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Policy mix in the transport sector: What role can the EU ETS play for road transport?

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1. Introduction

As part of its climate policy the European Union has set the target of reducing the GHG emissions of the transport sector by 60% by 2050 compared to 1990. Key policy instruments on EU level for this sector are the CO_2 emission standards (EU 2009b and EU 2011) and the Fuel Quality Directive (EU 2009a), which cover the direct emissions in road transport and the CO_2 intensity of the energy supply for the transport sector. Within the scope of current discussions about the continuation of CO_2 emission standards after 2020 and about the EU's 2030 Energy and Climate Package (European Council 2014), the European Union Emission Trading Scheme (EU ETS) has often been referred to as a possible climate policy instrument for the transport sector.

This discussion paper focuses on the incorporation of road transport in the EU ETS. Alongside consideration of the effect that its inclusion would have within the transport sector, the effects on other sectors will also be discussed, based on the assumption that road transport is integrated as a (semi)-open[1] system in the current EU ETS.

2. Effect within the transport sector

The idea behind the introduction of the EU ETS is a (partial) internalization of the external costs related to the CO_2 emissions of road transport. The most efficient approach seems to be to incorporate road transport on the fuel depot/refinery level since the energy tax is already levied on this level.

Effect chain

Assuming that road transport is integrated in the EU ETS, the following structure results as a "perfect" chain of effects:

1. The EUA[2] costs are passed by the fuel depot/refinery operators on to the filling station operators and are consequently passed through to the final customers. The costs for the EUAs thus function in a similar way to a carbon tax on fuel purchase.
2. Based on the higher fuel costs a decreased use of the existing vehicle stock is assumed in the short term. In the long term the demand for efficient vehicles increases in order to balance the higher fuel costs.
3. The vehicle manufacturers increasingly offer efficient vehicles for sale in order to meet the increased demand for such vehicles.

The actual effect depends on various factors (pass-through of the price signal, price elasticities, investment and innovation readiness) and is discussed in the following.

Impact on fuel costs and final energy demand

The effect achieved in the transport sector by integrating road transport in the EU ETS depends substantially on the extra cost added to the fuel costs. EUA prices in the range of 20 to 30 €/t CO_2 (Capros et al. 2008) were modelled by the EU Commission; however, the current EUA trading

[1] Open system: All sectors are covered by one emissions trading scheme. Semi-open system: For road transport, emission allowances from all sectors can be used. The emission allowances for road transport cannot, however, be used in the other sectors.

[2] EUA: European Emission Allowance; 1 EUA corresponds to one tonne of CO_2.

price amounts, for a number of reasons, to approx. 5 €/t CO_2. If the fuel properties of pure petrol and diesel from TREMOD 5.2 are used, the following additional costs arise for fuel costs when a complete cost pass-through is assumed:

- 1.2 – 1.3 €ct/l when the EUA price is 5 €/ tCO_2,
- 5.8 – 6.6 €ct/l when the EUA price is 25 €/t CO_2.

Short-term price elasticities with regard to the energy demand of passenger cars are in the range of -0.1 to -0.3; long-term changes – which also include the purchase of more efficient cars – are usually assessed as having a price elasticity of -0.6 to -0.8 (both from Smokers et al. (2011)). Taking the fuel costs in the energy forecast of the German Federal Ministry for Economic Affairs and Energy (Schlesinger et al. 2014)[3] as a basis, energy consumption in the transport sector is reduced by approx. 0.5% (with 5 €/t CO_2) and 2.3% (with 25 €/t CO_2) when a price elasticity of -0.64 is assumed. These small reductions show that vehicle users and manufacturers are not given a satisfactory price signal via the EU ETS for a significant contribution to be made to climate protection with this effect chain.

In terms of total cost calculations, efficient vehicles often have advantages over vehicles with higher emissions, without achieving a significant share in new vehicle registrations. One can therefore speak of a market failure in the transport sector since cost advantages are systematically underestimated by consumers on the basis of low energy consumption costs. Shifting the climate protection incentive mainly to the energy consumption costs of vehicle use does not therefore lead to the desired result.

