

## Decoupling the Environmental Impacts of Transport from Economic Growth

*Summary in English*

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This report presents the results of a project that was begun by the OECD Working Group on Transport in 2002. The overall objective of the project is to help OECD member countries develop efficient and effective policies for decoupling the environmental impacts of transport from economic growth. Where it can be achieved, efficient decoupling will contribute to more sustainable transport patterns.

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### *Links between transport and the economy*

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In 2003, transportation-related goods and services contributed \$1 156 billion, or about 11%, to US GDP. Transportation continued to rank fourth (after housing, health care, and food) in terms of total demand for US goods and services.

The modal split has changed considerably in recent years in the three regions analysed. Road transport has increased, while rail and inland waterways have declined. This has been mainly caused by the changing structure of industry and type of goods produced in the various sectors has changed. Mass commodities, more suitable for rail and inland waterway transport, have broadly become less important to the economy.

In the last few decades, growth in income, improvements in technology and infrastructure, and increasing time being available for leisure trips, have allowed people to travel more often and further. Increasing levels of disposable income have a strong effect on traffic growth, because car ownership will increase up to a relatively high level before saturation effects are observed. However, the amount of traffic is also influenced by prices, speed and quality of transport, and also by personal preferences and priorities.

A comparison between the US, the EU and Japan, reveals broad similarities in terms of size, modal shares and overall trends of passenger transport. Modal split is dominated by passenger cars in the US (87%), the EU (76%) and Japan (63%), while the other modes have minor shares of less than 10%, except for aviation in the US (10%) and railways in Japan (20%) of total passenger-km.

The modal split for freight transport is relatively similar in the EU and Japan, with a high share going to two major modes – short-sea shipping: 41% in Japan and 39% in the EU15; and road freight: 44% in the EU and 55% in Japan. The US has a more balanced modal share, with rail taking the highest share (39%), followed by road (31%) and pipelines, inland navigation and short-sea shipping (7-8%).

Price sensitivity tends to increase if alternative routes, modes and destinations are of good quality and affordable. For example, highway tolls tend to be more price-sensitive if there is a parallel free roadway. Also, driving is less price-sensitive in the automobile-dependent areas where transport alternatives are very difficult to use.

Numerous studies suggest that fuel price changes have a significant negative effect on car fuel demand, since a 10% increase in fuel price results in a 7% reduction in car fuel demand. Another significant result is the sensitivity of car fuel demand, car travel demand, and car stocks to changes in income. An increase of 10% in income will lead respectively to a 12% increase in both car fuel demand and travel demand, and to a 10% increase in car ownership.

It may take many years for the full effect of a price change to take place. Studies estimate that short-term elasticities (two-years) are typically one-third of long-term elasticities (15 years or more). Others concluded that about 30% of the response to a price change takes place within 1 year, and that virtually all takes place within less than 13 years.

In the early stages of development of a country, transportation infrastructure is an important contributor to economic growth. Transport investments stimulate growth from the demand side, and also contribute to the economic transformation of regions and urban areas affected, on the supply side. In the case of well-developed economies, transportation infrastructure investments

can lead to negative results for economic growth. For example, transport investments in one region could lead to competitiveness problems in another.

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### *Transport and the environment*

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In OECD countries, road transport is responsible for most of the transport sector's impact on human health and the environment. It accounts for over 80% of all transport-related energy consumption, for most of the accidents and the majority of air pollutant emissions, noise and habitat degradation. Maritime transport, although generally associated with lower environmental impacts, raises concerns regarding oil pollution from major accidents. More recently, there has been a growing concern over global environmental impacts from air traffic, which has been increasing particularly rapidly for tourism. Air transport currently represents about 11% of transport-related energy consumption.

The estimation of total external costs (excluding congestion costs) amounted to 650 billion euros for 2000, or about 7.3% of the total GDP in EU17. Climate change was the most important cost category, with 30% of total costs. Air pollution and accident costs amounted to 27% and 24% respectively. Noise and life-cycle processes each accounted for 7% of the total costs. The most important contributing mode is clearly road transport, generating 83% of the total cost. Two-thirds of the costs are caused by passenger transport and one-third by freight transport.

