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Analysis of energy saving potentials in selected EU countries based on a sectorial best-practise approach

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Analysis of energy saving potentials in selected EU countries based on a sectorial best-practise approach.

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2 Executive summary

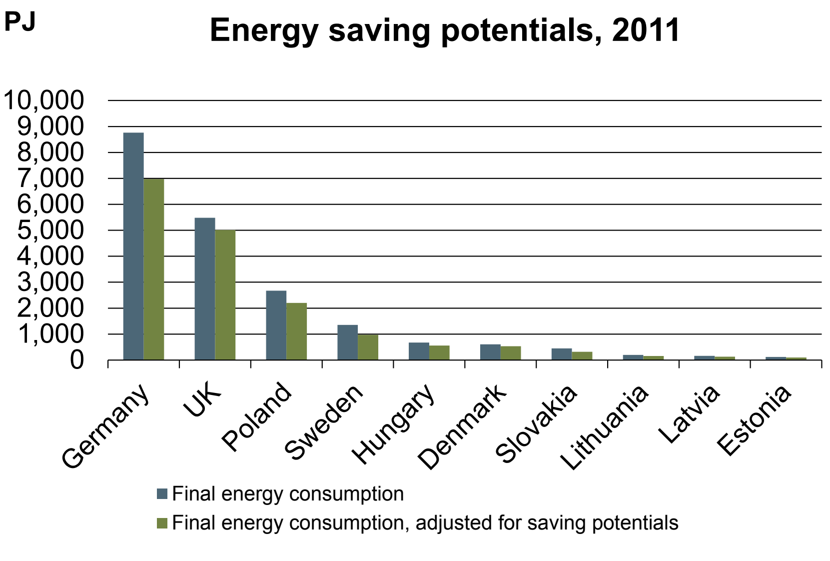
2.1 Main results

The analysis focuses on energy saving potentials in eastern European countries, compared to Denmark, Sweden, Germany and the UK. In total the analysis include Denmark, Estonia, Germany, Hungary, Latvia, Lithuania, Poland, Slovakia, Sweden and the UK.

The analysis uses a “what-if” methodology, by replacing the energy intensities in different sectors in each country with the best-practice energy intensity for the road transport sector and the best practice energy intensity per branch for the industry sector. The data used for the analysis is from 2011, which is the newest year with a satisfying data quality.

In 2011 the total, final energy consumption for the included countries was 20,484 PJ. The total saving potential is calculated to 3,521 PJ, equalling 17 % of the total, final energy consumption in the analysed country group.

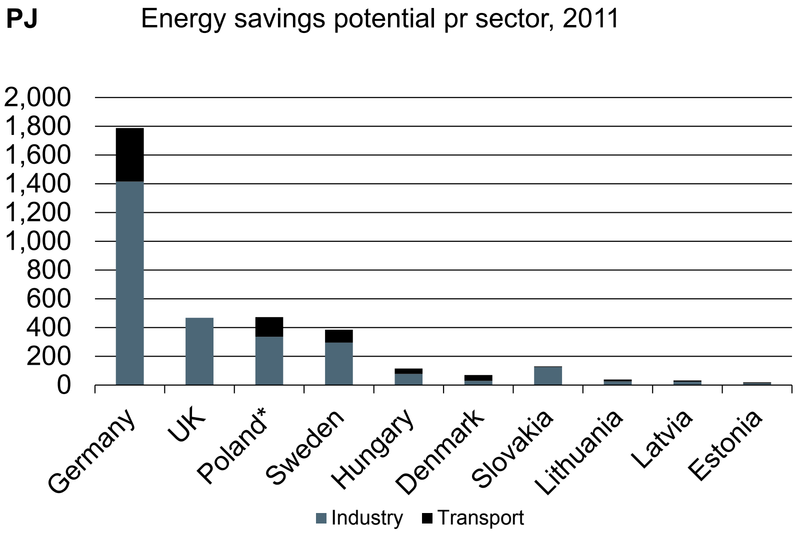
Figur 1 Final energy consumption, before and after realisation of energy saving potentials.



Source: Own calculations.

The total saving potential is calculated as the sum of the energy saving potential in the manufacturing industry and the transport sector. In the industry, the total energy saving potential is calculated to 2,812 PJ, or 80 % of the total saving potential. The transport sector has an energy saving potential of 709 PJ (20 %).

Figur 2 Energy saving potential per sector, 2011.



Source: Own calculations.

