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## **KEY DRIVERS AND SLOWERS OF PASSENGER CAR TRANSPORT (ENERGY) DEMAND IN THE EU-27**

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### **OVERVIEW**

Passenger car transport is one of the biggest contributors to high oil demand and increasing air pollution and greenhouse gas emissions. To alleviate these problems by introducing proper policies it is important to know the key drivers and slowers of passenger car transport. In the scope of the EU project ALTER-MOTIVE funded within the Intelligent Energy-Europe (IEE) programme we have analysed historical developments regarding car ownership, travel activity, fuel intensity and energy consumption as well as implemented policy measures in the EU-27 countries [1]. A number of parameters like population growth, growth in personal income and fuel costs are drivers of the demand for energy service in individual passenger road transport.

The core objective of this paper is to present the major results of this analysis as well as impact of various parameters such as changing fuel price, households income and investment costs of cars on the overall demand for passenger car energy and mobility demand for the period 1980 to 2007. Regarding fuel prices it is important to note that they vary considerably across EU countries. Fuel prices are an important driver of travel demand, mode choice and fuels intensity. Note, that the largest part of the total fuels costs are taxes the most of the EU countries.

### **METHODS**

The method of approach is based on analyses of time series for energy and service consumption, energy prices, fuel intensities, GDP, and car stock development in passenger car transport. A major feature in this context is the decomposition of energy consumption into service and intensity, see e.g. Horwath and Schipper (1991) [2] and Schipper and Haas (1997) [3]. Moreover, we use standard econometric approaches to extract the weight of the major impact parameters like fuel prices and income.

Moreover, relations between fuel prices (considering indirect tax policy effects, see e.g. Sterner (2007) [4]) and passenger travel activity as well as energy consumption in individual passenger transport, are analyzed for different EU countries.

### **RESULTS**

Our preliminary results:

Overall energy consumption of passenger car transport in the EU-155 in 2007 amounted to about 7 EJ. This is an increase of 28% in comparison to the year 1990.

Growth in car ownership is continuously increasing over time in all EU countries. Car ownership level in the EU countries in 1970 was ranging between 2 and 280 cars per 1000 capita, and in 2007 between 164 and 675 cars per 1000 capita. It can be notice that number of vehicles per capita and GDP per capita are strongly linked and both increasing over time.

In the European Union 5.75 % of the energy used for transportation should be biofuels by the year 2010. By 2020 10% of energy used in transport should be from renewable energy source, biofuels in practical terms. Due to this EU target the rapid growth of biofuels in recent years can be noticed in many countries. The share of alternative fuels in passenger transport in EU

has increased continuously since 2000 and contributes currently with about 4% to total energy consumption. The production of liquid biofuels in EU-27 increased from 62 PJ in 2003 to about 345 PJ in 2008.

The average fuel intensity in European countries is continuously decreasing. In 2007 on-road fuel intensity was in the range of 6.5- 8.2 liter per 100 kilometres. Average fuel intensity is especially decreasing by new cars, but the technical improvement that has been done to engine and other vehicle components have been usually largely offset by heavier, larger and more powerful cars.

With the increasing car ownership, also overall travel activity is continuously increasing in all EU countries and the range of vehicle kilometer per capita is between 3 200 and 8 600 vehicle kilometers per capita. The low travel activity per capita reflects low car ownership and utilization rates. There is a strong correlation between travel activity and income.

Fuel prices may have a significant impact on travel demand and fuel intensity. The range of fossil fuel prices vary wide across EU countries. Between 1985 and 1998 oil prices have been generally decreasing in real terms. After 1998 they increased significantly in many countries mainly due to increases in world oil prices, as well as increases in fuel taxes mostly in European countries, as for example in Germany and UK. Energy use for cars is usually much higher in countries with low fuel prices. Also low fuel prices correlate with higher car fuel intensity and higher travel activity.

## **CONCLUSIONS**

The major preliminary conclusion of this analysis is that policy measures have a significant impact on the development in car transport. Due to the CO<sub>2</sub> targets in the transport sector in Europe, new car fuel intensity is significantly improved. Unfortunately, overall energy conservation effects are largely offset by increases in overall travel activity and a trend to larger vehicles.

Fuel prices are strongly correlated with fuel intensity and income with car ownership and travel activity. High registration taxes and fuel taxes led to lower vehicle stock and energy consumption.

However, in the future a broad portfolio of policy instruments (taxes, standards...) will be necessary to reduce energy consumption and straightforward CO<sub>2</sub> emissions.

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