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(Fifteenth session, 2- 4 September 2002,
agenda item 9)

RELATIONSHIP BETWEEN TRANSPORT AND ECONOMIC DEVELOPMENT

SPRITE (Separating the Intensity of Transport from Economic Growth)

Addendum 2

Note: In accordance with the Working Party's request at its fourteenth session (TRANS/WP.5/30), the secretariat prepared a short summary containing the outline and the main conclusions of the SPRITE project which focus on the relationship between transport and economic development with a view to supporting sustainable transport development.

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SPRITE Project

This project, coordinated by Institute for Transport Studies University of Leeds, UK with participation of: Marcial Echenique & Partners Ltd., UK, Prognos AG, Germany, PROGLOS Transport, Belgium, and Dipartimento Idraulica Trasporti Strade, Italy, and funded through the European Union 5th Framework Growth programme, aimed to identify innovative measures which could be used to reduce travel demand while maintaining economic growth and enhancing environmental quality.

At the core are three technical and scientific objectives:

1. to identify the linkages between transport intensity, transport expenditure and economic growth;
2. to identify all possible innovative means (both within and outside transport) which can break these linkages;
3. to assess which of the innovative means in (2) are potentially practical and cost-efficient, and which offer the best trade off between environmental protection, transport spending and economic growth.

The project has involved several distinct stages each producing a range of results. These include:

- A detailed review of past research from which a long list of potential measures have been identified.
- A wide sample of over 600 experts from Europe and elsewhere were contacted for ideas on potential measures.
- Over 100 of these experts have completed questionnaires which have been analysed by the project team. These have provided both insights into measures not previously considered, but also more detailed information about those already identified.
- Three panel sessions have been held in different parts of Europe, each of which involved around 16 experts to debate the merits of different measures and to identify case study evidence of their effectiveness.
- An assessment framework was developed as part of the project and was used on a shortlist of 13 measures selected by the consortium. Some of these measures are designed to address decoupling of transport intensity from economic growth, others address more directly the link between transport growth and environmental impact.
- The assessments of the 13 measures were presented to a further expert panel session who helped identify whether the chosen measures were realistic and implementable. As a result of this panel a further shortlist of 7 measures were identified which it is believed are those with most promise. These measures are not intended to be absolutely prescriptive, but rather indicative of broad groups of measures which might be used. An indication of their effectiveness based on case study evidence is given.

Seven illustrative measures stand out from the results as having proven potential (albeit not necessarily at a European scale) to influence transport intensity and/or unit environmental load whilst not having large detrimental effects on GDP. These are (in no particular order):

- Combined measures to change mobility-related attitudes and traffic behaviour
- Car sharing as part of combined mobility
- Controlled Parking Zones
- Urban road pricing
- Hydrogen fuel cell vehicles
- High speed rail
- Road pricing for freight traffic.

These are the areas where we believe the EU could currently most usefully focus its efforts in terms of decoupling. We have provided an estimate (albeit based on case study information which is not always as complete as we would like) of the scale of possible changes which might be realised given the implementation of a particular measure. The EU needs to consider whether the measures suggested here are ones which could successfully be implemented as part of a policy to influence decoupling and whether there are issues of acceptability. Clearly it will be easier to implement measures such as green transport plans which are based around encouragement of people to change their behaviour, compared to measures which will force a change in behaviour through pricing or other means of control. Of course, ease of implementation does not imply effectiveness. It is noticeable that many of the most promising measures in terms of their decoupling potential are likely to be the most difficult to implement as a result of high public discontent and resultant political wavering.

It is worth noting that some of the measures considered which are not in the most promising list, for example tradeable permits, appear to have potential to influence transport use, but there is a distinct lack of research to back this up. Such measures certainly have the potential to change the costs of driving and to influence vehicle kilometres.