The methodology used is simplistic in that it does not take a detailed look on the energy saving potentials in road transport and industry in each country, but rely on comparison of energy intensities among countries.

Hence the results of the analysis should be taken as a starting point for more detailed evaluations of the economical realisable energy savings potentials in industry and transport in Europe.

3 Industrial energy savings potential

3.1 Methodological introduction

The industrial energy saving potential is calculated on the basis of a "best-practice" approach, where the "best-practice" energy intensity is identified for the EU28-country group for each industry branch on a 230-branch level. To correct for outliers, with unrealistic low energy intensities, the "best-practice" is defined as the 2nd best in the EU28 country group. The calculations are in addition made as a comparison to the Danish energy efficiency, by defining the "best-practice" as the Danish energy intensity.

The total industrial saving potential is then calculated for country *i*, following the equation:

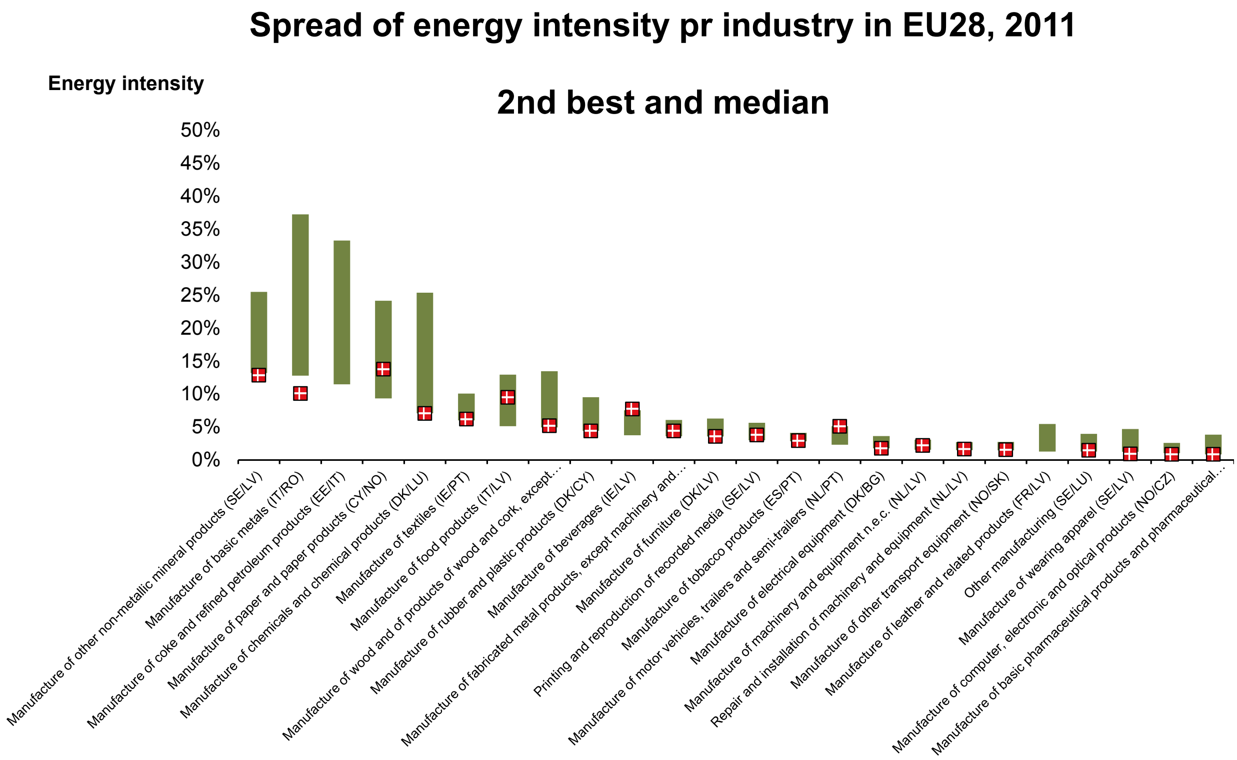
$$\boldsymbol{IES_i} = IEC_i - \sum_{n=1}^{230} \frac{MIN[2nd](energy\ intensity_n)}{energy\ intensity_{n,i}} * IEC_{n,i},$$

where IES_i is the industrial energy saving potential in country *i*, IEC_i is the industrial energy consumption in country *i,* and *n* is each industry branch from 1 to 230.

The spread of the energy intensities among EU28 countries, with the 2nd best and median energy intensity as low/high is shown in figure 3.[1]

[1] The figure shows the spread of energy intensity on a 24-branch level.

