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REPORT FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Energy prices and costs in Europe

{COM(2019) 1 final}

3 Oil and oil product prices

Main findings

— After the dramatic fall seen in 2014-2016, crude oil prices have broadly been rising since mid-2017, driven by robust global demand growth, Middle East tensions, concerns over the impact of a return to US sanctions on Iranian oil, sliding output in Venezuela and the continued OPEC-led output cuts.

— The crude oil price is the main driver for the development of the wholesale prices of oil products although other factors, like the supply-demand situation in the specific oil product market, refinery maintenance or seasonality can also influence the prices.

— In addition to the crude oil price, the retail price of oil products is also influenced by the costs of refining and distribution, variations in exchange rates (crude oil is traded in US dollar but the finished products are sold at the pump in euros or other national currencies) and tax rates. In fact, the share of crude oil in the final price can be as low as 25% and, therefore, variations in the price of crude oil have a limited impact on the price at the pump. In contrast, the tax component (excise duty plus VAT) can reach up to 70% of the retail price

— The high share of taxes and exchange rate developments moderate the pass-through of falling/rising oil prices to the retail prices of oil products in Europe.

— In mid-2018, retail prices reached the highest levels since 2014-2015

— There has been some convergence of gasoline and diesel prices, helped by some convergence of the excise duty rates but in several Member States the tax advantage of diesel actually increased.

3.1 Crude oil prices

Crude oil prices reached unprecedented levels in 2008, with Brent exceeding 140 USD/bbl at the height of the "commodity super cycle" which was driven by the rising demand from emerging markets, particularly China. The price increase was interrupted by the financial crisis, with a sharp downturn in the second half of 2008. However, as demand recovered, prices began to rise and crossed the 100 USD/bbl level again in early 2011. This was followed by three and a half years of remarkable price stability, with Brent rarely leaving the 100-120 USD/bbl range.

Crude oil prices started to decline in mid-2014, driven by weak demand and robust supply growth, resulting in an oversupplied market. Global oil demand growth has significantly weakened in 2014, mainly because of lower than expected global economic growth and mild winter temperatures.

On the supply side, non-OPEC output showed a robust growth, driven by increasing unconventional oil production in North America. US light tight oil production proved to be rather resilient to low prices: improving efficiency and cost reductions allowed output to continue increasing in spite of the plummeting crude oil prices.

In spite of the falling prices, OPEC countries chose not to cut production in an attempt to maintain market share and to squeeze out high-cost producers. Furthermore, the lifting of the Iranian sanctions in January 2016 allowed Iran to increase its oil exports, adding to an already

high OPEC output and further delaying the market rebalancing. OPEC and a few key non-OPEC producers finally agreed in November 2016 to limit their production, in order to accelerate the drawdown of the stock overhang and bring the rebalancing forward.

From a 115 USD/bbl peak in June 2014, Brent dropped to 26 USD/bbl on 20 January 2016, its lowest level since 2003. This means the price decreased by 77% in 19 months.

Despite the November 2016 agreement of OPEC and non-OPEC producers to reduce output, oil prices decreased in the first half of 2017 reflecting increasing production in the US, as well as growing output in Libya and Nigeria which were exempted from the OPEC cut. The rollover of the cut in May 2017 failed to reverse the trend: in the second half of June 2017, the price of Brent dropped below 45 USD/bbl, the lowest level since November 2016.

From mid-2017, however, oil prices have broadly been on the rise, driven by a combination of factors, including the robust growth of global demand, growing tensions in the Middle East, a number of actual supply disruptions (Northern Iraq, hurricanes in North America, closure of the Forties pipeline system in the UK North Sea, a sustained plunge of Venezuelan supply), the weakening of the dollar and a further extension of the OPEC cut in November 2017. In late December and early January, the protests in Iran provided support to prices.

Prices receded in early February 2018 as the market remained well supplied, but the price rise resumed afterwards as growing tensions in Syria and the expectation of the US withdrawal from the Joint Comprehensive Plan of Action (the Iran nuclear deal) raised concerns about future oil supplies. In mid-May 2018, after President Trump announced the re-imposition of US sanctions on Iran, Brent reached 80 USD/bbl, the highest level in three and a half years. Compared to the 44 USD/bbl low on 20 June 2017, Brent increased by more than 75%. Prices continued to rise despite the strengthening of the US dollar which in general is conducive to lower oil prices.

Brent receded to around 75 USD/bbl in late May/early June after Russia and Saudi Arabia indicated they would increase production in the second half of the year. On 22 June, OPEC and non-OPEC producers agreed to do away with the over-compliance with the cuts agreed back in 2016, implying a theoretical output increase of around 1 million barrels per day (mb/d) in the second half of the year. Despite the agreement, prices rose again in late June and early July, supported by production outages in Libya and Canada.

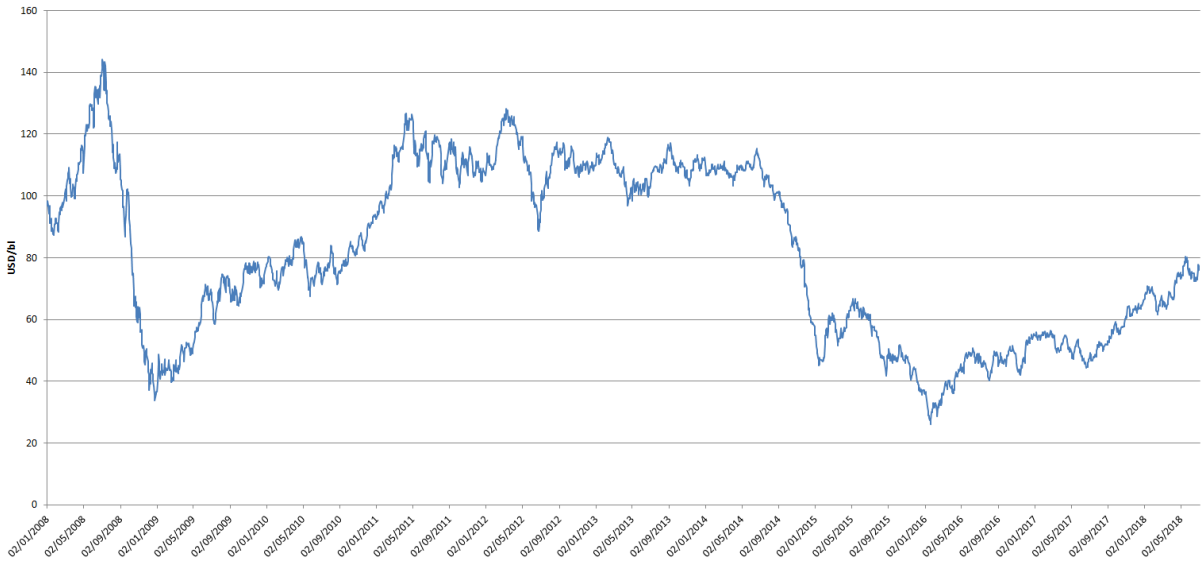

Figure 61 - The Brent crude oil price from 2008 to mid-2018

Source: Platts

The unilateral withdrawal of the US from the Iran nuclear deal casts doubt about the future of Iranian crude exports, at a time when we already see sliding output in Libya and Venezuela, as well as geopolitical risks in other parts of the world. This is expected to further tighten the global market, potentially leading to an additional price rise[30].

It is far from certain whether OPEC and Russia have the capacity to fill this gap. Even if they do, this will significantly reduce global spare capacity, making the market exposed to any supply disruptions.

3.2 Wholesale prices of oil products

Crude oil is the main feedstock to produce oil products and oil product prices closely follow the development of the crude oil price. This is clearly visible if we compare the Brent oil price with the representative wholesale prices of the main oil products in Western Europe.

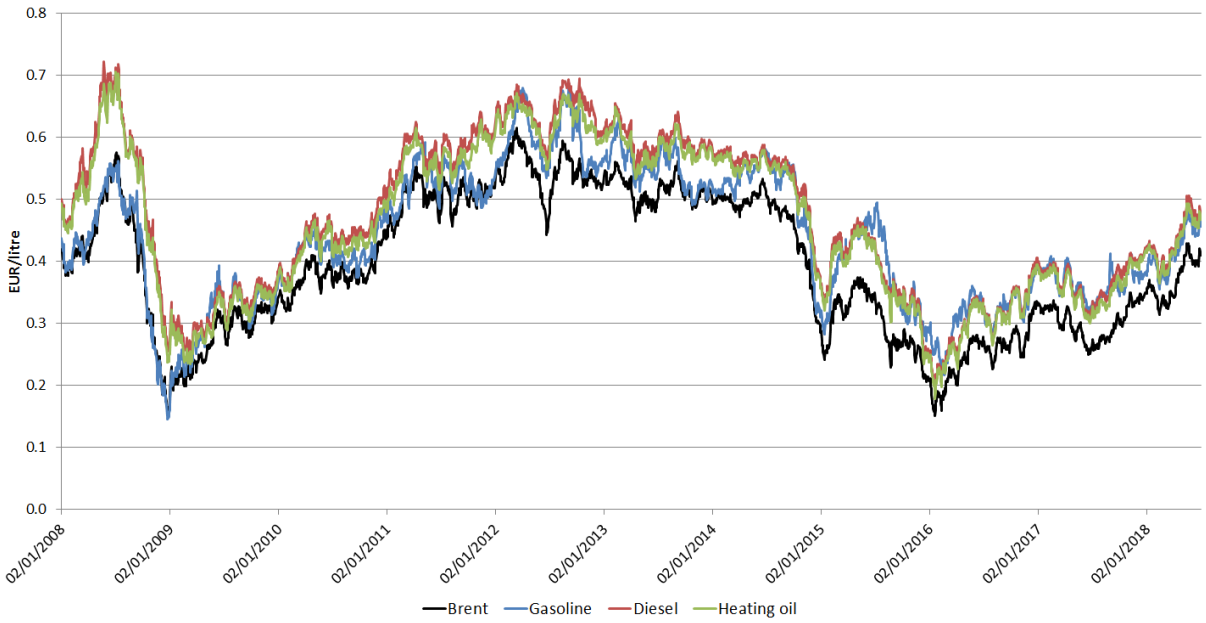

Figure 62 - Crude oil (Brent) and European wholesale gasoline, diesel and heating oil prices from 2008 to mid-2018

Source: Platts, ECB

The following oil product prices were used: Gasoline Prem Unleaded 10ppmS FOB AR Barge (gasoline), ULSD 10ppmS FOB ARA Barge (diesel) and Gasoil 0.1%S FOB ARA Barge (heating oil)
The following conversion rates were used: crude oil 159 litre/barrel, gasoline 1350 litre/ton, diesel and heating oil 1186 litre/ton.

Looking at the crack spreads (i.e. the differential between the wholesale price of oil products and crude oil), one can see that these spreads are however rather volatile and often follow different paths for different products.

[30] However, oil market is very volatile; since the beginning of October 2018 crude oil prices fell and at the end of November 2018 the Brent crude oil price was slightly below 60 USD/bbl.

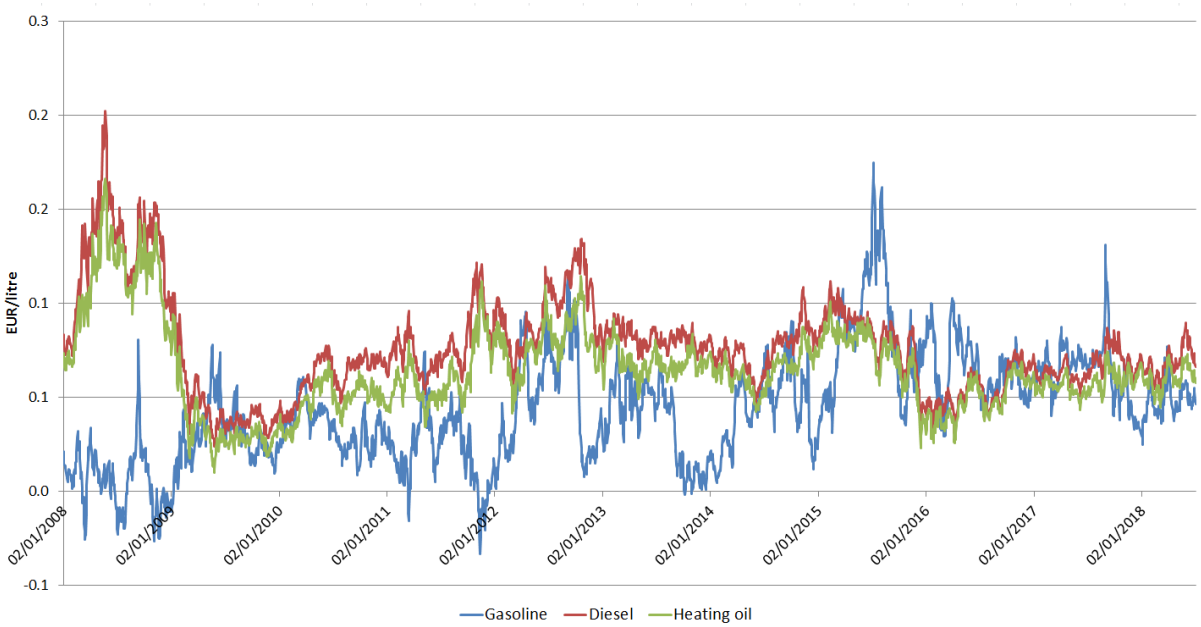

Figure 63 - Crack spreads of gasoline, diesel and heating oil from 2008 to mid-2018

Source: Platts, ECB

Crack spreads are calculated as the difference between the Brent crude oil price and the price of the following products: Gasoline Prem Unleaded 10ppmS FOB AR Barge (gasoline), ULSD 10ppmS FOB ARA Barge (diesel) and Gasoil 0.1%S FOB ARA Barge (heating oil)
The following conversion rates were used: crude oil 159 litre/barrel, gasoline 1350 litre/ton, diesel and heating oil 1186 litre/ton.

The supply-demand conditions of the different products are divergent (both from crude oil and from each other) which will affect their crack spreads. For example, the 2008 oil price rise was very much driven by industrial growth in China, leading to a big increase in the demand of middle distillates which is reflected in the high crack spreads of these products. There are also seasonal differences in demand, for example, gasoline demand is higher in the summer, typically resulting in a relatively high crack spread during that period while in times of low demand crack spreads can even turn negative (implying the gasoline is cheaper than crude oil). In the summer of 2015, gasoline crack spreads reached unusually high levels as low prices boosted gasoline demand.

Oil product supply can also fluctuate, for example as a result of refinery maintenance or natural disasters affecting refinery operations; this will also affect crack spreads. For example, Hurricane Harvey in the US triggered the spike of European gasoline crack spreads in late August 2017.

On **Figure 63** one can see that European crack spreads have been relatively high in 2015, averaging 0.08 EUR/litre (around 13 EUR/barrel) for both gasoline and diesel. Afterwards, crack spreads diminished: in the period from the beginning of 2016 to mid-2018, both gasoline and diesel crack spreads averaged 0.06 EUR/litre (less than 10 EUR/barrel).

3.3 Retail prices of oil products

In addition to electricity and gas, oil products constitute an important part of the energy costs of both households and industry. Oil products have a dominant role in transport where they have limited alternatives, particularly in road freight, maritime and air transport. In case of

space heating, the share of oil products is on a declining trend but in certain Member States they still have an important role in this sector.

The retail price of oil products depends on several factors. Variations in the price of crude oil will obviously have an impact on retail prices but crude oil costs constitute just a part, often a relatively small part, of the final price paid by the consumer. Crude oil is traded in US dollar but the finished products are sold at the pump in euros or other national currencies. Therefore, variations in exchange rates will also influence the crude oil component.

Crude oil has to be refined to produce fuels which can be used in transportation, heating or other uses. After refining, the finished products have to be distributed and sold, typically at petrol stations. Refining and distribution costs are relatively stable and are not proportional to the crude oil price.

A significant part of the price goes to taxes: excise duties, other indirect taxes and VAT. These taxes make an important contribution to the tax revenue of Member States (see Chapter 8.1). In case of motor fuels (gasoline and diesel), taxes typically cover more than half of the final price.

Excise duties are generally a fixed amount per quantity (usually litre or kg), i.e. not influenced by the price of crude oil. VAT, on the other hand, is set as a percentage of the price of the product (including the excise duty) and, therefore, changes in the crude oil price will have an impact on the absolute value of the VAT component.

Rates of both the excise duty and VAT vary by product and by Member State, resulting in significant price differences across Europe. Nevertheless, Member States have no complete freedom when setting the tax rates. The Energy Tax Directive (2003/96/EC) sets minimum excise duty rates for gasoline, gasoil, kerosene, LPG and heavy fuel oil. New Member States were often granted a transition period to reach the minimum level; today, all Member States comply with minimum level.

In case of VAT, the VAT Directive (2006/112/EC) requires that the standard VAT rate must be at least 15%; currently the standard VAT rates applied by Member States range from 17% (in Luxembourg) to 27% (in Hungary). In case of oil products, Member States typically apply the standard VAT rate. Under certain conditions, however, Member States can set a lower VAT rate for specific products and services; for example, a few Member States apply a reduced rate for heating oil.

As the share of crude oil in the final price can be as low as 25%, variations in the price of crude oil will have a limited impact on the price at the pump. In fact, the high share of fixed taxes in the price acts as a buffer: fluctuations in the retail price of oil products (particularly motor fuels) are significantly lower than the fluctuation of the crude oil price. Variations in the exchange rate have a similar effect: the oil price and the value of the US dollar usually move in the opposite direction: a strengthening dollar typically coincides with decreasing oil prices and vice versa. This means that changes in the oil price, whether upwards or downwards, are mitigated by the exchange rate and the volatility of the oil price expressed in euros is smaller than the volatility of the price expressed in dollar.

During the decline of crude oil prices in 2014-2016, the above factors moderated the pass-through to oil product prices in the EU: while crude oil prices (expressed in USD) fell by 77% between mid-2014 and early 2016, in the same period[31] the average EU consumer price of gasoline and diesel decreased by 24% and 28%, respectively. In case of heating oil, the decrease was 45%.

[31] Between 30 June 2014 and 15 February 2016

Similarly, the comparably high taxes in the EU mitigated the feed-through of the recent oil price rise: between 3 July 2017 and 11 June 2018, retail prices of gasoline and diesel (including taxes and duties) increased by 12% and 18%, respectively, as compared to a more than 50% increase in international crude oil prices in the same period (measured in USD). In case of heating oil, where the tax component is smaller, the price increase was 32%.

Finally, although their current use is limited, alternative fuels provide an increasing share of the energy mix in transport and their importance is expected to grow in the future. At the same time, as shown by Trinomics et al. (2018), data on retail prices for compressed natural gas (CNG), liquefied natural gas (LNG), liquefied petroleum gas (LPG) and biofuels is not widely available. The growing importance of the market for alternative fuels shows the need of further efforts in collecting such retail prices in the future.

3.3.1 Methodology

The analysis in this section is based on the data of the weekly Oil Bulletin. Pursuant to the Council Decision on Crude Oil Supply Costs and the Consumer Prices of Petroleum Products (1999/280/EC), Member States have to report to the Commission the retail prices of the main petroleum products on a weekly basis. Member States also have to report any changes in the tax rates (VAT, excise duty, other indirect taxes) applicable to these products, allowing us to break down the final price to three main components: the net price, excise duty[32] and VAT. The reported data are published on the website of DG Energy.[33]

The analysis covers the three main petroleum products sold in the retail sector: gasoline (Euro-super 95), diesel (automotive gas oil) and heating oil (heating gas oil). The time horizon is from 2008 to the first half of 2018. All Member States are covered but data for Croatia is available only from 2013. In case of heating oil, Slovakia does not report prices since October 2011 while, from 2015, Greece does not report prices for the period from May to mid-October.

Prices reported in currencies other than the euro were converted into euro, using the ECB exchange rate of the day for which the price applies.

For each year and each Member State an average price was calculated as an arithmetic average of the weekly prices and an EU average price was calculated as the weighted average of these. In the absence of 2017 and 2018 consumption figures, for these years we used the 2016 consumption data as the weight.

3.3.2 General findings

While the absolute level of the prices of the three oil products are different, their development over the last 10 and half years is very similar and basically reflects the evolution of the crude oil price in the same period. The price of all three products decreased significantly in 2009 when oil prices plummeted in the wake of the financial crisis. This was followed by years of gradual increase, with prices peaking in 2012. Prices decreased afterwards, with the decrease

[32] In this section, other indirect taxes are reported in the excise duty component
[33] https://ec.europa.eu/energy/en/statistics/weekly-oil-bulletin

accelerating in 2015-2016. As crude oil prices recovered from 2016, oil product prices have been also rising in the last two years.

For comparison, **Figure 64** also depicts the evolution of the Brent crude oil price (recalculated into EUR/litre).

