Inclusion of road transport in the EU ETS

Some initial considerations

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1 Introduction

The European Green Deal announced that the Emission Trading System (ETS) could be extended to emissions from road transport and the built environment (EC, 2019).
The European Commission intends to present a legislative proposal for this in June 2021. The road transport sector could be included in the current EU ETS or in another ETS form, that is yet to be determined (EC, 2020a).

In response to the Commission's intention, the Dutch Ministry of Infrastructure & Water Management would like to know more about the effects of including the road transport sector into the ETS. Of particular interest to the Ministry is information about the added value such an instrument could have compared to other (European and national) climate policies for road transport and the interactions between these different types of instruments. In the coming months, at the request of the Ministry, CE Delft will assess these issues.

In this paper, some initial considerations on the inclusion of road transport in ETS are provided based on existing knowledge of the researchers at CE Delft and an assessment of a (very) limited number of studies. These considerations will be validated, detailed and complemented in the next phases of the project.

In the remainder of this paper, we first briefly discuss the main options for including road transport in the EU ETS (Section 2). Section 3 provides an overview of some advantages and disadvantages of an ETS for road transport in terms of effectiveness and efficiency in CO_2 emission reductions, considering the main design options identified in Section 2. Next, interactions between the inclusion of road transport in ETS and existing (EU and national) climate policies for the road sector are discussed in Section 4. Finally, Section 5 describes the main impacts of inclusion of road transport in ETS on the current ETS sectors.

2 Options for inclusion of road transport in ETS

Several options for the inclusion of road transport in ETS can be distinguished. Based on the Impact Assessment of the Climate Target Plan (EC, 2020b) three main options can be defined:
- **Extension of the current scheme to the road transport sector**.
- **A separate EU-wide emission trading scheme for road transport.** A road transport emission trading scheme (RT ETS) will be a closed system, only covering the road transport emissions in the EU Member States.
- **Obligatory national trading mechanisms establishing a minimum effective carbon price on CO_2 emissions**. This option will result in a separate national system that may assist in achieving the national Effort Sharing Regulation (ESR) target.

Existing literature predominantly focuses on the first two options. Therefore, we will discuss mainly the first two options in this paper and the latter will not be discussed in detail[1].

For each of the main options to include road transport in ETS, several design variants are possible (e.g. whether emission allowances are initially auctioned or allocated for free). Although these design variants affect the effectiveness, efficiency, regulation costs and transactions costs, we will not discuss them in detail in the present paper[2].

[1] In the next phases of the project, more detailed assessments of national schemes could be performed.
[2] Again, these issues could be assessed in more detail in the next phases of the project.

3 Effectiveness and efficiency of CO_2 mitigation

In theory, including road transport in the EU ETS could be an effective and efficient way to mitigate CO_2 emissions. Because an emission cap is set, the system provides certainty on the emission reduction that will be achieved. Furthermore, because of the trade in emission allowances, emission reductions could be achieved at least cost, as the marginal abatement costs will be at the level that just meets the reduction target (Van Essen et al., 2010). From the perspective of the entire economy, a more cost-effective (i.e. cheaper) CO_2 reduction is likely to be achieved when road transport is incorporated in the current EU ETS instead of in a closed RT ETS. After all, the more parties included in the ETS, the more efficient the system will be in achieving CO_2 reduction (CE Delft et al., 2014) (Van Essen et al., 2010). However, the cost efficiency of a separate RT ETS could be improved by linking it with the present EU ETS through e.g. trading possibilities between both schemes (Achtnicht et al., 2015). For example, by allowing the trading entities in the road transport sector to purchase part of the required allowances in the EU ETS, they take advantage of the lower mitigation costs in the EU ETS sectors and hence the CO_2 cap is met at lower costs. To what extent such a semi-open (i.e. linked) system may result in higher cost efficiency depends heavily on the actual design of the scheme. Another benefit of a linked system is that it may be useful in early stages of introduction of an ETS for road transport, as it reduces the uncertainty on the financial impacts (in terms of allowance prices) it will have on trading entities[3]. However, whether a linked system is relevant for road transport requires further investigation as well as how such a linked system could then be best designed.

Including road transport in the EU ETS has the (theoretical) advantage that an incentive for any type of reduction measures is provided. The system leaves the choice of CO_2 reduction strategy to the market, which can deploy many different CO_2 reduction options, both technical (e.g. fuel-efficient engines and vehicles) and operational (e.g. modal shift, fuel-efficient driving, speed reduction, less travelling).