Figur 3 Spread of energy intensity.



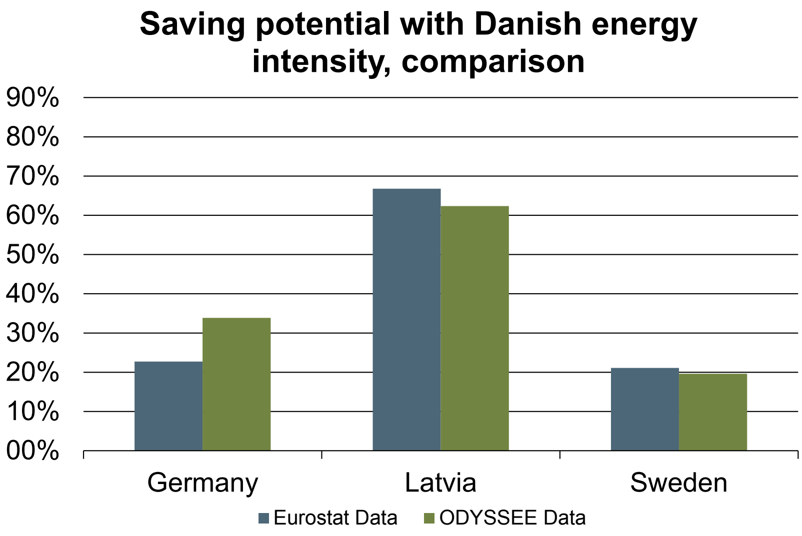
Source: Eurostat, Structural Business Statistics.
Note: The Danish energy intensity is marked with a flag.

Definition of energy intensity

The energy intensity for each country and industry is calculated on the basis of Eurostat Structural Business Statistics, as the purchase of energy products share of gross value added. This methodology implicit assume, that the value of purchase of energy is a good approximation for the amount of energy consumed. This assumption seems relative safe due to:

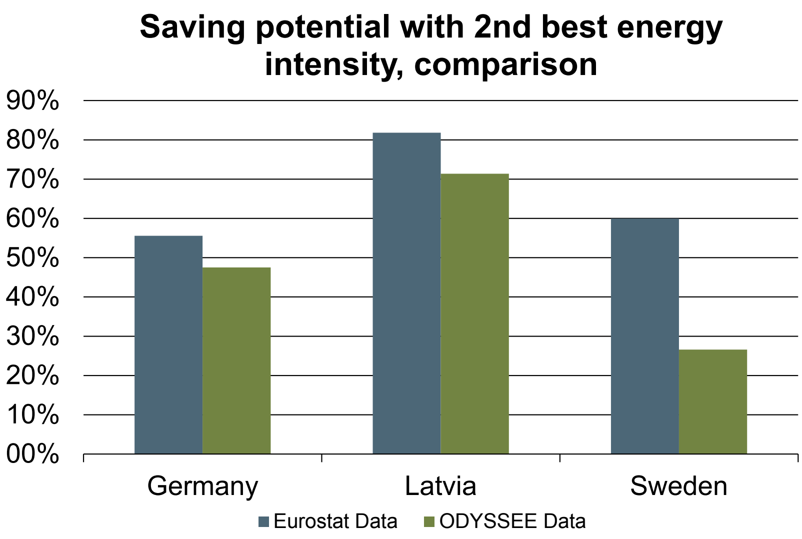
a. *The main energy products used in the industry (oil, natural gas and electricity) is widely traded on EU markets and taxes on energy products for industrial processes are low compared to the total energy price in all EU countries.*
b. *If a price-correction for energy products was made, the gross value added should also be price corrected, i.e. by a purchasing parity price index. It is a safe assumption that the purchasing parity price index and relative industrial energy products prices are positively correlated.*

Figur 4 Energy saving potential with Danish energy intensity.



Source: Own calculations, based on Eurostat and ODYSSEE data.