The individual measures identified by the SPRITE consortium are illustrative measures, that is they are examples of different kinds of measures, but in most cases are by no means the only example of each type. Each individual measure has some potential for reducing transport intensity, even in isolation. However, for their full impact to be recognized, they have to be incorporated into strategies of measures, which are both mutually supporting in the field for which they were designed and have beneficial, rather than adverse knock-on effects in the wider world. There is a clear message which comes out of all of the aspects of the SPRITE project (review, questionnaires and panel sessions) that no one measure alone will make a significant difference, rather there is a need for an integrated approach.

It is naturally more difficult to predict what the gross effects of different packages of measures may be and it is essential to consider the behavioural response to measures and packages of measures when planning their implementation. It is important to recognise that some measures may need to be formed into packages to be fully effective, for example pricing may need to be supported by enhanced provision of alternatives in order to have the desired effect on mode choice, emissions and sustainability. Clearly there is potentially some additive benefit to be gained from packages of complementary measures or measures which affect different aspects of the transport system. Thus, a combination of pricing measures and measures to improve high-speed rail systems is likely to have a greater impact than either one

measure alone. Also the addition of Green Transport Plans (although of limited benefit alone) or other measures designed to influence attitudes, may be expected to further enhance the decoupling impact.

Scientific and Technical Description of the Results

SPRITE set out to involve directly some of the leading thinkers and innovators from all over Europe in related fields and sectors to identify methods through which transport intensity and economic growth (and to a degree transport growth and environmental impact) could be decoupled.

Figure 1 summarizes the various interactions between the different stages and streams of work within SPRITE.

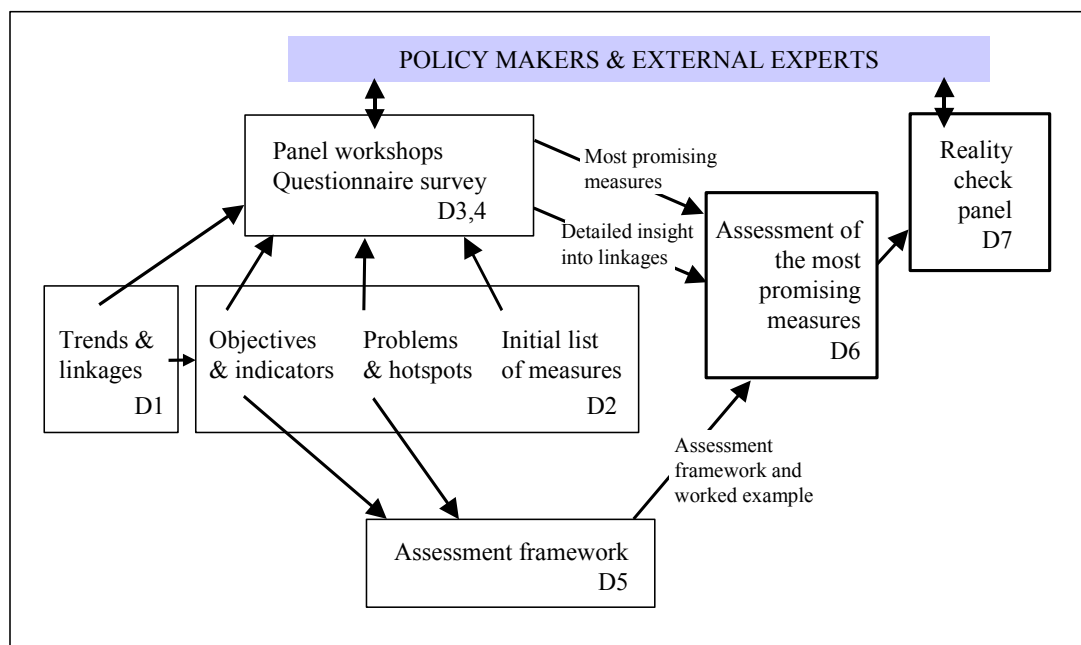


Figure 1: SPRITE Activities and Interactions

From the start, the SPRITE team were clear that there are two distinct aspects to the relationship between economic activity and transport impacts. These are:

Transport intensity, which describes the relationship between transport activity and economic activity. For the purposes of quantification, we define this as vehicle km (by mode & vehicle type) per unit GDP, euro.

