



The
Centre for
Sustainable
Transportation

Le
Centre pour
un transport
durable

DEFINING SUSTAINABLE TRANSPORTATION

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Enquiries about this document should be made to
Al Cormier at transport@cstctd.org or 905 858 9242

or to

Richard Gilbert at @richardgilbert1@csi.com or 416 923 8839

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OVERVIEW

This paper is an update of a paper with the same title prepared for Transport Canada in March 2004. That paper provided a brief review and analysis of some current definitions of sustainable transportation (sustainable transport). It assessed Transport Canada's need for such a definition, especially in the light of its sustainable development strategy. It suggested that adoption of a definition could be of value.

The substance of that paper has been retained. The remaining sections of that paper appear in this paper. Two sections have been added. One of these sections is entitled 'Further examples of use of the Centre's definition or the EU version of the definition'. It sets out a further 25 examples of use of one or another version of the definition, indicating in the End notes section where each of these examples can be pursued. The other added section has the title 'Measurement in Europe of progress towards sustainable transportation'. It describes two significant documents that have appeared since March 2004.

TRANSPORT CANADA'S SUSTAINABLE DEVELOPMENT STRATEGY

In February 16, 2004, the Minister responsible for Transport Canada laid before Parliament the document *Sustainable Development Strategy 2004-2006*.¹ This is the third such document.²

Transport Canada has described the three documents as follows:³

The first strategy provided a sound foundation for integrating environmental considerations into the work of the department.

In the second strategy, Transport Canada adopted a set of sustainable development principles and made specific commitments to action.

The third strategy brings more precision to the concept of sustainability, and defines seven challenges and 32 specific commitments for the next three years.

The first strategy document does not include a definition of sustainable transportation. It frames sustainability issues as being mostly environmental and noted work on a definition, as follows,⁴

The department is seeking an approach to a safe, efficient and affordable transportation system that meets society's need for environmentally sustainable transportation. Based on these principles, Transport Canada is developing a more broadly based definition of sustainable transportation and pursuing its implementation within the department's mission and mandate.

There are 89 occurrences of the phrase 'sustainable transportation' in the second strategy document. Again, the term is not formally defined, but it is discussed in some detail in

Part 3 of the document, which had an elegantly brief definition of sustainability as its epigraph: “Sustainability ... treating the world as if we intended to stay”.⁵ The following is said about a definition of sustainable transportation,⁶

Although there is no single, commonly held definition of sustainable transportation, for the department the concept means that the transportation system, and transportation activity in general, must be sustainable on three counts — economic, environmental and social. Practically, this means ensuring that decisions are no longer made with the environment as an afterthought. Appendix C lists some of the existing definitions of sustainable transportation.

The same Part of the document lists 13 “principles that recognize sustainable development as among the highest of departmental priorities, and define how the department will apply the concept of sustainable development to the transportation sector”. There are three each of social principles (safety and health, access and choice, quality of life), economic principles (efficiency, cost internalization, affordability), and environmental principles (pollution prevention, protection and conservation, and environmental stewardship), and four management principles (leadership and integration, precautionary principle, consultation and public participation, accountability).

The third document has 70 occurrences of the phrase ‘sustainable transportation’. The term is not formally defined, but is well explained in Part 3 of the document entitled ‘Sustainable development and Transport Canada’. This part of the document speaks to “the three elements of sustainable transportation – social, economic and environmental”. It continues,⁷

Transport Canada’s vision of a sustainable transportation system is guided by the following principles:

- highest practicable safety and security of life and property;
- efficient movement of people and goods to support economic prosperity and a sustainable quality of life;
- respect for the environmental legacy of future generations of Canadians;
- user pricing that better reflects the full costs of transportation activity and transportation infrastructure decisions that meet user needs;
- reasonable access to the national transportation system by Canada’s remote regions;
- accessibility in the national network without undue obstacles for persons with disabilities;
- coordinated and harmonized actions across all modes of transport; and,
- partnerships and collaboration among governments and with the private sector for an integrated, coherent transportation policy framework.

A question addressed later in the present document is whether Transport Canada might receive greater benefit from embracing a formal definition of sustainable transportation than from relying on the above vision and principles.

DEFINITIONS OF SUSTAINABLE TRANSPORTATION

Basically three threads of definition of sustainable transportation (known outside North America as ‘sustainable transport’ or ‘sustainable mobility’) can be identified in the literature.

