REPORT

INTERNATIONAL COLLOQUIUM ON TRANSPORT, ENERGY AND GREENHOUSE GASES

– Will Rationing be Necessary? –

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1. INTRODUCTION

Since 1987, a unique series of international scientific colloquia have taken place every year under the auspices of collaboration between the Rhône-Alpes region of France and Québec, Canada. Known as the *Entretiens Jacques Cartier,* these colloquia cover a wide range of subjects related to regional development, the economy, culture, and current and future challenges to society. Over the years, part of this last theme has often been devoted to the challenges associated with transport in Europe and North America. It was thus that, in December 2006, researchers from six countries met in Lyon, France, bringing an unusually broad set of perspectives to bear on the problem of reducing greenhouse gas (GHG) emissions in the transport sector, and in particular to consider whether various forms of regulation and rationing are an inevitable part of the solution. The two-day colloquium was opened with a keynote address by Dominique Perben, the French Minister of Transport, Infrastructure, Tourism and the Sea, and was organised into six debates drawing on a total of sixteen invited papers[1] and a number of discussion responses. This article provides an overview of the main issues raised in the debates and the findings of the Colloquium.

[1] The complete programme and a copy of the presentations can be accessed at http://www.let.fr/ejc2006/

2. THE DEBATES

2.1 What is the need for action?

In high-income countries, approximately 25% to 30% of the emissions of the principal greenhouse gas, carbon dioxide (CO_2), comes from the transport sector, and those emissions are growing in absolute and relative terms. This growth seems inevitable because of the overwhelming dependence of transport on internal combustion technologies in the shorter term, and a strong coupling between economic growth and rising vehicle-kilometres of travel (VKT). In his keynote address, we were charged by Minister Perben to think boldly given the seriousness of this situation. In particular, we were urged to think of ways to implement "virtuous" economic mechanisms that are consistent with solving environmental problems. This was itself "bold" as, in the past, market instruments have not been universally embraced as part of national energy and environment policies in France and other major emitters of greenhouse gases. It was also significant that the Minister talked about using economic instruments to modify behaviour, and took a personal position that individual tradable quotas should be among the options considered.

The debate about the need for action focussed initially on the estimation of the peaking of conventional oil and gas production and the timing of its expected decline, in relation to the expectations for technologically more challenging sources of hydrocarbons, notably synthetic fuels made from coal, shale or oil sands, of which enor-

mous reserves exist around the world. A major concern was whether the market would support prices sufficiently high to pay for the sequestering of carbon that would otherwise be released during the production of synthetic fuels, adding to the carbon released from end-use. The potential role of nuclear energy and biofuels was raised to mixed reactions. There was a lively discussion of the "seductive" situation that conventional oil production tends to peak before half of all discovered reserves have been exploited, and of whether the "oil peaking" analyses have fully taken into account the dynamics of markets, such as the increased incentives for exploration or enhanced oil recovery that result from increasing prices. There was agreement that fuel prices should correctly reflect the environmental externalities associated with carbon emissions, but there was no consensus that the institutional and political mechanisms to achieve this would come about in the shorter term, or indeed whether prices alone could lead to a less harmful level of consumption.

This first debate continued around the prospects for radical improvements in light- and heavy-duty motor vehicle fuel intensity, including hydrogen technologies, with general agreement that these could not diffuse into the world vehicle population quickly enough to reverse the growth in transport's GHG emissions in the medium term without other measures. However, such technologies were seen as of great importance as were, potentially, the efforts of governments to stabilise market conditions for their rapid development and deployment. This brought the debate back to the growth in vehicle-kilometres of travel (especially air travel), and to the relative adequacy of price versus quantity rationing systems to limit the global quantity of carbon emissions. Precedents for tradable permits were discussed, together with ideas about who, realistically, could act in carbon markets, such as manufacturers, transporters, regions, or individuals, thus setting the stage for the following debate.

2.2 What is the scope for action?

In the second debate, the potential scope for government intervention to reduce GHG production from transport was explored further, sharing experience with the regulation of vehicle fuel economy standards, the results of backcasting exercises that postulated dramatic reductions in GHG emissions, and the outputs of macro models that were used to evaluate multiple technological and policy options at the planetary level. Broader issues such as restructuring transport systems and land-use, or investment in public transport, were not included, as the focus of this Colloquium was on regulations and markets for quotas and permits; but of course it was recognised that the mechanisms for limiting GHG production by price or quantity have implications for other domains of intervention. There was a near-consensus that packages of mutually reinforcing interventions would be needed to achieve the greatest reductions. Transferable permits imply a range of interventions from introducing flexibility into classical regulation systems all the way to unrestricted markets in permits. The idea of using permit markets to achieve quantitative targets (such as GHG reductions) within the transport sector was seen as relatively novel. On a related point, several speakers underlined the importance of the carbon market, even if the current market price of carbon is much below that suggested by various recent estimates of the economic damage associated with carbon emissions.