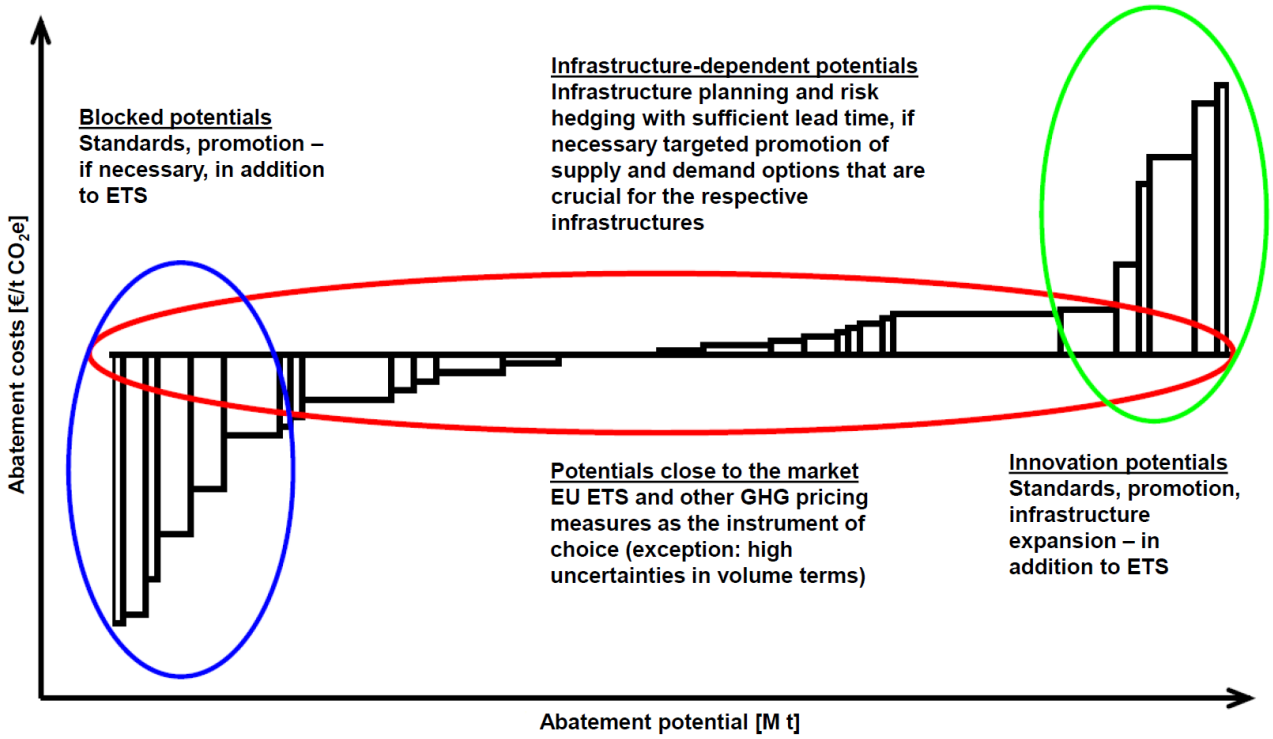
Supporting structural change in the transport sector

In the transport sector most climate change scenarios at EU level (EC 2011b) and for Germany (Schlesinger et al. 2014, Repenning et al. 2014, Nitsch et al. 2012) show a sharp increase in new registrations of vehicles with electric drives from 2020 to 2030. Such a – necessary – innovation drive and structural change cannot be induced by the low cost increases brought about by the EU ETS. Rather, additional incentives and standards (such as CO_2 emission and efficiency standards) are needed to stimulate innovation.

In the sectors already regulated by the EU ETS, it has already become clear that emissions trading is not the correct instrument for making structural changes to a system, serving instead the potentials close to the market that are achievable in the short term (Figure 1). In the electricity sector, for example, a promotion of renewable energy sources was introduced in most Member States in addition to the EU ETS to trigger structural change in electricity supply. However, since the incentive effect of the EU ETS is so small due to the low EUA price and does not, with regard to thermal power plants, result in the desired structural shift from coal to gas power plants, additional flanking measures such as coal phase-out legislation or a minimum CO_2 price for EUAs are being discussed. These examples from the electricity sector show that the incorporation of road transport in the EU ETS as the sole policy instrument does not bring about the structural change needed for climate protection. Rather, it can – if at all – function as a complementary policy instrument to other policy instruments.

