BACKGROUND PAPER (12/2018)

The diesel tax gap

The emission scandal in Germany put the diesel in the focus of politics and society. The once much praised diesel engine seems to be falling out of favour. Governments should use this window of opportunity to abolish the counterproductive tax advantage for diesel fuels and reform vehicle taxation in general. Billions of euros could be generated with better fuel and vehicle taxes based on stringent environmental criteria. A coherent and sustainable tax framework can incentivize the acquisition of more efficient vehicles and fewer emissions on the road.

To promote and protect commercial road freight transport from international competition, the tax credit for diesel was introduced in 1986. Passenger cars with diesel engines were a rare exception at that time. Since then the number of diesel cars in Germany (and many other countries) has exploded. Today, several million owners of diesel cars and trucks in Germany are benefiting from the lower tax rate. The subsidy has grown substantially in volume and many more people and groups are benefitting than was initially intended.

The subsidy was sometimes justified as a climate policy measures, because diesel cars emit less CO_2 than comparable petrol cars. However, the alleged climate advantage only exists in theory today. The average diesel car outperforms the average petrol car in terms of weight, power and has higher CO_2 emissions.

Additionally, diesel cars are inferior when it comes to other air pollutant emissions, particulate matter and nitrogen oxides in particular. Diesel cars cause great damage to the climate, the environment and are a serious threat for human health.

But the tax is not only bad for the environment; it also burdens the financial budget of the German state. The present tax reduction for diesel of 18.4 cents/litre costs over €7 billion every year. A one cent increase in the diesel tax rate alone would yield around €400 million additional revenues annually.

The diesel scandal has created much momentum and changed the public perception of the diesel technology. Sales of diesel passenger cars have dropped dramatically. Reacting to the scandal, the coaliton contract of CDU, CSU and SPD adresses the reduction of road traffic emissions – and NOx from diesel cars in particular. Retrofits, software updates, support for public transport and electric mobility are mentioned, and the general positions seems to have changed (CDU, CSU, SPD 2018). The scandal has received substaintial attention and the public debate has been taken further forward. This may pave the way for future activities. The diesel subsidy was however still not mentioned explicitly and no clearly defined goals were set. In 2018, the gap in taxation remained unchanged.

Many politicians embrace the idea of higher diesel taxes only behind closed doors. Many trade associations, large parts of the society and stakeholders think more progressively. Even former Volkswagen CEO Matthias Müller publicly questioned the intent and purpose of the diesel subsidy. The acknowledgement by an automotive executive that the diesel tax gap constitutes a subsidy is a huge improvement for the discussion, although many other relevant players still disagree with Müller.

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This report takes a closer look at the negative climate, environmental and health impacts of diesel emissions (chapter 1), and assesses the diesel tax gap against this background (chapter 2). The tax advantage is environmentally harmful, distorts the market and burdens public finances. The subsidy should be phased out, and additional revenues should be spent more wisely. Chapter 3 takes a brief look at other relevant policy measures and suggests some main recommendations.

1 Diesel Externalities

- Climate impact

The average diesel car in Germany emits more CO_2 per kilometre than the average petrol car. Performance and weight of new diesel cars have been increasing at an above-average rate for years, which outweighs the advantage of the more fuel-efficient engine. The higher driving performance is partly incentivised by the German tax structure, which is far less progressive than in other countries. This of course leads to additional emissions. The increased demand for diesel further exacerbates the CO_2 balance due to inefficiencies in fuel production and transport. The dependence of German car manufacturers on conventional and especially diesel-powered passenger cars has created path dependencies (FÖS/IKEM 2016).

Another study concludes that the diesel car boom in Europe over the last two decades did not help climate-policy efforts (Cames/Helmers 2013). Instead, the overestimated energy efficiency advantages of diesel engines were overcompensated by higher supply chain CO_2 emissions and climate-damaging black-carbon emissions (ibid.). Additionally, the efficiency of the diesel technology has already been maximized, whereas gasoline-powered passenger cars can still be improved.

Therefore, promoting the supposedly „climate-friendly" and clean diesel is bad policy.