One is what might be called a literal economist’s definition. Two examples were presented at the seminal OECD International Conference *Towards Sustainable Transportation* held in Vancouver in 1996. Nelson and Shakow proposed that sustainable transport “is achieved when the total future discounted per-capita social costs, both market and non-market, related to the transport system are equal to or less than the costs in a selected reference year”. The essence of this definition, according to its authors, is that “increased costs are not passed to succeeding generations”.⁸

The other example of this type of definition was proposed by Schipper: “transportation where the beneficiaries pay their full social costs, including those paid by future generations, is sustainable”.⁹

There are at least three kinds of problem with this type of definition. One is that recognition of whether or not a system is sustainable would depend on estimation of future costs, which is by nature imperfect and is often impracticable. Another is that a transport system could be evidently unsustainable even while meeting the sustainability requirement. To give an extreme example, the system could kill enough people each year to cause appreciable population loss, but because lives were valued so little the system’s users could continue to afford to pay for use of the system. A third problem is that the definition does not speak to what present and future services are required from transportation, whether to sustain society directly or support other efforts towards sustainability, only to what it must cost.

The second kind of definition concerns *environmentally* sustainable transportation (EST). Two versions of this kind of definition have been proposed by the Organization for Economic Cooperation and Development (OECD) during the course of its Environmentally Sustainable Transport project.¹⁰ The shorter one is this:

An environmentally sustainable transport system is one that does not endanger public health or ecosystems and meets needs for access consistent with (a) use of renewable resources at below their rates of regeneration, and (b) use of non-renewable resources at below the rates of development of renewable substitutes.

Here is the longer definition:

An environmentally sustainable transport system:

- allows generally accepted objectives for health and environmental quality to be met, for example, those concerning air pollutants and noise proposed by the World Health Organization (WHO);
- is consistent with ecosystem integrity, for example, it does not contribute to exceedances of critical loads and levels as defined by WHO for acidification, eutrophication, and ground-level ozone; and
- does not result in worsening of adverse global phenomena such as climate change and stratospheric ozone depletion.

Economists might argue that these two definitions are no more than restatements of the preceding definitions. They share the quality of mostly defining what the transportation system should not be rather than what it should be. The first of the OECD definitions acknowledges the need for access and focuses on sustainable resource use. The second focuses on avoidance of impacts on environment and health.

Neither captures what many regard as the key feature of sustainability—intergenerational equity—caught nicely in Gray’s aphorism quoted above, and also in the mother lode of sustainability statements, that in the 1987 report of the World Commission on Environment and Development (the Brundtland Commission). The Commission defined sustainable development “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.¹¹

The third type of definition of sustainable transportation can be called the comprehensive type of definition. The best-known examples are the definition developed by the Centre for Sustainable Transportation and the derivation of this definition given official status within the European Union. These similar statements are by far the most widely accepted definitions of sustainable transportation. They are discussed in the next section of the present document.

TOWARDS A WIDELY ACCEPTED DEFINITION OF SUSTAINABLE TRANSPORTATION

According to the European arm of the Rand Corporation and several partners, the definition of sustainable transport adopted by the Ministers of Transport of the 15 European Union countries should be favoured because it is concrete, comprehensive, and “has been reviewed by political mechanisms and received general political acceptance”.¹²

The definition referred to is as follows:¹³

A sustainable transport system [is] defined as one that

- allows the basic access and development needs of individuals, companies and societies to be met safely and in a manner consistent with human and

ecosystem health, and promotes equity within and between successive generations;

- is affordable, operates fairly and efficiently, offers choice of transport mode, and supports a competitive economy, as well as balanced regional development;
- limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and, uses non-renewable resources at or below the rates of development of renewable substitutes while minimising the impact on the use of land and the generation of noise.

The EU definition was taken almost word for word from the definition developed in 1997 by the Toronto-based Centre for Sustainable Transportation.¹⁴ The Centre's definition is now as follows:¹⁵

A sustainable transportation system is one that:

- allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations.
- is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy.
- limits emissions and waste within the planet's ability to absorb them, minimizes consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components, and minimizes the use of land and the production of noise.

The French version of the Centre's definition is as follows:

Le transport durable s'entend d'un système :

- qui permet aux particuliers et aux sociétés de satisfaire leurs principaux besoins d'accès d'une manière sécuritaire et compatible avec la santé des humains et des écosystèmes, et qui ne porte pas préjudice à notre génération ou aux générations future ;
- dont le coût est raisonnable, qui fonctionne efficacement, offre un choix de modes de transport et favorise une économie dynamique;
- qui limite les émissions et les déchets de manière à ce que ceux-ci ne dépassent pas les capacités de la planète de les absorber; réduit au minimum la consommation des ressources non renouvelables; limite la consommation des ressources renouvelables dans le respect des principes de développement durable; et réutilise et recycle ses composantes et réduit au minimum le bruit et l'utilisation du sol.