[3] Petrol: 2020: 1.71 €/l, 2030: 1.89 €/l; diesel: 2020: 1.57 €/l; 2030: 1.76 €/l

Figure 1: Groups of emission abatement potentials and associated possible policy instruments



Source: Based on Matthes (2010)

3. Effects on sectors within the EU ETS

The incorporation of road transport in the EU ETS can also have impact on the sectors already regulated by the EU ETS and the effect on these sectors should therefore also be included in the discussion. Different effects result depending on the design of the EU ETS and the other policy instruments in the transport sector.

(Too) low GHG emission reduction in the transport sector

Substantial impact on the other EU ETS sectors arises when GHG emissions in the transport sector are not abated to the degree envisaged in the design of the emission reduction path. This situation can come about if there are no further policy instruments to reduce emissions in the transport sector in addition to the EU ETS or the emission reduction achieved in the transport sector by the other policy instruments is too low. Based on the low emission reduction of the transport sector, the EUA prices would initially increase. Since the industry sector and the electricity sector react more strongly than the transport sector to a change in the EUA price, the emission reduction not achieved by the transport sector would have to be made by the industry and electricity sectors and the cost pressure on these two sectors would increase.

(Too) high GHG emission reduction in the transport sector

It is theoretically conceivable that the need for the transport sector to reduce emissions would be overachieved. This might be the case if the effect of the existing policy instruments for the transport sector exceeds the abatement effect foreseen with the EU ETS. In this case, there would be a kind

of free-rider effect in which the need of other EU ETS sectors to abate emissions is decreased without an additional emission reduction being induced in the transport sector by the EU ETS.

4. Interactions with other climate policy instruments in the transport sector

There are some effective steering measures geared to road transport, with the result that the interaction with these policy instruments must be taken into account when discussing the possible incorporation of road transport in the EU ETS.

On the supply side, the policy instruments addressing the CO_2 emissions of road transport are CO_2 emission standards (direct emissions of the vehicles) and the Fuel Quality Directive (direct and indirect emissions of the fuels used). On the demand side, a steering effect is mainly brought about by the fuel use tax in the transport sector and by the motor vehicle taxes.

CO_2 emission standards

Several recently published studies (Cambridge Econometrics 2014, Mock et al. 2014) have estimated what EUA prices are necessary to achieve an incentive effect which leads to the same efficiency increase as with the current CO_2 emission standards (2020: 95 g CO_2/km). The estimates of 370 - 440 € per tonne of CO_2 are far above the EUA prices that are expected and politically enforceable in an emissions trading scheme. This makes clear that the price signal arising from the integration of the transport sector in the EU ETS is not sufficient. Rather, an ambitious emission reduction target is necessary to bring about the increase in vehicle efficiency that is needed to meet the EU's climate protection targets in the transport sector.

Fuel Quality Directive

In contrast to the EU Emissions Trading Scheme, the energy sources used in the transport sector are specifically addressed in the Fuel Quality Directive. For the energy sources, a lower greenhouse gas intensity is enforced on average and specific sustainability criteria are defined. The main difference to the EU ETS lies in the consideration of the upstream emissions of fuels, with the result that the emissions relating to biofuels and tar sands-derived fuels are included. In the EU ETS only the emissions within the EU are counted; biogenic energy sources are calculated as zero emission (EC 2012). Due to the low incentive effect, a significant decrease in the greenhouse gas intensity of the energy sources used in the transport sector is – as in the case of vehicle efficiency – not to be expected upon incorporation of road transport in the EU ETS. Rather, without the Fuel Quality Directive the opportunity would be lost to integrate in a steering instrument the upstream emissions that are mostly outside the EU.