- Health damages

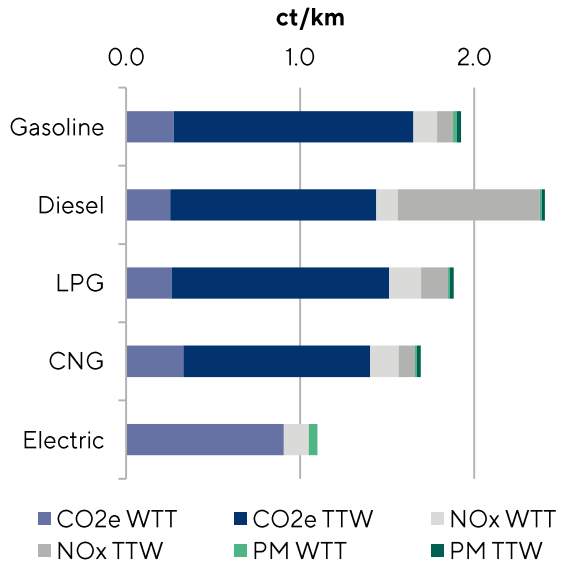
Figure 1 shows that the external costs per kilometre are highest for diesel. Diesel causes the greatest climate, environmental and health damages in total of all fuels under consideration. Nitrogen oxide (NO_X) emissions in particular are a serious problem with high external costs.

Nitrogen oxide is associated with allergic diseases, cardiovascular and respiratory diseases, lung cancer and increased mortality in general (see e.g. Franze et al. 2005, Samoli et al. 2006, Laumbach/Kipen 2012, Guarnieri/Balmes 2014, Hamra et al. 2015).

Nitrogen dioxide (NO_2) irritates the respiratory tract, in the long term it impairs lung function and leads to chronic cardiovascular diseases. It is particularly dangerous for sensitive groups, such as children (UBA 2017). NO_2 also forms ground-level ozone, a secondary pollutant, which can cause irritation of the respiratory tract, headaches, breathing difficulties and lung diseases (UBA 2013). In 2012, 2,100 people died through ground-level-ozone (EEA 2016)

Particulate matter (PM) is known for causing mucosal irritations, for example when reaching the trachea or it can infiltrate the bloodstream, even increase the plaque formation in the blood vessels (UBA 2016a). For the year 2012, it was estimated that over 70,000 people in Germany died because of NO_2 and particular matter (EEA 2016).

Figure 1: externalities in ct/km



Source: own graph based on FÖS/IKEM (2016)

- Environment

Not only human health is affected by NO_X. Many other damages caused by NOx are known. For example, NO_X might lead to biodiversity losses, which can have huge effects on ecosystem services (SRU 2015). The value of ecosystem services is estimated with very different outcomes. According to some studies, 100.000 protected areas around the world can provide ecosystem services worth of 4.4 to 5.2 trillion US $ per year (NABU 2010).

Another negative effect is observable when looking at the life cycle of the different forms of Nitrogen. Nitrogen in the air (N_2) is very inert, while in diesel produced NO_X is highly reactive (UBA 2016b). The long term effects of a conversion of atmospheric nitrogen to a lot of NO_X are not sufficiently known.

Health, climate and environmental goals should not be played off against each other, but rather be pursued at the same time with well-aligned policy instruments.

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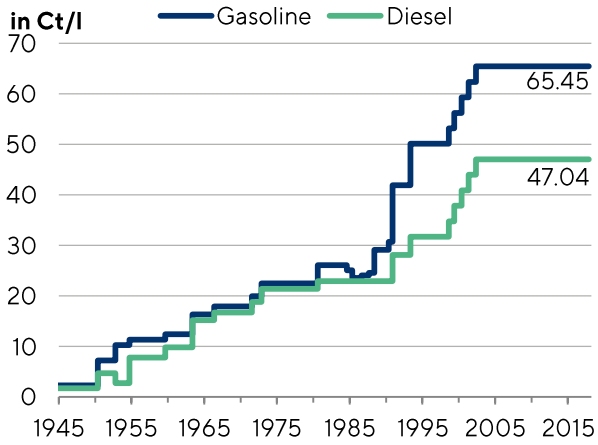
- Other traffic related impacts

As mentioned before, the average diesel car has a higher driving performance and mileage than other engine cars, partly incentivised by the lower tax rates on diesel fuel. Higher mileage also means more traffic in general and more traffic-related externalities. This concerns, for example, the provision and maintenance of road infrastructure or the additional costs of accidents and noise pollution (Verkehrsclub Österreich 2017).