However, a consideration with the incorporation of the road transport sector in the existing EU ETS is that **the road transport sector may end up as a net buyer of emission allowances**. The abatement options in the transport sector are often considered to be high (although debated by several studies, including Van Essen et al., (2010)) and the price elasticity of these options is relatively low when compared to other sectors such as electricity where coal to gas switches in the grid provide reduced demand for allowances. As a consequence, without any other climate policies in place, emission reduction is expected to occur in other ETS sectors than the road sector. A closed RT ETS, on the other hand, would ensure that CO_2 emissions from the road transport sector itself will be reduced, as the emission cap have to be met by emission reductions applied in this sector (Van Essen et al., 2010).

Another consideration with respect to including road transport in the EU ETS, closely related to the previous one, is **that innovative reduction technologies with relatively high upfront costs may not be fully incentivised**. Because of consumer myopia, only fuel price incentives provided by the inclusion of road transport in ETS of three to five years are considered by consumers when buying a new vehicle. Therefore, economic instruments targeting the variable costs of vehicles (e.g. fuel costs) are less effective in stimulating innovative reduction technologies than measures targeting the upfront costs. Furthermore, the volatility in the price incentive provided by a trading scheme may act as a barrier for

[3] As the price of allowances in the current EU ETS is more predictable than the price in a separate RT ETS.

investors in the innovative technologies. This is particularly true for inclusion of road transport in the existing EU ETS, but also in a closed RT ETS the price incentive is expected to be too low to stimulate the uptake of these reduction technologies[4]. Particularly, as these reduction options often require an adjustment of the infrastructure (e.g. charging infrastructure for electric vehicles) or legal setting as well (CE Delft et al., 2014). Therefore, additional policies are required for the successful uptake of these innovative reduction options[5], as will be discussed in more detail in Section 4.

As the current EU ETS covers sectors competing with industries operating in non-EU countries, there is a **risk of carbon leakage** if their competitive position is impacted by a high ETS price (Van Essen et al., 2010). If inclusion of the road transport sector and reducing the CO_2 cap strongly may lead to such carbon leakage, it may affect the overall effectiveness of CO_2 policies[6]. Furthermore, the relocation of (non-transport sector) activities to countries outside the EU may have a negative impact on the EU economy and employment[7]. By including road transport in a separate RT ETS, the risk of harming the competitive position of the EU industry and 'carbon leakage' is minimised, also because the transport sector has limited options to reallocate activities outside the EU (CE Delft et al., 2014).

The inclusion of transport in EU ETS will probably have a (small) negative impact on disposable incomes of consumers (CE Delft et al., 2014). It may also affect the income distribution of consumers. Whether the impact will be regressive or progressive and the size of the impact, however, differs widely between countries/regions and depends on all kinds of factors (urbanisation rate, quality of public transport infrastructure, existing transport taxes, etc.)[8].

Finally, integration of road transport in EU ETS will be a new policy measure in the road transport sector and hence will lead to **additional operational, administrative and transaction costs**. The complexity and costs of such a scheme heavily depends on the actual design. This issue may be investigated in more detail in the next phase of the study.

4 Individuals may prefer other, less expensive reduction options (e.g. purchasing a more fuel-efficient fossil fuelled car, switch to public transport, etc.). As the cap in the RT ETS can be met by applying these less expensive and innovative options, there will be no effective incentive to stimulate the uptake of more innovative reduction technologies.

5 Particularly because these innovative technologies may contribute to more cost-effective CO_2 reduction and hence they may be important elements of meeting the stricter CO_2 emission reduction targets in the future in a cost-effective way. For that purpose, current market penetration of innovative reduction technologies is relevant in order to realise economies of scale and learning effects.

6 Part of the CO_2 reduction achieved within the EU may be undone by additional CO_2 emissions outside the EU. Hence, the reduction in CO_2 emissions at the global level is less than anticipated.

7 The risk of carbon leakage of extending the current EU ETS to road transport could be(partly) addressed by specific design options, e.g. by implementing carbon border adjustments. Such additional design features will, however, further complicate the overall design of the scheme.

8 For example, in countries/regions with high urbanisation rates, a good-quality public transport infrastructure and/or high initial vehicle taxes, owning a passenger car could be considered more like a luxury good, while in countries/regions with low urbanisation rates, poor public transport and/or low initial vehicle taxes the ownership of a passenger cars is considered more like a basic good. The average income level of car owners will probably be higher in the former case and hence the impact on inclusion of transport in EU ETS will be more progressive in these countries/regions.

4 Interaction with other climate policies

Currently, several policies aim to reduce GHG emissions from the road transport sector, both at the European and national level. At the European level, some important measures are the CO_2 standards for vehicles, the Fuel Quality Directive (FQD) and Renewable Energy Directive (RED) and the Energy Taxation Directive (ETD). At the national level fiscal measures, fuel taxes and subsidies for electric vehicles are examples of decarbonisation measures implemented in the Netherlands.