The main differences between the Centre's definition and the version adopted by the European Union Council of Ministers are these:

- first bullet point: “access needs of individuals and societies” has been expanded in the EU version to “access and development needs of individuals, companies and societies”;
- second bullet point: the word “fairly” and the phrase “as well as balanced regional development” have been added to the EU version;
- third bullet point: the phrase “minimizes consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components” has been replaced in the EU version by “uses renewable resources at or below their rates of generation, and, uses non-renewable resources at or below the rates of development of renewable substitutes”.

As well as its use by the European Union, the Centre’s definition has achieved considerable acceptance elsewhere. This was noted in a recent thesis presented at the Massachusetts Institute of Technology, which included the following: “Discussions with leading transportation research institutions have highlighted a growing international acceptance of the definition of sustainable transportation developed by the Canadian Centre for Sustainable Transportation”.¹⁶

Here are several examples of use of the Centre’s definition or the EU version of the definition:

- The Prime Minister’s Caucus Task Force on Urban Issues characterized the Centre’s definition (second version) as a “solid base of objectives for a national Transit/Transportation Program” in its November 2002 report *Canada’s Urban Strategy: A Blueprint for Action*.¹⁷
- Transport Canada has made use of the Centre’s definition (first version) in elaborating “What sustainable transportation means to Transport Canada” in its May 2000 *Discussion Paper for Transport Canada’s Second Sustainable Development Strategy*.¹⁸
- A document produced by the University of Quebec at Montreal, *Les transports en commun à Montréal*, uses the Centre’s definition (first version) as the basis for consideration of what is meant by efficient, equitable, and ecologically sound public transit.¹⁹
- The City of Gatineau (Quebec) used the Centre’s definition (first version) as a basis for its plan, *Pour une nouvelle ville de Gatineau résolument tournée vers les transports durables et une forme urbaine plus viable*.²⁰
- The Centre’s definition (first version) was used by the organization GPI Atlantic (Genuine Progress Index for Atlantic Canada) in its May 1999 document *Application of The Genuine Progress Index Approach to Analyzing Reduction of Greenhouse Gas Emissions in the Nova Scotia Freight Transport Sector*.²¹

- The words of the Centre’s definition (first version) were incorporated into Bylaw 2952 (*A Bylaw to adopt a Regional Growth Strategy for the Capital District*) adopted by the Regional Board of the Capital Regional District, Victoria, British Columbia, in August 2003.²²
- The Centre’s definition (first version) has been adopted by the International Centre for Sustainable Cities.²³
- The Centre’s definition (first version) was presented as the definition of ‘sustainable mobility’ of the Union internationale des transports publics (UITP) by Secretary General Hans Rat at the Sustainable Mobility workshop held in Shanghai, China, in November 2002 by the World Business Council for Sustainable Development. It has also been used in a UITP brochure.²⁴
- The Centre’s definition (first version) was described as being the most common definition of sustainable transport in use in Europe and North America in a document on the Web site of La Cité des Sciences et de l’Industrie (Paris, France).²⁵
- With other definitions of sustainable transportation, that of the Centre (first version) was noted in Appendix A of Report 8 (Sector Report: Transport) of the Baltic 21 process, published in 1998. This process is a joint long-term effort of the 11 countries of the Council of the Baltic Sea States (CBSS) to attain sustainable development in the region.²⁶
- The Centre’s definition (first version) was used as a model for the development of the “sustainability outcome definition” adopted by the California Department of Transportation’s Policy Advisory Committee.²⁷
- The Centre’s definition (first version) is used as the working definition of sustainable transportation in the Sustainable Indicators Program of the City and Regional Planning Department, California Polytechnic State University.²⁸
- A modified version of the Centre’s definition has been used by the Texas Transportation Institute.²⁹
- A modified version of the Centre’s definition has been adopted by the City of Rockdale, New South Wales, Australia.³⁰
- With other definitions of sustainable transportation, the European Union’s version of the Centre’s definition is noted in the *TDM Encyclopedia* of the Victoria Transport Policy Institute (Victoria, B.C.).³¹
- The European Union’s version of the Centre’s definition was used as the working definition of a sustainable transport system in the *Issues and Options Discussion Paper* used by Western Australia’s Ministry of Planning and Infrastructure in connection with the Southern Suburbs East-West Public Transport Study (Perth).³²

- The European Union’s version of the Centre’s definition has been used by the Victorian Local Governance Association (Australia) in work for the State of Victoria’s Department of Infrastructure.³³
- The City of Freemantle (Western Australia, Australia) made use of the European Union’s version of the definition in its *Transport Strategy* (2002).³⁴