2 The Diesel Subsidy

In many countries, diesel is taxed at a lower tax rate than petrol. In Germany, the difference was significantly increased during the nineties and amounts to 18.4 cents/litre since 2003 (see Figure 2). The differentiated tax rates were used to maintain the competitiveness of the German transport and haulage industry. However, passenger cars are beneficiaries, too, and their importance has been growing steadily with the diesel boom.

Figure 2: Energy tax rates in Germany since 1945



Source: own graph based on BMF 2014

Some relevant players from the automotive and related industries still do no acknowledge that the lower tax rate on diesel constitutes a subsidy. Volkswagen CEO Matthias Müller is a prominent exception. He publicly questioned the intent and purpose of the diesel tax break and called it a subsidy.

It should be obvious that the lower tax rate for diesel is adversely distorting competition, particularly between passenger cars with diesel and petrol engines. The tax break is a substantial cost advantage for diesel cars, giving them an unjustified competitive advantage. This misguided policy increases demand for and production of diesel cars. It also keeps the costs of burning diesel artificially low, thereby promoting excessive usage and additional emissions.

The German Environmental Agency (UBA 2016c) estimates that the diesel subsidy amounts to a shortfall in tax revenues of €7.353 billion per year. Passenger cars account for roughly half the amount. Taking into account the higher vehicle tax rates for diesel cars, the subsidy volume is still worth around one and a half billion euros (UBA 2016d). These funds could be used much more effectively e.g. for modern, climate-friendly mobility.

The UBA calculations are based on the assumption that diesel and petrol should be taxed at the same rate. However, fair and useful taxation of energy should be based on the principle of equivalence, i.e. it should be based on energy and/or carbon dioxide content (see e.g. FÖS/IKEM 2016). Every litre of diesel, petrol etc. contains a certain amount of carbon dioxide. Fuel taxes hence put a price on every gram that will be emitted, thereby internalizing the climate costs of burning fossil fuels.

If the principle of equivalence was applied, diesel would have to be taxed at an even higher rate than petrol due to its higher energy and carbon content. Against this background, the calculation of the subsidy would yield even higher values.

Many actors, like the European Commission (2011) and the OECD (2014), criticise the tax gap. Some countries, including Belgium and France, already started to phase out the subsidy or at least have plans to do so (see e.g. Damert/Rudolph 2018).

Additionally, tax rates should be indexed to inflation. While consumer prices have been rising every year, the energy tax rates on diesel and petrol (and many more) stayed constant in Germany since 2003 (see Figure 2). Such a long period (13 years) without raising energy tax rates is quite unusual in international comparison. Inflation has been diminishing the real value of nominally defined tax rates. The intended steering effect and revenues are thus slowly decreasing in real terms. Several taxes are adjusted to inflation on a regular basis e.g. in Sweden (since 1994), Denmark (since 2008) and the Netherlands (since 1999). Other countries like Portugal, Romania and Cyprus have introduced indexation just recently. In Flanders, Belgium, motor vehicle tax rates are adjusted to inflation.

2.1 Environmental Impact

The aforementioned environmental impact of a phase-out of the diesel subsidy has been analysed in a range of studies. Zimmer/Koch (2017), for example, show that taxing diesel at the same rate as gasoline would reduce CO_2 and NO_X emissions by approximately 10% over a five year time period. The increase of the diesel price at the

pump of about 20 cents is associated with a 14% decrease in total diesel consumption.

These studies support the argument that there is no reasonable justification for the diesel tax break. Diesel is dirtier than gasoline and the alleged climate advantage of the diesel engine no longer exists. There may be good reasons to incentivise clean transport, but diesel is far from being clean or climate-friendly.

