SUSTAINABLE TRANSPORT IN EUROPE

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Summary

This chapter reviews trends in transport at the European level and suggests that, predominantly because of the enormous growth in the popularity of road transport, these trends are unsustainable for social, environmental, and economic reasons. The chapter outlines principal issues facing policymakers and discusses a range of policy options available to promote transport sustainability. Among these are: using economic incentives to ensure motorists (in particular) pay the full external costs of using their vehicles, adopting technological developments, promoting public transport, and employing planning regulations that prevent car dependence. It is shown that, although some strides toward transport sustainability in Europe are being made, progress is slow, including at the pan-European level.

1. Introduction

Just as with sustainable development more broadly, several definitions of sustainable transport exist. One follows closely the famous phrase advanced in the Brundtland Report, describing sustainable transport as "satisfying current transport and mobility needs without compromising the ability of future generations to meet these needs." There is a certain vagueness to this definition as no limit is placed on future generations and nothing is sustainable forever. An alternative is to suggest that for transport to be sustainable, it should meet three conditions: (a) its rates of use of renewable resources do not exceed their rates of regeneration; (b) its rates of use of nonrenewable resources do not exceed the rate at which renewable substitutes are developed; and (c) its rates of pollution do not exceed the assimilative capacity of the environment. It might be assumed that such definitions are concerned primarily with environmental sustainability, but, as this chapter will show, there is an underlying assumption that social and economic factors, such as safety and the monetary cost of congestion, should also be included.

While debates over a precise definition take place among academics, the broader concept of transport sustainability is increasingly understood beyond learned journals and institutions. Although a remarkably recent phenomenon—some of the major adverse impacts we now associate with transport and its related activities have only been recognized in the last two decades or so of the twentieth century—the notion of sustainable transport is coming to the fore in the public sphere. Faced with mounting criticism over rising levels of pollution and congestion, politicians and policymakers are becoming aware of the need to develop credible strategies to make transport more sustainable.

This chapter reviews the principal issues facing policymakers and practitioners in the transport field. It begins by reviewing transport trends and describing their major social, environmental, and economic consequences. The chapter then turns to discuss the range of policy options available to promote transport sustainability, with reference to some examples of good (and indifferent) practice around Europe. It will have become apparent by the end of the chapter that progress toward transport sustainability in Europe is rather slow, and that much remains to be done to develop effective policies across the continent.

2. Transport Trends in Europe

The amount Europeans travel has increased dramatically. Passenger movement has increased by more than 40% since 1985 in the EU 15 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, The Netherlands, Portugal, Spain, Sweden, and the UK), and the growth in goods transport has exceeded this figure (Figure 1).

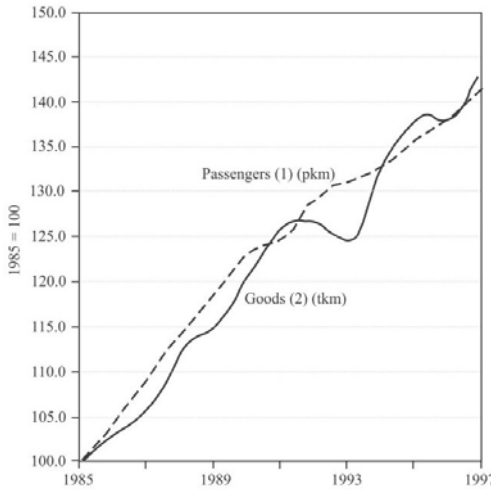

Figure 1. Graph to show increase in passenger and goods traffic

Much of this growth has come from an increase in road traffic, especially the private car. Car ownership has spread from the rich to be the expectation of most people. There has been an eightfold increase in the level of car ownership in Western Europe since the 1950s (it now averages about 450 per thousand population), and there has been a proliferation in the number of multicar households (from 2% in 1966 to 23% in 1992 in the UK). In Central and Eastern Europe, the Slovak and Czech republics have car ownership of 390 per thousand and 348 per thousand population, respectively, and the corresponding figures even for poorer countries such as Romania now exceed 110 per thousand (Figure 2). Although there are exceptions, the rising demand for road transport has generally led to a relative decline in the use of other surface modes of transportation (Figure 3).

