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## Transport, energy and greenhouse gases: perspectives on demand limitation. Guest editorial

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## **GUEST EDITORIAL**

*Special issue "Transport, energy and greenhouse gases: perspectives on demand limitation"*

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Transport sector activity generates worldwide about one fourth of the total emissions of CO<sub>2</sub> from fuel consumption (about 30% in the OECD countries), and this share has been growing steadily for years until the recent economic downturn at the end of 2008. Within transport, road transport is responsible for 75% of CO<sub>2</sub> emissions while aviation produces 13% and navigation 8%, but the emissions of these latter two modes are growing rapidly.

There are two drivers of transport emissions growth: one is a dependence on internal combustion engine technologies, for which there is no economically viable, large-scale alternative in the medium term; the other is the strong growth in vehicle-kilometres of travel, which seems to go hand in hand with economic development.

The current economic recession results in reduced industrial output and energy consumption, and thus reduces freight transport activity, but it also reduces employment and income, which in turn reduces passenger transport activity. There are still uncertainties on the duration of the current economic crisis, but everything indicates that growth in transport demand should restart again in the near future, although perhaps at a slower pace.

According to the most stringent scenario of the Intergovernmental Panel on Climate Change, a long term goal would include a peak in emissions in the next 10 to 15 years, and a decline of 50% over 2000 levels by 2050. This would stabilise emissions at around 450 parts per million CO<sub>2</sub>-equivalent in the atmosphere and correspond to a 2 to 2.4°C rise in temperatures. The European Union is already committed to a 20% reduction of its CO<sub>2</sub> emissions by 2020 but considers that additional effort by industrialised countries would be needed to achieve a division by four of their emissions by 2050, given their historic responsibilities and economic capabilities. Projected economic growth and energy demand in major developing countries, such as China and India, will require also their engagement. Obviously the transport sector will have to contribute its share of this effort.

In view of reports that crude oil stocks are being rapidly depleted, one could ask whether it is enough just to wait for fossil fuel supplies to dry up in order to see a reduction in transport-related emissions. However, the sharp rise in crude oil prices until 2008 had made it profitable to exploit the abundant reserves of non-conventional oil, such as oil shales, tar sands, coal or gas-based synthetic liquid fuels. Given the size of the reserves of these various sources there is every indication that fossil fuels will continue to be used well into the next decades.

It would thus seem important to pay close attention to policies intended to influence the energy intensity of transport. Structural policies that influence the organisation of transport supply and land use may reduce vehicle-kilometres of travel, and these are well discussed elsewhere in the literature. However, the same cannot be said for another major part of this class of policies – the consistent use of a whole range of economic instruments that ration consumption of fossil fuel by price, such as fuel taxes (or “carbon tax”), or by quantity, such as transferable quotas or permits.

The term “transferable permits” is used to designate instruments ranging from an increase in the flexibility of classic regulation systems to the organisation of competitive permit markets.

The idea of using marketable quotas within the transport sector to achieve quantitative targets – such as the level of CO<sub>2</sub> emissions – is relatively new.

This special issue comprises a selection of papers, earlier versions of which were presented at an international colloquium on the possibility of rationing fuel in view of growing greenhouse gas (GHG) emissions. The colloquium was part of the series “Entretiens Jacques Cartier”, held in Lyon (France) in December 2006.

The first paper, by Roger Bentley, puts the issue of limited resources of conventional oil and gas into context. He shows that many historical estimates of the year in which supply will peak have been flawed, and there remain today many difficulties in making such estimates. However, the weight of the evidence would seem to promise some volatility in the market in the short to medium terms. It would therefore be prudent both to improve data sources on hydrocarbon depletion, and to develop policy instruments to address any volatility that may occur in their availability.

Philippe Barla then addresses the issues of greenhouse gas emissions in the North-American trucking industry, whose growth has outpaced general economic growth since 1990, and especially since the implementation of the North American Free Trade Agreement in 1994. Interestingly, the accompanying growth in GHG emissions is attributed mostly to increasing average distances that trucks travel. Evaluating the potential of different instruments for reducing emissions is problematic. Observations of fuel price sensitivities in recent years that could guide tax policy were often obscured by responses to the much larger changes in rates of currency exchange during the same period. At the same time, uncertainties about the market response to emissions permits have complicated the assessment of the relative advantages of caps and taxes on emissions, and of their projected effects on competitiveness.

The potential of permit markets to address the CO<sub>2</sub> emissions of road transport is more specifically explored by Charles Raux. There is strong evidence that, for private vehicles and for freight vehicles, agents are more sensitive to signals of quantity than to signals of price. This would argue in favour of decentralised permit markets to ensure that these mobile sources bear their share of the burden of reducing CO<sub>2</sub>. Unfortunately, most of the practical experience with such permit markets is with those designed for static sources. The author reviews many detailed questions related to practicality, efficiency and equity, including the key issue of permit entitlement.

Adriaan Perrels picks up on some of the same themes in his review of user response and the problems of equity in carbon crediting systems for personal travel. He looks, as have others, at the prospect of focusing on transport fuel purchases, possibly extended to include public transport use. However, he goes further to consider whether it would be better to develop a system for both the transport and the non-transport consumption of households, and which includes all direct emissions, plus certain embodied emissions that are not covered by other instruments. He examines evidence on consumer response from elasticity analysis, as well from research into various kinds of feedback, including experimental monitoring systems, some of which track a household's carbon emissions from most classes of consumption.

In a final paper, Martin Lee-Gosselin revisits the gasoline demand restraint policies of the 1970s and 1980s in the United States and Canada, and research into public reactions of the time. He explores at first hand some of the policy dilemmas that this research addressed, including the need for governments to intervene appropriately at different levels of shortage and to different speeds of onset. He draws some key lessons from in-depth studies of simulated behaviour, and of the attitudinal underpinnings of approaches to fuel conservation, in the contemporary context of GHG reduction.

A common thread in the special issue is the implicit need for a cohesive strategy to improve the evidence on which to design the difficult policies that may be needed to reduce carbon emissions. In part, this requires better continuous monitoring of both personal travel and freight operations at a time that data collection, in some countries, is an easy target for budget reductions and cuts. In part, it calls for imaginative experimental research to fill the gaps in our understanding of how well transport users respond to persuasion or coercion to shrink their carbon footprint. It is our hope that this special issue will hasten a consensus on that strategy among energy specialists