Transport-related energy consumption in the US increased from 516 million tonnes in 1971 to 745 million tonnes in 2002 (growth of 44%), at the same time that total energy consumption in all sectors was increasing by 47%. Growth in transport-related energy

consumption was much stronger in the EU, where the increase was 133% between 1970 and 2002. Growth in the energy consumption of all sectors was relatively weaker, increasing by only 121% over this period.

In 1970 in the US, CO<sub>2</sub> emissions from the transport sector represented 24% of the total, while in 2002 it increased to 31%. Between 1970 and 2002, CO<sub>2</sub> emissions from the transport sector increased by 69%: from 1 037 MT to 1 761 MT.

In the EU, this share was 12% of the total in 1970; by 2002, it had increased to 26%. Between 1970 and 2002, CO<sub>2</sub> emissions from the transport sector increased sharply by 126%, from 370 MT to 837 MT. In Japan in 1970, the share was 13%; in 2002, it reached 20%. Between 1970 and 2002, CO<sub>2</sub> emissions from the transport sector increased by 163%, from 96 MT to 253 MT. In 2002, the level of CO<sub>2</sub> emissions of the road transport was 4 349% higher than for rail transport.

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### *Decoupling trends*

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Since 1980, the US experienced a relative decoupling of both passenger and freight transport *versus* GDP. The EU also experienced a very weak decoupling of freight transport *versus* GDP, while passenger transport growth went very much along with GDP growth.

When the focus is placed on air passenger and road freight, the results are different. Growth in these two modes has been much more rapid than that of GDP. Between 1970 and 2003, air passenger increased by 328%, while GDP was increasing by only 178%. Between 1970 and 2003, the increase in air passenger transport was some 1260% in the EU. Growth in road transport was less sharp, but still high (increasing by 223%). In the two regions analysed here, therefore neither a relative nor an absolute decoupling of certain modes of transport has occurred.

If only road transport is considered, there has been an overall (relative and/ absolute) decoupling of road transport-related emissions of CO<sub>2</sub>, CO, NO<sub>x</sub> and VOC. During the past three decades, CO<sub>2</sub> emissions grew by 95% in the US and 156% in Europe, whereas GDP grew by almost 169% and 187% respectively. However, these overall figures disguise some important differences. In the US, most of the decoupling took place in the early 1980s, and has fluctuated since then. In Europe, the relative decoupling has been very “weak” throughout this period.

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### *Main recommendations*

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There is not a predetermined policy path for achieving decoupling. Approaches that suit one country will therefore not necessarily be appropriate for another country. Measures involving low investment costs and short implementation periods (*e.g.* improving rail service quality or the overall accessibility of rail and public transport) should be promoted in the early stages of any decoupling strategy. These measures will quickly reduce environmental pressure without involving excessive economic cost. The existing limited level of public acceptance of pricing measures for road transport could also be improved by offering better alternatives in other modes.

Road passenger and road freight are the overwhelmingly dominant modes, and their environmental impacts and related externalities are the highest. In designing policies to decouple these impacts, there is a need to focus on the high growth modes where the impacts from activity growth outpace the level of improvement made per unit of transportation service.

Road pricing measures should also be an important (and early) element of the decoupling strategy. The more intensively road transport pricing measures are implemented, the better the incentives for the rail and public transport options will be. For achieving public support for road pricing policies, it may also be appropriate to recycle some of the revenues raised back to affected parts of the economy or to promote new investments in more environmentally sustainable transport modes (*e.g.* public transport).

Problem awareness is another essential part of gaining public acceptance of measures that lead to increases in road transport costs. It is necessary to raise public awareness not only with respect to transport-related environmental and health impacts, but also in terms of the advantages created for local products and urban living.

Infrastructure investment policies have the lowest priority from a decoupling perspective. Only at the stage where pricing measures in the road sector reach a relatively high level are new rail and public transport infrastructure investments likely to be appropriate.

Implementation of all of the above-mentioned measures is most dependent on decisions made at the national level. However, improvements in rail freight transport are only likely to be possible in the context of international co-operation, especially in Europe. This is likely the case, for example, for both combined transport infrastructure and the harmonisation of rail regulations.

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