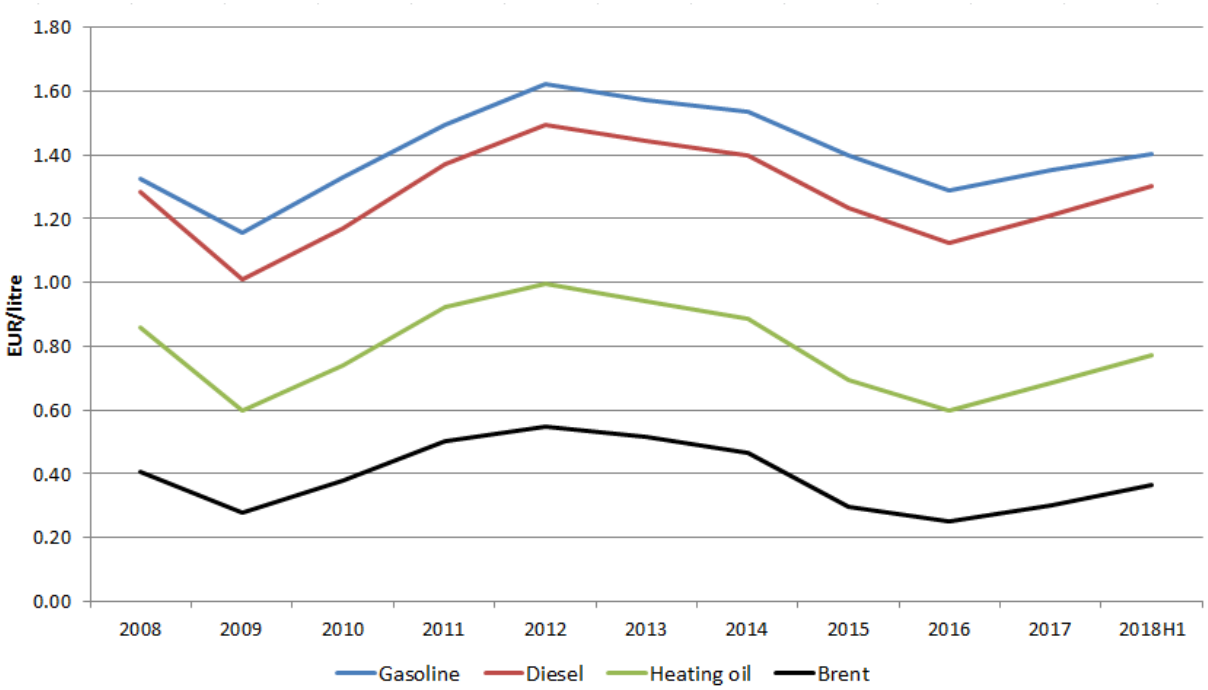

Figure 64 - Average retail price of oil products in the EU

Source: Oil Bulletin, DG Energy, Platts

The difference in the absolute price of the three products can be mostly attributed to the diverging tax rates. In practically all Member States, the excise duty rate of gasoline is higher than that of diesel. The Energy Tax Directive also sets a higher minimum rate for gasoline (0.359 EUR/litre) compared to diesel (0.33 EUR/litre). The UK is the only Member State where the two motor fuels are taxed at the same level.

In case of heating oil, a few Member States (Bulgaria, the Czech Republic, Hungary and the Netherlands) apply practically the same excise duty rates than for diesel. In most Member States, however, heating oil is taxed at a lower level. The minimum rate established by the Energy Tax Directive (0.021 EUR/litre) is much lower than those for motor fuels. Ireland, Luxembourg and the UK also apply a reduced VAT rate for heating oil.

Although excise duty rates are set in absolute values, i.e. as a fixed amount per quantity of the product, several Member States increased the tax rates over the period, resulting in a gradually increasing (weighted) average tax rate. According to the Energy Tax Directive, the minimum excise duty rate for diesel increased from 0.302 EUR/litre to 0.33 EUR/litre on 1 January 2010, requiring some Member States to adjust their rates.

Contrary to the general trend, the weighted average excise duty rate for gasoline slightly decreased in 2016 and 2017. While a few Member States indeed reduced the excise duty rate for gasoline in this period, the decrease was driven mainly by exchange rate developments, in particular the depreciation of the pound sterling which made the UK excise duty (unchanged in the local currency) significantly lower when expressed in euros.

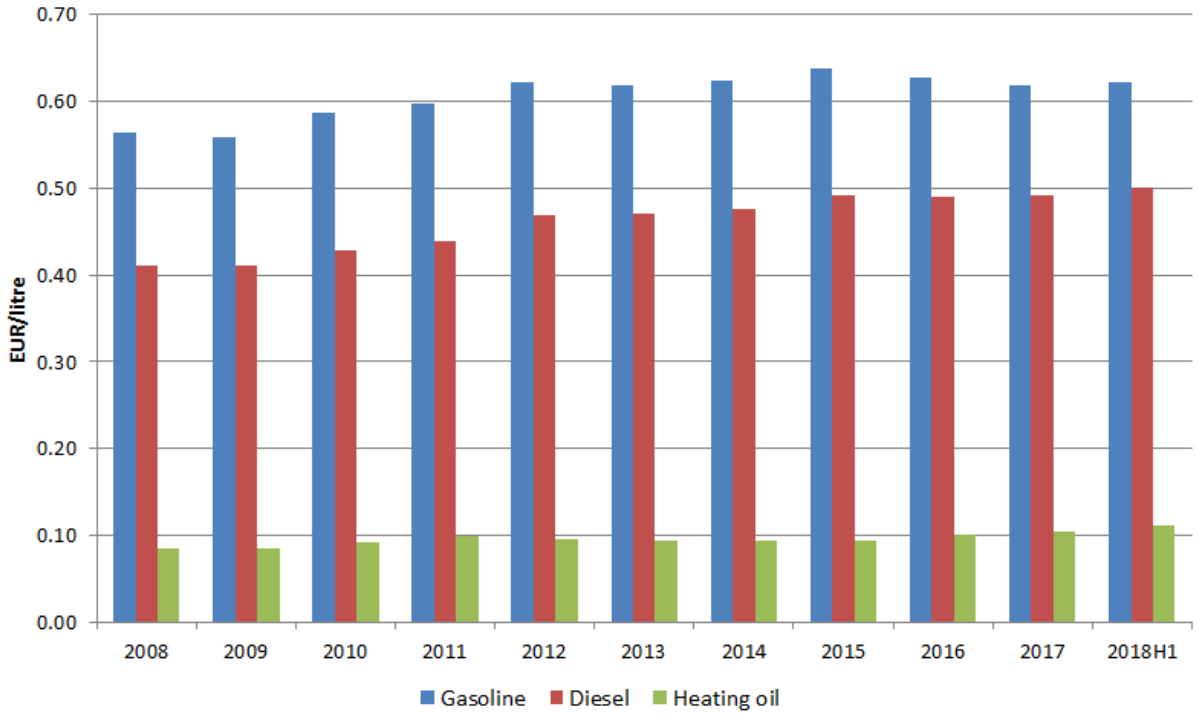

Figure 65 - Average excise duty rates for oil products in the EU

Source: Oil Bulletin, DG Energy

If the net price of the three products is compared, the difference is significantly lower. In fact, during the whole period the net price of diesel is slightly higher than that of gasoline.

Figure 66 also depicts the evolution of the Brent crude oil price (recalculated into EUR/litre), showing that crude oil is clearly the main component of the net price. Over the period, crude oil price represented on average 65-70% of the net price of gasoline and diesel but in 2015-2016, as crude oil prices dropped significantly, this share dropped below 60%.

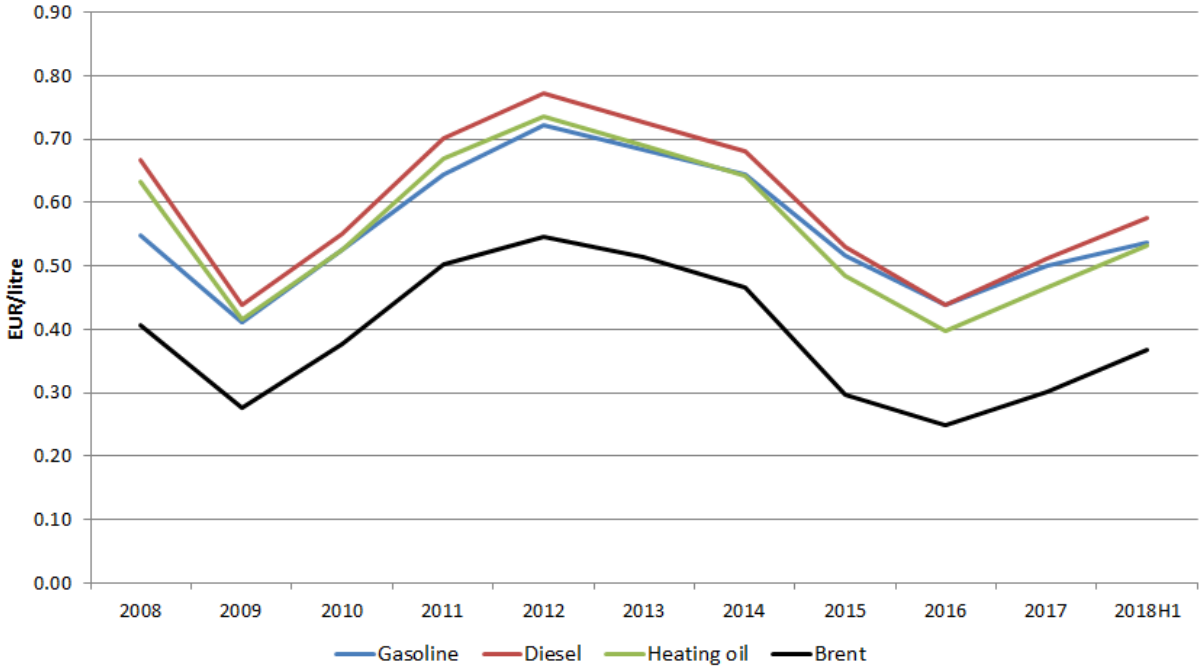

Figure 66 - Average retail price of oil products in the EU, without taxes

Source: Oil Bulletin, DG Energy

3.3.3 Gasoline

In most Member States, the evolution of gasoline prices clearly followed the trend of the crude oil price but there have been considerable differences in the absolute level, mainly explained by the diverging excise duty and VAT rates. Average prices moved in a relatively wide range, with the difference between the highest and lowest price being about 0.5 EUR/litre. This range has slightly narrowed between 2008 and 2014, from 0.52 EUR/litre to 0.45 EUR/litre, indicating some degree of price convergence. However, the range widened afterwards, reaching 0.54 EUR/litre in the first half of 2018.

Greece showcased the biggest relative increase in gasoline prices: while in 2008-2009 Greek prices were well below the EU average, since 2011 they are among the highest, mainly as a result of the sharp increase of the excise duty rate. In the first half of 2018, the EU average gasoline price was 6% higher than in 2008; in case of Greece, the increase was 39%. At the other end of the spectrum, prices in Poland decreased by 8%, mainly because of the depreciation of the national currency in the second half of 2008 (measured in Polish zloty, the average price increased).

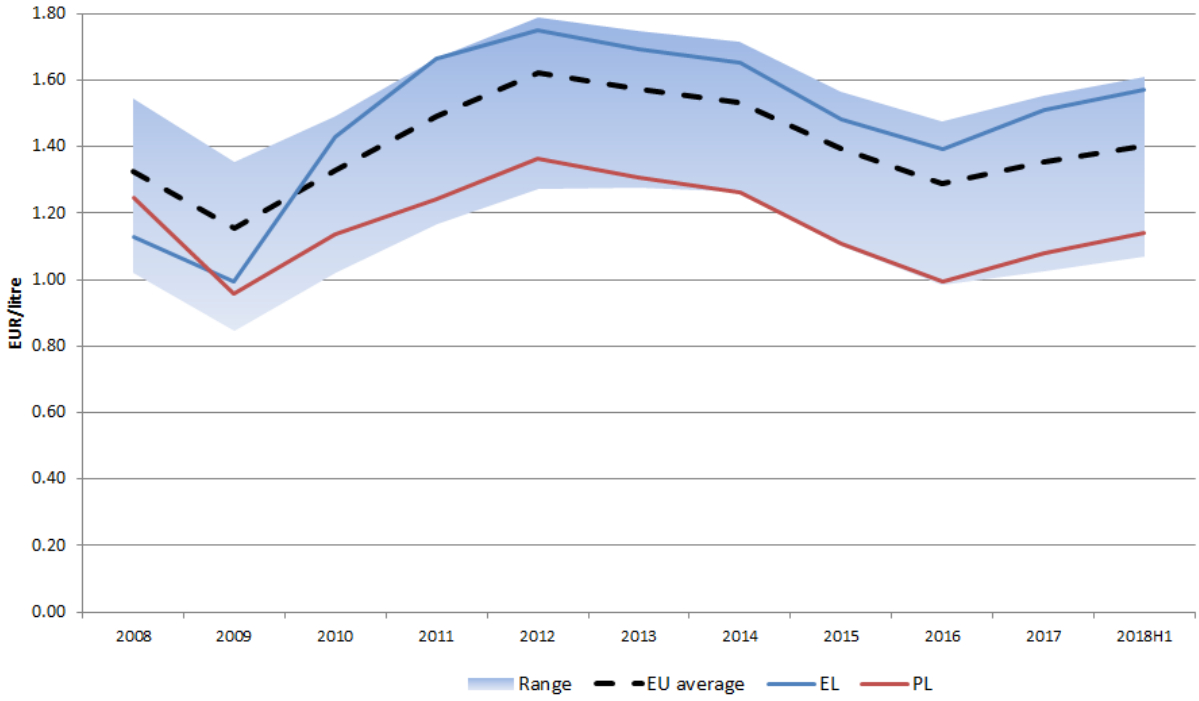

Figure 67 - The retail price of gasoline in the EU

Source: Oil Bulletin, DG Energy

Looking at net prices, the dispersion is smaller, the difference between the highest and the lowest price is typically between 0.10 and 0.15 EUR/litre. The net price depends on a number of factors, including the source of supply (local refinery or import), industry structure and competition. In the first half of 2018, the highest net price was reported by Denmark while the lowest by the UK. Comparing the average net price with a representative wholesale price (Platts Gasoline Prem Unleaded 10ppmS FOB AR Barge), the difference is relatively stable, averaging 0.13 EUR/litre over the period.

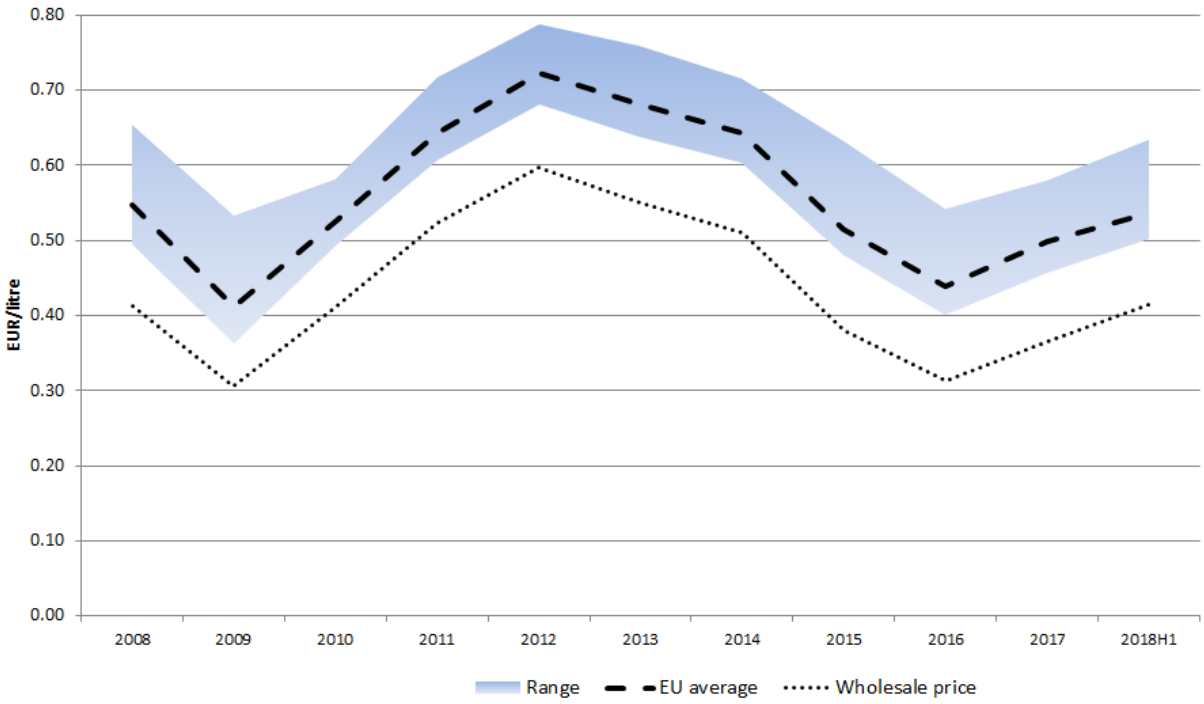

Figure 68 - The retail price of gasoline in the EU, without taxes

Source: Oil Bulletin, DG Energy, Platts

The wholesale price is Gasoline Prem Unleaded 10ppmS FOB AR Barge reported by Platts

Excise duty is an important component of the retail gasoline price; in the first half of 2018, in half of the Member State it actually exceeded the net price. Over the years, we see a gradual increase of the average excise duty rate, with a slight decrease in 2016 and 2017. While in 2008 the average excise duty rate was 0.56 EUR/litre, by 2015 it increased to 0.64 EUR/litre. In the first half of 2018 the average rate was 0.62 EUR/litre.

The average VAT rate also increased during this period, from 19.3% in 2005 to 21.0% in 2014. Since then, the average VAT rate has not changed.

In most Member States, excise duty rates increased between 2008 and the first half of 2018, with the biggest increases in Greece (98%), Latvia (63%) and Cyprus (58%). Germany and Luxembourg are notable exceptions: in these countries, the excise duty rate for gasoline has not changed since 2003 and 2007, respectively. In Hungary and Poland, the excise duty rate measured in euro was lower in the first half of 2018 than in 2008, mainly because of exchange rate developments (in national currencies, the excise duty rates increased over this period). In 2015, the UK had the highest excise duty in the EU but since then, due to the depreciation of the pound sterling, the excise duty measured in euro has significantly decreased.

For most of the study period, the Netherlands applied the highest excise duty rate for gasoline while Bulgaria had the lowest rate, just above the minimum level prescribed by the Energy Tax Directive.

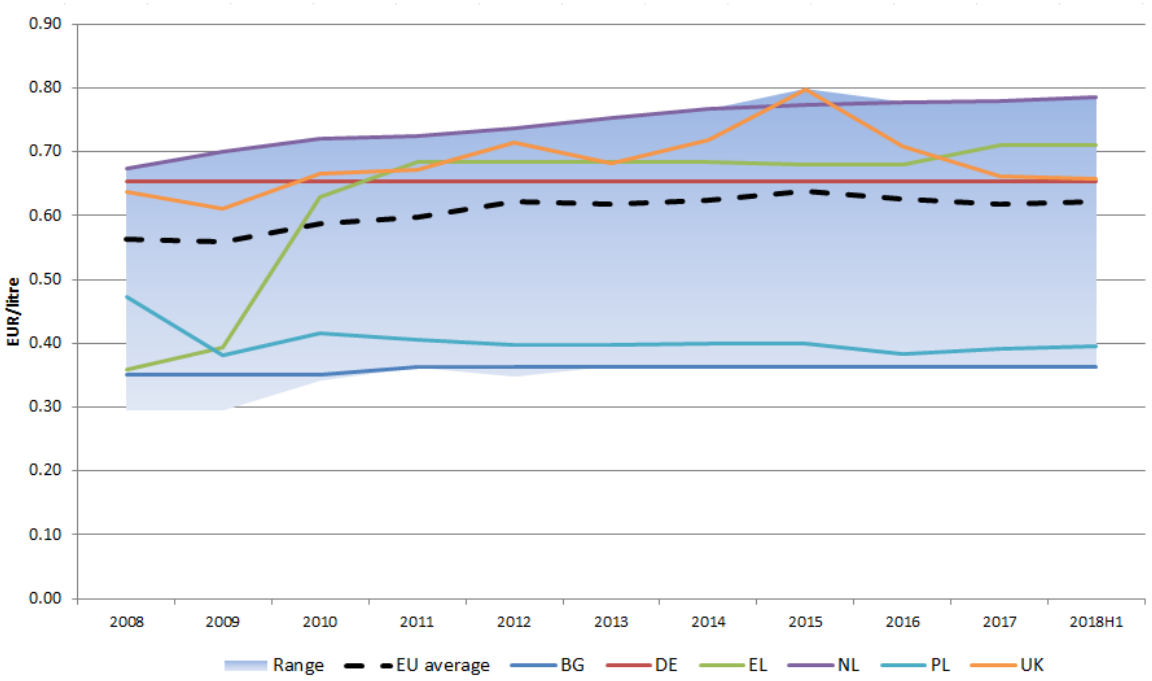

Figure 69 - The exercise duty rate of gasoline in the EU

Source: Oil Bulletin, DG EnergyIn 2014-2016, in line with the decreasing oil prices, the average retail price of gasoline decreased. However, because of the fixed (or, in case of several member States, increasing) excise duty rates, the share of the tax component gradually increased, from 55% in 2012 to 66% in 2016. In absolute terms, the tax component decreased from 0.90 EUR/litre in 2012 to 0.85 EUR/litre in 2016.

The average gasoline price increased in both 2017 and the first half of 2018 but remained well below the record level reached in 2012. In the first half of 2018, the average price was 1.40 EUR/litre, composed of a 0.54 EUR/litre net price (38%), 0.62 EUR/litre excise duty (44%) and 0.24 EUR/litre (17%) VAT.

Figure 70 - Average retail price of gasoline in the EU by price component

Source: Oil Bulletin, DG Energy

The next graph shows the composition of the average gasoline price by Member State in the first half of 2018.