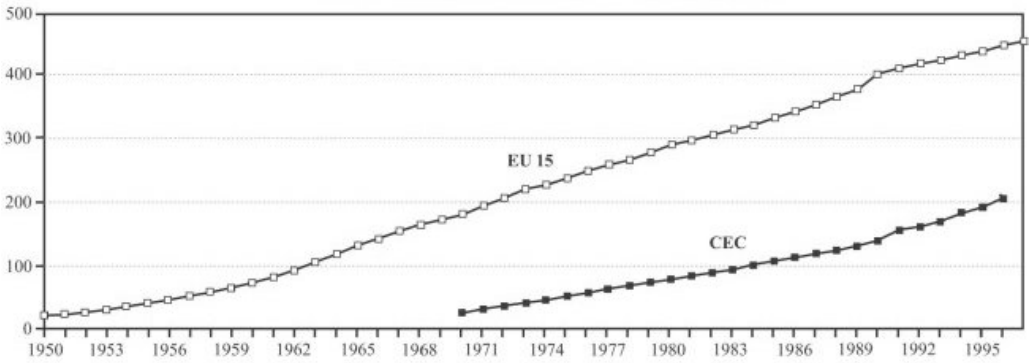

Figure 2. Car ownership/1000 pop. in the EU 15 and Central European Countries, 1950–1997

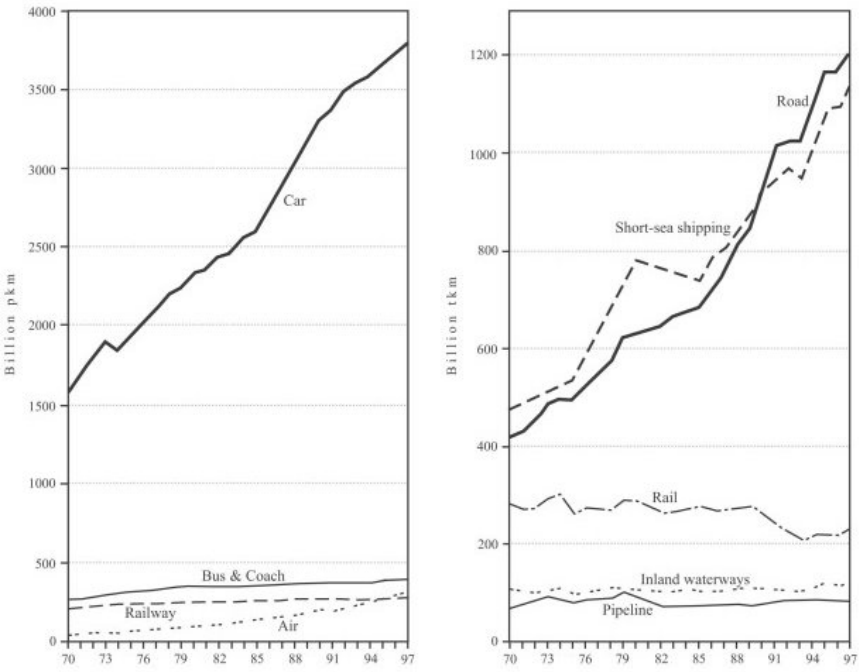

Figure 3. Freight/passenger modal split, 1970–1997

Developments in air transport, including the almost universal adoption of the jet engine, the introduction of wide-bodied jets, and the EU's pursuit of an open skies program (see Section 4.5), have resulted in air passenger kilometers quadrupling between 1970 and 1990. Air transport currently accounts for 6.7% of all journeys in the EU.

Virtually all forms of mechanized transport require nonrenewable, fossil fuels for power, in particular petroleum-based products. In the UK alone, £16 billion (US$24 billion) was spent on transport energy in 1988, whilst £11 billion (US$17.5 billion) was spent on domestic uses and £6 billion (US$9 billion) on industrial uses: in other words, 42% of the UK's energy bill was paid by the transport sector. What is more, this figure relates only to direct energy consumption, i.e. vehicle operation. It does not include energy consumed in the manufacture of transport vehicles and infrastructure, nor the energy used in producing the energy that transport systems consume. Indirect energy consumption by the transport sector accounts for half again as much as that used for vehicle operation.