2.3 The feasibility of quotas on traffic

The focus of this debate was on vehicle movements. An evaluation, based on survey data, was presented of a potential system for credit-based congestion pricing, as it would be applied to passenger automobiles in a major US city. This illustrated the use of a pricing system that provides users with feedback on marginal social costs, dynamically. While the predicted effects would be a spatial and temporal reorganisation of traffic, some reduction in vehicle-kilometres of travel could also result. The discussion moved to the idea that the VKT of an urban region could be capped. Concerns were raised about urban/rural equity, social equity and the effects of potential solutions on land markets. A fixed limit on traffic was also the subject of an example that was presented from the freight sub-sector. In this case, heavy truck traffic crossing the Swiss Alps, a limit on the number of vehicle movements has been imposed by national referendum, starting in 2009. Total transalpine goods traffic is expected to increase by 50% by 2030, and findings on a proposed open market in crossing rights through Swiss territory was discussed in relation to its impacts on adjacent countries and alternative alpine routes. It could be inferred from this debate that dynamic pricing or quota systems addressing mobile sources of GHG are feasible both for private passenger vehicles and heavy goods vehicles, but that these systems must cover sufficient territory and be carefully designed to avoid perverse effects.

2.4 The allocation of carbon to individuals and firms

Compared to the debate about traffic, there was less

of a consensus between speakers and participants regarding carbon or energy allocation systems applied to individuals, household and firms. This was the case both at the level of principles and at the level of potential mechanisms. Once again, the advisability of a strong "cap" ran throughout the discussion: whether it was too draconian if applied to private consumption; whether carbon permits trading would fit well with broader consumer actions; and whether or not it would engender cooperative behaviour. Presentations looked both at the theoretical consequences, including social equity, of individual quota systems, and at the lessons learnt from the energy contingency policies of the 1970s and 1980s. Three arguments stood out. First, public and political acceptance of quotas is much more difficult in the context of a "creeping" problem such as global climate change than when faced with emergencies such as supply disruptions: research confirms that the same individuals behave differently in these two contexts. A second and related argument was the complexity of getting public acceptance of quota accounting frameworks that mix current and future consumption/emissions, for example over the lifetime of a fuel-efficient vehicle: in the view of some, this problem has not been resolved in the design of transferable permit systems for fuel and vehicle producers, let alone for households. Thirdly, the design of good policies requires reliable, disaggregated information on the state of consumption (for example the carbon associated with different categories of household expenditure), and on the current and potential response of consumers.

2.5 The automotive industry

The debate on ways to regulate the emissions characteristics of motor vehicles included a comparison of voluntary and mandatory instruments used by federal governments in North America and the European Union. Of key interest was the cost of achieving different levels of CO_2/Kilometre and the relationship between those costs and the cost of environmental damage associated with carbon emitted throughout the entire life of the vehicle, which is to say from manufacture, use and disposal. One speaker claimed that the economic benefits of radical improvements in light-duty vehicle fuel efficiency, in combination with reduced VKT and low-carbon fuels, are potentially very large and would have a major positive impact on employment. Speakers with diverse backgrounds from both sides of the Atlantic expressed support for regulations and agreements that accelerate bringing lower-emission vehicles to market, but without prescribing the technology that manufacturers should use. Some believed that a market in emissions quotas for a manufacturer's entire new vehicle production would lead to a lower unit cost for low-emission vehicles. Also, of contemporary interest, was the spread of parallel vehicle taxation policies that reinforce the demand for such vehicles.

2.6 The transport operators

The last of the six debates again took an international view, focussing on two types of transport operators, airlines and surface freight. These were chosen because of their close association with economic growth. The case of very rapid airline growth was seen as particularly important, even if their total GHG emissions are a small percentage of total transport emissions. Of concern was that aviation is not included in the European Union Emissions Trading Scheme, which since 2005 has been the world's first large-scale GHG trading programme. The trial implementation of permit systems in the aviation sub-sector was seen as both *necessary*, in order to establish a shock absorber in future instances of tight fuel supply, and as *problematic*, because of the high portion of air travel that crosses the borders of jurisdictions that could administer such systems. There were interesting parallels with the case of surface freight, of which the international component has, in general, been growing faster than the domestic component, both within and between large trading blocks. Here, the fear that GHG quotas would harm national competitiveness was seen as a brake on public policy, although one speaker noted that the contention of this issue should be weighed against the relatively small proportion of costs that transport represents for many commodities. Another made the case that hauliers would prefer a purchased quota trading system that involved the negotiated transfer of quotas from shippers to hauliers, than one in which free allocations were distributed: reportedly, their primary motivation would be the stabilisation of fuel costs. Once again, there was an appeal for improved information, especially to better understand the price sensitivity of truck fuel demand and indeed the price sensitivity of the demand for trucking services.