Other definitions of sustainable transportation appear to be used relatively rarely.³⁵

There seem to have been few or even no criticisms of the definitions of the Centre and EU. It could perhaps be argued that the definitions are little more than wish lists of desirable conditions, but that does not necessarily detract from their value. The true value of a definition is perhaps that it allows the setting of goals and the assessment of performance. The Centre’s definition has stimulated and been a basis for these activities.³⁶

FURTHER EXAMPLES OF USE OF THE CENTRE’S DEFINITION OR THE EU VERSION OF THE DEFINITION

Since the first version of this report was produced in March 2004, the following further uses of the definition have been noted:

- Community Transport Association Wales quoted the EU version of the Centre’s definition in its response to the Welsh Assembly Government’s Sustainability Development Action Plan.³⁷
- The European Commission had established an Expert Group on Sustainable Urban Transport Plans, which issued its final report in December 2004, available at the URL below. The Expert Group used the EU version of the Centre’s definition as a starting point of its work.³⁸
- The EU version of the Centre’s definition was quoted by the managing director of the French Association of Public Transport Authorities (GART) as part of a presentation at the fourth European Conference on Sustainable Cities and Towns, Aalborg, Denmark, June 2004.³⁹
- The EU version of the Centre’s definition had been quoted in the document of the Arctic Council entitled *Sustainable Transportation and Development of Infrastructure in the Arctic Regions*, October 2001.⁴⁰
- In comments on the European Commission’s April 2004 document *Towards a thematic strategy for the urban environment*, the European Cyclists Federation (ECF) criticizes the Commission’s use of the EU version of the Centre’s definition on the grounds that the definition is “unnecessarily hazy” and that there is not in it “more specific mentioning of the most basic and most ecological transport modes walking and cycling”.⁴¹

- The EU version of the Centre’s definition was quoted in a paper by Harry Timmermans, Professor of Architecture, Building and Planning at Eindhoven University of Technology, The Netherlands, entitled *Transit Oriented Urban Environments Reduce Travel – A Fairytale !/?*, presented at the International Planning Symposium on *Incentives, Regulations, and Plans – The Role of States and Nation -States in Smart Growth Planning* held in Annapolis, Maryland, in October 2004.⁴² In the paper, the definition is criticized in this way: “[It] is a typical political definition: it lacks rigor, is vague and potentially inconsistent. Regardless, it seems to be based on the notion that if we build such sustainable (transit-oriented) systems and urban environments, people will use it. Where did we hear this before? Is there any empirical evidence to support this view?” Professor Timmermans then describes nine examples of work he has been associated with that, in his words, “indicate that land use and transportation policy cannot expect to have a substantial impact on housing/residential choice in terms of reducing mobility patterns”.
- The EU version of the Centre’s definition was quoted in a document entitled *Mo.Ve International, Non-governmental, Permanent Observatory on Sustainable Mobility*, produced in 2004 by Automobile Club Italia and the Foundation for the Automobile and Society.⁴³ The definition was described as the embodying the basic principles of the Mo.ve Observatory.
- The EU version of the Centre’s definition (cited as the Centre’s version) was quoted in a paper by Emmerson Richardson, who is with the Australian engineering firm Sinclair Knight Merz, entitled *The Role of Local Government in Integrated Transport* presented at a conference of the Institute of Public Works Engineering Australia (IPWEA) in 2004.⁴⁴ The definition was characterized as having “obtained a high level of acceptance in North America and Europe”.
- The EU version of the Centre’s definition was featured in the September 2003 report entitled *State of the art report on Life Quality assessment in the field of transport and mobility* by the participants in five EU countries in the project *Assess implementations in the frame of the Cities-of-tomorrow (ASI)*.⁴⁵
- Further to the use as a working definition noted above, the EU version of the Centre’s definition, cited as originating with the Centre, was featured in the final *Integrated Regional Transport Plan for South West Metropolitan Perth* (Western Australia), issued in April 2003.⁴⁶
- Notwithstanding the last example, Perth’s Sustainable Transport Coalition has adopted the Centre’s version of the definition (second version).⁴⁷
- The EU version of the Centre’s definition was used as the definition of sustainable transport at the informal council of EU transport and environment ministers held under the auspices of the Belgian presidency of Council of the EU, September 2001.⁴⁸
- The Centre’s definition (first version) featured in material produced by the University of Moncton’s ‘Autosage’ project.⁴⁹