Although the total amount of energy consumed throughout the world has remained relatively stable since 1973, consumption in the transport sector has increased by 23%, with the largest increase coming from road transport. The most important reason for this is the massive increase in car/lorry use at the expense of other modes of transportation. There are significant differences in fuel efficiencies between transport modes—for example, a car can use up to 10 times as much energy per passenger kilometer as an underground train—and there has therefore been a shift from higher-efficiency to lower-efficiency modes. Although there has been a significant increase in the fuel efficiency of private cars, this has been counteracted by greater car ownership, falling occupancy rates, a trend toward larger-engined models, and higher travel speeds.

3. The Impact of Transport

Concern about specific, localized impact of transport systems is not new. Transport-related problems in the urban environment, for example, are as old as cities themselves. Documents from ancient Rome chart complaints of congestion and pollution associated with transportation. In 1900 it was estimated that the 15 000 horses in Rochester, New York, produced enough manure in a year to cover a square acre to a depth of more than 50 m. Many early canal and railway proposals in Britain faced opposition from landowners on grounds such as visual intrusion and land-take—about 20 000 people were displaced in central Glasgow, and at least 120 000 in London, by demolition for railway construction between 1840 and 1900—and successful objections led to constructors making concessions such as a route alteration or screening.

Notwithstanding these localized concerns, the general level of awareness about the impact of transport has increased markedly. In part this reflects the growing importance of transport to the functioning of modern societies. More travel has led to more roads, increasing land-take, worsening congestion, and so on. There have also been, of course, entirely new modes of travel, in particular the airplane, which have exacerbated existing problems such as noise pollution. More generally, however, there is now a greater awareness of the contribution of transport, most particularly road transport, to a range of ills on many spatial scales. Advances in scientific understanding have revealed that the adverse impact of transport and transport-related activities can extend far beyond the localities in which they originate.

It is becoming increasingly apparent that current transport trends present us with a paradox: on the one hand, modern industrial societies (and those seeking this description) pursue economic growth through the open exchange of people, raw materials, energy, goods, and services in an increasingly global marketplace, yet, on the other hand, the transport systems required to allow such exchanges may be creating impacts of such adversity that the prospect of maintaining or achieving a high quality of life in many human societies is threatened. In short, we apparently cannot live without transport development, but neither can we cope with its side effects over the long term. The key impacts of transport systems might be summarized under three headings, social, environmental, and economic. It should be noted that each of these categories is strongly interrelated and cannot necessarily be isolated, but they form a useful conceptual distinction, and the discussion will proceed on this basis.

3.1. Social Impact

Transport has numerous effects on humans in a social context. Perhaps the most significant of these is its impact upon human safety. Concerns over safety are often expressed in terms of fatalities or injuries resulting from transport-related accidents. Without question, road transport causes most of these, in both relative and absolute terms. In 1997, for example, 43 400 people were killed on EU roads, whereas railway accidents claimed only 90 lives. Safety considerations permeate a range of human behaviors, and can act to curtail previously accepted social norms. The young in particular have fallen victim to a substantial loss of independence as a result of spatial restrictions imposed upon them by parents worried about the dangers associated with

increasing traffic volumes on certain roads. The development of community life has also been impeded by traffic growth because, in many cases, it is now too dangerous to use streets as a place to meet and interact. A classic study in San Francisco found that people living along quiet streets had three times more local friends and twice as many acquaintances than those living along busy roads, and the researchers suggested that heavy traffic can preclude the development of a sense of community.

The high levels of noise and vibration caused by transport activities also give rise to social inconveniences. Research into noise effects has shown that continued exposure to excessive noise (above 75 dB (A), typical of a busy urban street) can permanently impair human hearing. In the context of transport, however, it is subtler physiological and psychological changes and their impact on human health that are generally of greatest concern. Some forms of transport-related noise can disturb sleep patterns, cause long-term physiological damage such as high blood pressure, and may trigger aggression, annoyance, personal grievance, and impair learning/workplace performance. The primary source of transport noise is road traffic, and the OECD estimates that significantly in excess of 100 million European people are subjected daily to road traffic noise levels of more than 65 dB (A), which is widely regarded as being at the upper end of the acceptable limit.