By including road transport in the EU ETS (both by extending the current ETS to road transport or by implementing a closed RT ETS), **support for maintaining and particularly increasing the targets for existing instruments may decrease**. For example, carmakers may argue for not further tightening up the CO_2 standards for passenger cars, as 'CO_2 emissions are dealt with in the ETS'. And not only at the European level, also at the national level pressure may emerge to lower the ambition levels of abatement policies for the road transport sector. Although it is very uncertain to what extent this pressure may emerge, it should be taken into account when considering the inclusion of road transport in the EU ETS. One consequence may be that a more stringent cap in the EU ETS is required in order to achieve the reduction targets set for the transport sector, which may result in (increasing) resistance from the current ETS sectors to include road transport in the scheme as well. The latter effect is mainly relevant for inclusion of road transport in the existing EU ETS. However, in case of a closed RT ETS there may be resistance from transport users against a more stringent cap, as they are confronted with higher fuel costs[9].

Another concern with the inclusion of road transport in the EU ETS is the potential incompatibility of this instrument with additional, mostly national, policies to curb CO_2 emissions in this sector. As the overall cap for CO_2 allowances is set, saving emissions at the national level by implementing national measures will lead to freeing up emission allowances, which will be bought and used by other emitters in Europe. Because of this so-called **'waterbed effect'** the net emission reduction achieved by the national measures could even be zero. However, in the current design of the EU ETS, the Market Stability Reserve and its cancellation mechanisms partly neutralise this waterbed effect[10], although there is still much debate[11] to what extent and for which period this will be the case (Perino, 2018, Rosendahl, 2019). In case a closed RT ETS will be implemented, a similar kind of mechanism could be included. Another option could be to implement national emission trading schemes for road transport.

[9] To compensate for the additional fuel costs, governments may decide to reduce fuel taxes. Although this will have no impact on the effectiveness of the scheme (the overall emission reduction is determined by the cap), it may have distributional effects. Transport users in countries where fuel taxes are lowered are less affected by higher fuel costs than countries where fuel taxes are not lowered. In this respect, it should also be noticed that not all countries have the same room to lower their fuel taxes. In some countries (particularly Eastern European countries and some Southern European countries) fuel taxes are just below the mandatory minimum levels and hence they do not have much room to lower their fuel taxes.

[10] The Market Stability Reserve, which is in place since 2019, makes automatic adjustments to the auction supply based on the surplus of allowances in the market. The higher the surplus, the more allowances are withheld from auction. From 2023 onwards, automatic cancellation of allowances is planned: if allowances held in reserve exceed the auctions of the preceding year, all allowances above the auction volume are cancelled. Because of this mechanism, national abatement measures may result in a lower total supply of allowances (as these are cancelled) and hence may lead to a net reduction of CO_2 emissions.

[11] This debate could be assessed and discussed in the next phase of this project.

Given these concerns with respect to including road transport in the EU ETS, what may be reasons to include such an instrument next to the existing European and national climate policies for this sector? As mentioned before, an emission trading scheme incentivises all potential reduction options transport users have, i.e. using more fuel efficient vehicles, increase transport efficiency, apply a more fuel-efficient driving style or reduce the amount of kilometres travelled. In this way, **ETS for road transport is in most situations complementary to existing climate policies**, certainly at the European level, as these are often targeting just one specific reduction option (e.g. CO_2 vehicle standards are 'only' leading to more fuel efficient vehicles). Considering the entire package of European abatement measures for the road sector (vehicle standards, RED/FQD, Clean vehicle Directive, Vehicle Labelling Directive), reduction options like improving transport efficiency, modal shift and curbing transport demand are not/poorly targeted. At the European level, these reduction options are currently mainly affected by the Energy Taxation Directive (ETD), which sets minimum fuel excise duties for all EU Member States. Actually, the ETD and inclusion of road transport in ETS both target the same reduction options by the same kind of incentive (increased fuel price). Therefore, having both instruments apply simultaneously could decrease the legislative efficiency (and cost-effectiveness) of both policies (CE Delft et al., 2014). However, as the minimum fuel excise duty levels set by the ETD are relatively low (and political support to increase them is weak), adding an additional price incentive by including road transport in EU ETS may have added value. Furthermore, important EU policies like the CO_2 vehicle standards and the RED/FQD incentivise reduction options that are not well targeted by including road transport in ETS, as vehicle standards address market failures that are not addressed by ETS (see below), while blending renewable biofuels is a reduction option that will probably be too expensive to be incentivised by ETS (CE Delft et al., 2014).