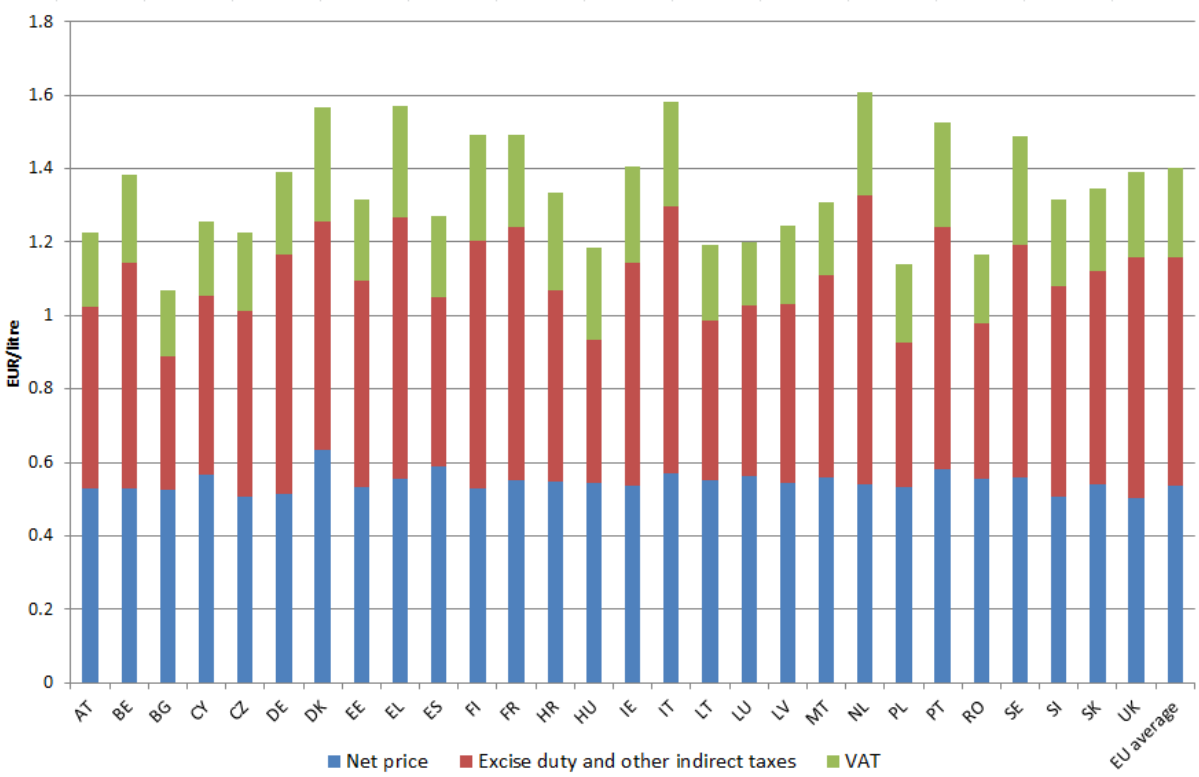

Figure 71 - Average retail price of gasoline in the first half of 2018 by Member State and price component

Source: Oil Bulletin, DG Energy

3.3.4 Diesel

Similarly to gasoline, the evolution of diesel prices clearly followed the trend of the crude oil price, with considerable differences in the absolute level, mainly explained by the diverging excise duty and VAT rates. Average prices moved in a relatively wide range and, contrary to gasoline, this range has widened between 2008 and 2015: it was 0.40 EUR/litre in 2008 but grew to 0.56 EUR/litre in 2015. In 2016-2018, the range has significantly narrowed, mainly because of the decrease of UK prices measured in euros.

If the three most expensive countries (Italy, Sweden and the UK) were disregarded, the range would be considerably narrower. In 2015, the UK was by far the most expensive, 0.18 EUR/litre above the second most expensive country, Italy. However, the depreciation of the pound sterling in 2016-2017 had a negative impact on UK prices measured in euros and, as a result, it was "only" the third most expensive country in the first half of 2018.

Cyprus experienced the biggest relative increase in diesel prices: in 2008 it had the lowest price in the EU but after significant increases in the excise duty rate the price reached the EU average by 2013. In the first half of 2018, EU average diesel prices were 1% higher than in 2008; in case of Cyprus, the price increased by 16%. In Slovakia, in turn, the price fell by 9% in this period, helped by a reduction of the excise duty rate introduced in 2010.

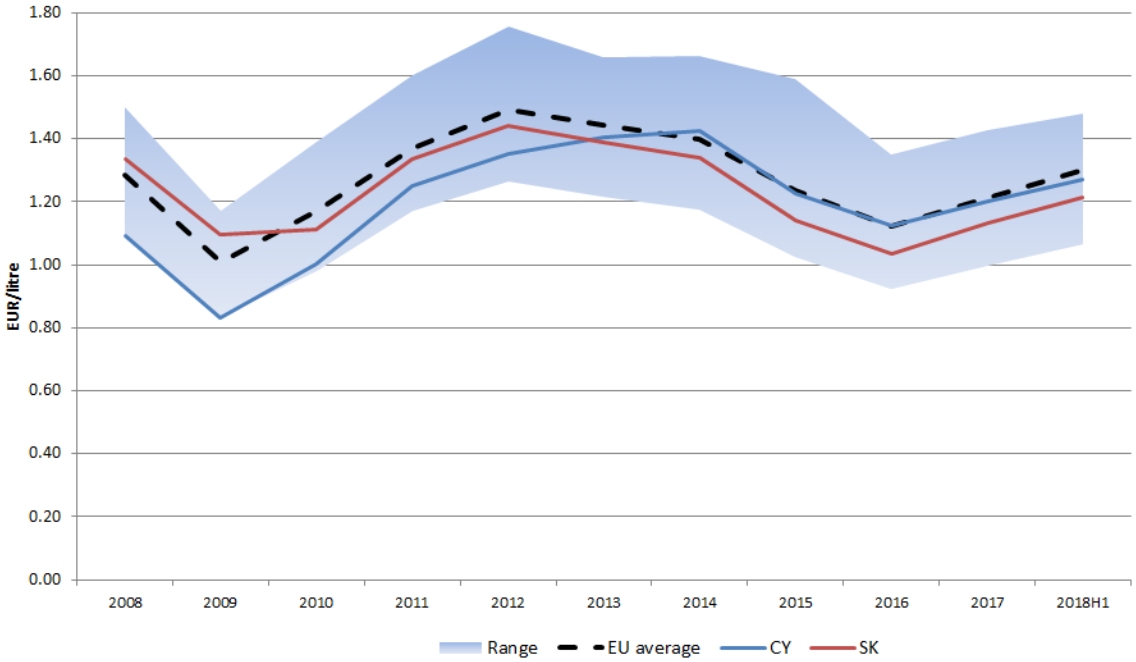

Figure 72 - The retail price of diesel in the EU

Source: Oil Bulletin, DG Energy

In case of net prices, the difference between the highest and the lowest price has been 0.10-0.12 EUR/litre in 2008-2014 but significantly increased afterwards, reaching 0.20 EUR/litre in the first half of 2018. The widening range was largely driven by a robust price increase in Sweden which is now by fare the most expensive country in terms of net prices. In the first half of 2018, somewhat surprisingly, the lowest net price was reported in Malta which in 2015 was the country with the highest net price. Comparing the EU average net price with a representative wholesale price (Platts ULSD 10ppmS FOB ARA Barge), the difference has increased from 0.11 EUR/litre in 2010 to 0.14 EUR/litre in the first half of 2018.

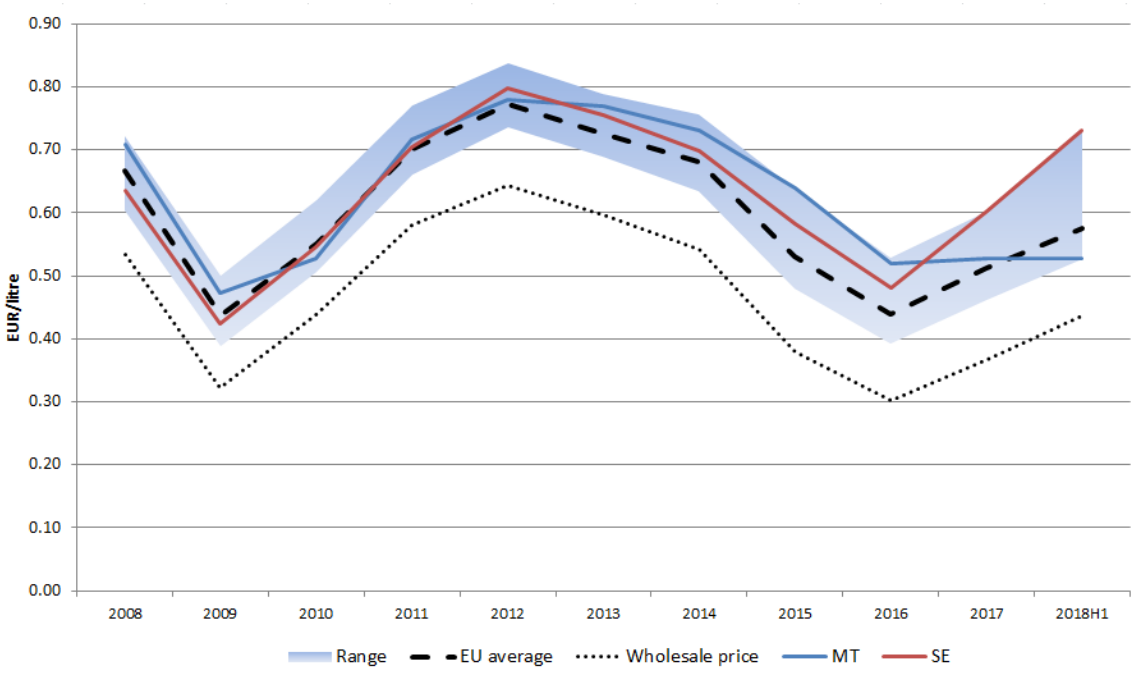

Figure 73 - The retail price of diesel in the EU, without taxes

Source: Oil Bulletin, DG Energy, Platts**.** The wholesale price is Gasoline Prem Unleaded 10ppmS FOB AR Barge reported by Platts

The average excise duty rate of diesel increased from 0.41 EUR/litre in 2008 to 0.50 EUR/litre in the first half of 2018 (an increase of 22% in 10 years). This increase is faster than in case of gasoline and, as a result, the difference between average excise duty rate of gasoline and diesel slightly narrowed: from 0.16 EUR/lire in 2010-2011, it decreased to 0.12 EUR/litre in the first half of 2018.

The average VAT rate of diesel also increased during the study period, from 19.1% in 2008 to 20.9% in 2014. Between 2014 and the first half of 2018, the average VAT rate for diesel has not changed.

With two exceptions, excise duty rates increased in all Member States between 2008 and the first half of 2018, with the biggest increases in Cyprus (80%), Belgium (76%) and Slovenia (64%). In Germany, the excise duty rate for diesel has not changed since 2003 (similarly to the excise duty of gasoline). Slovakia is the only country where the excise duty was lower in the first half of 2018 than in 2008, as a result of a cut in the rate in 2010.

The excise duty rate applied by the UK and Italy is significantly higher than in the rest of the countries. Even after the depreciation of the pound sterling in 2016-2017, the UK excise duty rate remained the highest in the EU. In contrast, Bulgaria imposes a rate at the minimum level prescribed by the Energy Tax Directive.

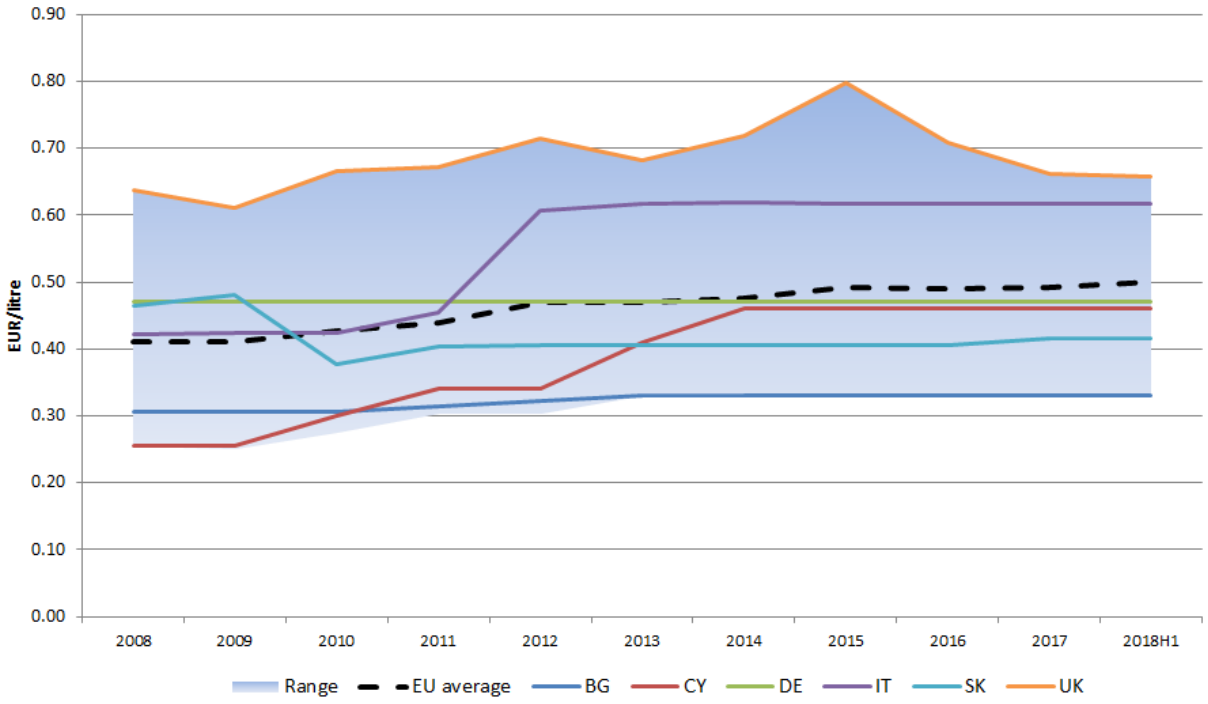

Figure 74 - The exercise duty rate of diesel in the EU

Source: Oil Bulletin, DG Energy

In 2012-2016, the average retail price of diesel decreased, with the share of the tax component increasing from 48% in 2012 to 61% in 2016. In absolute terms, the tax component decreased from 0.72 EUR/litre in 2012 to 0.68 EUR/litre in 2016.

Since 2016, the average retail price of diesel has been on the rise but remained well below the record level reached in 2012. In the first half of 2018, the average price was 1.30 EUR/litre, composed of a 0.57 EUR/litre net price (44%), 0.50 EUR/litre excise duty (39%) and 0.22 EUR/litre (17%) VAT. Compared to 2016, the absolute value of the tax component increased to 0.73 EUR/litre but its share in the total price fell to 56%.

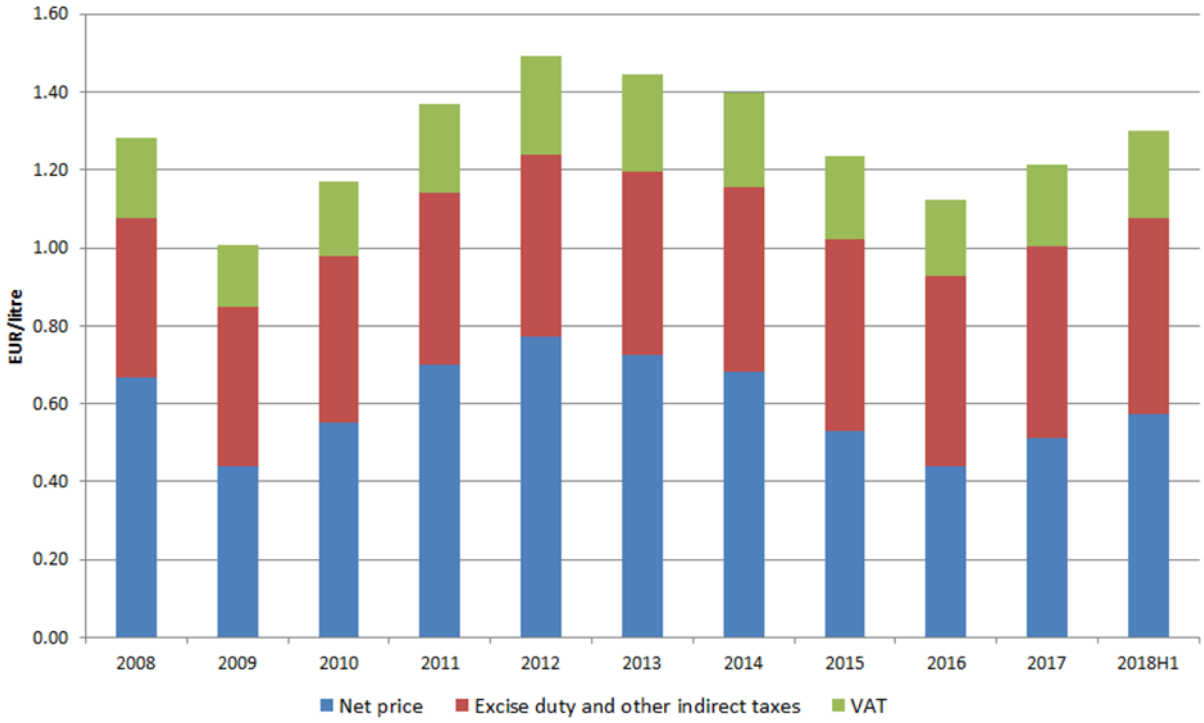

Figure 75 - Average retail price of diesel in the EU by price component

Source: Oil Bulletin, DG Energy

The next graph shows the composition of the average diesel price by Member State in the first half of 2018.

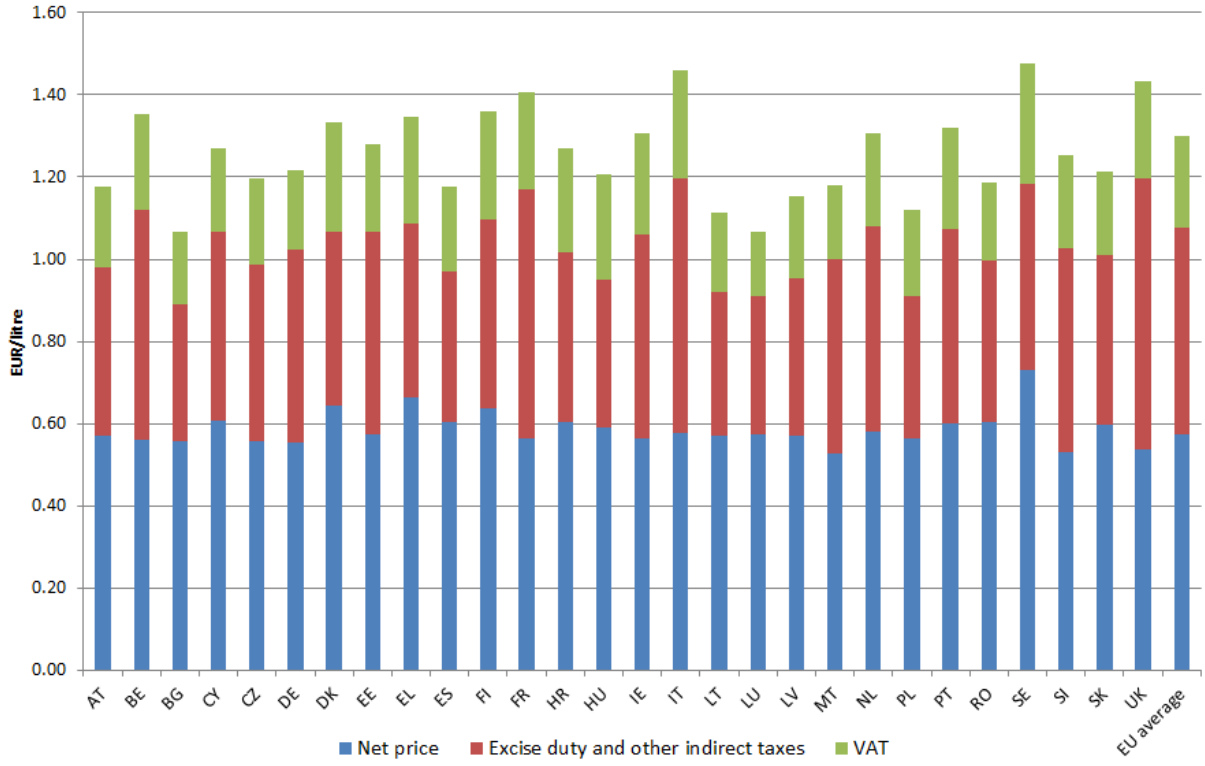

Figure 76 - Average retail price of diesel in the first half of 2018 by Member State and price component

Source: Oil Bulletin, DG Energy

3.3.5 Heating oil

The large differences in the excise duty rates result in a wide dispersion of heating oil prices across the EU. The difference between the highest and lowest price increased from 0.60 EUR/litre in 2008 to 0.79 EUR/litre in 2014 but decreased to 0.67 EUR/litre in the first half of 2018. In the most expensive Member State, Denmark, the price in the first half of 2018 was 109% higher than in the cheapest Member State, Luxembourg. Many of the most expensive countries have a rather low level of heating oil consumption. Germany is by far the biggest consumer of heating oil in the EU and its price has been consistently below the EU average.

Bulgaria experienced the biggest relative increase in heating oil prices: in 2008 its price was well below the EU average but today it is considerably higher. In the first half of 2018, the EU average heating oil price was 9% lower than in 2008; in case of Bulgaria, the price increased by 33%. Ireland experienced the biggest price drop between 2008 and the first half of 2018, 23%.

During most of the study period, Denmark had the highest heating oil prices in the EU, driven by a high excise duty.