Figur 5 Energy saving potential with 2nd best energy intensity



Kilde: Own calculations, based on Eurostat and ODYSSEE data

Due to lack of data for Poland in the Eurostat Structural Business Statistics, the Polish industrial energy intensity is calculated on the basis of ODYSSEE data[2]. The ODYSSEE data gives data for energy consumption, measured by energy content, and gross value added adjusted for the national purchasing

[2] http://www.indicators.odyssee-mure.eu/

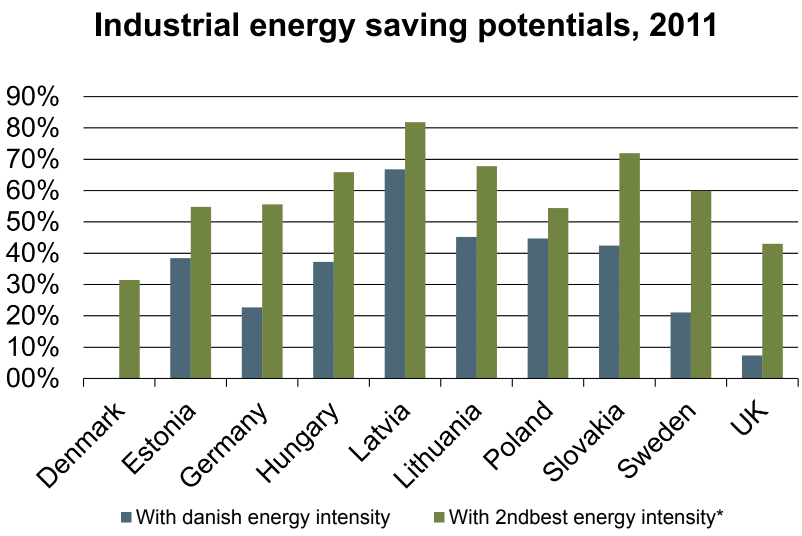
parity price index. A comparison of the resulting energy saving potential, using the Eurostat structural business statistics and ODYSSEE data gives an idea of how well assumptions *a* and *b* are true. The resulting energy saving potentials for the industry are shown in figure 4 and 5 for the countries where data is present in both the Eurostat Structural Business Statistics and ODYSSEE. For comparison with the Danish energy intensity, the assumptions seem safe. For Germany and Latvia the assumptions also seems safe for comparison with the 2nd best energy intensity, though the Eurostat structural business statistics seems to exaggerate the saving potential in Sweden.

The Eurostat structural business statistics are used as the primary data source, as its industrial branch level is far more detailed than in the ODYSSEE database.

3.2 Results for industrial energy saving potentials

The industrial energy consumption for the country group in 2011 was 5,225 PJ, where the eastern European countries accounted for 20 % of the industrial energy consumption. In total the industrial energy saving potential with the 2nd best energy intensity, is 2,812 PJ, equalling 54 % of the total energy consumption for the country group. The Polish industry could cut down energy consumption with 337 PJ alone, equalling 3 times the total Danish industrial energy consumption. If each country's industry produced with the Danish energy intensity, the energy saving potential would be 1,203 PJ, see figure 6.

Figur 6 Energy saving potentials, 2011



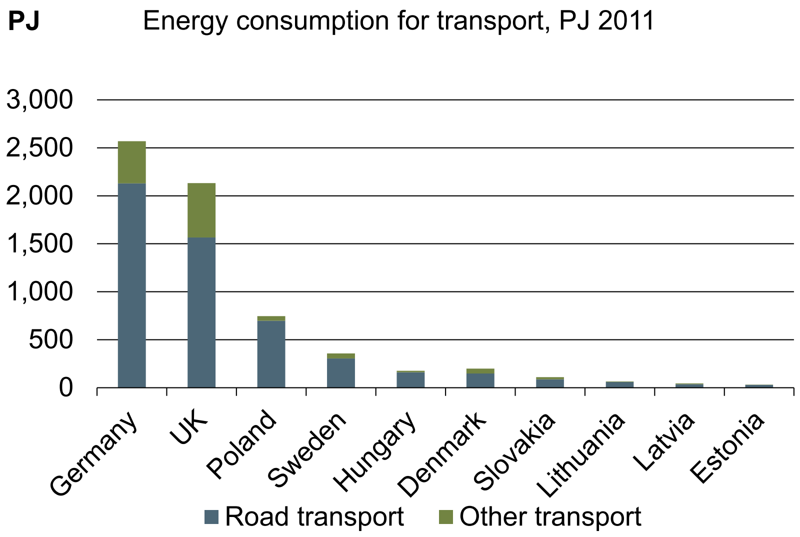
Source: Own calculations, based on Eurostat and ODYSSEE data.
Note: * With 2nd best energy intensity pr. industry in EU28, ** Poland based on ODYSSEE Data.