2.2 Fiscal Effect and Revenue Use

The subsidisation is not only environmentally harmful but also has negative fiscal effects. The German Environmental Agency (UBA 2016c) estimates the tax break for diesel compared with petrol amounts to a tax shortfall of €7.353 billion in total in Germany. Passenger cars account for roughly €3.5 billion. Even after correcting for the higher vehicle taxes, which have to be paid for diesel cars, the subsidy is worth one and a half billion euros (UBA 2016d).

Looking at it from another perspective, every additional cent in the energy tax rate for diesel used in passenger cars would increase tax revenues by more than €200 million annually (everything else held constant). This money could be spent much more effectively to support a modal shift, green mobility or low-carbon transport. The revenues could also be used to finance a more general tax shift e.g. from labour to environmental externalities.

Many other countries tax diesel at lower rate than petrol. ODI et al. (2017) find that subsidies to diesel consumption amount to at least €21 billion in 11 EU countries. For some countries under consideration there are, however, no calculations. The actual amount is possible much higher.

2.3 Testing procedures

The diesel scandal was triggered by manipulated exhaust gas measurements. But also the regular procedures are being criticised for their unrealistic and far too positive measuring results. In recent years, the test values for CO_2 and NOx measured on the test stand have been diverging from real world values on the road (ICCT 2016; ICCT/TNO 2017). The ICCT found that the gap between official and real-world CO_2 emission values of passenger cars exceeded 40% on average in 2016.

Many EU member countries have adopted CO_2-based vehicle taxes. With flawed type-approval CO_2 values tax revenues turn out to be much lower than they should. If CO_2 emission values had been more realistic, tax revenues from the annual motor vehicle tax in Germany would have been more than €4 billion higher between 2010 and 2016 (FÖS 2018).

The introduction of the Worldwide harmonized Light vehicles Test Procedure (WLTP) is a first step to reduce the emissions gap. The WLTP is however far from perfect and fundamental problems remain. According to Stewart et al. (2015), the emissions gap will remain large and might even increase again.

3 Other Relevant Policy Measures

Chapter 2 made the case for closing the diesel tax gap and introducing the principle of equivalence to energy taxation. This chapter summarises additional policy measures of relevance.

It is of high importance to **close the emissions gap** between type-approval and real-word emission values. The regulatory framework needs improvement and should be stricter. CO_2-based taxation can only be effective if CO_2 values are reliable and realistic. The emissions gap has been impairing taxation in many countries (see FÖS 2018). The introductions of WLTP and RDE are expected to bring some progress, but the system is still far from being perfect.

Registration taxes are a key instrument to reduce average CO_2 emission values of new passenger car registrations. Many countries (e.g. the Netherlands and Portugal) already have highly effective taxes put in place. In Germany and some other EU countries there are no such taxes upon registration or acquisition at all. Such taxes need to be consciously designed. CO_2 emission values appear to be a good tax base. Tax rates, tax calculations, tax thresholds etc. have to be adjusted continuously to keep up with technological advances.

Company car taxation should also be reformed. Taxation currently does not appropriately cover the benefit of driving a company car for private purposes. This undertaxation constitutes an environmentally harmful and socially unfair subsidy. Some EU countries have much higher tax rates and/or put CO_2 emission values into the tax calculation. Discussions to reform company car taxation in Germany have already started.

More generally, all vehicle taxes need to be adjusted to technological developments. Many taxes are not prepared for the electrification of transport or the use of alternative fuels and technologies. Many temporary solutions are currently in place. In the medium-to-long term, **intelligent road pricing schemes** seem to be the best solution for sustainable transport infrastructure finance. Like fuel taxes, they are able to take into account actual vehicle use. At the same time, they are able to address certain vehicle attributes, congestion, air pollution and other externalities from road transport. The German

Lkw-Maut is one example of a country-wide system for road freight transport. Systems with a regional focus can be found in London and Stockholm.

Last but not least, tax rates should be **indexed to inflation**. While consumption prices are rising each year, tax rates for diesel and gasoline were last adjusted in 2003. Inflation is lowering the real value of all nominally defined tax rates (not only fuel taxes). Hence, the taxes' intended steering effects and revenues are slowly decreasing in real terms. Indexation of tax rates can be found, for example, in Sweden, Denmark and the Netherlands.

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