Finally, transport policy developments in certain areas of Europe, particularly the UK, have resulted in cutbacks in public transport provision as car-ownership rates and car usage have risen. This has led to concerns over the social exclusion of those who do not own or have access to private transport, particularly in rural or semirural areas. Studies have shown a high degree of car dependence and have identified the importance of public transport networks for carless individuals in rural areas. The further withdrawal of public transport provision in such places threatens the social fabric in the sense that relocation might become the only realistic option for many people without private transport.

3.2. Environmental Impact

Building transport infrastructure clearly involves appropriating land, whether it be virgin or reclaimed from other uses. Land transport developments generally require long strips of land which effectively divide large areas into smaller ones (the process of severance), and zones adjacent to the new development may be rendered unsuitable for other activities (especially in the case of pipelines carrying volatile materials). Roads generally take the largest amount of land as they require more surface area than other modes do to transport the same volume of people. Another major impact of all transport development, of course, is its visual intrusion on the landscape, and although this is likely to be highest near areas of outstanding natural beauty or sites of historical/cultural importance, assessing the effect of a transport development in this sense can be problematic because so much depends upon people's perceptions. Not only will these vary when a particular development takes place, but they will also change over time: today's concrete monstrosities may be tomorrow's revered masterpieces in much the same way as many large, Victorian railway structures in Britain are now viewed as enhancing the landscape. Finally, building transport infrastructure can also impact

adversely upon ecosystems through severance, and disrupt hydrological processes by creating artificial barriers to permeability.

Probably the most widely discussed aspect of transport's relationship with the environment is not the building of infrastructure but its use. In particular, we refer to air pollution. The phrase "energy crisis" dates from the early 1970s, when the rapid oil price rise raised concerns about future supplies of oil and its finite nature. It is sometimes suggested that the energy crisis now relates as much to the air pollution resulting from energy use as to the depletion of resources (although clearly this remains an issue). Whereas air pollution from domestic and industrial sources has been falling, the proportion of air pollution from transport sources is growing considerably.

It is known that about 400 polluting compounds are emitted by petrol and diesel vehicles and from petrol vapor. The main pollutants are:

- *Carbon monoxide (CO).* This can be detrimental to human health, especially in confined spaces and urban areas, but the main concern is that it can oxidize to become CO_2 (see below). Transport sources are responsible for about 80% of the CO emissions in advanced industrial countries.
- *Nitrogen oxides (NO_x).* Nitrogen-based pollutants which can harm human health and the global environment. In combination with sulphur dioxide, emitted from fossil fuel-burning power stations, they are the main contributors to acid rain. Transport accounts for more than half of all NO_x emissions in the developed world.
- *Hydrocarbons (HC),* including *Volatile Organic Compounds (VOCs).* These result from the incomplete combustion of carbon-based fuels. They are important in the formation of photo-chemical oxidants, such as ozone (O_3), which can irritate eyes, damage plants, and contribute to acidification and global warming. HCs are toxic in their own right—benzene, for example, is a known carcinogen—and transport produces almost half of all the developed world's emissions of hydrocarbons.
- *Other pollutants*. Lead compounds added to petrol have (or had—leaded petrol is increasingly rare) effects on IQ and behavior, particularly in children. Chlorofluorocarbons (CFCs) commonly occur in materials used to build vehicles and are responsible for the depletion of ozone levels in the stratosphere. Particulate matter (of which transport generates 10%) is mostly emitted by diesel vehicles, can have a particularly harmful effect on human health, and has been estmated to be responsible for the advanced deaths of 10 000 people annually in Britain.

The possible link between the increasing incidence of asthma and rising air pollution has also received much attention. One view is that, while it is unlikely that air pollution can cause asthma directly, it can aggravate the condition. It should be noted, however, that providing *conclusive* evidence linking environmental pollution from transport to a deterioration of public health remains notoriously difficult. One of the basic difficulties is that a number of pollutants are usually found together in the atmosphere, whereas laboratory studies are often concerned with high concentrations of individual substances. It may well be that the combined influence of numerous pollutants acting

together causes the most harm. Nevertheless, it is the view of the UK Royal Commission on Environmental Pollution (RCEP) that the present use of road vehicles may be causing serious damage to human health by triggering or exacerbating respiratory symptoms and by exposing people to carcinogens.

