Part V: Conclusions

CHAPTER 12: Conclusions

The results of the STEPs analyses serve as a basis for the development of a view on future policy and research requirements in the area of transport and energy scenarios. The partial conclusions of each analysis were presented and discussed during clustering meetings and soundboard forums throughout the project. The synthesis of overall conclusions was presented at the final conference, and gave rise to a debate involving various views on future policy and research requirements.

This chapter presents a synthesis of the main findings on trends and policy scenarios, and the policy recommendations based on the STEPs results. Then some general reflections are presented, and we end with recommendations for further research.

12.1 Trends

- The long-term future of energy supply for transport appears difficult, and the situation has become significantly more critical even during the short project period of STEPs.

- Today a growing majority of experts believe that because of a combination of scarcity in cheap oil, increased global energy demand and greater supply disruptions provoked by Geo Political Dependence of Europe, fuel prices will continue to rise in the medium and long term. Indeed, mostly due to the emerging economies in Asia (in particular China and India), energy demand is rising significantly more than oil production and oil refining capacity, making disruptions in energy supply a major and increasing concern. The share of worldwide energy demand and energy market stress that these markets bring along with their expansion is overwhelming. The growth of mobility and transport systems in most Asian countries has progressed at a different speed – India and China had a slow start but have now surpassed Western regions in their economic growth rates, which is directly reflected in their transport demand, mobility growth, and increased energy demand.

- All trends in economic activity, goods transport and personal travel, point towards longer distances and, despite energy efficiency gains, to more energy consumption. This reflects a pattern shared by most industrialised countries which have developed their economy and lifestyles firmly rooted in the promise of cheap energy supply. We observe a trend towards an ever-increasing intensity of freight transportation. In the passenger transport sector we continue to observe a trend for increased mobility coupled with faster and more flexible realization of mobility needs and an increase in the use of private automobiles. This is noticeable in the increasing traffic flows, the modal split, high car dependency, etc. These trends are unsustainable vis-à-vis the trends of declining energy supply, increased supply disruption risks, higher energy costs and the growing risks of climate change.

- All efforts to decouple economic growth and energy consumption and to reduce greenhouse gas emissions have, with a few local exceptions, failed and are insufficient to meet the more demanding post-Kyoto targets.

12.2 Policies

- Demand management policies making road transport slower or more expensive (push measures) are more efficient in reducing transport fuel consumption than policies promoting more sustainable transport modes, such as walking/cycling or public transport (pull measures). Integrated strategies combining push and pull demand management policies, technology development policies and land use policies are more successful than isolated individual policies. The efficiency depends on the level of change of both push and pull measures, and availability of alternatives.

- Technology development policies making vehicles more energy-efficient or promoting alternative propulsion systems are successful in reducing fuel consumption per km, but tend to result in longer distances travelled by both passengers and freight unless the higher costs of new technologies are taken into account.

- All policies using dominant push measures resulting in lower fuel consumption for transport have negative effects on accessibility and hence economic activity. Public transport fare reductions (pull measures) would have good impacts on accessibility and lower fuel consumption.

12.3 Policy recommendations

- The widening gap between global energy demand and declining energy resources and the growing risks of climate change require immediate, strong and probably unpopular policy action, including transport, regional, agricultural and technology policy. The common transport policy of the European Union needs to be fundamentally reviewed in the light of the urgency of these risks.

- While it is irrelevant for the behaviour of users whether fuel price increases are caused by rising resource costs or fuel taxes, for decision-makers or governments it makes a difference. Fuel taxes contribute a lot to government revenues which may well be affected directly and indirectly through impacts on other taxes. A harmonised system of vehicle taxes, fuel taxes and road pricing for cars and lorries on all types of roads should be introduced in all EU member states to achieve the necessary energy savings and emission reduction targets, with special exemptions for disadvantaged and peripheral regions.

- Fuel taxes can be used to mitigate or reinforce the effects of increases in fuel resource costs. Consultation among governments could result in a unified fuel tax policy throughout Europe, aiming at increasing global competitiveness.

- Co-ordination between different government sectors and levels of government should be enhanced in order to design and implement integrated strategies combining policies from different policy fields, such as transport policy, regional policy, urban land use policy and environmental policy.