Unit environmental load, which describes the impact on the environment per unit of transport activity, where impact is defined as a composite of the various environmental impacts of transport activity, and transport activity is again measured in vehicle km (by mode & vehicle type). Key quantifiable variables here are: CO₂ emissions; local emissions (particulates, nitrous oxides, SO₂ and CO) in urban/rural areas; noise and space occupied by transport infrastructure.

It follows that there are two possible types of decoupling and hence two possible decoupling objectives:

- 1 Reduce transport intensity. For example, measures which effectively substitute non-transport for transport activities or structural changes which impact on demand, would be expected to produce a reduction in transport intensity (internet working and shopping are sometimes held to promise this, although at the end of project we are in considerable doubt whether such pure substitution is possible with these measures alone).
- 2 Reduce unit environmental load. For example, a measure promoting 'greener' engines for transport vehicles would be expected to lead primarily to a reduction in unit environmental load.

A background theme throughout SPRITE was: which of these is more efficient?

SPRITE has always been more concerned with the transport intensity relationship - hence the project title Separating the Intensity of Transport from Economic Growth. The focus in the description of work is on 'means of reducing transport use, with minimum impacts on overall levels of economic growth'. However, many of the decoupling measures proposed by our expert panels and questionnaire respondents, and discussed during the project, relate to reductions in unit environmental load, or to both transport intensity and unit environmental load. Therefore, we have tried to keep the whole picture in view at all times, whilst focusing most attention on measures to reduce transport intensity.

Figure 2 shows these relationships schematically. Much more detailed relationships exist for individual modes, travel purposes and so on (essentially, transport intensity is different in different markets). These detailed linkages were analysed in Deliverables 1 and 2, and form part of our understanding of the problem and possible solutions.

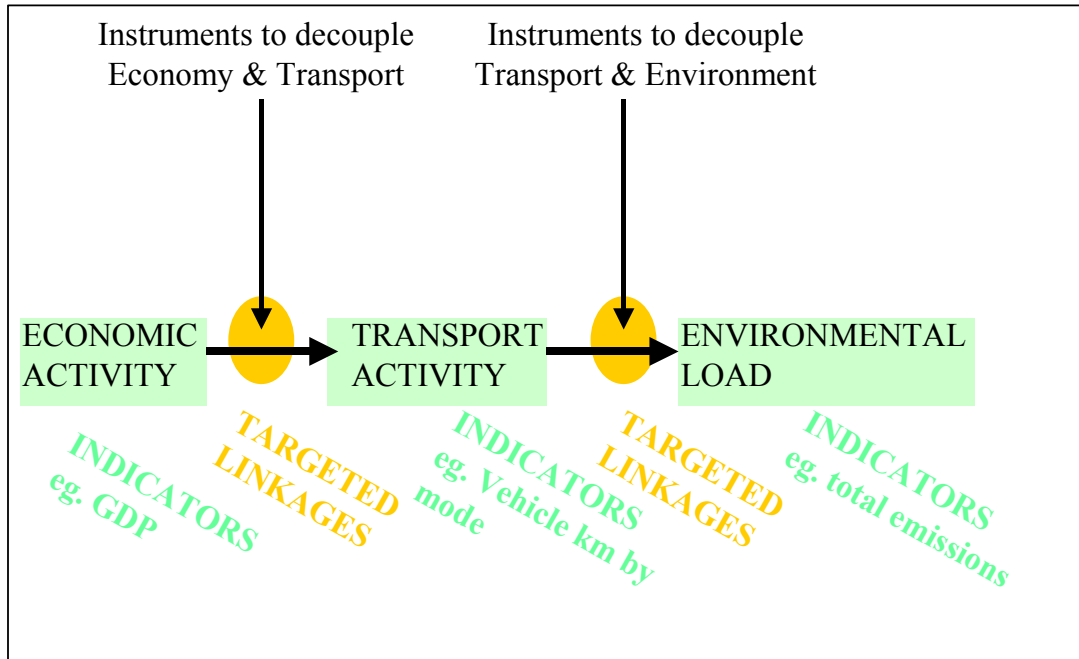


Figure 2: Two types of 'decoupling'