An **ETS for road transport may also improve the effectiveness of existing policy instruments**. For example, the price incentive provided by the ETS may support the demand for fuel-efficient vehicles, which contributes to meet the CO_2 vehicle standards in a cost-effective way (CE Delft et al., 2019b). At the European level, such demand-side policies are scarce[12] and hence ETS may create additional financial incentives which significantly help to increase the market share of fuel efficient vehicles (Van Essen et al., 2010). In this case, a closed RT ETS may be more effective than inclusion of road transport in the existing ETS, as it will probably provide a more significant price incentive[13] for buying fuel efficient vehicles. National vehicle taxes or purchase subsidies could also be used to provide such financial incentives, as is done in the Netherlands. However, the Netherlands is a front-runner in this respect in Europe and in many EU countries much less financial incentives for fuel-efficient vehicles are in place (for a detailed overview of transport taxes and charges applied in the various EU Member States, see CE Delft et al., (2019a)). This implies that the added value of an ETS scheme for road transport will probably be higher in many other EU countries than in the Netherlands.

Policies like the CO_2 vehicle standards and the RED/FQD may complement the ETS for road transport as well, as they are targeting other market failures like knowledge spill overs, myopic behaviour and asymmetric information. In the presence of such market failures, a set of climate instruments can reduce emissions more efficiently than a single pricing option (Marcantonini et al., 2017). For example, compared to economic instruments CO_2 vehicle standards are considered more effective instruments to address the so-called

[12] The Clean Vehicle Directive and the Car Labelling Directive (and to some extent the ETD) could be considered demand-side policies, but their effectiveness in supporting the demand for fuel-efficient vehicles is rather low.

[13] Because the CO_2 price will be higher in a closed RT ETS, as was explained in Section 3.

energy paradox, i.e. consumers/companies do not purchase a fuel-efficient vehicle even if the higher investment costs are fully compensated by lower energy costs (CE Delft et al., 2019b). This energy paradox may be explained by various factors, including consumer myopia[14] and imperfect information[15] for vehicle buyers, and the existence of split incentives[16] (EC, 2007). Applying CO_2 vehicle standards seems a more effective option to deal with this market failure than an ETS for road transport.

Finally, **policies like the CO_2 vehicle standards and RED/FQD may have a downward pressure on the allowance price**, as they reduces the demand for allowances in the market (Marcantonini et al., 2017). In case road transport is included in the existing EU ETS, this may result in more support from the current ETS sectors for the extension of the scheme, while in case of a closed RT ETS it may contribute to more support for a stringent cap from transport users.

5 Impacts on other sectors in the EU ETS

An extension of the current EU ETS to road transport may affect the current ETS sectors. Several studies argue that inclusion of road transport in the EU ETS will have an **upward pressure on allowance prices** (Cambridge Econometrics, 2020, Oko-Institut & Energiewende, 2020), which would result in higher compliance costs for the current ETS sectors. These studies mention that price elasticity in the road sector is relatively low compared to some of the current ETS sectors and that the costs of abatement options in the road sector are relatively high. As a result, road transport would become a net buyer of allowances and additional abatement measures (with higher marginal costs) have to be taken by the current ETS sectors. This will lead to a rise in allowance prices. However, the relatively high abatement costs in the road transport sector are debated by studies like CE Delft et al., (2014) and Van Essen et al., (2010). Therefore, it is recommended to carry out a more detailed study on the abatement costs and price elasticities in the road transport sector compared to other sectors in the next phase of the study, in order to further validate the finding that extension of the EU ETS to road transport will lead to a higher allowance price.

As mentioned before, other climate policies implemented in the road transport sector (e.g. CO_2 vehicle standards), may have a downward pressure on the allowance price. Therefore, the extent by which current ETS sectors are confronted with higher compliance costs also depends on the targets set for these other climate policies.

Finally, extension of the current EU ETS to road transport may also affect the **volatility (i.e. the fluctuation) of the price of allowances**, which may have all kinds of effects for the road sector or other ETS sectors. However, as the impact on price volatility is rather complex and depends on many factors, a more thorough analysis is needed in the next phases of the project to draw conclusions.

[14] Consumers (both private consumers and companies) do often not take the life-time savings from improved fuel efficiency into account, but only the savings for small number of years (three to five years).

[15] Buyers of new vehicles have less accurate information than manufacturers about the potential performance of fuel-saving technologies. Because of this uncertainty, buyers may attach a risk premium to investing in new technologies and give a relatively larger weight to immediate costs than future savings.

[16] This refers to the situation that the buyer of a fuel-efficient vehicle is not the one (fully) benefitting from the fuel savings achieved with that vehicle. This may be the case if the owner of the vehicle is not its operator (e.g. due to leasing constructions) or when fuel provisions are used in transport contracts, implying that the operator's costs do not change with fuel consumption.

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