- The production and use of biofuels in Europe is seen as a promising short- to medium-term option to decrease European energy dependency regarding transport related energy consumption. Yet, despite the positive indications contained in the EU policy supporting the production of biofuels as an alternative to fossil fuels, there are little evidences that biofuels can effectively be seen as a full alternative to conventional sources, but rather as an interesting complement to satisfy a parcel of the energy demand in transportation.

- National, regional and local governments should be encouraged to support domestic economic linkages, regional and local production circuits, less car-dependent, more compact forms of settlements and pedestrian-friendly neighbourhoods.

- The EC should vigorously adopt a long-term goal to drastically reduce CO_2 emissions from transport by promoting, through stricter regulation and activation of public procurement, improvements of current vehicle technology, and tightening the standards for the introduction of near-zero emission passenger vehicles.

- One of the main instruments at EU level so far has been the voluntary agreements with the car industry. This approach is proving relatively weak in view of the challenges ahead and should become more ambitious if consumption of fossil fuels is to be reduced to a more sustainable level.

- European technology policy should increase funding of research and development for more energy-saving and alternative vehicles.

- The impact of energy scarcity and growing greenhouse gas emissions are a bigger threat together than either is alone. These concerns should be combined as issues and a comprehensive policy approach developed to deal with them as a package.

12.4 General reflections

- The future of energy supply to the transport system will be closely tied to the development and the options in stationary power plants. Hence, there will probably be no partial energy supply system dedicated to transport but rather a Global Energy Supply model shared by most applications including transport, which will adopt energy carriers rather than primary sources to fulfil mobility needs, necessarily bringing the discussion on this subject to a higher strategic level than is currently the case.

- The transport projects co-financed by the EU under the Structural and Cohesion Funds need to be re-assessed with more emphasis given to energy saving and sustainability targets.

- There is an urgent need to mobilise and combine fossil fuel-based energy supply concerns as a supporting driver for CO_2 reduction, since both challenges largely call for measures of a similar type. There seems to be no single policy solution to solve the energy supply issue to transport which brings us to the point that a multi-instrument approach is required if we want to reverse energy supply trends and associated problems.

- Particular attention should be paid to road transport, where most of the energy demand and CO_2 emissions in transportation have their origin. In particular regarding private transport performance, there will be a need to create a level playing field to market more energy-efficient power trains and climate neutral (bio-) fuels. It is also necessary to promote a more energy-efficient driving style (supported by in-car devices), traffic management to improve traffic flow, and innovations in logistics and freight demand management, where GALILEO applications will play a crucial role. European transport policy should therefore make maximum use of the potential of GALILEO as an instrument to implement energy saving oriented policies.

- The combined use of European models and regional models proved successful in examining effects of the scenarios at European and regional level. Linking the regional

response to the more global modelling applied in environmental studies and climatic change analyses could add an additional dimension to the scenario assessment.

- The policies analysed in STEPs, are general strategies, rather than specific, operational policy measures. Policy measures will only be implemented if they have sufficient social and political support. Creating the basis for change is a process that can be stimulated through information, education, etc. STEPs clearly shows that change will be necessary. Anticipating this by starting the process of creating a social basis for change, will help smooth the transition, rather than waiting for shocks in the global energy markets to dictate sudden policy decisions with potential drastic effects.

12.5 Recommendations for further research

- Forecasting fuel price increases seems to be more difficult than forecasting the impacts of fuel price increases. Research should therefore address the issue of likely market responses to exogenous energy price shocks and the related policy responses.

- Future research should study more extreme energy price scenarios than were examined in STEPs in order to advise policy makers how to avoid or mitigate them through more energy-efficient technology, more sustainable transport and less car-dependent cities.

- Future research should study the impacts of energy price shocks not only on transport but also on land use, i.e. on urban form, the relationship between city and countryside and the related changes in lifestyles and work patterns.

- Further research is needed to explore the optimal tax policy under different oil price scenarios. A cost benefit approach could be used to find optimal prices/taxes. This perspective could also address the rural/urban issue: is fuel tax already too high in rural areas and too low in urban areas? We need to rethink the instrument for demand management.

- More advanced vertical (EU-regional/local) and horizontal (energy-land use-environment) integration between models, would provide a very powerful tool to assess regional impacts of European transport policies.