Energy taxes

With the integration of road transport in the EU ETS, a cost component would be added for vehicle users, which acts in an equivalent way to the current energy taxes in the transport sector. The basic idea of the cost efficiency of the EU ETS is to reduce greenhouse gas emissions where the costs for emission abatement are lowest. For the transport sector, however, this would not work with the current tax measures since the energy sources are already taxed differently with regard to greenhouse gas emissions. Currently in Germany, diesel is less taxed (by about 100 €/t CO_2) than petrol; in the case of natural gas, the tax advantage in terms of CO_2 emissions amounts to approx. 210 €/t CO_2. Furthermore, there are some considerable differences in tax rates applied in the EU Member States (e.g. the energy tax on petrol is 65.4 €ct/l in Germany and 39.4 €ct/l in Poland (EC 2014)). Thus, a distortion of the market is already taking place, which conflicts with the idea of

cost-efficient emission reduction. Moreover, the cost increases brought about by the EU ETS are substantially lower than the current energy tax rates, with the result that a correction of the current market distortion is not to be expected. It is anticipated that some Member States would reduce their energy tax rates following the inclusion of road transport in the EU ETS. A binding decrease for any sector being added to EU ETS was foreseen in the failed proposal for the introduction of a minimum tax level for energy sources (EC 2011a).

Policy mix

In general it should be assumed that the relevant opportunities for emission abatement (vehicle efficiency and CO_2 intensity of the energy sources) are addressed by the current mix of policy instruments for current vehicles and an emission reduction is achieved when designed appropriately. In the case of vehicle and fuel demand, there is also a suitable set of policy instruments available – energy and motor vehicle taxes – for a climate protection effect to be produced when designed appropriately. Taking into account market failure in respect of vehicle purchase (see Section 2: underestimation of the cost advantage of operating efficient vehicles), it should be assumed that policies directly supporting vehicles with lower GHG emissions at the point of purchase (e.g. the feebate system) function more effectively as climate protection measures than those which address the costs arising during vehicle operation (e.g. inclusion within the EU ETS).

5. Conclusions

It is clear that an incorporation of road transport in the EU ETS makes fuel purchases only slightly more expensive and would, assuming relatively rigid price elasticities of consumers, only produce a very low steering effect. Depending on the design of the additional policy instruments in the transport sector, additional pressure on the sectors already regulated by the EU ETS would result in the case of a low reduction of GHG emissions in the transport sector. In the contrasting case of a strong GHG emission reduction in the transport sector – which, however, would only be achieved with measures that go beyond incorporation in the EU ETS – the need of the remaining EU ETS sectors to reduce emissions would decrease, thereby giving rise to additional emissions overall compared to the situation without the inclusion of road transport in the EU ETS.

Compared to existing policy instruments it is clear that the efficiency development of vehicles as defined in the CO_2 emission standards can only be achieved with emission allowance prices that are far from realistic. Moreover, in contrast to the Fuel Quality Directive, the upstream emissions of the energy sources used are not taken into account in the EU ETS, with the result that a significant share of the emissions of alternative fuels would not be covered by the scheme. A regulation of the market – and also a very strong distortion of the market – is already taking place based on the different energy taxes of the Member States and of the different energy sources, with the result that the efficiency function of the EU ETS would not take effect in the transport sector without a fundamental change of the energy taxes. In addition, transaction costs for the administration of the EU ETS arise upon the incorporation of the transport sector in the scheme, which would further undermine cost efficiency.

It should be noted that in the transport sector there is market failure since vehicle buyers do not fully appreciate the cost advantages of low emission vehicles arising during vehicle use. To enable a high steering effect, the policy instruments which have a direct effect on vehicle purchase and do not primarily target the operating costs (like the EU ETS) are more effective in the transport sector.

Therefore, the incorporation of the transport sector in the EU ETS should, if it occurs at all, be made complementary to the existing policy instruments. As long as the design and the tightening of the existing policy instruments in the transport sector are not compromised by the EU ETS it would not – at least in the transport sector – have a negative effect on the targeted emission reduction. For effective climate protection in the transport sector, the existing measures and their design should be addressed as a priority and, where appropriate, be expanded to include measures that have a direct effect on vehicle purchase.

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