Results and Conclusions

The SPRITE project set out to identify and document expert opinion on the potential of different measures to influence the relationships between transport intensity, economic growth and environmental impact. Our conclusions are as follows:

The case for decoupling

The case for decoupling is one which seems obvious to some, but less so to others. It rests, essentially, on a series of limited propositions:

- that the environmental externalities of transport are serious and need to be reduced;
- that single direct measures such as optimal pricing, though theoretically capable of pushing the transport – economy – environment system to a better solution, are in practice unlikely to be implemented fully, quickly, and without complementary policy measures;
- that, therefore, it is legitimate in that context to consider a range of measures which could be helpful either alone or as part of a package.

We have found that opinions differ both about the seriousness of transport-related externalities and about the practical feasibility of using direct pricing measures to address them. We have found broad, though not universal support among the experts we have consulted for the Commission's policy of aiming for decoupling using a range of measures to support the policy.

These measures fall into two groups. The first group aims to reduce the unit environmental load, that is to say to reduce the emissions and the second to reduce the environmental impact per unit of transport work done. Many other projects have considered policies towards vehicles and infrastructure which could help to achieve that. We have therefore devoted relatively less attention to this area. However, it should be noted that the cost-effectiveness of achieving reductions in unit environmental load is an important determinant of the burden which might neatly fall on the second group, namely reducing transport intensity. Policy needs to be balanced between the two, recognising that some options – say fuel cell technology – may only be significant contributors in the medium to long run.

The main focus of our work has been in the means of reducing transport intensity, that is reducing the ratio between transport work done and economic activity. We identified a wide range of relevant measures which have been described at least in outline, with examples where possible. From this list, thirteen measures were selected for more detailed assessment using a case study approach. The strength of this approach is that it is possible to gain a reasonable understanding of how well these measures have worked (or in one or two cases could work) in the context they have been tried. A weakness is the difficulty of grossing up. It is not always easy to assess the size and range of markets to which a particular policy instrument is transferable. It could be that some instruments depend for their implementation on a particular conjunction of transport and political considerations which are not widely repeated elsewhere. To take an example, whether the model for road user charging should be one which is network wide or at city level or for the centre of the capital city or not at all, is the subject of debate in more than one member state. Which of these options is ultimately chosen is likely to make a significant difference to the impact of the policy on vehicle kilometres and emissions.

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It is naturally more difficult to predict what the gross effects of different packages of measures may be and it is essential to consider the behavioural response to measures and packages of measures when planning their implementation. It is important to recognise that some measures may need to be formed into packages to be fully effective, for example pricing may need to be supported by enhanced provision of alternatives in order to have the desired effect on mode choice, emissions and sustainability. Clearly there is potentially some additive benefit to be gained from packages of complementary measures or measures which affect different aspects of the transport system. Thus, a combination of pricing measures and measures to improve high-speed rail systems is likely to have a greater impact than either one measure alone. Also the addition of Green Transport Plans (although of limited benefit alone) or other measures designed to influence attitudes, may be expected to further enhance the decoupling impact.

The EU White Paper on transport (European Transport Policy for 2010: Time to Decide) acknowledges, particularly in the light of potential enlargement of the Community, the need to break the link between transport growth and economic growth. In the SPRITE project we have investigated how such a link may be broken. Our findings show that at EU level there are considerable potential benefits both in reductions in transport intensity and unit environmental load from various of the measures we have examined. In terms of transport intensity the most promising measures appear to be Car Sharing which could give a 1% reduction in car mileage at EU level and Combined Measures which could give a 1.5% reduction in car mileage based on Germany (though how transferable such combined measures are to other countries with less existing supportive infrastructure is highly debatable, and it might be expected that the immediate short term impacts, if applied more generally to the EU, would be significantly less). Such measures, combined with a move towards Hydrogen Cell vehicles would also offer significant reductions in unit environmental load. The Combined Measures approach also has the potential to bring about a 5-10% reduction in fuel consumption per car kilometre.