- A brochure for Detour Publications (Toronto) cites the Centre’s definition (first version).⁵⁰
- The Union internationale des transports publics (UITP), in connection with the December 2004 Tenth meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change, held in Buenos Aires, Argentina, produced a document entitled *Ticket to the Future: 3 Stops to Sustainable Mobility*. This document presented a definition of sustainable mobility that is similar to the Centre’s and the EU’s definition and is introduced as being based on the Centre’s definition.⁵¹
- The Institution of Professional Engineers New Zealand features the Centre’s definition (first version) in its 2004 document *Sustainability—A Task for Engineers*.⁵²
- In the November 2004 issue of *Network*, produced for the employees of Parsons Brinkerhoff, a major U.S. engineering and construction company, an article by Chris Baca, *Sustainable Highways: A Case Study In Enhanced Outcomes, U.S. 70 Hondo Valley, New Mexico*, quotes the Centre’s definition (first version).⁵³
- The International Youth Summit on Sustainable Urban Transportation, held in Ottawa in May 2004, featured the Centre’s definition (second version) as “our definition of sustainable transportation”.⁵⁴
- The Government of Jamaica’s draft *Fleet Management Guidance Document*, December 2003, features the Centre’s definition of sustainable transportation (second version).⁵⁵
- The Centre’s definition (first version) is featured in a November 2004 document prepared by Brendon Hemily for the American Public Transportation Association entitled *Trends Affecting Public Transit’s Effectiveness*.⁵⁶
- The Canadian Institute of Transportation Engineers (CITE) featured the Centre’s definition (first version) in its July 2003 *Interim Research Report for the Canadian Guide to Promoting Sustainable Transportation through Site Design*.⁵⁷
- The January 2002 *Preliminary Evaluation Plan* for the transport system at the now-operating Vancouver Island Technology Park, prepared by GMK2000, featured the Centre’s definition (first version).⁵⁸
- The Winnipeg Chapter of the Red River Clean Cities Coalition features the Centre’s definition (second version) in its promotional material.⁵⁹
- The University of Saskatchewan’s 2002 *Sustainability Assessment* features the Centre’s definition (first version).⁶⁰
- Dillon Consulting Ltd. featured the Centre’s definition (first version) in its September 2004 documentation for the Regent Park Development Project.⁶¹

MEASUREMENT IN EUROPE OF PROGRESS TOWARDS SUSTAINABLE TRANSPORTATION

This section responds to the second and third items in the proposal for the current report, as follows:

2. Go further than the 2004 report by setting out the indicators used within the Europe Union to measure progress towards attainment of sustainable transportation, whether in relation to the definition adopted by the EU Ministers of Transportation (which was based on The Centre's definition) of separately.
3. Describe the data used to develop and support the EU's indicators, with an indication as to whether such data are available for Canada.

The main exercise concerning the measurement of the improvement of the environmental performance of Europe's transport system is that of the European Environment Agency (EEA) under the title Transport and Environment Reporting Mechanism (TERM).⁶² The TERM program was not covered in the 2004 report because it is not linked to a definition of sustainable transportation, and also because it directly concerns *environmental* performance only. Nevertheless, it is given prominence in this section because it is the most advanced program concerning the *measurement* of progress associated with attainment of sustainable transportation.

The EEA is an agency of the European Union providing information on the EU's 25 members, on three candidate countries, and on four other European countries.

The TERM program has developed and monitored 40 indicators under seven heads:

- Environmental consequences of transport
- Transport demand and intensity
- Spatial planning and accessibility
- Supply of transport infrastructure and services
- Transport costs and prices
- Technology and utilization efficiency
- Management integration

Extensive information is available on each of the 40 indicators.⁶³ None of the indicators appear to have been updated during 2004. Some, for example the indicator in the last of the seven groups concerning public awareness and behaviour, have not been updated since 2001.

A TERM activity during 2004 was publication of the document *Ten key transport and environment issues for policy-makers*.⁶⁴ This reported on a selection of the TERM indicators. It is the focus of the present account of the TERM program.

What follows is a list of the ten issues with the brief account provided for each issue:

1. **Growing transport volumes are challenging decoupling policy**
 Transport volumes are continuing to grow at roughly the same rate as GDP. The central aim of the Common Transport Policy — decoupling of transport growth from economic growth — has only been achieved in a few EU Member States.
2. **Emissions of air pollutants from road transport are falling, despite a growth in traffic**
 The vehicle fleet is gradually becoming cleaner due to improvements in the technology required to meet European emission standards. Improvements are occurring significantly faster than the growth in traffic volumes, with absolute reductions in emissions of harmful substances to the air. Nonetheless, further initiatives will still be needed to reduce people’s exposure to damaging pollutants and to achieve the air quality targets set for 2010 especially for NO_x and fine particles.
3. **Greenhouse gas emissions from road and air transport increasing**
 Transport energy consumption and the resulting emissions of greenhouse gases are increasing steadily due to a rise in transport volumes that outweighs improvements in vehicle efficiency. Current policies are insufficient to stop the growth although average specific emissions of new passenger cars are on their way to meeting the 140 g CO₂/km emission target committed to by the automobile industry. International aviation emissions are rising especially fast, and are as yet not covered by the Kyoto Protocol.
4. **Alternative fuels policy is starting to take effect with biofuels**
 There is strong growth in the use of biofuels, allowing the transport sector to reduce its emissions of greenhouse gases when the full life cycle of the fuels is considered. To maximise their environmental benefit, however, it is important to produce biofuels in a way that minimises negative impacts.
5. **Market shares of road and air travel are continuing to grow**
 Contrary to the aim of the Common Transport Policy, the shares of aviation and road transport continue to grow, while the shares of rail, bus, and inland shipping are gradually decreasing. However, because the environmental performance of road transport is improving faster than other modes, the consequences of its growth are not as bad for the environment as might be expected. The rapid growth of air transport is a cause for concern because of its greenhouse gas emissions.
6. **Access to many basic services is dependent on car use**
 The relatively high speed and flexibility of road passenger transport improves access to basic services — education, business, shopping and health services — but only for those with access to a car. As a consequence, many disadvantaged people do not enjoy the full benefits of transport.
7. **Present price structures are favouring individual transport**
 Passenger fares for rail and bus services are increasing faster than the cost of private car use. This trend favours the private car over public transport. Transport prices for freight continue to fall, pushing transport demand higher and enabling more transport intensive economic activities and logistics. Both trends are moving away from the Common Transport Policy’s target of revitalising rail transport.
8. **Signs of promising developments for transport pricing**
 Progress is slow in restructuring transport charges towards better internalisation of external costs. The framework regulations being put in place for rail and road transport are positive developments towards fair and efficient pricing and a more sustainable transport system. However, air and water transport are still not covered.
9. **Infrastructure investment needs to balance economic and environmental needs**
 Infrastructure — in particular road and high-speed rail — continues to expand. Extending transport infrastructure is the most common policy response to the need for improved accessibility and capacity. But optimizing the use of existing infrastructure through road pricing or congestion charges offers a means of meeting demand with fewer new infrastructure developments.
10. **Transport infrastructure is fragmenting natural habitats**
 Transport infrastructure networks are generally seen as a benefit but their expansion, traffic growth and urban sprawl pose a significant threat to habitats and biodiversity. Proximity to disturbances, land frag-

mentation and isolation of habitats create new barriers to natural migration and movement of animal populations.

Each of the ten issues is elaborated in the document, making use of TERM indicator material. Coverage is inconsistent. In some cases, material is presented for individual countries or even particular urban regions, and in some cases for groups of countries, with the group varying according to the issue.

Except for the last issue—concerning fragmentation of natural habitats—Canadian data are readily available on each of these topics.⁶⁵ For the most part, the relevant data—current at the time—were reported in The Centre’s December 2002 document *Sustainable Transportation Performance Indicators: Phase 3 Report*.⁶⁶

The other European program of note, still in development, has the title Sustainable Mobility, Policy Measures and Assessment (SUMMA).⁶⁷ It is funded by the European Commission’s Directorate-General for Energy and Transport. More than TERM, this program is concerned with sustainable transportation, known as ‘sustainable mobility’. The specific mission of SUMMA to operationalize the concept of sustainable mobility, i.e., to quantify it in a way that allows performance to be measured. The starting point is the EU version of the Centre’s definition of a sustainable transport system.

This program is due for completed during 2005. The final deliverable of the project is a conference to be held in Brussels on April 5, 2005, at which the project’s results will be presented. (The Centre, which has played a small role in the SUMMA program, has been invited to participate in the conference but will not be able to attend.)

In the meantime, reference can be made to the May 2004 report *Operationalising Sustainable Transport and Mobility: The System Diagram and Indicators*.⁶⁸ This 266-page document describes the process of indicator development and characterizes proposed indicators. The indicators would be presented in five groups: (i) indicators of forces driving system change; (ii) system indicators; (iii) economic outcome indicators; (iv) environmental outcome indicators; and (v) social outcome indicators.

The focus for policy assessment is on the three groups of outcome indicators. The proposed list of these indicators as set out in the above report appears in Table 1 on the next page. To what extent these indicators have actually been developed will not be known until the final report on the SUMMA program is available. There is an indication in the conference material that, notwithstanding the objectives of the SUMMA program, a set of indicators may not have been developed. The material includes the following: “The list of indicators is basically a wish list, since it does not take into account whether or not the indicator can currently be measured or otherwise determined”.