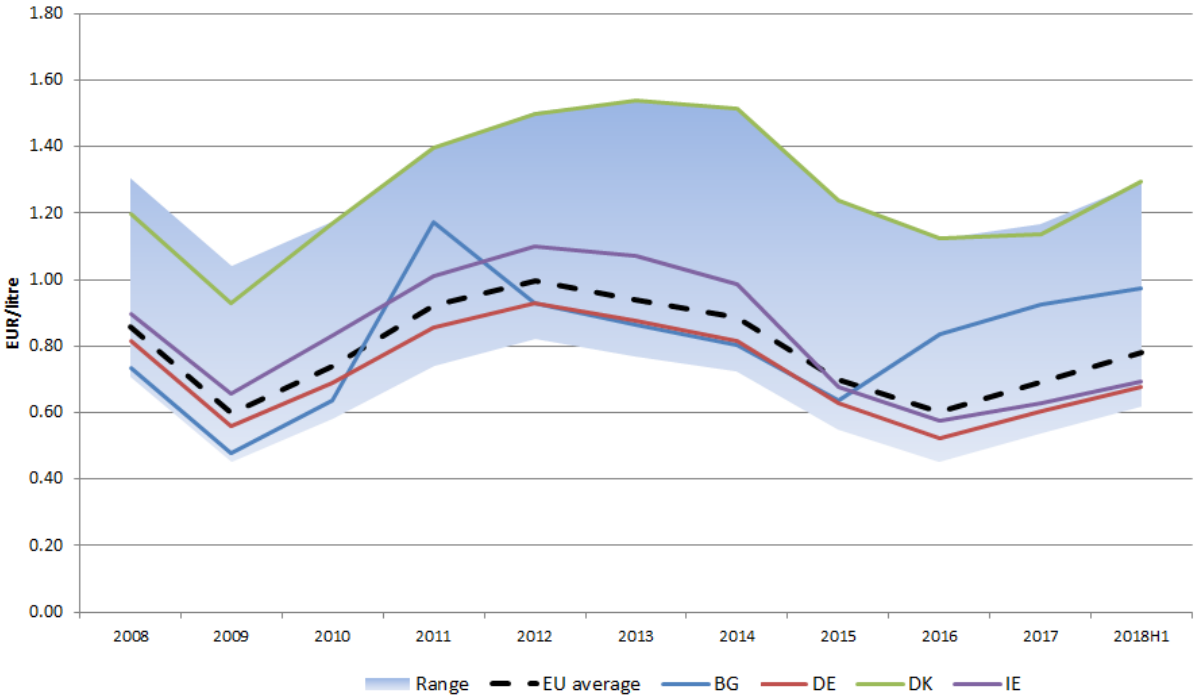

Figure 77 - The retail price of heating oil in the EU

Source: Oil Bulletin, DG Energy

The difference between the highest and the lowest price is rather high also in case of net prices (0.21-0.43 EUR/litre), significantly higher than for motor fuels. The gap significantly increased until 2014 but narrowed afterwards.

Denmark had the highest net price of heating oil in the first half of 2018; the lowest net price was reported in the Netherlands. Comparing the EU average net price with a representative wholesale price (Platts Gasoil 0.1%S FOB ARA Barge), the difference has been stable in the 0.10-0.12 EUR/litre range. Curiously, the Dutch price is lower than the wholesale price.

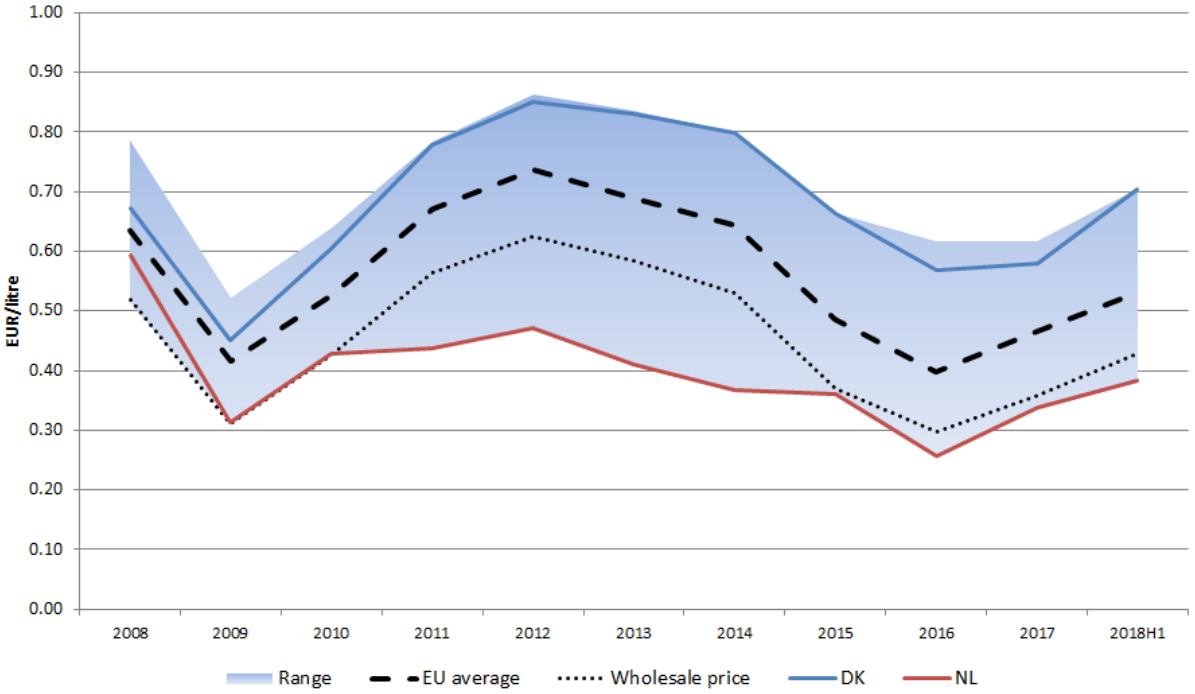

Figure 78 - The retail price of heating oil in the EU, without taxes

Source: Oil Bulletin, DG Energy, Platts

The wholesale price is Gasoline Prem Unleaded 10ppmS FOB AR Barge reported by Platts

The average excise duty rate of heating oil increased from 0.08 EUR/litre in 2008 to 0.12 EUR/litre in the first half of 2018. Although most Member States apply a higher rate, the main consumer of heating oil, Germany, has an excise duty of only 0.06 EUR/litre.

The average VAT rate of heating oil also increased during this period, from 19.3% to 20.1%.

Several Member States increased the excise duty rate between 2008 and the first half of 2018, but in a couple of countries (Austria, Germany, Italy, Lithuania and Luxembourg) it remained unchanged. Bulgaria significantly increased the excise duty rate in 2011 but returned to the previous, lower rate the following year; the rate was increased again in 2016. The Netherlands has the highest excise duty rate (0.50 EUR/litre in the first half of 2018) – it is one of the few countries that apply the same rate for diesel and heating oil. Luxembourg reports the lowest excise duty rate, 0.01 EUR/litre. The rates applied by Belgium and Luxembourg are lower than the minimum level set by the Energy Tax Directive (0.021 EUR/litre); Lithuania uses the minimum level.

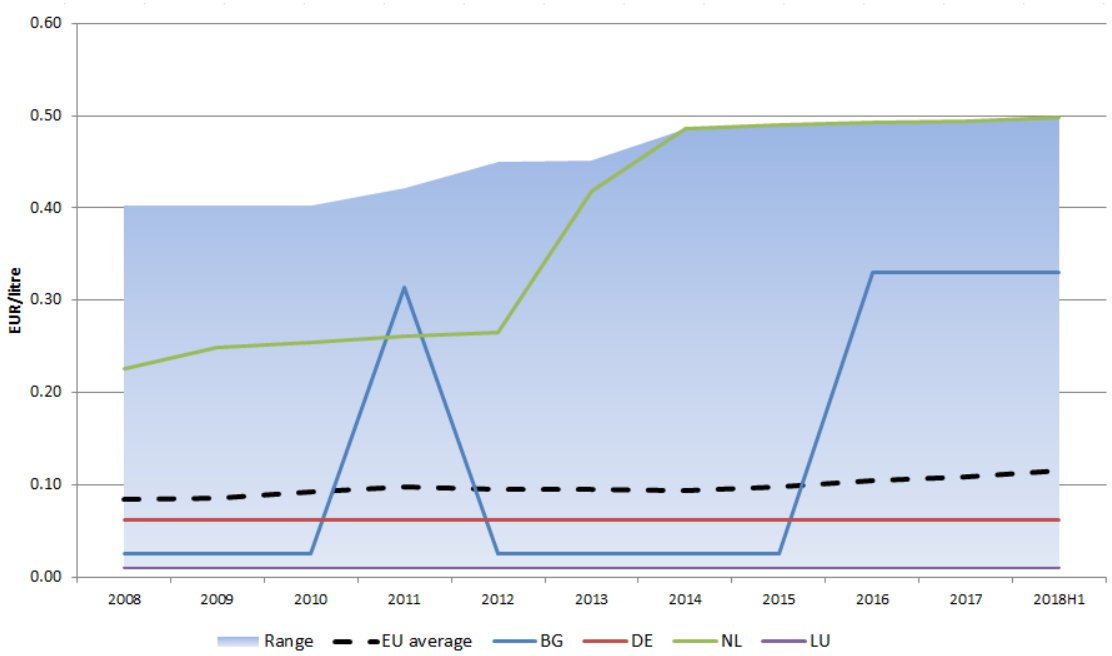

Figure 79 - The exercise duty rate of heating oil in the EU

Source: Oil Bulletin, DG Energy

The average retail price of heating oil significantly decreased between 2012-2016, with the tax component increasing from 26% in 2012 to 34% in 2016. In absolute terms, the tax component decreased from 0.26 EUR/litre in 2012 to 0.21 EUR/litre in 2016.

Prices have been rising since 2016 but remain well below the levels seen in 2012. In the first half of 2018, the average price was 0.78 EUR/litre, composed of a 0.53 EUR/litre net price (68%), 0.12 EUR/litre excise duty (15%) and 0.13 EUR/litre (17%) VAT.

Because of the low average level of the excise duty, the tax component of the average heating oil price is much lower than for gasoline and diesel.

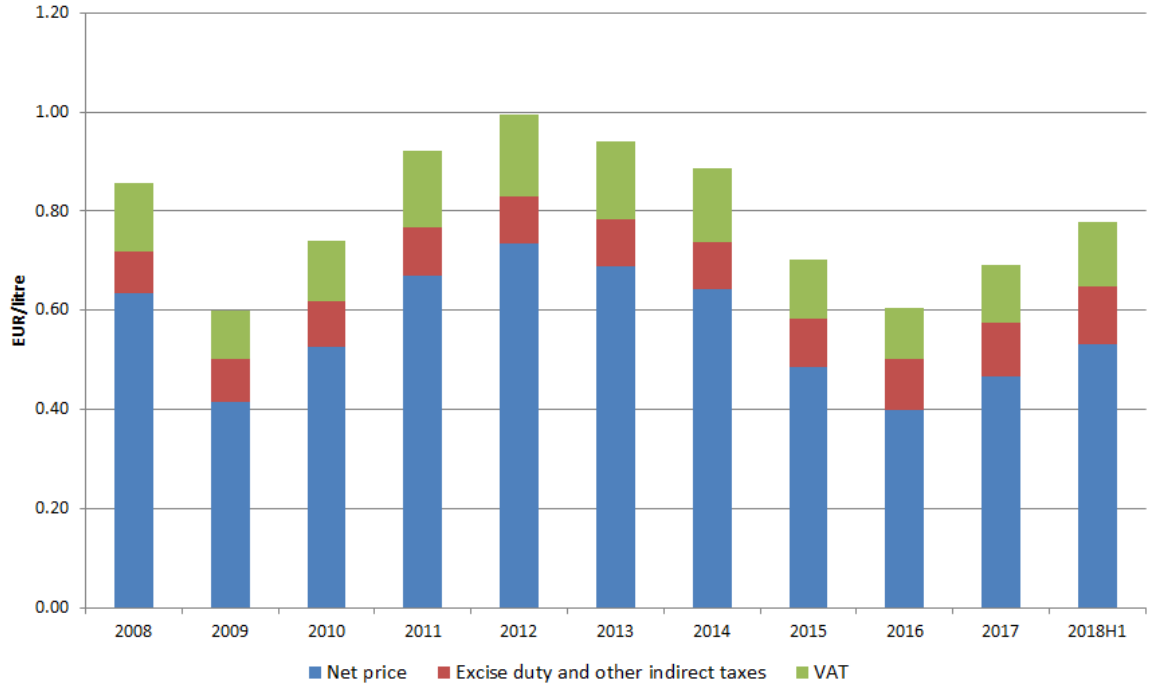

Figure 80 - Average retail price of heating oil in the EU by price component

Source: Oil Bulletin, DG Energy

The next graph shows the composition of the average heating oil price by Member State in the first half of 2018.

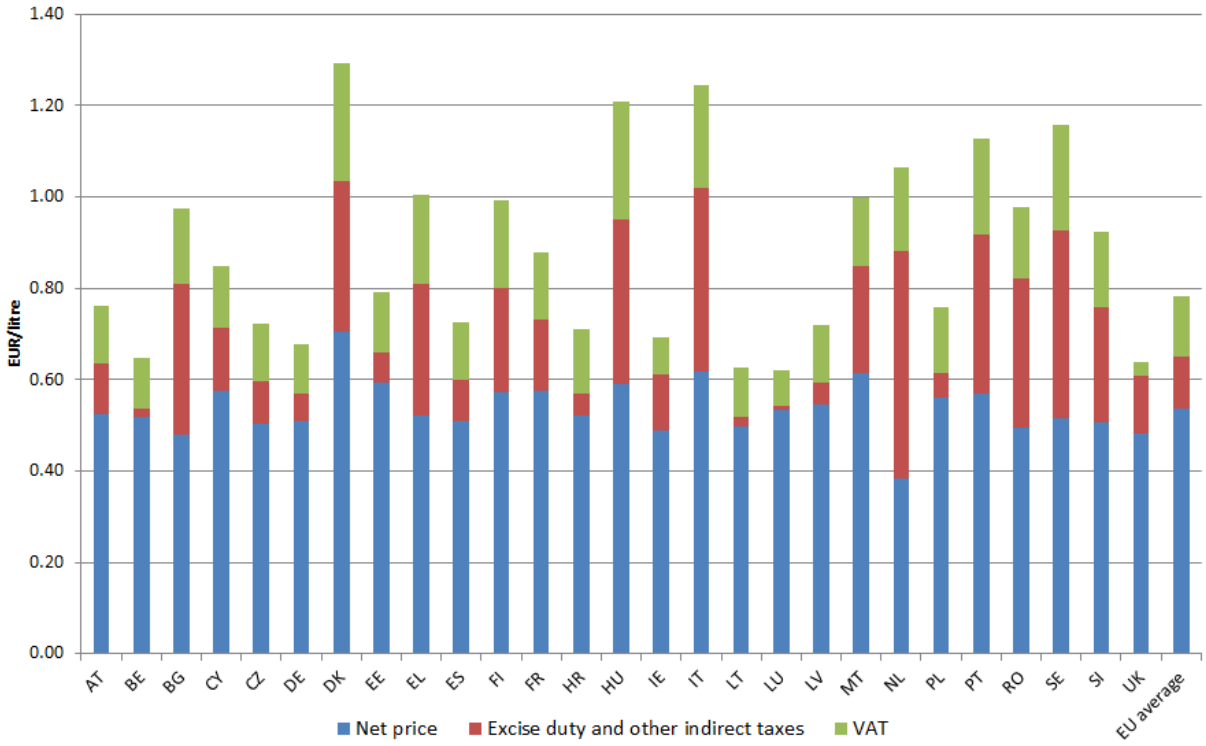

Figure 81 - Average retail price of heating oil in the first half of 2018 by Member State and price component

Source: Oil Bulletin, DG Energy

3.3.6 Gasoline vs diesel

The unequal tax treatment of the main motor fuels, gasoline and diesel, has been a contentious policy issue and was often blamed for the "dieselisation" of the European vehicle fleet. Most Member States impose a lower level of excise duty for diesel than for gasoil, resulting in a lower retail price, in spite of the fact that the wholesale price of diesel is typically slightly higher than that of gasoline. The price advantage of diesel, coupled with the improving fuel economy of diesel engines, made diesel cars increasingly popular in the passenger car and light duty vehicle segments, with their share from new registration reaching up to 70-80% in certain Member States. In contrast, in other regions of the world gasoline-engine cars continued to have a dominant role in the passenger car fleet. The dieselisation significantly contributed to the gasoline/diesel imbalance: European refineries produce too much gasoline which has to be exported while diesel output is insufficient to meet demand is Europe has to rely on imports.

More recently, the Volkswagen emission scandal which broke out in September 2015 put diesel-engine cars in the spotlight and raised renewed questions about the tax advantage of diesel.

Back in 2011, the Commission made an attempt to remove the distortive tax treatment of the two fuels in the proposed revision of the Energy Taxation Directive.[34] According to the proposal, the minimum tax rates of energy products would have been based on the energy content and the CO2 content of the fuel, resulting in a lower minimum rate for gasoline (diesel has a higher energy and CO2 content per litre). However, following the unsuccessful negotiations between Member States in the Council, the proposal was withdrawn.

In this section we compare the development gasoline and diesel prices in the EU and try to investigate whether there has been an approximation of excise duty rates imposed on the two fuels.

Over the last ten years, the average retail price of gasoline has been consistently above the price of diesel, with the difference averaging 0.13 EUR/litre in this period. The difference peaked in 2016 at 0.17 EUR/litre but, since then, has noticeably decreased: in the first half of 2018 it averaged 0.10 EUR/litre, the lowest level since 2018.

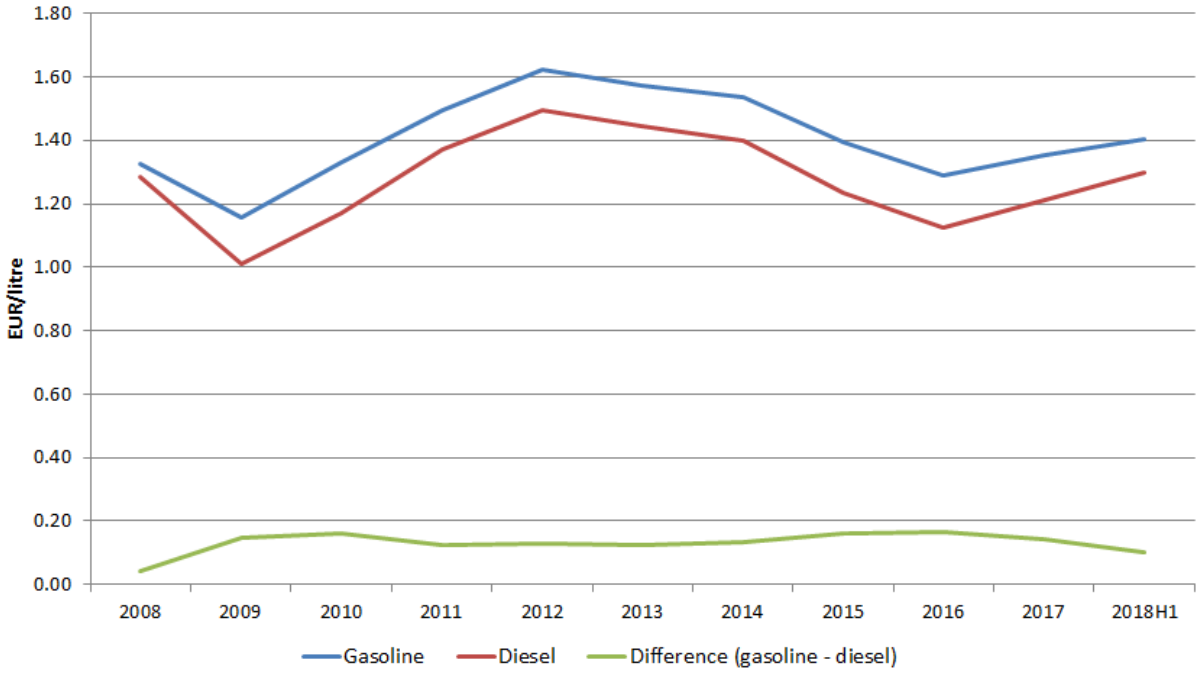

Figure 82 - Average retail price of gasoline and diesel in the EU

Source: Oil Bulletin, DG Energy

When comparing the prices without taxes, it is striking that diesel prices are actually higher than gasoline prices. The only exception is 2016 when the average gasoline and diesel price was practically identical. In this year, global gasoline demand was supported by record-low oil prices, resulting in a relatively high gasoline price. Over the ten and half year period, the net price of diesel was on average 0.04 EUR/litre higher.

[34] http://europa.eu/rapid/press-release_IP-11-468_en.htm?locale=en

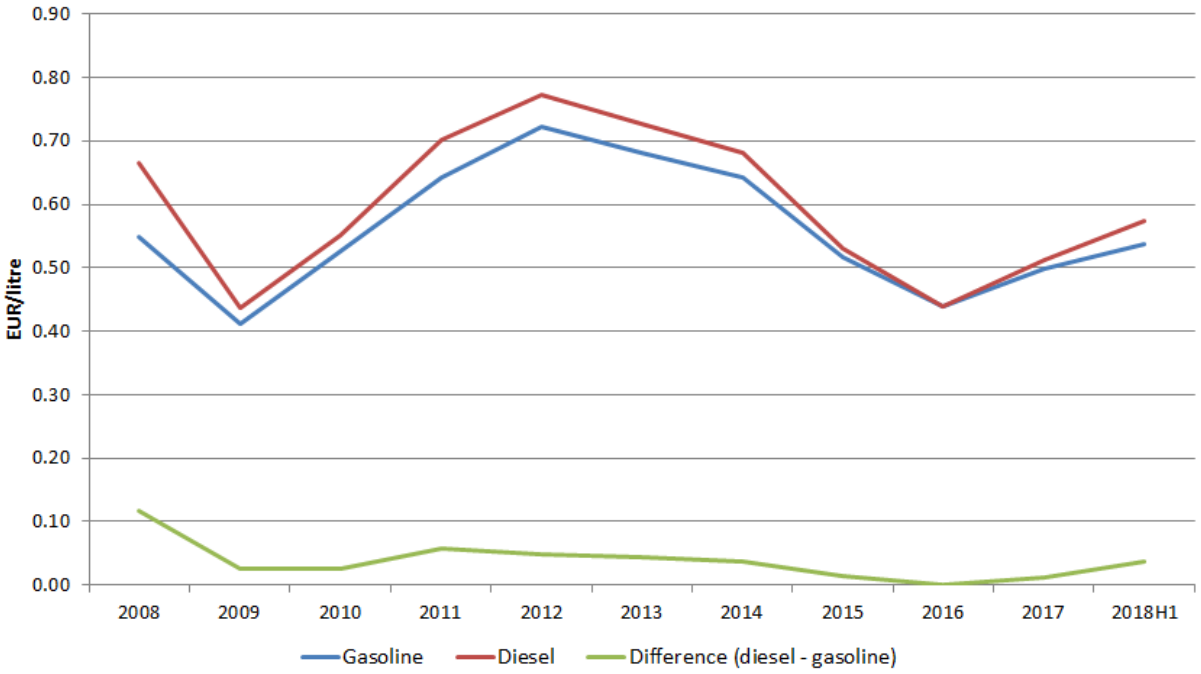

Figure 83 - Average retail price of gasoline and diesel in the EU, without taxes

Source: Oil Bulletin, DG Energy, Platts

The average excise duty rate for gasoline has been 0.15 EUR/litre over the period, more than offsetting the lower net price of gasoline. The difference was largest in 2010 (0.16 EUR/litre) but since then there has been a clear declining trend, with the average difference dropping to 0.12 EUR/litre in the first half of 2018.