4 Transport energy savings potential

4.1 Methodological introduction

Road transport is the primary driver for transport energy consumption in all countries within the country group, when international bunkers are not included. In total the country groups transport sector, excluding international bunkers, consumed 6.432 PJ in 2011, where road transport accounted for 4,533 PJ (70 %). The model for transport energy saving potential focuses on energy saving potentials in the road transport.

Figur 7 Energy consumption for transport, PJ 2011.



Source: Eurostat

The road transport energy saving potential is calculated on the basis of a "best-practise" approach, where the best-practice is measured on the basis of average fuel efficiency of the national car fleet. The road transport energy saving potential is then calculated following the equation for country *i*:

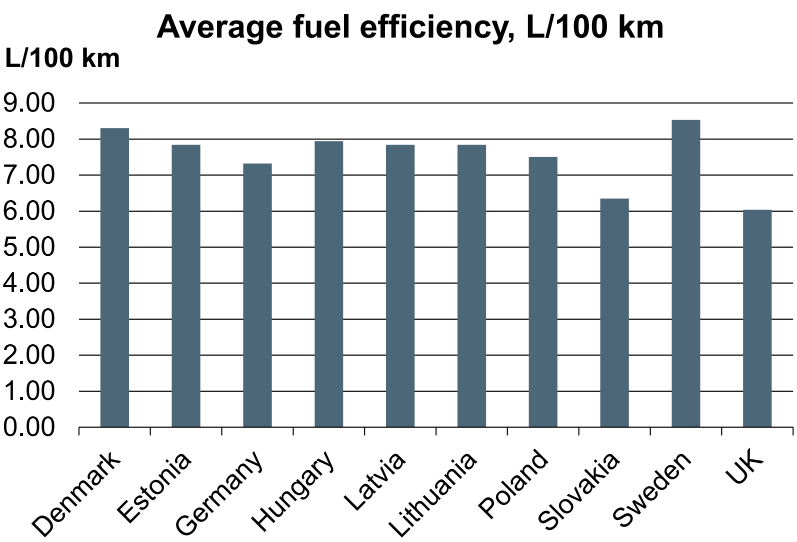
$$\boldsymbol{RTES_i} = RTEC_i - \frac{MIN(fuel\ efficientcy)}{fuel\ efficiency_i} * \ RTEC_i,$$

Where RTES is the road transport energy saving potential, RTEC is the road transport energy consumption, and the fuel efficiency is measured as *litres pr. 100 km.*

4.2 Results for road transport energy saving potentials

UK has the most fuel efficient car fleet, where the average car uses 6 litres pr. 100 km. Sweden and Denmark has the lowest fuel efficiency for the car fleet, with 8.3-8.5 litres pr. 100 km.

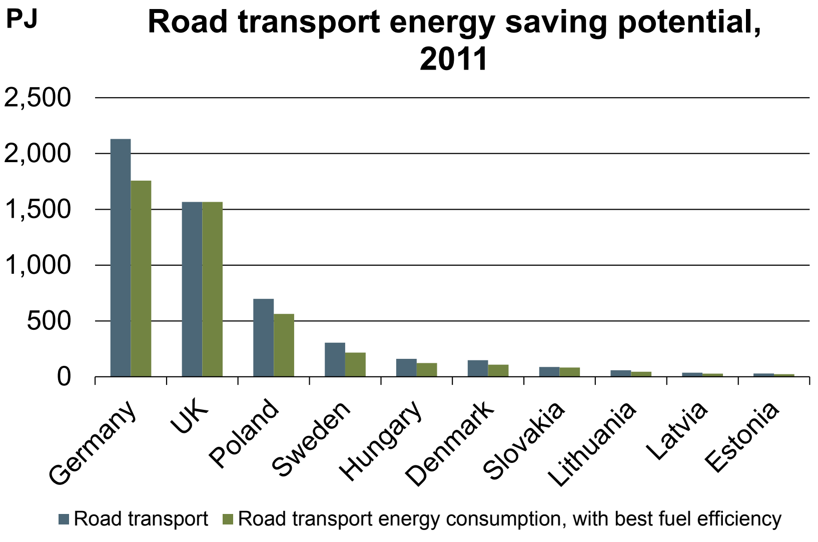
Figur 8 Average fuel efficiency.



Source: ODYSSEE, http://www.indicators.odyssee-mure.eu/online-indicators.html.

In total the country group could save 709 PJ for road transport, equalling 1.2 the total Danish final energy consumption, if the car fleet was as efficient as the UK car fleet. Germany alone could save 373 PJ, and Poland 136 PJ.

Figur 9 Road transport energy saving potential.



Source: Own calculations.

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