REFERENCES

ACEA- European Automobile Manufacturers Association (ACEA) (2004a). P.10. European Automobile Industry Report 2004. www.acea.be

ACEA- European Automobile Manufacturers Association (ACEA) (2004b). Monitoring of ACEA's Commitment on CO2 Emission Reductions from Passenger Cars. www.acea.be

CEC-Commission of the European Communities (1996). Communication from the Commission to the Council and the European Parliament on Environmental Agreements, COM(96) 561 Final, 1996.

Cool, T. (1997). An estimation for the road freight handling factor. Adviesdienst Verkeer en Vervoer (AVV) Transport Research Centre, Netherlands Ministry of Transport, Public Works and Water Management.

COWI (2002). Fiscal measures to reduce CO_2 emissions from new passenger cars.

Dyer, J. S., Fishburn, P. C., Steuer, R. E., Wallenius, J., and Zionts, S. (1992). Multiple Criteria Decision Making, Multiattribute utility Theory: The next Ten Years. Management Science, 38(5), 645-654.

EC- European Commission (1998). Energy Efficiency in the European Community –Towards a Strategy for the Rational Use of Energy COM (1998) 246.

EC- European Commission (2000). Green Paper: Towards a European strategy for the security of energy supply. COM (2000) 769 final.

EC- European Commission (2001). White Paper: European Transport Policy for 2010: time to decide. COM (2001) 370 final.

EC- European Commission (2003). Energy and Transport in figures 2003. Statistical Pocketbook. European Commission, Directorate General for Energy and Transport.

EC- European Commission (2004a). Energy and transport: Report 2000-2004. Office for Official Publications of the European Communities, Luxembourg.

EC- European Commission (2004b). Pocketbook on energy, transport and environment indicators – Data 1991-2001. Office for Official Publications of the European Communities, Luxembourg.

EC- European Commission (2004c). Decision No 884/2004/EC of the European Parliament and of the Council amending Decision No 1692/96/EC on 21 April 2004 on Community guidelines for the development of the trans-European transport network.

EEA- European Environmental Agency (1997). Environmental Agreements-Environmental Effectiveness. European Environment Agency, Copenhagen.

EEA- European Environment Agency (2001). TERM 2001 – Indicators tracking transport and environment integration in the European Union, Final Report. European Environment Agency, Copenhagen.

EEA- European Environmental Agency (2002). Paving the way for EU Enlargement. Indicators of transport and environment integration. (TERM 2002), European Environment Agency, Copenhagen.

EEA- European Environmental Agency (2004). 'Ten key transport and environment issues for policy-makers'. TERM 2004: Indicators tracking transport and environment integration in the European Union. EEA Report No 3/2004.

EU- European Union (2004). Treaty establishing a Constitution for Europe, Official Journal of the European Union, OJ 2004/C, 310/0, 16/12/2004 .

EuroCASE- European Council of Applied Sciences and Engineering (2000). Freight Logistics and Transport Systems in Europe – Trends in the location of European industry and its interaction with logistics and transport.

Hammar, H., Lofgren, A., Sterner, T. (2004). Political Economy Obstacles to Fuel Taxation, IAEE – The Energy Journal, Volume 25, Number 3.

IEA- International Energy Agency (1998). Energy efficiency initiative. Volume 1: Energy Policy Analysis. IEA, Paris.

IEA- International Energy Agency (2001). Policy Options for Realizing the Potential of Next Generation Technologies, IEA, Paris.

IEA- International Energy Agency (2003). Transport technologies and policies for energy security and CO2 reductions. IEA, Paris.

IEA- International Energy Agency (2004a). Biofuels for transport – an international perspective, Office of Energy Efficiency, Technology and R&D, OECD/IEA, Paris, 2004.

IEA- International Energy Agency (2004b). Biofuels for transport. International Conference for Renewable Energies Bonn, Germany, 3 June 2004.

IPCC- Intergovernmental Panel on Climate Change (2001). Climate Change 2001. IPCC Third Assessment Report.

JRC- Joint Research Centre (2004). Hydrogen Prefeasibility study: Final Report (ESTO, JRC/SETRIS). EUR 21512 EN.