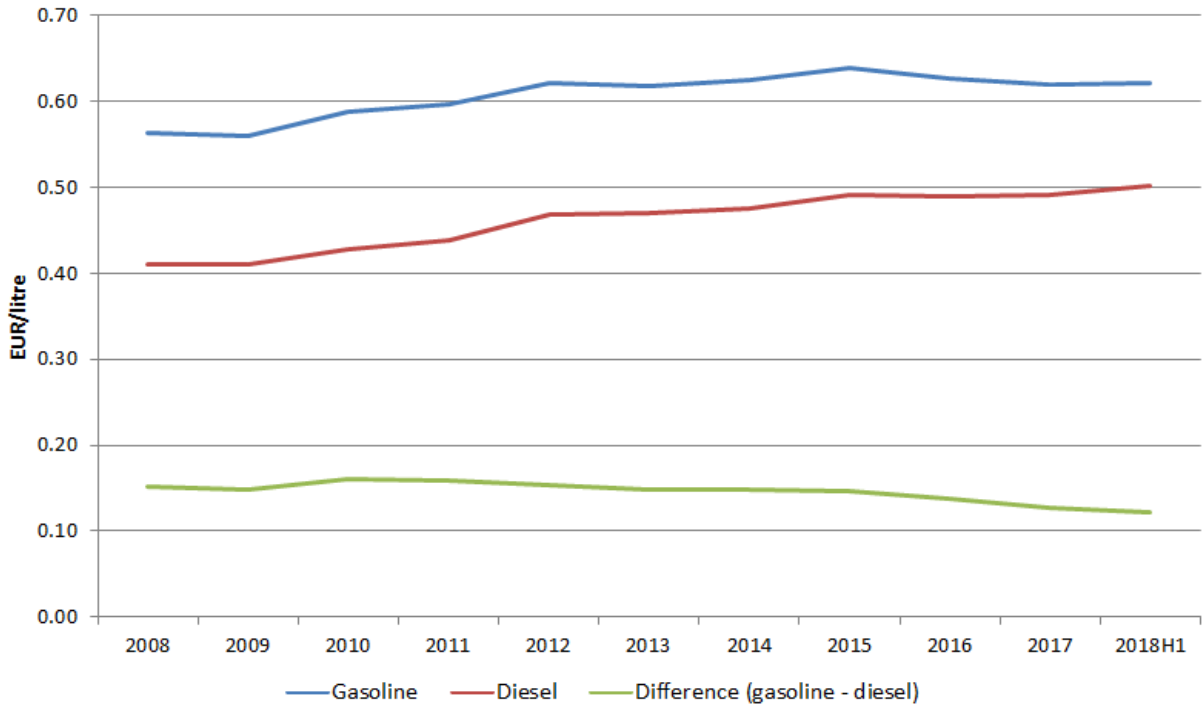

Figure 84 - Average excise duty rates for gasoline and diesel in the EU

Source: Oil Bulletin, DG Energy

In addition to the absolute difference, the relative (percentage) difference between gasoline and diesel excise duty rates also shows a decreasing trend: while in 2010 the excise duty on gasoline was on average 37% higher, by the first half of 2018 this difference decreased to 24%.

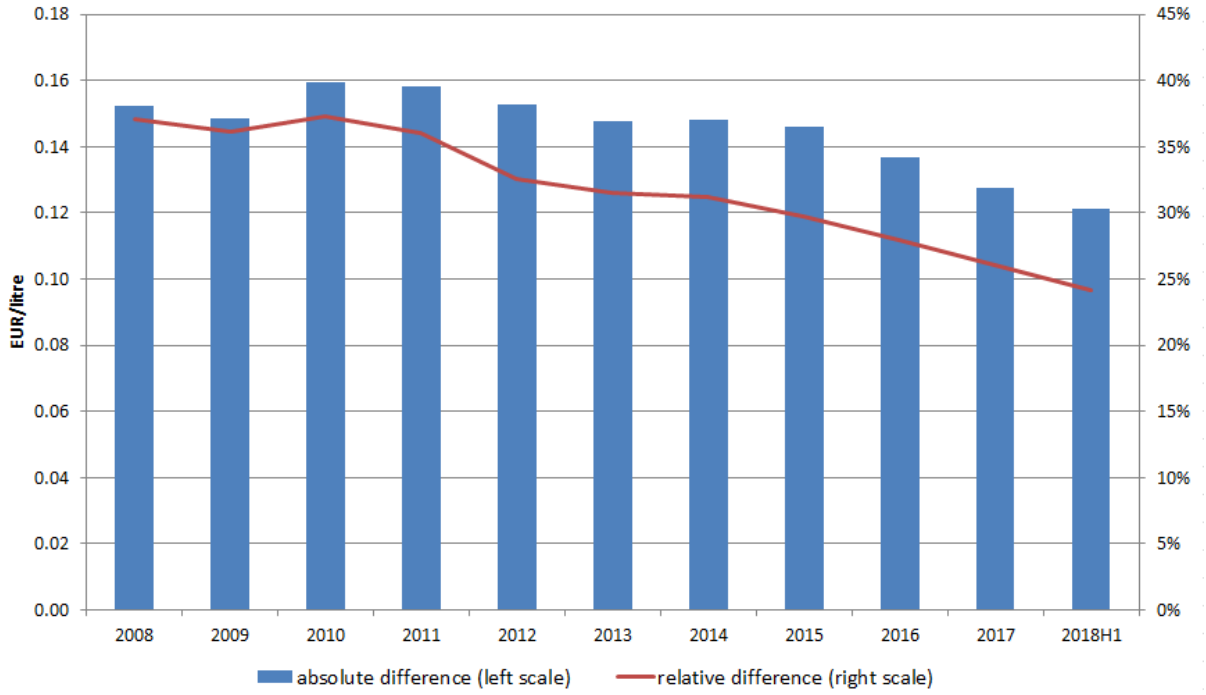

Figure 85 - The difference between the average excise duty rate on gasoline and diesel

Source: Oil Bulletin, DG Energy

In most Member States, excise duty rates increased for both gasoline and diesel in the last ten years. In case of gasoline, the average EU rate grew from 0.56 EUR/litre to 0.62 EUR/litre (+10%) while for diesel the average rate increased from 0.41 EUR/litre to 0.50 EUR/litre between 2008 and the first half of 2018. The faster growth of the diesel rate means that the difference has gradually diminished. Nevertheless, there is still only one Member State, the UK, which applies the same rate for the two fuels.

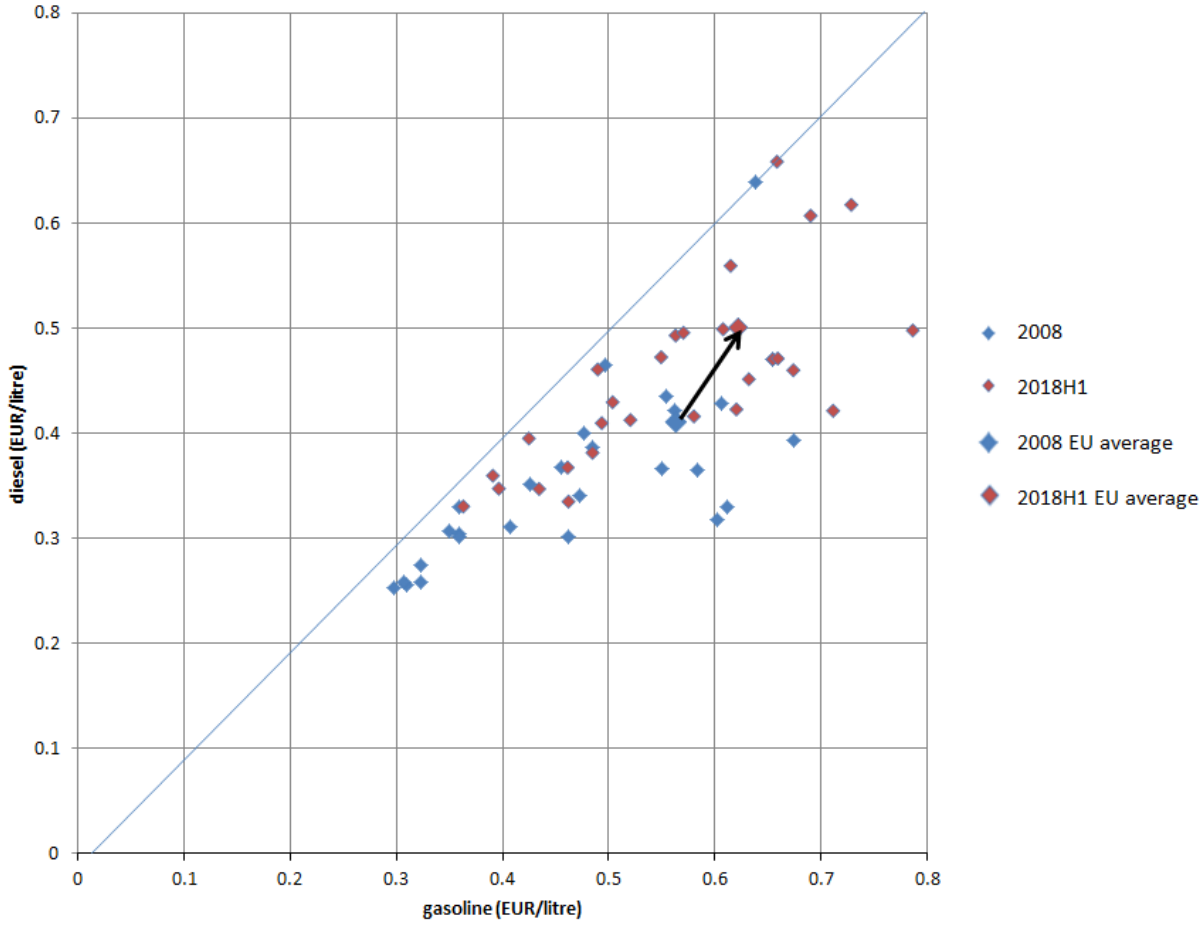

Figure 86 - Excise duty rates in individual Member States in 2008 and the first half of 2018

Source: Oil Bulletin, DG Energy

At EU level, the difference between the average gasoline and diesel excise duty rates decreased from 0.15 EUR/litre in 2008 to 0.12 EUR/litre in the first half of 2018. Looking at Member States, we can see that the difference decreased in only half of the Member States. In 12 Member States the absolute difference has actually increased, implying a growing tax advantage for diesel. For example, in Greece the gasoline excise duty rate has almost doubled (+98%) in this period while that of diesel grew by "only" 39%.

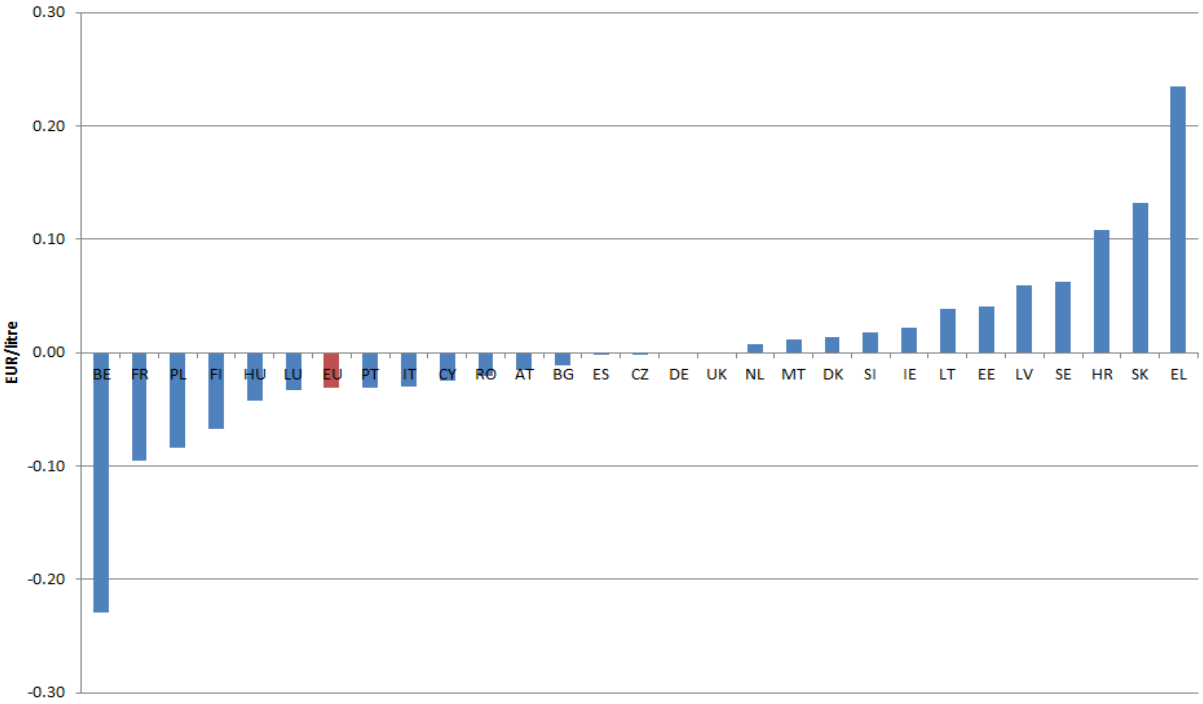

Figure 87 - the change of the difference between the gasoline and diesel excise duty rates between 2008 and the first half of 2018

Source: Oil Bulletin, DG Energy

In recent years, Belgium made the biggest step to remove the tax advantage of diesel: since 2016, the excise duty rate for diel has been gradually raised and by mid-2018 the difference between the gasoline and diesel rate dropped to 0.03 EUR/litre. As a result the difference between the retail price of the two fuels has practically disappeared.

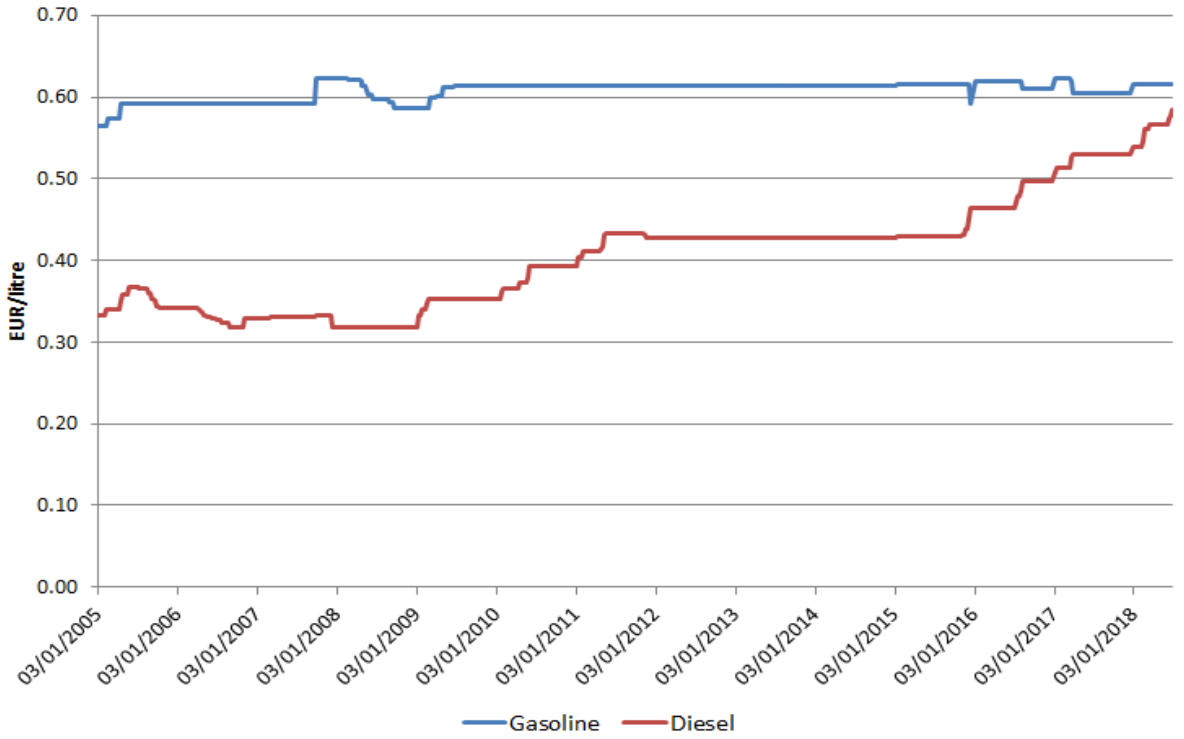

Figure 88 - Excise duty rates for motor fuels in Belgium

Source: Oil Bulletin, DG Energy

3.3.7 International comparison

This section is relying on the price data collected by Trinomics and covering G20 economies.[35]

Comparing the average retail price of motor fuels in the EU with prices in other G20 countries reveals that the trajectory of prices is in general very similar, basically following the development of crude oil prices. However, there can be significant differences in the absolute level of prices which are largely affected by taxes.

In case of gasoline, retail prices in most G20 countries are lower than the EU average. The retail price in the US is typically less than half of the EU average level. While in the EU the tax component is on average about 60% of the final price, this share in the US is only around 25%. Excluding taxes, EU and US prices are comparable. A few G20 countries had higher prices than the EU average for most of the period, in particular Korea and Turkey, but even these have converged to the EU average level over the last decade.

To sum up, differences in tax treatment are instrumental in explaining the price differences across G20 countries. EU taxes on fuels are among the highest globally, resulting in a high retail price compared to most G20 countries.

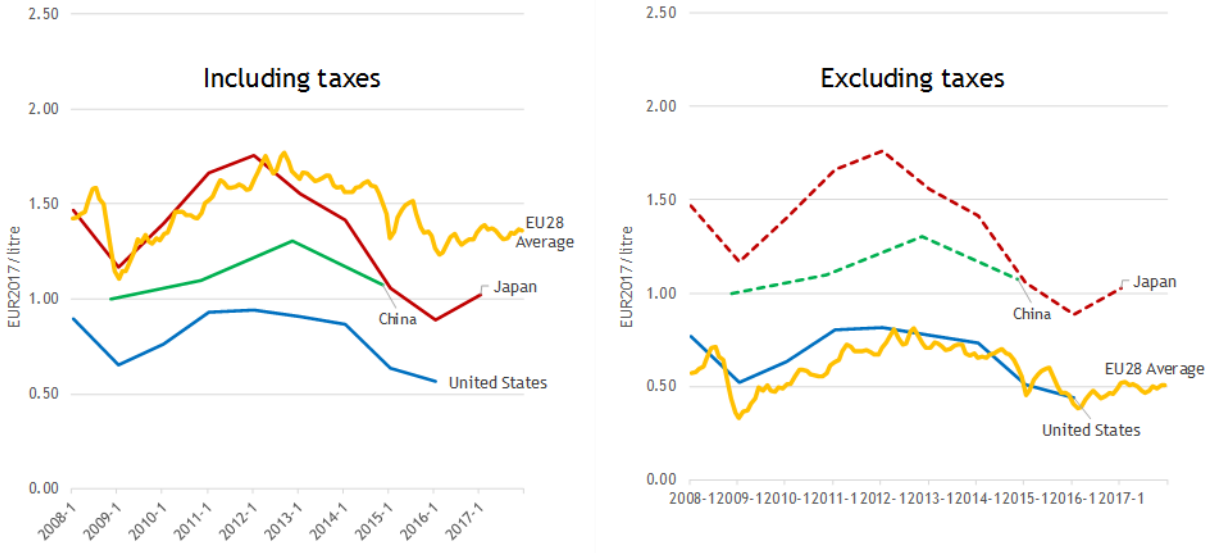

Figure 89 - International comparison of retail gasoline prices

Source: Oil Bulletin, DG Energy; IEA, GIZ

Note: prices are expressed in real (2017) euros; dotted line highlights that it is unclear if the excluding taxes price actually excludes relevant taxes

[35] Trinomics et altri (2018)

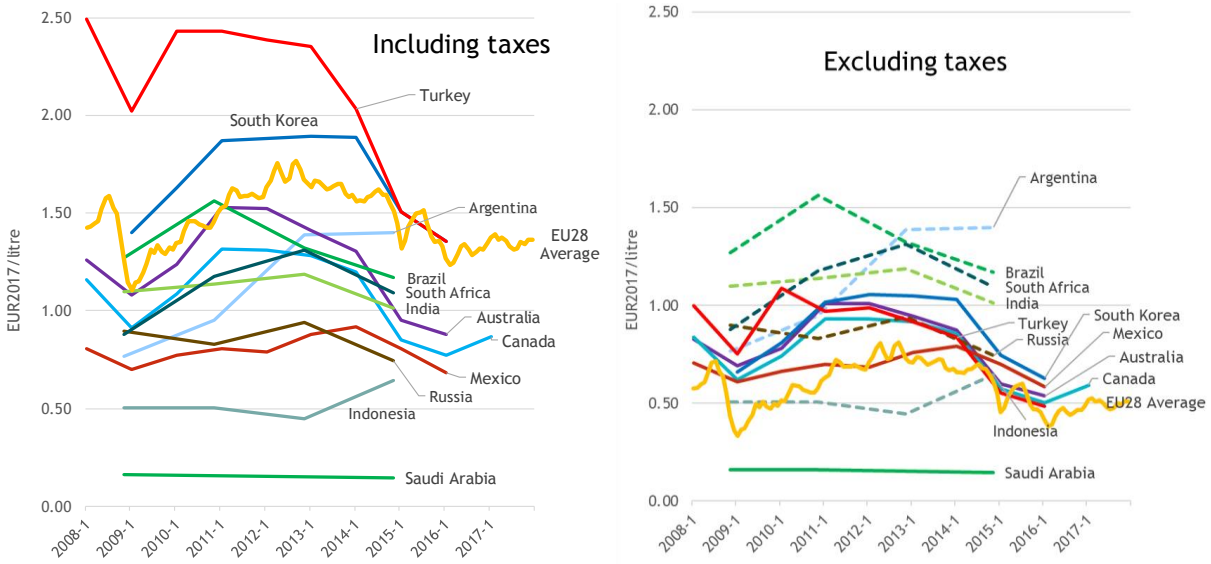

Figure 90 - International comparison of retail gasoline prices

Source: Oil Bulletin, DG Energy; IEA, GIZ
Note: prices are expressed in real (2017) euros; dotted line highlights that it is unclear if the excluding taxes price actually excludes relevant taxes

For diesel, the price is similar: the EU average price is one of the highest among the G20 countries. This is explained by a high tax component which on average constitutes about 50% of the final price. The retail price in the US, where the share of the tax component is only about 25%, is less than half of the EU average. Excluding taxes, EU prices are very similar to those in the US and lower than those in the majority of G20 countries. Turkey is the country which had a consistently higher price than the EU average for most of the period but the difference has largely disappeared by 2015-2016.