The program material is more positive about another deliverable: “a model that uses predicted demand to estimate the effect [of transport policies] on the three dimensions of sustainability, economic, environmental, and social”. Dubbed Fast Simple Model, it is said to assess the effects of policies at the European, national, and regional levels.

Table 1. Proposed SUMMA indicators

Outcome of Interest	Indicator name
ECONOMIC OUTCOME INDICATORS	
EC1 ACCESSIBILITY	EC11 Intermodal Terminal facilities EC12 Accessibility of origins/ destinations EC13 Access to basic services (SO11) EC14 Access to public transport (SO12)
EC2 TRANSPORT OPERATION COSTS	EC21 Supplier operating costs EC22 Transport- related expenditures of households (soc 21) EC23 Transport prices
EC3 PRODUCTIVITY / EFFICIENCY	EC31 Freight haulage-related costs on product costs EC32 Utilisation rates EC33 Energy consumption efficiency of transport sector EC34 Energy efficiency
EC4 COSTS TO ECONOMY	EC41 Infrastructure costs EC42 Public subsidies EC43 External transport costs EC44 Final energy consumption (EN11)
EC5 BENEFITS TO ECONOMY	EC51 Gross value added EC52 Public revenues from taxes and traffic system charging EC53 Benefits of transport
ENVIRONMENTAL OUTCOME INDICATORS	
EN1 RESOURCE USE	EN11 Energy consumption EN12 Consumption of solid raw materials EN13 Land take
EN2 DIRECT ECOLOGICAL INTRUSION	EN21 Fragmentation of land EN22 Damage of underwater habitats EN23 Losses of nature areas EN24 Proximity of transport infrastructure to designated nature areas EN25 Light emissions EN26 Collisions with wildlife EN27 Introduction of non-native species
EN3 EMISSIONS TO AIR	EN31 Transport emissions of greenhouse gases EN32 Greenhouse gas emissions from manufacture and maintenance EN33 Transport emissions of air pollutants EN34 Air pollutant emissions from manufacture and maintenance
EN4 EMISSION TO SOIL AND WATER	EN41 Hardening of surfaces EN42 Polluting transport accidents EN43 Runoff pollution from transport infrastructure EN44 Wastewater from manufacture and maintenance of transport infrastructure EN45 Discharges of oil at sea EN46 Discharges of wastewater and waste at sea
EN5 NOISE	EN51 Exposure to transport noise
EN6 WASTE	EN61 Generation of non-recycled waste
SOCIAL OUTCOME INDICATORS	
SO1 ACCESSIBILITY AND AFFORDABILITY (users)	SO11 Access to basic services SO12 Access to public transport SO13 Car independence SO14 Affordability SO15 Trip length
SO2 SAFETY AND SECURITY (users, drivers, the affected)	SO21 Accident related fatalities and serious injuries SO22 Vehicle thefts & other crimes SO23 Security on public transport
SO3 FITNESS AND HEALTH (users)	SO31 Walking and cycling as transport means for short distance trips
SO4 LIVEABILITY AND AMENITY (inhabitants, society, the affected)	SO41 Walkability, pedestrian friendliness SO42 Traffic calming SO43 Children's journey to school SO44 Open space availability and accessibility
SO5 EQUITY (users and the affected)	SO51 Horizontal equity (fairness) SO52 Vertical equity (income) SO53 Vertical equity (mobility needs and ability)
SO6 SOCIAL COHESION (inhabitants, society and the affected)	SO61 Public opinion profile on transport and transport policy issues SO62 Violation of traffic rules SO63 Long distance commuting
SO7 WORKING CONDITIONS IN TRANSPORT SECTOR (employees, drivers, operatives)	SO71 Occupational accidents SO72 Precarious employment conditions SO73 Work absence due to accidents and illness

IS A DEFINITION OF SUSTAINABLE TRANSPORTATION NEEDED?

The first aspect of this question is whether a definition is needed at all. A simple answer is that the term sustainable transportation is used frequently in policy discourse and consistency in what is understood by it could be helpful. Nevertheless, commentators continue to argue that the term is not definable, that the concept is meaningless, and that attempts to define it are at best fruitless and at worst misleading.⁶⁹

On the face of it such arguments are more about whether the concept of sustainable transportation (and, by extension, sustainable development) has value. Perhaps a reasonable response to such criticism is that humanity has thought more about its legacy since notions of sustainability achieved currency, and such terms have value in stimulating further reflection of this kind. The problem with sustainability discourse may not be an inherent fuzziness in terminology but frequent use of the term ‘sustainable’ as a synonym for ‘good’.