In addition, there is the production of carbon dioxide to consider. CO_2 is a colorless, odorless, naturally occurring gas that is not strictly a pollutant, but concern arises because it is a major contributor to global warming. The Intergovernmental Panel on Climate Change (IPCC), the most authoritative source on the subject, believes that: (a) emissions resulting from human activities are significantly accelerating the naturally occurring greenhouse effect, and (b) global mean temperature could increase by around 1 °C by 2025 and by 3 °C by the end of the century. The effects of this could be severe: rising sea levels might flood low-lying coastal areas, including major cities and arable lands; increasing temperatures will produce more intense weather conditions, latitudinally shift crop boundaries, and result in feedback effects that could further increase global warming. Agricultural production could be severely affected, and food shortages might occur. Current fears about global warming have to be seen in the context of long-term climate cycles on the planet, but it would seem that human activity is artificially speeding up the current episode. The transport sector (again, especially road transport) is the fastest growing source of CO_2 and is currently responsible for about 25% of the EU's annual production of the gas (Table 1, Figure 4).

	1985	1985–1990 % p.a.	1990	1990–1995 % p.a.	1995	% of EU
EU 15 (14% of world)	2997	0.6	3088	–0.3	3048	100
Electricity and heat production	926.2	1.4	994.1	–1.0	946.4	31
Energy branch	126.1	0.9	132	1.7	143.4	5
Industry	625.8	–1.4	581.8	–2.1	523.4	17
Households, commerce	733.9	–2.6	642	–0.3	630.9	21
Transport	585.3	4.7	737.8	1.7	803.5	26
Of which						
Railways (1)	11.7	–4.9	9.1	–1.4	8.5	0
Road transport	499.7	4.6	626.1	1.6	677.9	22
Air transport	61.5	5.9	82	3.3	96.5	3
Inland navigation (2)	12.4	10.7	20.6	0.0	20.6	1

(1) Without fossil fuel for electricity production
(2) Including passenger transport and leisure boating

Table 1. CO_2 emissions from fossil fuels (million tons) (from European Union, 1999, *Transport in Figures: Statistical Pocketbook*)

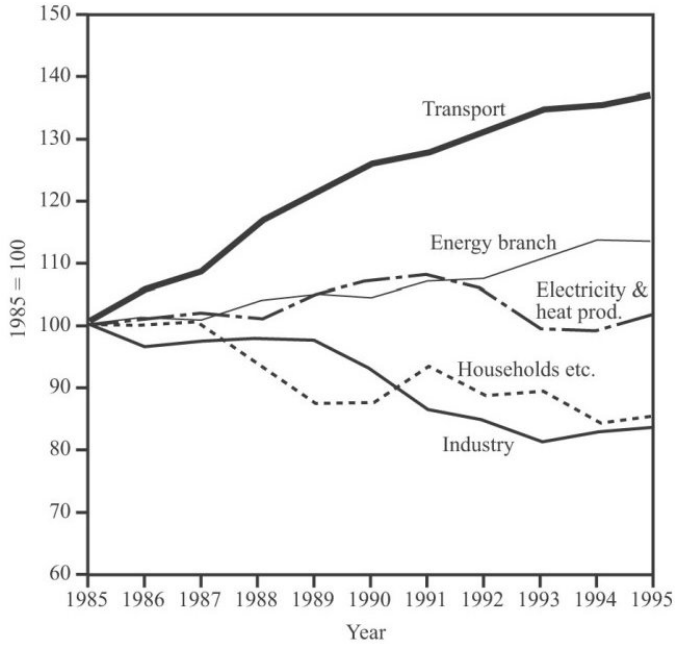

Figure 4. Sectoral trends in CO_2 production

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Mr. William Walton is Senior Lecturer in the Department of Geography and Environment, University of Aberdeen. He has strong research interests in the relationship between planning and transport, with particular reference to road transport, and has published extensively in research journals.