Similarly to gasoline, differences in tax treatment are instrumental in explaining the price differences across G20 countries. EU taxes on fuels are among the highest globally, resulting in a high retail price compared to most G20 countries, in spite of the relatively low net price.

The EU is not the only region with gasoline retail prices exceeding diesel prices. This is the case in practically all G20 economies.

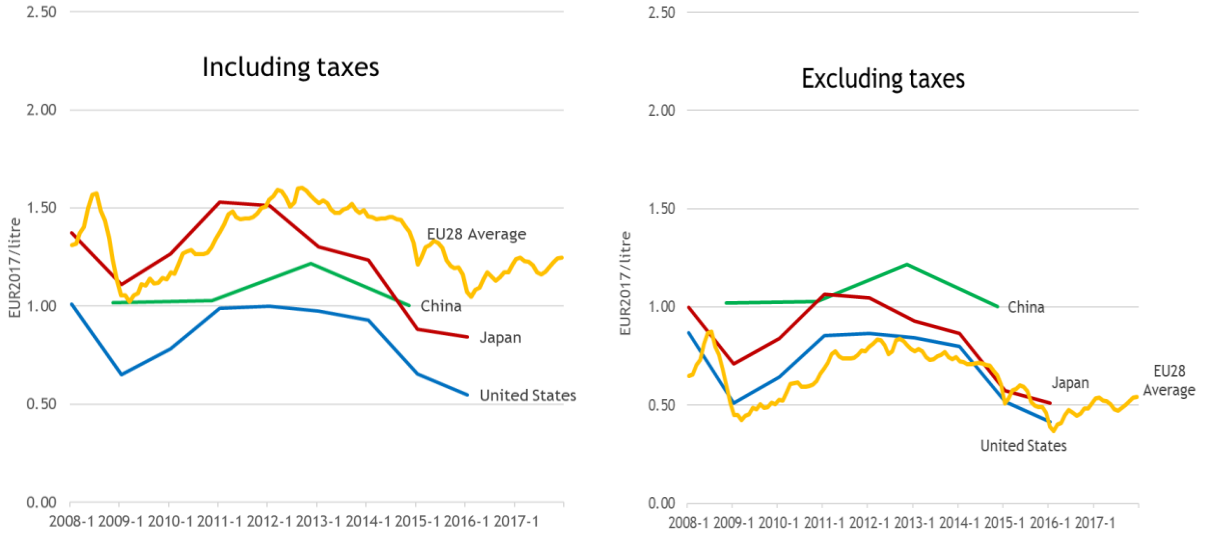

Figure 91 - International comparison of retail diesel prices

Source: Oil Bulletin, DG Energy; IEA, GIZ

Note: prices are expressed in real (2017) euros

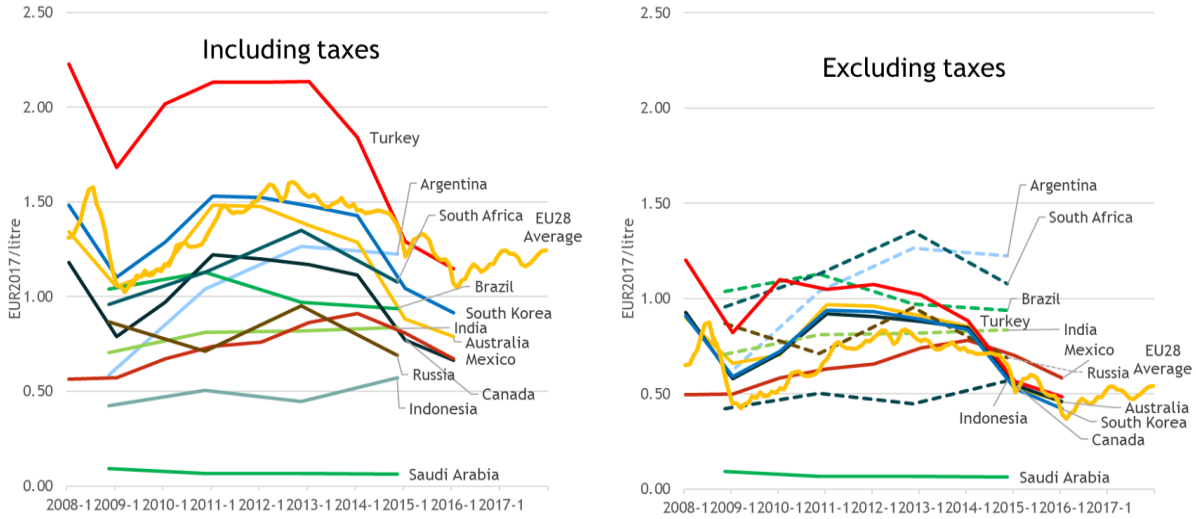

Figure 92 - International comparison of retail diesel prices

Source: Oil Bulletin, DG Energy; IEA, GIZ

Note: prices are expressed in real (2017) euros; dotted line highlights that it is unclear if the excluding taxes price actually excludes relevant taxes

PART II

ENERGY COSTS for the economy, households and industry

4 The EU energy bill

In this chapter we outline the main drivers of the import bill and estimate its size in the last couple of years.

Main findings

— High import dependency means that the EU faces an important energy import bill.

— The price of oil, gas and coal decreased significantly in 2014-2016, resulting in a decreasing import bill. After bottoming out in 2016, energy commodity prices and the import bill have been on the rise

— In 2013, the EU's estimated import bill reached EUR 400 billion. In 2013-2016, falling energy prices allowed the import bill to decrease significantly, although the weakening of the euro has partly offset this effect. In 3 years, the import bill has almost halved, thereby giving a boost to the economy.

— The prices of all three fuels increased in 2017, resulting in a growing import bill, but still well below the 2013 level: in 2017, the estimated import bill amounted to EUR 266 billion, 26% more than in 2016 but 34% less than in 2013.

— The increase in crude oil prices in 2018 could result in lower growth and higher inflation. Crude oil prices assumed at 75$/bbl on average in 2018 would result in an economic growth being 0.4% lower in the EU and an inflation rate higher by 0.6% than the baseline assumption with oil prices remaining at the level of 2017.

— Crude oil is by far the main component of the import bill, making up 68% of the total in 2017. The share of gas and hard coal was 28% and 4%, respectively.

4.1 Introduction

The EU is a net importer of energy: in 2016, the import dependency[36] stood at 53.6%, practically the same as two years earlier. This means that the EU needs to import just over half of the energy it consumes. Import dependency is particularly high in case of fossil fuels: in 2016, it was 87.4% for crude oil and NGL, 70.4% for natural gas and 40.2% for solid fuels (from which 61.2% for hard coal).

Between 2014 and 2016, import dependency increased for gas (because of rising consumption and falling indigenous production) but decreased for solid fuels (the consumption of which decreased to a larger extent than production). The import dependency for oil has not changed significantly.

EU energy import dependency seems to have stabilised in recent years: since 2005, it has been fluctuating between 52% and 55%. While the import dependency of fossil fuels shows a

[36] Import dependency is calculated as net imports divided by gross inland consumption

long-term increasing trend, their share within the energy mix is gradually decreasing. The share of renewables, on the other hand, is steadily growing and these are typically produced within the EU.

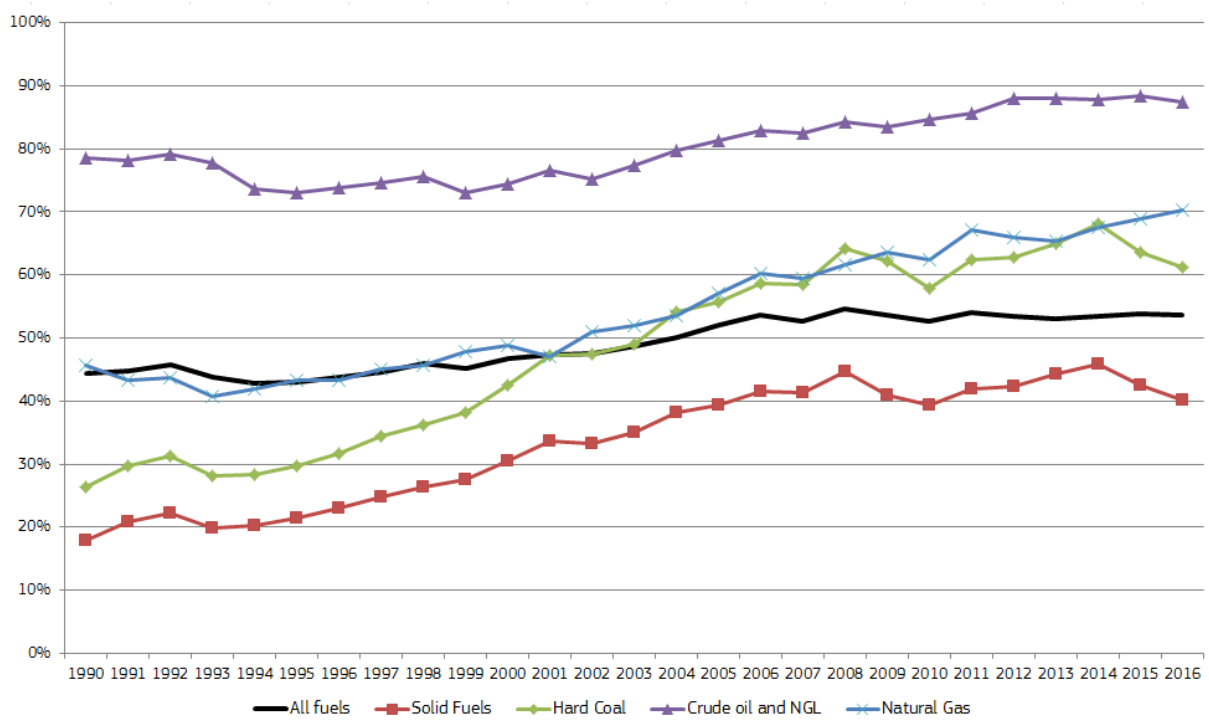

Figure 93 - EU import dependency by fuel

Source: Eurostat

The high import dependency poses significant challenges in terms of energy security and the diversification of suppliers and supply routes but, in addition, it also means that the EU is facing an important energy import bill.

4.2 Methodology

Scope

In this analysis, we focus on the import bill of the EU as a whole, therefore only extra-EU imports are considered. (When the import bill of an individual Member State is looked at, it is of course reasonable to take all imports into account, including those coming from other Member States.)

The analysis covers the main fossil fuels: crude oil, natural gas and solid fuels. These fuels still cover nearly three-quarters of the EU's gross inland energy consumption and the overwhelming majority (98% in 2016) of net energy imports. Crude oil alone makes up well over half of the EU's net energy imports while gas accounts for 30%.

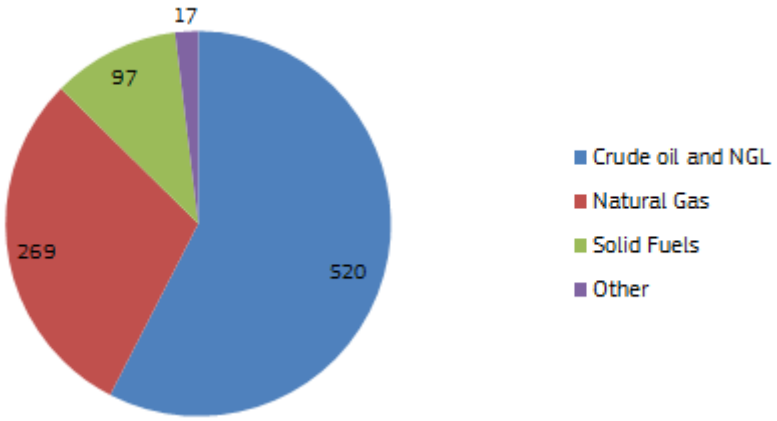

Figure 94 - EU net imports of energy in 2016 (mtoe)

Source: Eurostat

In addition to crude oil, the EU is also an importer of petroleum products. However, considering the practical difficulties of finding reliable volume and price data for a multitude of products with different specifications and the fact that the EU is also exporting petroleum products and exports and imports are of a similar magnitude (the EU typically exports motor gasoline and imports middle distillates), petroleum products were not included in the calculation of the import bill.

Lignite/brown coal is typically not traded internationally and the imports arriving to the EU are negligible. Therefore, the analysis of solid fuels was restricted to hard coal.

In terms of time horizon, we provide import bill estimates for the period 2013-2017.

Data sources

In case of oil, we are in comfortable position as Member States report on a monthly basis the volume and the average CIF price[37] of imported oil under Regulation (EC) No 2964/95 of 20 December 1995 introducing registration for crude oil imports and deliveries in the Community.[38] Every year, the collected and aggregated information is published on the website of DG Energy.[39]

For gas, the import volumes used are from the Transparency Platform of the European Network of Transmission System Operators for Gas (ENTSO-G)[40] which is based on the gas flows reported by gas transmission system operators. Gas imports arrive to the EU from Russia, Norway, Algeria and Libya through several pipelines while, in 2017, LNG was arriving from 12 supplying countries to around 25 terminals in 13 Member States.[41] Volumes were calculated by adding the gas flows at the relevant entry points to the EU gas network.

Gas import prices can vary across Member States depending on the supplier, the supply route, the type of contracts (spot or long-term), the way of pricing (hub-based or oil-indexed) and the level of competition. Based on available sources, including customs data, national agencies (e.g. BAFA in Germany) and commercial data providers, for each supplier (Russia,

[37] The CIF price includes the FOB price (the price actually invoiced at the port of loading), the cost of transport, insurance and certain charges linked to crude oil transfer operations.
[38] http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:31995R2964
[39] https://ec.europa.eu/energy/en/statistics/eu-crude-oil-imports
[40] https://transparency.entsog.eu/
[41] Including small-scale terminals in Finland and Sweden.

Norway, Algeria, Libya and LNG) and for each year an estimated average price was established.

Table 5 - Estimated average gas import prices by supplier (€/MWh)

Year	Russia	Norway	Algeria	Libya	LNG
2013	30.0	25.0	30.0	31.0	28.5
2014	25.5	20.0	27.5	29.5	25.5
2015	22.0	19.5	23.5	23.5	20.5
2016	16.0	14.0	16.0	14.5	15.5
2017	17.5	17.5	18.0	15.5	18.5

Source: DG Energy estimation

In case of coal, volumes are the imports of hard coal[42], reported in Eurostat annual (2013-2016) and monthly (2017) statistics. For price, the CIF ARA spot price reported by Platts was used; this is deemed to be representative for most of the hard coal imports arriving to the EU.

For the conversion from US dollars to euros, we used the annual average of the daily official exchange rates published by the European Central Bank[43]: 1.3281 in 2013, 1.3285 in 2014, 1.1095 in 2015, 1.1069 in 2016 and 1.1297 in 2017.

4.3 Drivers

The import bill basically depends on the volume and the average price of imports. Like most commodities, energy sources are typically traded in US dollars and therefore the development of the USD/EUR exchange rate will also influence the import bill (if expressed in euros).

Volumes

Import volumes will depend mainly on the level of consumption. In addition, the development of indigenous production (falling production results in increasing import dependency even if consumption is unchanged) and, to a smaller extent, stock changes can also affect import volumes. In principle, exports can also influence import volumes (higher exports has to be offset by higher imports) but extra-EU exports of crude oil, natural gas and coal are negligible.

[42] This includes anthracite, coking coal, other bituminous coal and sub-bituminous coal
[43] http://www.ecb.europa.eu/stats/exchange/eurofxref/html/index.en.html

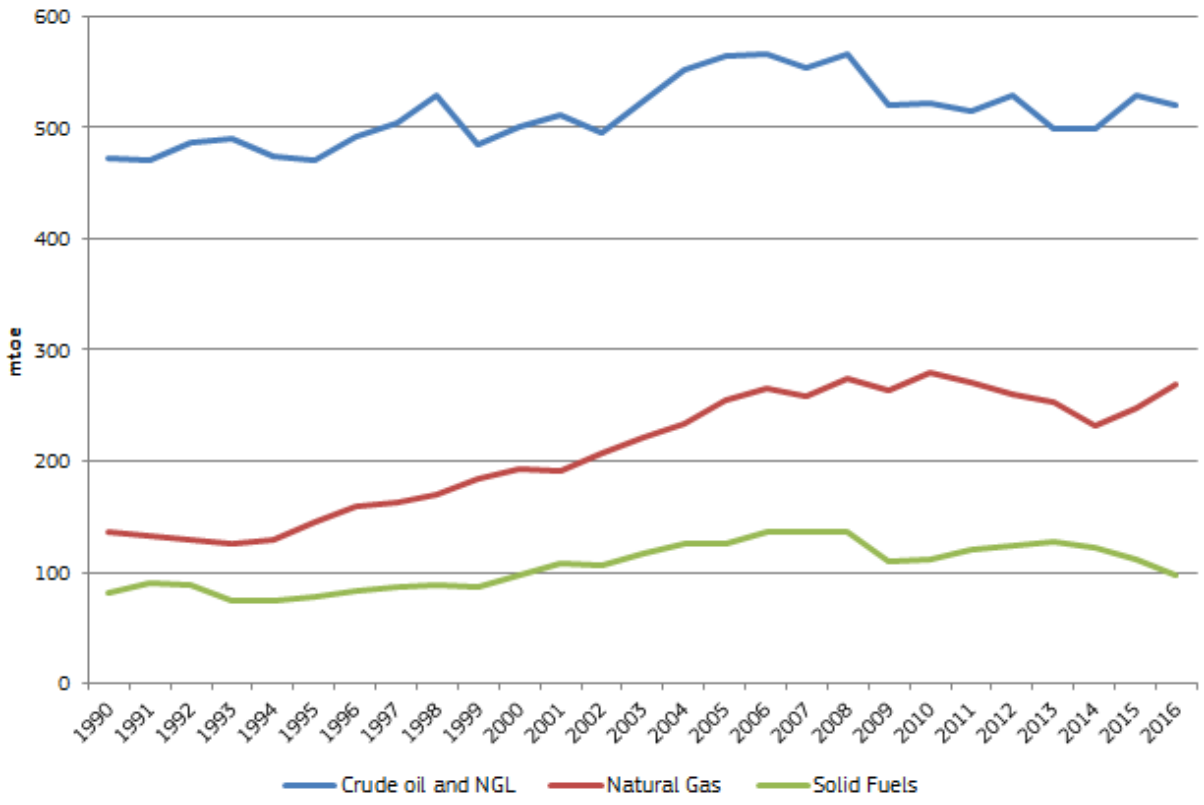

Figure 95 - EU net imports

Source: Eurostat

EU imports of fossil fuels showed a marked increasing trend during the 1990s and for most of the 2000s. Since then, the tendencies of the different fuels are diverging.

In case of oil, imports have been decreasing since 2008 but bounced back in 2015, as the significant fall of oil prices triggered an increase in fuel demand.

Gas imports decreased in 2010-2014 when this fuel lost ground in the electricity sector where it had to face increasing competition from renewables and coal. The trend turned after 2014 as increasing gas consumption and the ongoing fall of indigenous production increased import needs.

In case of hard coal, imports increased from 2009-2010, helped by low prices (cheap shale gas squeezed out the fuel from the US power sector), coupled with the low carbon prices. In 2013-2014, the trend reversed and coal imports started to fall again. The competitiveness of gas has improved compared to coal and, in addition, many Member States announced plans to phase out coals.

Prices

International commodity prices generally decreased in 2014-2016 and have been rising since 2016. There is a strong correlation between international commodity prices; in particular, one can observe a strong correlation between Brent and TTF (the Dutch gas benchmark) since 2015.

In the short run, changes in the import volumes are usually moderate but prices can be rather volatile. For example, the price of oil fell by more than 70% between mid-2014 and early 2016, whereas coal prices have more than doubled between the beginning and the end of 2016.

