

European Perspectives

This new regular section looks at emerging issues with a definite pan-European focus and high significance for transport and/or infrastructure research. Three general inter-related themes will be examined in the new section – policy, practice and research. The connections between these themes will also be the focus of the section. Sometimes the section will primarily address one of these themes and at other times it will address two or all three of the themes. The policy theme will include recent developments in European transport policy and also recent developments in environmental, regional development and economic policy where there are specific implications for transport. The practice theme will include issues such as European benchmarking and pilot projects as well as recent developments in different transport industries across Europe (shipping, aviation and rail for example) and prospects for the future. The research theme will include topics such as recent developments in European research priorities and funding opportunities for transport and/or infrastructure research.

The External Costs of Transport and Electricity Generation

Dominic Stead
OTB Research Institute for Housing, Urban and Mobility Studies
Delft University of Technology
Delft
The Netherlands
E-mail: d.stead@otb.tudelft.nl

EJTIR, 3, no. 3 (2003), pp. 317 - 320

The European Commission has recently publicised the results of a number of related studies aimed at quantifying the full socio-environmental costs of different means of transport and electricity generation with a view to strengthening the empirical basis for potential future decision-making on eco-taxes (European Commission, 2003). According to European Commissioner Philippe Busquin in the foreword to the summary report of the ExternE (External costs of Energy) research network (the network of these related studies), the comparison of external costs using a coherent framework allow policy actions to be taken 'to tax the most damaging fuels and technologies or to encourage those with lower socio-environmental costs' (European Commission, 2003: p3). The publication would seem to indicate that there is still an interest (perhaps a renewed interest) within the European Commission to internalise socio-environmental costs. The publication of the summary report of the ExternE research network comes some 8 years after the European Commission's green

paper on policy options for internalising the external costs of transport in the European Union (European Commission, 1995).

The types of impacts analysed in the ExternE studies include human health, damage to buildings, crops and ecosystems, global warming and noise pollution (Table 1). The studies employed a bottom-up methodology by measuring source emissions, analysing changes in air, soil and water quality, before assessing physical impacts and expressing them in monetary terms. This was designed to take into account the highly site dependent nature of external costs, since the same level of pollution can have very different ecological or health effects depending on where this pollution is emitted (see also Eyre et al, 1997).

The external costs for all types of transport not only took into account tailpipe emissions and pollution caused during fuel production but also the environmental impacts of vehicle production and infrastructure building. Two projects within the ExternE research network focused on the external costs of transport: UNITE (unification of accounts and marginal costs for transport efficiency) and RECORDIT (real cost reduction of door-to-door intermodal transport), both funded under the Fifth Framework Competitive and Sustainable Growth Programme. The UNITE project¹ was funded between 1999 and 2002 to develop pilot transport accounts for all modes, provide a comprehensive set of marginal cost estimates around Europe; and develop a framework for the integration of accounts and marginal costs. The main objectives of the RECORDIT project², funded between 2000 and 2001, were to define and validate a methodology for the calculation of the internal and external costs of intermodal freight transport, to compare real costs to charges and taxes currently paid, to compare costs and prices of intermodal transport services across countries and between intermodal and all-road solutions and to assess current imbalances and market distortions. The study involved the examination of three case study long-distance transport corridors (Genova to Manchester, Athens to Gothenburg and Barcelona to Warsaw). According to the work carried out as part of the RECORDIT project, intermodal transport can have substantially lower external costs than road-based transport, especially in terms of the external costs of accidents, global warming and energy conversion. The study reports that intermodal transport has between 60 and 80% lower external costs due to accidents when compared with road transport, between 38 and 64% lower external costs due to CO₂ emissions, and between 34 and 72% lower external costs due to energy conversion³ (Schmid et al, 2001).

¹ UNITE project website: <http://www.its.leeds.ac.uk/projects/unite>

² RECORDIT project website: <http://www.recordit.org>

³ External costs due to energy conversion include fuel supply, in-use emissions (excluding greenhouse gas emissions) and manufacturing and maintenance of vehicles.