In terms of impact on CO₂, the measures with most potential are the Combined Measures (around 16 million tonnes for Germany) and Hydrogen fuel cell vehicles (6 million tonnes for Germany) which if applied throughout the EU have the potential to make a considerable impact on levels of Carbon Dioxide emissions from transport. Complementary to these measures would be development of high speed rail (a further 3.6-5.6 million tonnes reduction in the EU) and road pricing for freight transport (perhaps a similar overall reduction in the EU).

Table 1: General inventory of measures – “Moderating the growth of transport demand”

	Problem/hotspot										Segment			Strategy				Policy domain					Policy orientation					
	Globalization and European integration	Globalization	Reverse logistics	Rescheduling of product flows	Competitive advantage of road haulage and air	Light-duty traffic	Liberalization of transport markets	Cohesion and TENs	Urban overload	Urban sprawl and rural traffic	Long-distance trips, air travel and airport access	Competitive advantage of car travel	Urban	Inter-urban	Rural	Moderating the growth of transport demand	Modal shift	Increasing transport efficiency	Better vehicles/fuels	Transport	Production and organization	General economic	Land use	Technology	Energy	Command and control	Market-based	Persuasion/lifestyle
1. Dominant strategy: moderating the growth of transport demand																												
1.1 substituting factors with information flows of design details	x	x	x	x	x								x	x		x					x							x
1.2 substituting products and services with telecommunications	x	x	x	x	x							x	x		x						x							x
1.3 substituting products with other less transport-intensive	x	x		x	x								x		x						x							x
1.4 miniaturization	x	x	x	x	x								x		x						x							x
1.5 increasing the durability of goods	x	x	x	x	x								x		x						x							x
1.6 substituting products with services	x	x	x	x	x								x		x							x						x
1.7 product responsibility for manufacturers for the whole life cycle	x	x	x		x								x		x						x	x						x
1.8 regional production networks	x	x			x								x		x						x	x						x
1.9 regional consumer markets	x	x			x								x		x						x	x						x
1.10 public procurement	x	x	x	x	x								x		x							x						x
1.11 regional development agencies	x	x			x								x		x							x						x
1.12 slowing down deterritorialization	x	x			x								x		x							x						x
1.13 substituting trade with capital flows	x	x	x	x	x								x		x						x	x						x
1.14 tax based on a combination of weight and distance for road	x	x	x	x	x	x							x		x	x	x	x		x								x
1.15 eco-labelling of transport intensity	x	x			x								x		x	x	x	x			x							x
1.16 transport impact assessment	x	x	x	x	x								x		x						x	x						x
1.17 ecological tax reform	x	x	x		x	x							x	x		x	x	x				x						x
1.18 infrastructure and R&D policy	x	x											x		x							x						x
1.19 tele-everything													x	x	x							x						x
1.20 mobile services													x		x						x	x						x
1.21 site development													x		x						x							x
1.22 increasing the attractiveness of local destinations for tourism													x		x							x						x

Table 2: General inventory of measures - 'Modal shift'