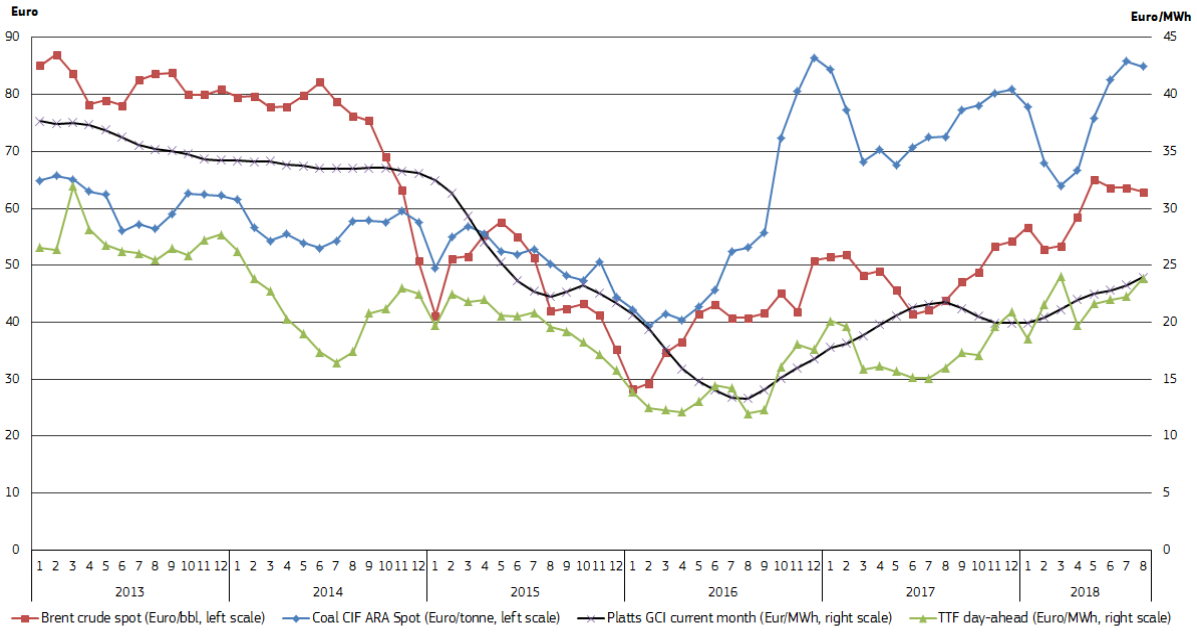

Figure 96 - Comparison of European oil, gas and coal prices

Source: Platts; GCI is the North West Europe Gas Contract Indicator, a theoretical index showing what a gas price linked 100% to oil would be

As the EU is net crude oil importer, price volatility impacts the energy expenditure of EU consumers and at macroeconomic level the impact can be tracked in economic growth and in the inflation. According to an analysis carried out by the European Commission, in 2015 and 2016 decreasing oil prices resulted in an additional GDP growth of 0.8% and 0.5%, respectively. As since crude oil prices started to rise again, an opposite impact is anticipated.

If prices are estimated to be 75 USD/barrel on average in 2018, being measurably higher than the average of 2017 (54 USD/barrel), real GDP in 2018 is predicted to be 0.4% below a baseline reflecting constant 2017 oil prices. Compared to the baseline, rising production costs together with the direct effect of higher oil prices on consumer prices are expected to translate into an overall increase in the consumer price index (CPI) inflation by 0.6 percentage points in 2018.

Exchange rates

Most energy is traded in US dollars. Accordingly, the fluctuations of the USD/EUR exchange rate can directly affect the prices and the import bill when these are measured in euros.

Historically, there has been a consistently negative correlation between oil prices and the US dollar, although recently, with the decline of US oil imports, the relationship has weakened. In other words, it can be observed that the price of oil and the value of the US dollar generally move in an opposite direction: a strengthening dollar typically coincides with decreasing oil prices and vice versa. This means that changes in the oil price, whether upwards or downwards, are mitigated by the exchange rate and the volatility of the oil price expressed in euros is smaller than the volatility of the price expressed in dollars. In view of the correlation between oil, gas and coal prices, to a certain extent this is true for coal and gas prices, too.

The euro has considerably weakened compared to the US dollar in the second half of 2014: the exchange rate went down from nearly 1.40 USD/EUR in early May 2014 to 1.06 in March

2015, a depreciation of 24% in 10 months. In spite of the weakening of the euro in the second half of 2014, the 2014 average exchange rate was practically the same as in 2013, 1.33, but in 2015 it decreased to 1.11.

In 2015-2016, the exchange rate had been rather stable, moving in the 1.05-1.15 range during most of this period. The annual average was 1.11 in both 2015 and 2016.

Throughout 2017, the Euro strengthened compared to the US dollar but the annual average exchange rate was only slightly higher (1.13) than in the previous two years.

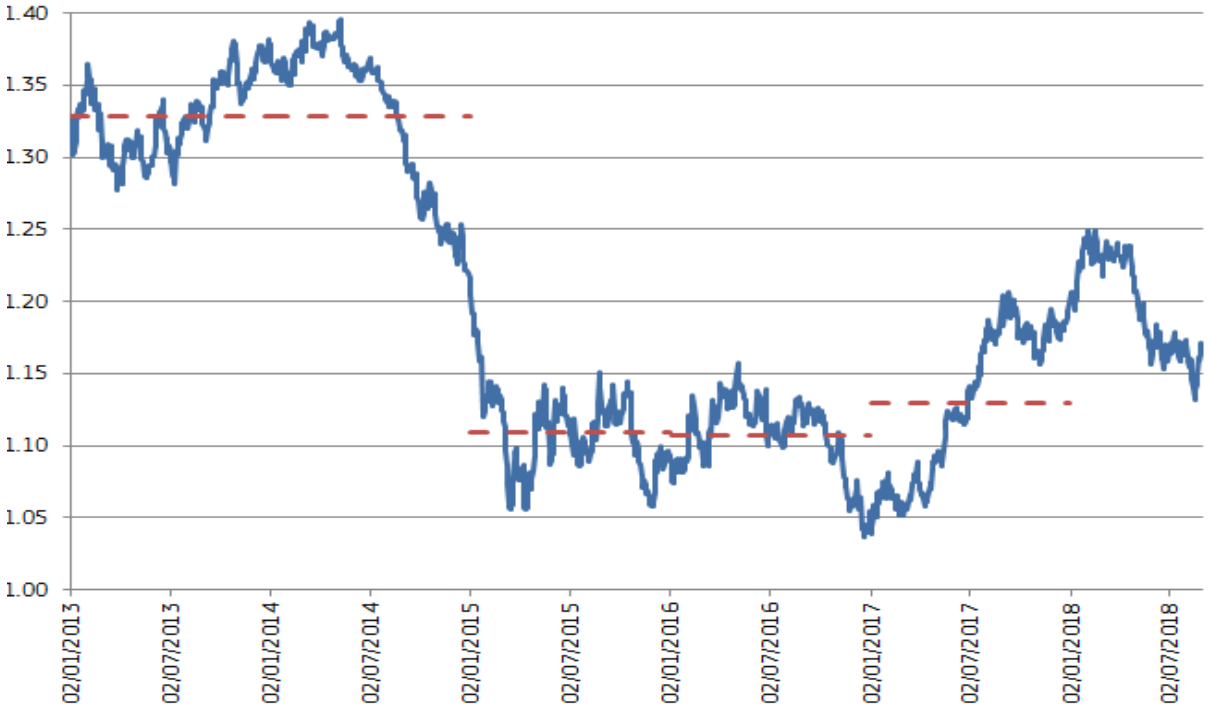

Figure 97 - The USD/EUR exchange rate since 2013

Source: ECB

The red dotted lines represent the annual average in 2013, 2014, 2015, 2016 and 2017

The European Union has a strong intention to "do more to allow the euro to play its full role on the international scene"[44]. As the EU is a net importer of petroleum products, gas and coal, broader deployment of euro in the international trade of these energy products could eliminate the risk of price volatility stemming from the fluctuation of euro against other major currencies, such as the US Dollar.

[44] See Commission President Juncker's speech on the State of the Union, 2018. https://ec.europa.eu/commission/sites/beta-political/files/soteu2018-speech_en_0.pdf

4.4 Import bill calculation

Oil

Table 6 - EU crude oil import bill in 2013-2017

	2013	2014	2015*	2016*	2017*
Volume (million bbl/day)	9.83	10.01	10.48	10.29	10.53
Average Brent price (USD/bbl)	108.66	98.95	52.39	43.73	54.19
Average CIF import price (USD/bbl)	108.83	98.65	51.72	42.11	53.16
EUR/USD exchange rate	1.3281	1.3285	1.1095	1.1069	1.1297
Import bill (bn USD)	390.6	360.4	197.8	158.6	204.3
Import bill (bn EUR)	294.1	271.3	178.3	143.2	180.8

Source: DG Energy, based on Member State reports under Regulation (EC) No 2964/95, Platts, ECB

*for confidentiality reason, from 2015 figures do not include the Czech Republic (in 2014, imports by the Czech Republic made up around 1.5% of total EU imports, implying an estimated annual import bill of 2-3 billion euros in 2015-2017)

In spite of the growing import volumes, the EU oil import bill significantly decreased in 2014-2016 as a result of the oil price fall. While in 2013 the oil import bill was close to USD 400 billion, in 2016 it dropped below USD 160 billion, a decrease of almost 60% within three years. The depreciation of the euro in the same period mitigated this trend: measured in euros, the import bill decreased from EUR 294 billion in 2013 to EUR 143 billion euros in 2016, a decrease of 51%.

2017 was the first year since 2012 when the average Brent price increased: it was 54 USD/bbl, 24% more than in 2016. The volume of daily imports also rose (by 2.3%), helped by falling indigenous production, rising fuel consumption and a relatively good refining environment. Driven mainly by the increasing oil prices, the EU's oil import bill increased from EUR 143 billion in 2016 to EUR 181 billion in 2017 (an increase of around 26%) but remained well below the level observed in 2013, the last year before the oil price fall. The euro slightly strengthened in 2017, which moderated the increase of the oil price bill.

Gas

Table 7 - EU gas import bill in 2013-2017

	2013	2014	2015	2016	2017
Volume (TWh)	3 390	3 113	3 445	3 853	4 238
Estimated average import price (€/MWh)	28.1	23.6	21.0	15.2	17.7
Import bill (bn EUR)	95.4	73.5	72.4	58.7	74.8

Source: ENTSO-G, DG Energy estimations

Gas imports showed a robust increase in 2015, 2016 and 2017 but prices had been on the decline, bottoming out in 2016 and increasing in 2017. In spite of the rising volumes, the estimated import bill decreased in 2014, 2015 and 2016 (as a result of the falling prices) but bounced back in 2017 when both import volumes and prices increased.

Between 2013 and 2016, the estimated gas import bill decreased by 38%, from EUR 95.4 billion to EUR 58.7 billion. In 2017, the gas import bill increased by 27%, reaching EUR 74.8 billion.

Coal

Table 8 - EU hard coal import bill in 2013-2017

	2013	2014	2015	2016	2017
Volume (million tons)	230.0	226.6	210.8	183.4	140.0
CIF ARA spot price (USD/ton)	81.57	75.20	56.84	60.18	84.73
EUR/USD exchange rate	1.3281	1.3285	1.1095	1.1069	1.1297
CIF ARA spot price (EUR/ton)	61.41	56.63	51.25	54.37	75.00
Import bill (bn USD)	18.8	17.1	12.0	11.0	11.9
Import bill (bn EUR)	14.1	12.8	10.8	10.0	10.5

Source: Eurostat, Platts, ECB

Similarly to oil and gas, the coal import bill also decreased between 2013 and 2016 although the absolute values are significantly lower. The estimated coal import bill decreased by 29%, from EUR 14.1 billion in 2013 to EUR 10.0 billion in 2016. International coal prices significantly increased in 2017 which offset the decrease of the imported volumes, resulting in a 5% increase of the import bill to EUR 10.5 billion.

Total

In 2013, the total import bill was about EUR 400 billion, more than EUR 1 billion per day. Falling prices allowed the EU to decrease its estimated import bill to EUR 358 billion in 2014 (-11%), EUR 262 billion in 2015 (-27%) and EUR 211 billion in 2016 (-19%). The cumulative decrease between 2013 and 2016 was 47%.

In 2017, however, the import bill increased by 26%, reaching EUR 266 billion.

When expressed as a percentage of EU GDP (at current prices), the share of the estimated import bill decreased from 3.0% in 2013 to 1.4% in 2016. This saving gave a significant boost to GDP growth in 2015-2016: lower energy prices meant more disposable income for households, lower energy costs for businesses and increasing activity of oil intensive sectors (e.g. transport, refining and chemicals). In 2017, the estimated import bill was equivalent to 1.7% of the GDP.

The per capita import bill decreased from around 800 euros in 2013 to 415 euros in 2016 and bounced back to around 520 euros in 2017.

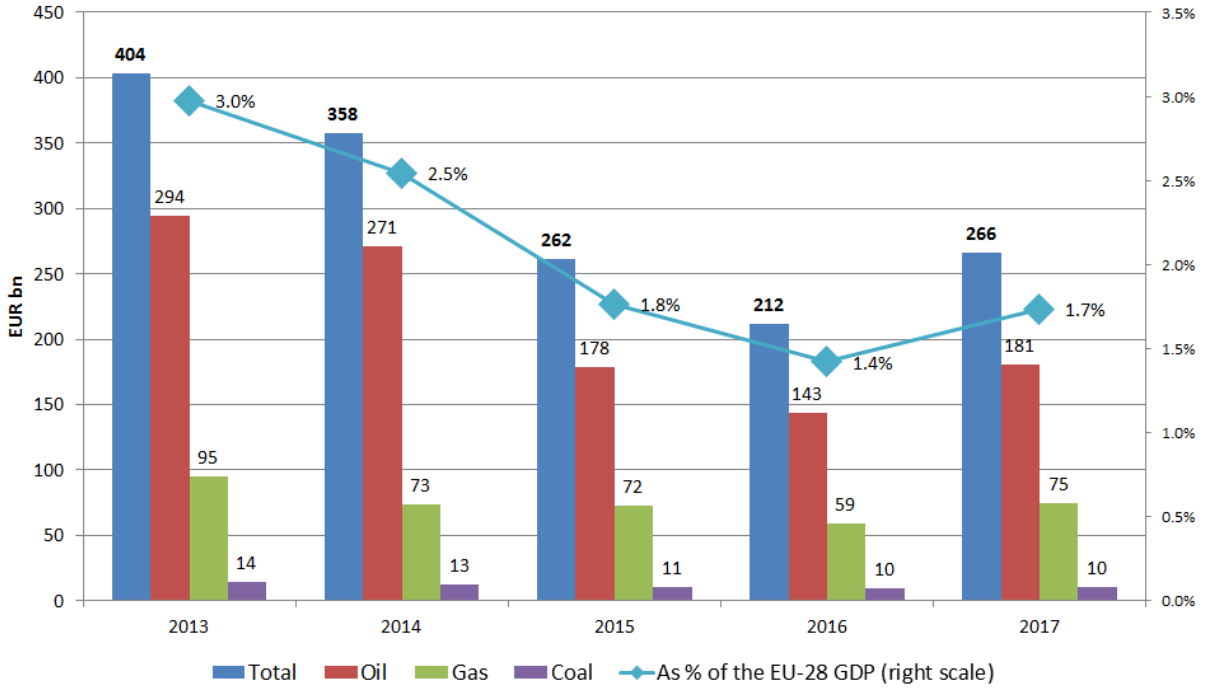

Figure 98 - The estimated EU import bill

Source: DG Energy calculation

5 Household energy expenditure and energy poverty

Introduction

Energy poverty became an ever more important issue in the last decade, as retail energy prices underwent a significant increase and in the consequence of economic crisis that began in 2008 the income of many households, especially in the case of the poor, fell measurably, leading to an increasing burden of paying their energy bills, as the share of energy rose in their consumption expenditure. As energy as basic need cannot be replaced, at least not on the short run, increasing energy related expenditures imply less spending on other consumer purposes.

In its Clean Energy for All Europeans legislative package, the European Commission has proposed to include the concept of energy poverty, explicitly mentioning it in the proposal of the new Electricity Directive. This would foresee that all Member States measure energy poverty. Recently, the project on European Energy Poverty Observatory (EPOV) has been launched, aiming at collecting data, developing indicators and presenting best practices to tackle energy poverty in the EU Member States. In this chapter an analysis is provided on the importance of energy products and transport fuels for households with different income across the EU Member States.

Main findings

— In 2015 the poorest households spent € 870 on energy products (electricity, gas, liquid and solid fuels, central heating) in the EU on average, representing around 10.4% of their total consumption expenditure. There were huge differences across the EU Member states, energy expenditures ranging from € 500 to € 2,300 per household.

— When compared to the total expenditure, the poorest households in Sweden spent only 3% on energy, while in Slovakia this share was more than 23%.

— Households with middle income, though spending higher amounts on energy products, spent proportionally less on energy within their total expenditure, only 7.1% on EU average, as opposed to the aforementioned 10.4% in the case of the poorest.

— However, even middle income households in Central and Eastern Europe spent around 10-15% of their expenditure on energy, owing to lower income compared to North and Western Europe, where this share was typically around 4-8% in 2015.

— The share of households being unable to keep their home adequately warm serves as a good complementary indicator on energy poverty, showing a positive correlation with the share of energy products within the total household expenditure. In 2017 around 19% of lower middle income households in the EU could not keep their home adequately warm, ranging from 2% in Finland to 60% in Bulgaria.

— Expenditures on transport fuels (petrol and diesel) represented € 370 (3.1% of the total expenditure) on EU average in the case of the poorest, while for middle income households it reached € 980 (4.3% of the total expenditure).

— Households with higher income spent proportionally more on transport fuels within their total expenditure than the poorer, and diesel had an increasing importance in their fuel spending compared to lower income households.

5.1 Energy products in household budgets

In this chapter we primarily rely on data provided by national statistical authorities (NSIs) on expenditure on energy products of households in the twenty-eight EU Member States. Energy expenditure of the residential sector usually covers heating, lighting, cooking needs, and the operation of electrical appliances. Household Budget Survey (HBS) and Standard Income and Living Conditions (SILC) data, available in both Eurostat and NSI databases provide information on expenditures on products and services and the quality of living conditions. In order to analyse the burden energy expenditures mean to households, it is reasonable to take into account the major energy products households spend resources on (electricity, gas, solid fuels, liquid fuels and heating – mainly district heating), and to look at how much households with different income conditions spend on these products, in absolute figures and in the share of their total expenditure on products and services.

In the 2016 edition of the Energy prices and costs report, detailed data were provided on energy expenditures in each income quintiles (one fifth of the population regarding their income), in this report for most of the EU countries we have more refined data, detailed expenditures in each decile (one tenth of the population, arranged into income strata). Furthermore, detailed data are available on expenditures on transport fuels (fuels total, expenditures on petrol and diesel). The analysis in this report primarily focuses on the latest available data, as opposed to the 2016 report, which looked at the timely evolution of energy expenditures over a ten-year long period.

5.1.1 Energy expenditure (excluding transport) in households with low income

The next chart (**Figure 99**) shows energy expenditure of households in the lowest decile (the poorest ten per cent of the population) in the EU countries[45]. In the EU € 870 was spent on energy on average by the poorest household according to the latest data[46], which represented 10.4% of their total consumption expenditure. There were huge differences across the EU on both absolute expenditures and the share of energy in the total household expenditure. In Bulgaria and Romania the annual energy expenditure remained below € 500[47], in contrast, in Denmark it was above € 2300 in 2014-2015. This nearly five-fold difference in energy expenditures reflect mainly differences in average household incomes in different EU Member States, however, differences between household energy prices also play a role. In the case of heating related expenditure the quality of residential building stock also has of particular importance, as energy expenditure can be reduced if buildings are more energy efficient.

[45] For some countries (Germany, Denmark and Poland) data of the lowest quintile (the poorest 20% of the population) was used for the computations as we did not receive decile data from the national authorities or there were issues with the data quality.

[46] EU average is calculated as weighted average from Member States' expenditure data, using the number of households as weight. Latest available data in most cases mean 2015 or 2014 data, however, due to different data collection in different countries, in some cases data might be of earlier time period.

[47] In this chapter expenditures are expressed per household

Looking at the shares of energy products in the households' budget[48], in Sweden the poorest households spent only 3% of their total expenditure on energy, whereas in Slovakia this share was higher than 23%. Countries in Central and Eastern Europe, primarily owing to lower incomes compared Northern and Western Europe, spent significantly higher share on energy within their household expenditure.

The role of different household energy products may also differ across the EU. A good example for this is the high share of district heating in Denmark, representing more than half of the total energy-related household expenditures[49]. In Estonia, Lithuania, the Czech Republic and Slovakia district heating also had an important share in household energy.

Electricity had high share in Sweden, Finland and France; in these countries this energy source is dominant not only in residential lighting but in heating as well. Natural gas had high share in the Netherlands, Italy, UK and Malta, and liquid fuels, mainly in the form of heating oil, are of importance within household energy in Slovenia, Belgium, Ireland and Luxembourg. Solid fuels only represented a fraction in the total energy expenditure in the EU, however, in Ireland, and in some Central and East European countries they still had a measurable share.