Lautso, K., Spiekermann, K., Wegener, M., Sheppard, I., Steadman, P. Martino, A., Domingo, R., Gayda, S. (2004). PROPOLIS. Planning and Research of Policies for Land Use and Transport for Increasing Urban Sustainability. Final Report. LT Consultants, Helsinki. http://www.wspgroup.fi/lt/propolis.

Litman, T. (2005). Efficient vehicles versus efficient transportation. Comparing transportation energy conservation strategies. Transport Policy, 12(2), 121-129.
Malczewski, J. (1999). GIS and multicriteria decision analysis, John Wiley & Sons, Inc., New York.

McKinnon, A. (2003). The Relationship between Supply Chain Trends and Freight Traffic Growth: A Review of EU Research Results. Proceedings of the 20th German Logistics Conference, 22-24 October, 2003, Berlin.

Mintzberg, H. (1994). The Rise and Fall of Strategic Planning, Financial Times, Prentice Hall, London.

Nijkamp, P., Rietveld, P., and Voogd, H. (1990). Multicriteria Evaluation in Physical Planning, North Holland, Amsterdam

OECD- Organisation for Economic Co-operation and Development (1996). Energy balances of OECD countries, 1993-1994. Paris.

OECD- Organisation for Economic Co-operation and Development (1998). Improving the Environment through Reducing Subsidies, Part I: Summary and Policy Conclusions, and Part II: Analysis and Overview of Studies. OECD, Paris.

OECD- Organisation for Economic Co-operation and Development (2004a). IEA/SMP Model Documentation and Reference Case Projection.

OECD- Organisation for Economic Co-operation and Development (2004b). Biofuels for Transport; an international perspective. Executive summary.

Palacio, L. (2004). EC (2004). 'With oil prices surging, Loyola de Palacio recalls the necessity of having a concerted European approach to the issue of security of energy supplies'. IP/04/1020. Brussels

Pucher, J. (2003). 'Transport policies in central and Eastern Europe'. Rutgers Univetsity. USA.
Reddy, S. and Painuly, J. P. (2004). 'Diffusion of renewable energy technologies-barriers and stakeholders’ perspectives.' Renewable Energy, 29(9), 1431-1447.

REDEFINE Consortium (1999). Final Report. European Commission, Transport RTD Programme.

Rehfeld, C. (1998). Transport infrastructure investments and decision support systems., Institute of Planning, Ph Dissertation. Transport Studies: Technical University of Dennmark, Lyngby.

Saidel, M. A. and Alves, S. S. (2003). 'Energy efficiency policies in the OECD countries.' Applied Energy, 76(1-3), 123-134.

Spiekermann & Wegener (2006a). Comparability of Scenario Results. STEPs Technical Note S&W STEPs 01. Dortmund. Spiekermann & Wegener.

Spiekermann & Wegener (2006b). Meta Analysis of Scenario Results. STEPs Technical Note S&W STEPs 03. Dortmund. Spiekermann & Wegener.

Stead, D. (2001). 'Transport intensity in Europe -- indicators and trends.' Transport Policy, 8(1), 29-46.

SULOGTRA Consortium (2000). WP1 Deliverable: Analysis of trends in supply chain management and logistics. SULOGTRA project funded by European Commission, Directorate General for Energy and Transport.

Tseng, P., Lee, J., and Friley, P. (2005). A hydrogen economy: opportunities and challenges. Energy, 30(14), 2703-2720.

UNDP- United Nations Development Program (2000). World Energy Assessment: Energy and the challenge of sustainability. United Nations Development Programme, New York.

WBCSD- World Business Council for Sustainable Development (2004). Mobility 2030: Meeting the challenges to sustainability. Sustainable Mobility Project, Project Overview.

WEC- World Energy Council (2004). Drivers of the Energy Scene. World Energy Council, London, 2003.

Wegener, M. and F. Fürst (1999). Land-Use Transport Interaction: State of the Art. Deliverable 2a of the EU project TRANSLAND (Integration of Transport and Land Use Planning). Berichte aus dem Institut für Raumplanung 46. Dortmund: Institut für Raumplanung, Universität Dortmund.

Woodmackenzie (2003). Why so Unhappy at $30?. Wood Mackenzie Horizons. Energy Issue 9, February 2003.