Table 1. Health and environmental effects included in the analysis of external costs

Impact Category	Pollutant / Burden	Effects	
Human health – mortality	PM10, SO ₂ , NO _x , O ₃	Reduction in life expectancy	
	Benzene, Benzo-[a]-pyrene 1,3-butadiene, diesel particles	Cancers	
	Noise	Loss of amenity, impact on health	
	Accident risk	Fatality risk from traffic and workplace accidents	
Human health – morbidity	PM10, O ₃ , SO ₂	Respiratory hospital admissions	
	PM10, O ₃	Restricted activity days	
	PM10, CO	Congestive heart failure	
	Benzene, Benzo-[a]-pyrene 1,3-butadiene, diesel particles	Cancer risk (non-fatal)	
	PM10	Cerebro-vascular hospital admissions Cases of chronic bronchitis Cases of chronic cough in children Cough in asthmatics Lower respiratory symptoms	
	O ₃	Asthma attacks Symptom days	
	Noise	Myocardial infarction Angina pectoris Hypertension Sleep disturbance	
	Accident risk	Risk of injuries from traffic and workplace accidents	
	Building materials	SO ₂ , acid deposition	Ageing of galvanised steel, limestone, mortar, sandstone, paint, rendering, and zinc
		Combustion particles	Soiling of buildings
Crops	NO _x , SO ₂	Yield change for wheat, barley, rye, oats, potato, sugar beet	
	O ₃	Yield change for wheat, barley, rye, oats, potato, rice, tobacco, sunflower seed	
	Acid deposition	Increased need for liming	
Global warming	CO ₂ , CH ₄ , N ₂ O, N, S	Worldwide effects on mortality, morbidity, coastal impacts, agriculture, energy demand, and economic impacts due to temperature change and sea level rise	
Amenity losses	Noise	Amenity losses due to noise exposure	
Ecosystems	Acid deposition, nitrogen deposition	Acidity and eutrophication (avoidance costs for reducing areas where critical loads are exceeded)	

Source: European Commission, 2003: p. 7

Various future research topics are identified in the summary report of the ExternE projects and some of these are of particular relevance to transport research. The growth of energy demand in recent years, coupled with the current political situation, according to the report, raises prospects of new energy shortages. Thus, the security of supply implications of different energy technologies requires further examination. A second topic concerns traffic accident risks. Costs due to accident risks make a considerable share of the total cost of transport externalities but available empirical evidence is still quite poor for some key factors such as the marginal risk caused by an additional vehicle kilometres. Examination of these key factors in more detail would reduce some uncertainties in the estimates of external costs. A third area for future research is the issue of new technologies in the transport sector. Vehicle propulsion technologies are evolving, internal combustion engines are being improved and new systems such as fuel cells and hybrid systems are approaching market maturity. Because of these changes, there is a case to reassess the externalities of these technologies.

The report stresses that there are major uncertainties contained within the results and that current research into the health impacts of pollution and the value of a life year lost, for example, will have a significant impact on future findings. However, what is also clear is that a number of conclusions and choices are quite robust: they do not change over the whole range of possible external cost values. In terms of road transport, the most significant external costs appear to be accidents and air pollution. Despite the uncertainties, the authors of the study believe that the results of the studies carried out within the ExternE research network will help to make the decision-making process more transparent. The report concludes that the knowledge of a possible range of the external costs is obviously a better aid for policy decisions than the alternative – having no quantitative information at all.

References

European Commission (1995). *Towards Fair and Efficient Pricing in Europe. Policy Options for Internalising the External Costs of Transport in the European Union [COM(95)691]*. Directorate-General for Transport DG-VII, European Commission, Brussels [http://www.europa.eu.int/comm/off/green/index_en.htm].

European Commission (2003). *External Costs. Research results on socio-environmental damages due to electricity and transport*. Directorate General for Research, European Commission, Brussels [http://www.europa.eu.int/comm/research/energy/gp/gp_pubs_en.html].

Eyre, N.J., Ozdemiroglu, E., Pearce, D.W., and Steele, P. (1997). Fuel and location effects on the damage costs of transport emissions. *Journal of Transport Economics and Policy* 31(1) 5-24.

Schmid, S.A., Bickel, P. and Friedrich, R. (2001). RECORDIT Deliverable 4: External cost calculation for selected corridors. Institute of Energy Economics and the Rational Use of Energy, University of Stuttgart, Stuttgart [<http://www.recordit.org/deliverables.asp>].