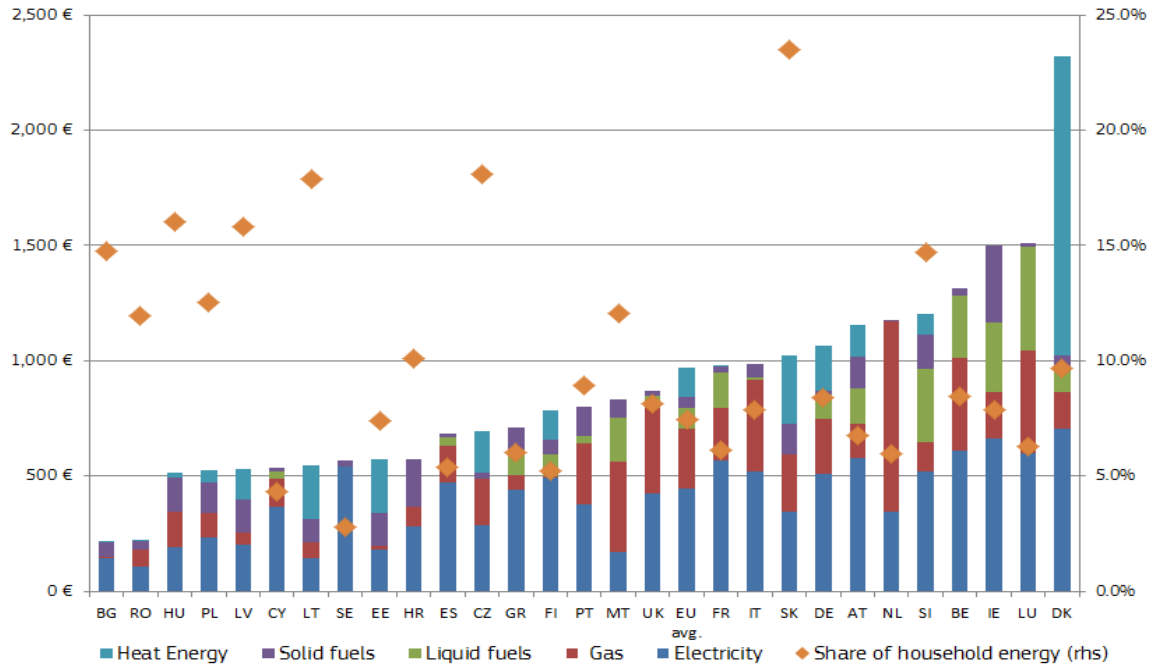

Figure 99 - Expenditures on household energy products for the poorest households in the EU Member States), and the share of energy in the total household consumption expenditure

Source: DG ENER ad-hoc data collection on household consumption expenditures

[48] As HBS data are not fully harmonised in the EU, the actual shares might differ from the result of this analysis. In some countries the share of energy is low in the total expenditure, as energy bills are "hidden" in the rental payments in the housing sector.

[49] According to the Danish District Heating Association, around 64% of all Danish households were connected in 2017 to the district heating grid, and district heating companies were legally bound to run on a non-profit basis. Otherwise saying, the high expenditures on district heating in Denmark was rather due to the broad deployment of district heating, not to the costs of this technology.

5.1.2 Energy expenditure (excluding transport) in households with middle income

Beside the poorest households, it is reasonable to analyse the situation of the lower-middle income and middle-income households, which are represented by the third and the fifth income decile (or in the case of some countries, the second and the third quintile) in the expenditure data. As both **Figure 100** and **Figure 101** show, the order of the countries regarding the absolute spending on energy products and the distribution of the individual energy sources within the total spending on energy is similar in all income deciles, however, the higher income a given household has, the higher is the usual amount it spends on energy products.

On the contrary, households with higher income spend proportionally less on energy products, compared to their total consumption expenditure, than poorer households. In the third decile (lower-middle income households) the average share of energy in total spending was only 7.2% (as opposed to 10.4% in the case of the poorest), and in the fifth decile (middle income households it was 7.1%. However, even for middle income households differences across Europe are perceivable regarding the share of energy in total spending, as households in Northern and Western Europe spent typically between 4% and 8% of their expenditure on energy, in Central and East Europe this share was 10-15% in recent times, implying that amid current income levels energy represents a significant burden for households in these latter countries.

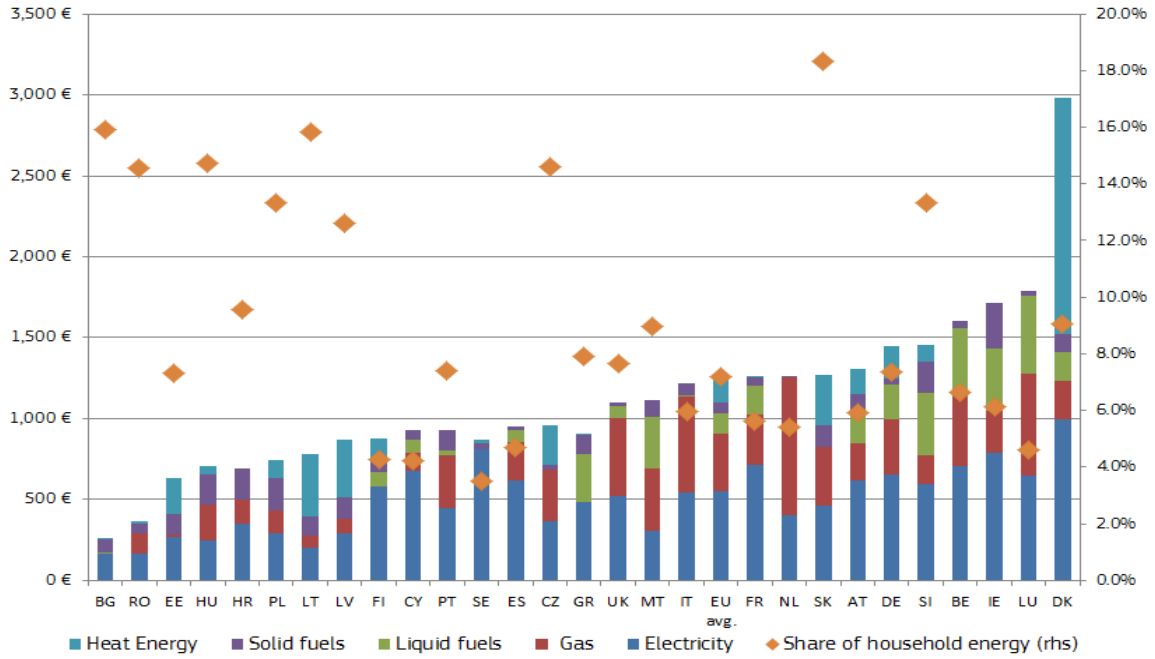

Figure 100 - Expenditures on household energy products for the lower-middle income households in the EU Member States, and the share of energy in the total household consumption expenditure

Source: DG ENER ad-hoc data collection on household consumption expenditures

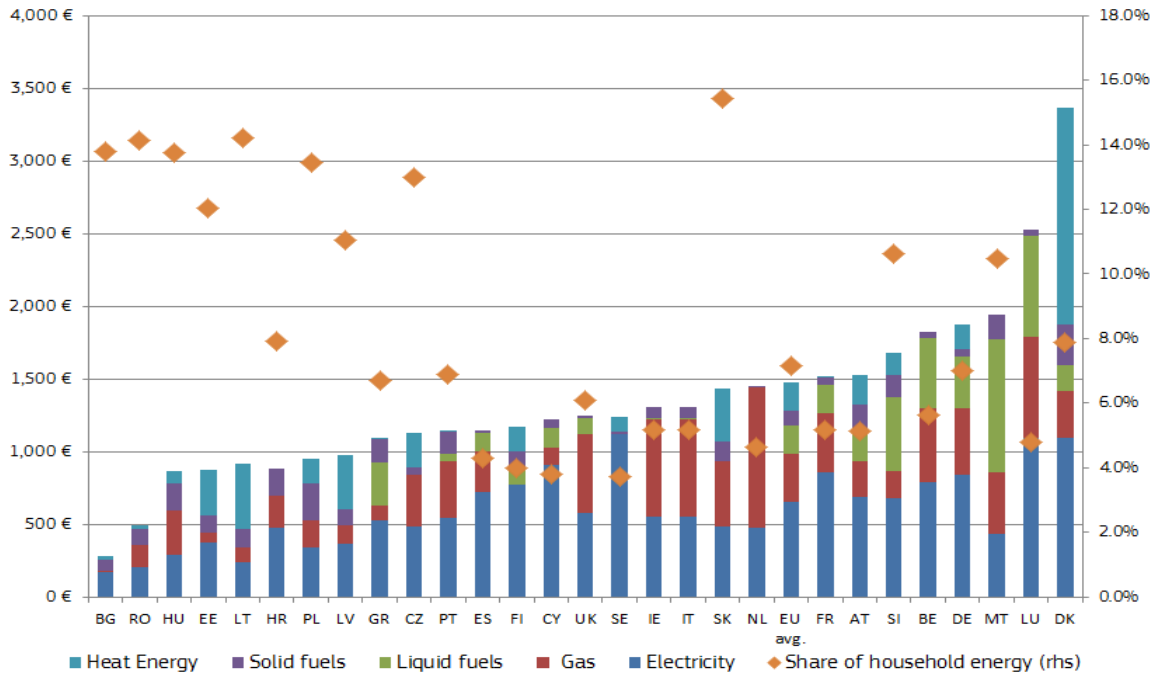

Figure 101 - Expenditures on household energy products for households with middle income in the EU Member States, and the share of energy in the total household consumption expenditure

Source: DG ENER ad-hoc data collection on household consumption expenditures

There exist a few other indicators providing information on the burden of household relating to paying their energy bills and/or keeping their home sufficiently warm. **Figure 102** shows the relation between spending on energy (in the share of the total) for lower-middle income households and the share of those being unable to warm up their home sufficiently.

Whereas in Finland only 2% of the households being under 60% of the median income were not able to keep their home adequately warm, in Bulgaria this share was more than 60% in 2017. The share of homes non-adequately warm shows a positive correlation (though not very strong, having a coefficient around 0.25) with the share of energy in total expenditures. The correlation is weakened by the data in some Mediterranean EU Member States, owing to lower energy expenditure amid warmer climate; however, this is not reflected in the perception of households on having a sufficiently warm home.

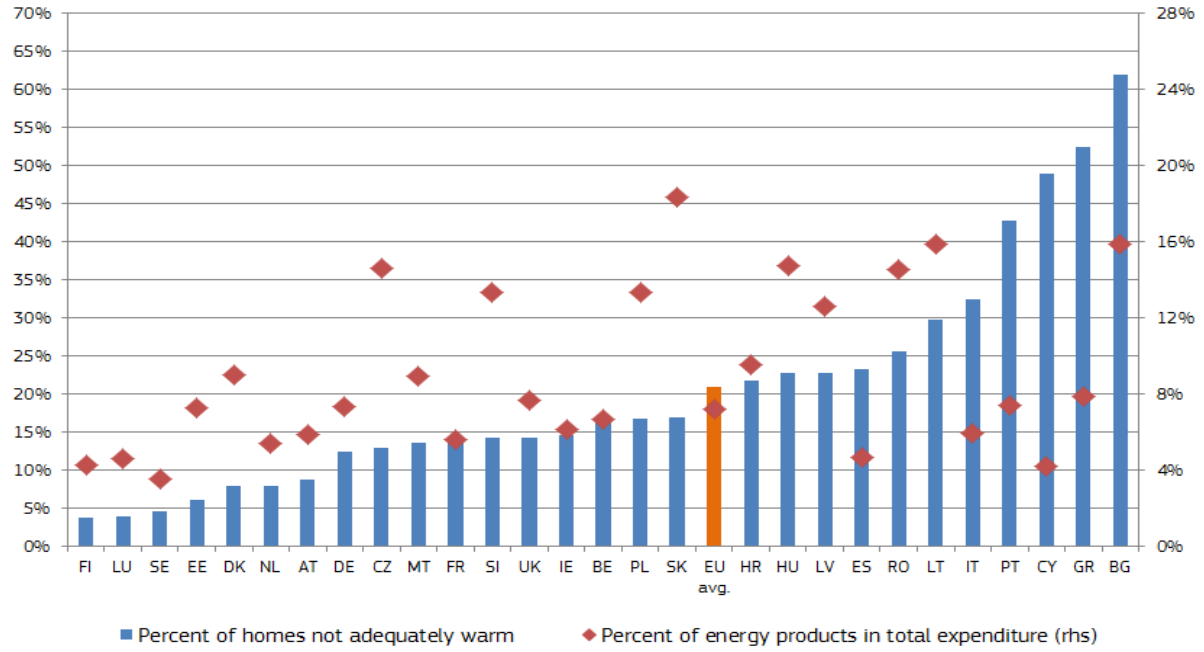

Figure 102 - The ratio of homes being not adequately warm for households being below the 60% of the median income and the share of energy products within the total expenditure for households in the third decile (lower-middle income)

Source: DG ENER ad-hoc data collection on household consumption expenditures and Eurostat

Box –Energy efficiency of the household sector

Energy consumption in the residential sector is impacted by several factors. Higher number of households, higher floor area of buildings, higher disposable household income all result in higher energy consumption (though as regards income proportionally less expenditure on energy products, as it was presented before, than in the case of poorer households). Increasing energy prices also result in decreasing consumption, however, energy is a price-inelastic product and necessary to living conditions. Energy consumption also shows strong correlation with climate conditions and has a strong intra-annual seasonality therefore, as two thirds of total energy consumed by households is related to heating needs.

Energy efficiency measures can mitigate the impact of these factors on the total residential energy consumption. Consumption of energy in the EU residential sector, accounting for around a quarter of total final energy use, rose by 7.4% between 2014 and 2016, largely owing to colder weather conditions in 2016 compared to the mild winter in 2014. Weather-corrected heating energy consumption has been relatively flat since 2010, following a decade of reductions. Non-heating related energy use, accounting for one third of the household energy consumption, went up by 3% a year between 2014 and 2016. This was related to large household appliances, such as refrigerators and televisions, in spite of their improving energy efficiency. For better understanding the reasons behind household energy consumption, the attention should be more focused on electricity, which seems to be driving up the total residential energy consumption in recent years.

In earlier periods significant decreases could be observed in EU household energy consumption (by 5.7 between 2008 and 2016), largely owing to decreasing heating related consumption, due to building refurbishments and more efficient heating systems (e.g.: replacement of boilers with low energy efficiency). However, over the last few years these factors could not any longer contribute to the decrease in energy consumption up to such extent as before, pointing to the need of seeking new sources of efficiency improvements in other areas, such as the aforementioned electricity use of appliances.

5.1.3 Energy expenditures in the transport sector

Figure 103 and **Figure 104** show the expenditures on transport fuels (petrol and diesel, or in the case of some Member States where detailed data were not available, fuels and lubricants total). Similarly to household energy products, there were significant differences across the Member States, both in absolute spending on fuels and in their share in the total household expenditure.

There were six Member States (Romania, Bulgaria, Slovakia, Lithuania, Czech Republic and Latvia) where spending on transport fuels remained below € 100 per household in 2015, whereas in France and Italy it was above € 600. In the EU the poorest households spent € 370 on average on transport fuels, representing 3.1% of the total consumption expenditure. The lowest share of transport fuels within the total expenditure could be observed in Romania (2%), whereas in Malta the poorest households spent almost 8% on transport fuels of their total expenditure.

The share of petrol and diesel within transport fuels was different across the EU. In countries like the Netherlands, Sweden, Belgium, UK and most of the countries in Central and Eastern Europe expenditures on petrol dominated the transport fuel bill, whereas in France, Italy, Luxembourg or Austria diesel had a significant share (though with the exception of France it was lower than the share of petrol).

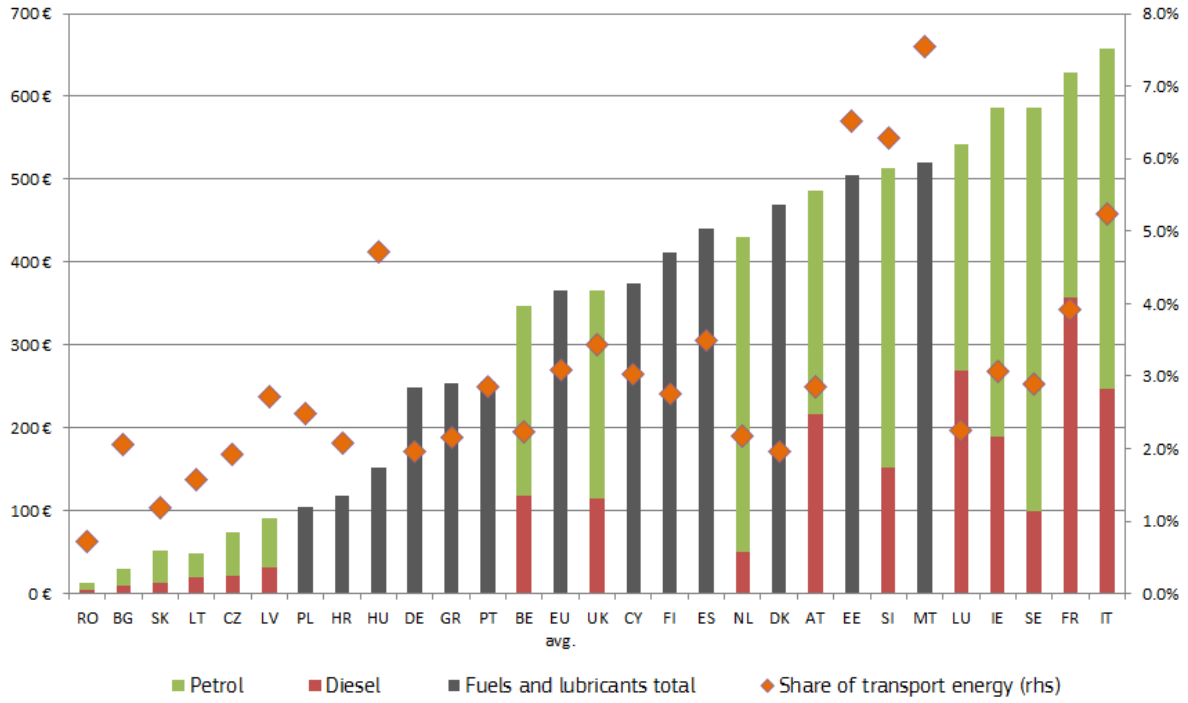

Figure 103 - Expenditures on transport energy products for the poorest households in the EU Member States, and the share of transport energy in the total household consumption expenditure

Source: DG ENER ad-hoc data collection on household consumption expenditures

Note: "Fuels and lubricants total" cover diesel, petrol and other fuels and lubricants. A split is not available by fuel in these EU Member States

In contrast to household energy products, the share of transport fuels within the total expenditure proportionally increases with the income of households, otherwise saying richer households tend to spend more on transport fuels within their total expenditure. As it was

mentioned before, the poorest households spent 3.1% on transport energy on EU average, while those in the third income decile (lower-middle income) and in the fifth decile (middle income) respectively spent 3.9% and 4.3%. Expenditures on transport fuels reached €980 in the case of middle income households in 2015 in the EU.

Comparing the details of transport fuel expenditures of the poorest and middle income households, it seems that the share of diesel fuel is higher in the case of middle income households than for the poorest. Diesel engine cars are more popular among those who use their car more frequently, or having a higher annual mileage, as in many countries taxation of diesel fuels is more favourable (or at least it used to be in the past) compared to petrol.

As households with higher income rely more on private transport, they spend proportionally more on diesel than the poorer. However, in the future this might change as difference in taxation of petrol and diesel (mainly excise duties) will diminish and due to the changing environmental rules and public acceptance; thus diesel may not be as attractive alternative to petrol cars as in the past.

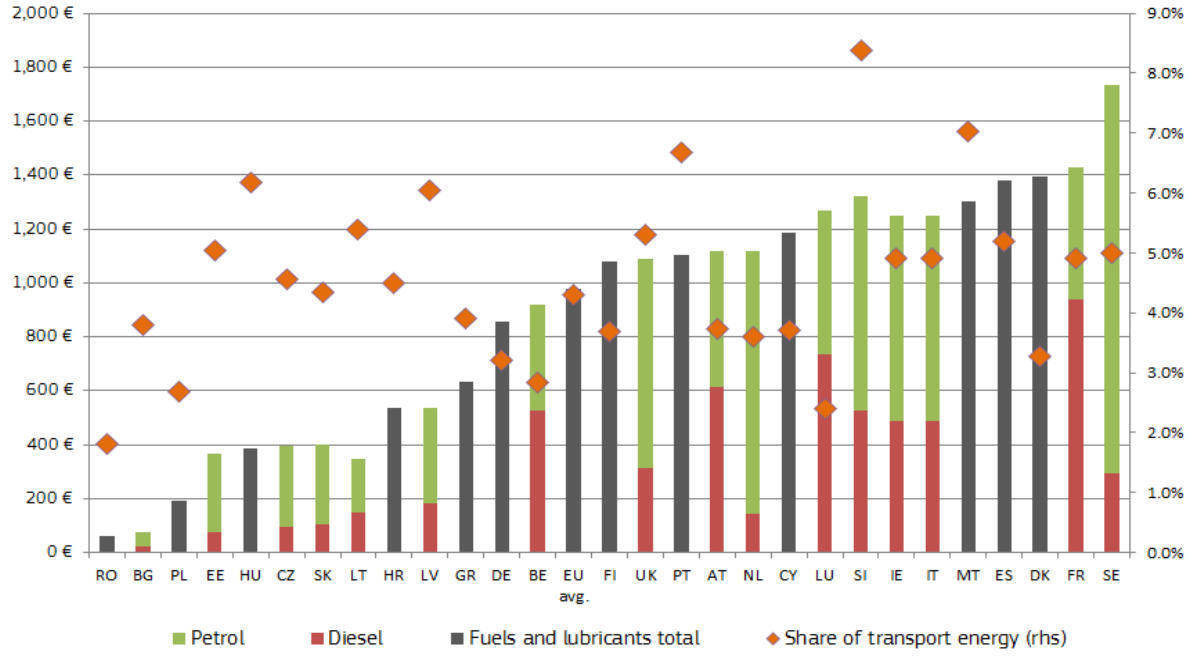

Figure 104 - Expenditures on transport energy products for households with middle income in the EU Member States, and the share of transport energy in the total household consumption expenditure

Source: DG ENER ad-hoc data collection on household consumption expenditures