to be considered for the inclusion in the EU ETS. Marginal abatement costs for shipping are lower than for aviation.

One MEP noted that decisions on taxes require a unanimous vote in the EU whereas changes to the ETS can be agreed with majority voting.

WORKSHOP PROGRAMME

Policy Department for Economic and Scientific Policies
Committee on the Environment, Public Health and Food Safety



Workshop

'2030 climate target plan: extension of European Emission Trading System (ETS) to transport emissions'

Wednesday, 26/05/2021, 10.00-12.00

SPINELLI 1E2, European Parliament
(also Interactio virtual room and webstreaming)

Draft Programme

To achieve climate neutrality by 2050, the EU has adopted a more ambitious EU-wide, economy-wide greenhouse gas emissions reduction target of 55% by 2030 compared to 1990. Among the proposals for revisions of relevant legislative measures to deliver on the increased climate ambition is the review of Emissions Trading System (ETS) and its extension to the transport sectors. The workshop should prepare for the upcoming legislative package of proposals in June 2021.

10:00-10:05	Welcome remarks Chairing: MEPPascal Canfin, ENVICommittee chair, European Parliament
10:05-10:15	Extension of emissions trading to road transport Speaker: Dr. Dora Fazekas, Managing Director, Cambridge Econometrics, Hungary
10:15-10:30	Q&A session with Members
10:30-10:40	Extension of emissions trading to shipping Speaker: Jasper Faber, CE Delft, the Netherlands
10:40-10:55	Q&A session with Members
10:55-11:05	Aviation in emissions trading Speaker: Dr. Janina Scheelhaase, German Aerospace Center (DLR), DLR Institute of Air Transport and Airport Research, Germany
11:05-11:15	Q&A session with Members
11:15-11:25	Impacts on the EU ETS Speaker: Verena Graichen, Senior Researcher, Energy & Climate Division, Öko-Institut, Germany
11:25-11:55	Q&A session with Members
11:55-12:00	Closing remarks Chairing: MEPPascal Canfin, ENVICommittee chair, European Parliament

WORKSHOP PRESENTATIONS

Extension of emissions trading to road transport, by Dr. Dora Fazekas

Available at: <https://www.europarl.europa.eu/cmsdata/234966/Fazekas%20-%20Extension%20of%20ETS%20to%20Road%20transport.pdf>

Extension of emissions trading to shipping, by Jasper Faber

Available at: https://www.europarl.europa.eu/cmsdata/234967/Faber%20-%20Extension%20of%20ETS%20to%20Shipping_v2.pdf

Aviation in emissions trading, by Dr. Janina Scheelhaase

Available at: <https://www.europarl.europa.eu/cmsdata/234964/Scheelhaase%20-%20-%20Aviation%20ETS%20and%20CORSIA.pdf>

Impacts on the EU ETS, by Verena Graichen

Available at: <https://www.europarl.europa.eu/cmsdata/234965/Graichen%20-%20Transport%20ETS%20&%20stationary%20installations.pdf>

SPEAKERS BIOGRAPHIES

Available at: <https://www.europarl.europa.eu/cmsdata/234581/Biographies%20Workshop%20ETS%20in%20transport%20v2.pdf>

THE RECORDING OF THE WORKSHOP

Available at: https://multimedia.europarl.europa.eu/en/departement-for-economic-scientific-and-quality-of-life-policies-workshop-2030-climate-target-extensi_20210526-1000-COMMITTEE-ENVI_vd

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The proceedings summarise the expert presentations and discussions of the workshop on the extension of the EU ETS to transport emissions. The workshop served to prepare the ENVI Committee for the upcoming legislative “Fit for 55” package of proposals, as part of the European Green Deal. The presentations focused on options and implications of the future inclusion of road transport, shipping and aviation in the EU ETS.

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