WS Atkins (1999). Modelling Multimodality, Intermodality, Interoperability, Accessibility and Area Impacts of Transport Infrastructure. Steinbeis Transfer Centre of Applied Systems Analysis, Institut für Raumplanung (Universität Dortmund), Institut für Verkehrswirtschaft (Universität Köln) Deliverable 7 of EU project EUROSIL (European Strategic Intermodal Links). London: WS Atkins.

Zografos, K.G. and I.M. Giannouli (2001). Development and application of a methodological framework for assessing SCM trends. International Journal of Logistics: Research and Applications, 4/2, 153-190.

Zografos K.G. and I.M. Giannouli (2002). Emerging trends in logistics and their impact on freight transport system: A European perspective. Transportation Research Record, 1790, 36-44.

APPENDICES

APPENDIX 1: List of Abbreviations

ACEA	European Automobile Manufacturers Associations
BAU	Business As Usual
CBA	Cost-benefit Analysis
CEC	Commission of the European Communities
CH_4	Methane
CNG	Compressed Natural Gas
CTP	Common Transport Policy
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DG	Directorate General
DM	Decision-Maker
DR	Demand Regulation
EC	European Commission
EEA	European Environment Agency
EU	European Union
Euro-CASE	European Council of Applied Sciences and Engineering
GDP	Gross Domestic Product
GHG	Green House Gases
GIS	Geographical Information Systems
HC	Hydrocarbons
HMA	Helsinki Metropolitan Area
ICE	Internal Combustion Engines
ICT	Information Communication Technologies
IEA	International Energy Agency
IPCC	Intergovernmental Pannel on Climate Change
JAMA	Japanese Automobile Manufacturers Associations
HC	Hydrocarbons
HMA	Helsinki Metropolitan Area
ICE	Internal Combustion Engines
ICT	Information Communication Technologies
IEA	International Energy Agency
IPCC	Intergovernmental Pannel on Climate Change
JAMA	Japanese Automobile Manufacturers Associations
JRC	Joint Research Centre
KAMA	Korean Automobile Manufacturers Associations
LDV	LDV: Light Duty Vehicles
LH_2	Liquefied Hydrogen
LPP	Lean Premixing Prevaporising
LPG	Liquid Petroleum Gas
LUTI	Land-Use and Transport Interaction
MARS	Metropolitan Activity Relocation Simulator
MCA	Multi-Criteria-Analysis
MCDM	Multi-Criteria Decision Making
MDO	Marine Diesel Oil
MGO	Marine Gas Oil
NG	Natural Gas
NGVs	Natural Gas Vehicles
NLEV	National Low Emission Vehicle

NMS	New Member States
NOx	Nitrogen Oxides
OECD	Organisation for Economic Co-operation and Development
PCU	Passenger Car Unit
PEST	Political Economical Social Technological
PM	Particle matter
PT	Public Transport
RBQQ	Rich Burn Quick Quench
RTD	Research and Technological Development
SCM	Supply Chain Management
SO_2	Sulphur Dioxide
SUV's	Sport Utility Vehicles
UIC	International Union of Railways
UNDP	United Nations Development Program
UPT	Public Transport Operators
US	United States
VAT	Value Added Tax
VOC	Vehicle Operation Cost
WBCSD	World Business Council for Sustainable Development
WEC	World Energy Council
ZEV	Zero Emission Vehicle

APPENDIX 2: List of Deliverables

D1 State-of-the-art.

D2 Overview of relevant trends and translation into parameters.

D3.1 Framework of the scenarios and description of the themes.

D3.3 A bee with a view – Essay.

D4.1 Modeling suite for scenarios simulations.

D4.2 Scenario impacts.

D5.1 Methodology for the assessment of transport and energy supply scenarios. - Database requirements.

D5.2 Assessment and comparison of scenarios.

D6 Final report.

D8.1 Report on the first Clustering Meeting, Budapest, 25th November 2004

D8.2 Report of the second Clustering Meeting, Krakow, 29th May 2005

D8.3 Report on the third Clustering Meeting, Gothenburg, 15th June 2006

D9.1 Dissemination plan.

D9.2 Dissemination materials

D9.3 Plan for using and disseminating knowledge

Reports in Bold are not available in the public domain