3. SUMMING UP

With the help of two commentators, one from France and the other from Canada, who reflected on the issues raised in all six debates, the colloquium participants shared their sense of the priorities for building a research evidence base for greenhouse gas and energy

policy in the transport sector. An earlier speaker had pointed out that the schools of thought underlying the design of rationing instruments can be distinguished in terms of the balance, on one hand, between price and quantity, and on the other, between political optimisation and economic optimisation. Several schools of thought were clearly represented in the debates, and a perfect consensus on potential policies and mechanisms was not to be expected. Nevertheless, the seriousness of GHG impacts was not in question, and there was substantial agreement on the research agenda.

First, the responses of different actors to tradable permit systems deserve serious study. It was pointed out by one of the commentators that three complex systems are involved: the level of consumption (including, but not limited to, mobility); modal shares and shifts; and technological innovation (including some sub-systems beyond transport, such as distributed power generation from vehicles). Of particular, but not exclusive, relevance to technology was the appeal of several speakers to keep an open mind on the possibility of radically new paths.

Secondly, there is much to do to help consumers at all levels understand the whole range of external costs, and why it is often difficult for the market to incorporate them without government intervention. Where such intervention raises net revenue, transparent mechanisms for directing the surplus into mitigation actions need careful design, and careful public communication: for example, investing a fuel tax into energy efficiency measures can involve a multi-step logic that is much harder to explain than adding road capacity or even planting trees.

Finally, with respect to price effects, the discussion came back to the chronic nature of the build-up of greenhouse gases, and the acute nature of events that bring the greatest political leverage. Rather frequent acute climate events can now be added to acute energy supply events as sources of disruption, awareness, and learning. A new understanding is needed of cross-elasticities in the short, medium and long term taking into account the effects of such events, which may expose consumers to bidirectional shifts in energy prices, sometimes of surprising amplitude.

This article can give only a broad sense of the richness of the exchanges at this international colloquium. However, a book of selected papers and discussions is expected to be published in 2008.

4. PAPERS PRESENTED AT THE COLLOQUIUM

(in addition to oral presentations: see http://www.let.fr/ejc2006/)

Barla, P. Les enjeux liés aux émissions de gaz à effet de serre dans l'industrie du camionnage en Amérique du Nord. (Greenhouse gas issues in the North-American trucking industry)

Bauquis, P-R Quelles énergies pour les transports au 21ème siècle ? (Which energies for transport in the 21st century?)

Bentley, R. The expected dates of global resource-limited production of conventional oil and gas.

Chateau, B. Prospective de la demande de transport pour une division par 4 des émissions en 2050. (Prospects of achieving a 75% reduction in transport emissions by 2050.)

Crozet, Y. Le transport aérien et les permis d'émission : pertinence d'une approche européenne dans une perspective globale. (Air transport and emission permits: a global perspective on the European approach.)

Fleming, D. Tradable Energy Quotas (TEQs): Pathway for a Phased Energy Descent?

Friedman, D.J. Opportunities and impacts in the automobile sector

Godard, O. Transports et développement durable : les conditions de la compatibilité. (Transport and sustainable development: conditions for compatibility).

Kockelman, K. Credit-based congestion pricing.

Labriet, M. Quelle contribution des nouvelles technologies de transport aux stratégies climatiques à long terme? Modélisation et analyse technico-économiques. (What is the contribution of new transport sector technologies to long term climate policies? Techno-economic modeling and analysis.)

Lawson, J.J. A North-American viewpoint on regulatory instruments.

Lee-Gosselin, M. What can we learn from the demand restraint policies of the 1970s and 1980s and public attitudes to them?

Perrels, P. User response and problems of equity with respect to carbon crediting systems

Rapp, M. Bourse des droits de passage pour la régulation du trafic transalpin des poids lourds (Exchange of alpine transit rights for heavy goods vehicles traffic)

Raux, C. Des quotas de CO_2 pour le transport de marchandises ? (CO_2 quotas for freight transport?)

ten Brink, P. The CO_2 Challenge for Passenger Cars in Europe and the Potential Role and Impacts of Emissions Trading.