	Problem/hotspot										Segment			Strategy				Policy domain					Policy orientation					
	Globalization and European integration	Globalization	Reverse logistics	Rescheduling of product flows	Competitive advantage of road haulage and air	Light-duty traffic	Liberalization of transport markets	Cohesion and TENs	Urban overload	Urban sprawl and rural traffic	Long-distance trips, air travel and airport access	Competitive advantage of car travel	Urban	Inter-urban	Rural	Moderating the growth of transport demand	Modal shift	Increasing transport efficiency	Better vehicles/fuels	Transport	Production and organization	General economic	Land use	Technology	Energy	Command and control	Market-based	Persuasion/lifestyle
2. Dominant strategy: modal shift																												
2.1 coordinating land use and transport planning (freight)					x								x				x										x	
2.2 standardization of load units					x								x				x					x					x	
2.3 making road haulage more expensive					x	x						x	x				x	x			x							x
2.4 giving preferential treatment to intermodal pre and end-hauls					x								x				x				x							x
2.5 bans on truck traffic					x							x	x				x	x									x	
2.6 investments and R&D to stimulate freight intermodality					x			x					x				x	x			x	x						x
2.7 information to stimulate freight intermodality					x			x					x				x	x			x	x						x
2.8 alternative means for freight transport					x			x				x	x				x	x			x				x			x
2.9 coordinating land use and transport planning (passenger)									x	x		x		x			x				x			x			x	
2.10 development value capture									x	x		x	x		x		x				x		x					x
2.11 parking pricing and control									x			x	x				x				x						x	x
2.12 traffic and speed restrictions									x			x	x	x		x	x				x						x	
2.13 public transport pull measures									x			x	x				x				x						x	x
2.14 cycling and walking									x			x	x				x				x						x	x
2.15 green commuter plans									x	x		x	x				x				x							x
2.16 car sharing									x			x	x				x				x				x			x
2.17 on-demand road transport										x		x					x				x							x
2.18 tradable mobility credits									x			x	x	x		x	x				x							x
2.19 home delivery										x		x					x	x			x	x						x
2.20 air quality forecasts												x					x	x	x		x							x
2.21 innovative rail systems										x		x	x				x				x						x	x
2.22 excise for aircraft fuels									x	x							x				x							x

Table 3: General inventory of measures - ‘Increasing transport efficiency’

	Problem/hotspot											Segment			Strategy				Policy Domain					Policy Orientation					
	Globalization and European integration	Globalization	Reverse logistics	Rescheduling of product flows	Competitive advantage of road haulage and air	Light-duty traffic	Liberalization of transport markets	Cohesion and TENS	Urban overload	Urban sprawl and rural traffic	Long-distance trips, air travel and airport access	Competitive advantage of car travel	Urban	Inter-urban	Rural	Moderating the growth of transport demand	Modal shift	Increasing transport efficiency	Better vehicles/fuels	Transport	Production and organization	General economic	Land use	Technology	Energy	Command and control	Market-based	Persuasion/lifestyle	
3. Dominant strategy: increasing transport efficiency																													
3.1 increasing vehicle loading factors													x	x				x			x	x							x
3.2 increasing weight-volume ratio in packaging													x	x				x			x	x							x
3.3 increasing outsourcing of transport services														x				x			x								x
3.4 tax based on a combination of weight, volume and distance for road	x	x	x	x	x	x								x			x	x	x	x	x							x	
3.5 emission charges for road haulage	x	x	x	x	x	x			x					x	x		x	x	x	x	x							x	
3.6 logistics eco-labelling	x	x	x	x										x			x	x	x	x	x	x						x	
3.7 information to improve transport efficiency in logistics	x	x	x	x					x					x	x		x	x	x	x	x	x						x	
3.8 urban freight distribution									x					x			x	x		x	x							x	
3.9 tradable circulation rights for road haulage	x	x	x	x	x	x			x					x	x		x	x	x	x	x							x	
3.10 road vehicle prioritization									x					x				x	x		x	x					x	x	
3.11 driver information systems						x			x					x	x			x		x								x	
3.12 road pricing						x			x					x	x		x	x	x	x	x							x	
3.13 one stop shop and slot allocation for road						x			x					x	x		x	x	x	x	x							x	
3.14 enforcement of existing driving regulations						x			x					x	x			x		x								x	
3.15 increasing unit and system capacity						x			x					x	x			x		x	x							x	
3.16 integration of passenger services with freight																		x		x								x	
3.17 car pooling									x					x				x		x								x	
3.18 working hours									x					x				x		x								x	