The second aspect is whether it would be helpful for Transport Canada to have a definition of sustainable transportation. Considering the frequency of use of the term (89 and 70 times respectively in the two most recent *Sustainable Development Strategies*), a definition of it could have value. Moreover, during Canada-wide consultations towards the current *Sustainable Development Strategy* held by Transport Canada in 2003, interveners argued that “having an agreed upon definition of ‘sustainable transportation’ would go a long way towards focussing everyone’s attention on the required policies and actions to get there”.⁷⁰

The simple way for Transport Canada to have a definition would be for it to define sustainable transportation as transportation that conforms to the principles that guide its vision (see Page 3 above). There could be debate as to whether the principles were appropriate or well balanced, but Transport Canada would at least have a definition.

An alternative for Transport Canada would be adoption of the Centre’s definition, or the European Union’s almost identical version of it.

END NOTES

- ¹ Transport Canada's *Sustainable Development Strategy 2004-2006* (ISBN 0-662-67869-9) is available at the first URL below. It and the two documents detailed in Note 2 were prepared and submitted pursuant to Section 24 of the *Auditor General Act*, which requires the Minister for Transport Canada and the Ministers responsible for 24 other federal departments and agencies to submit such documents every three years (see the second URL below).
 1. http://www.tc.gc.ca/programs/Environment/SD/sds0406/docs/TC%20SDS_E3.pdf. Accessed March 30, 2004.
 2. http://www.oag-bvg.gc.ca/domino/cesd_cedd.nsf/html/menu1_e.html. Accessed March 30, 2004.
- ² Transport Canada's two previous strategies are *1997 Sustainable Development Strategy*, available at the first URL below, and *Sustainable Development Strategy 2001-2003* (ISBN 0-662-29813-6), available at the second URL below.
 1. <http://www.tc.gc.ca/programs/Environment/SD/strategy97/menu.htm>. Accessed March 30, 2004.
 2. <http://www.tc.gc.ca/programs/Environment/SD/strategy0103/final%20SD%20Strategy%20-%20eng.pdf>. Accessed March 30, 2004.
- ³ The quote is from Transport Canada's Web site at the URL below.
 1. <http://www.tc.gc.ca/programs/Environment/SD/menu.htm>. Accessed March 30, 2004.
- ⁴ The quote is from Part 2 of the first source detailed in Note 2 and can be found specifically at the URL below.
 1. <http://www.tc.gc.ca/programs/Environment/SD/strategy97/issues.htm>. Accessed March 30, 2004.
- ⁵ The source of the epigraph was not given in the strategy document. It is probably a statement by Robert Gray of the University of Glasgow, Glasgow, UK. On enquiry, Professor Gray responded that he could have used the phrase in a 1996 publication but that a better reference could be to his 1993 book *Accounting for the Environment* (London, UK: Paul Chapman).
- ⁶ The quote is from Page 7 of the second source detailed in Note 2.
- ⁷ The quotes in and below this paragraph are from Page 7 of the first source detailed in Note 1.
- ⁸ This definition is contained in Nelson D, Shakow D, Sustainable transportation through an integrated planning process. In, Proceedings of the OECD International Conference *Toward Sustainable Transportation* held in Vancouver, Canada (CD-ROM produced by Environment Canada: EPS Publications, Hull, Quebec). This paper is also available at the URL below.
 1. <http://www.globaltelematics.com/lcp/nel3.htm>. Accessed March 30, 2004.
- ⁹ This definition is contained in Schipper L, Sustainable transport: What it is, and whether it is. Paper presented at the conference detailed in Note 8. (Only the abstract of this presentation is available in the proceedings, but the definition is in the abstract, which is also available at the URL below.)
 1. <http://www.oecd.org/dataoecd/28/54/2396815.pdf>. Accessed March 30, 2004.
- ¹⁰ Both definitions of EST can be found in OECD and BLFUW, *Synthesis Report*. Prepared for the OECD International Conference held in Vienna, Austria, 4-6 October, 2000, entitled *est! Futures, Strategies, and Best Practices*. Organisation for Economic Cooperation and Development, Paris, and Austrian Federal Ministry for Environment, Forestry, Environment and Water Management (BLFUW), Vienna, 2001. This document is available at the URL below.
 1. <http://www.oecd.org/dataoecd/15/29/2388785.pdf>. Accessed March 30, 2004.
- ¹¹ The definition of sustainable development is on Page 41 of World Commission on Environment and Development, *Our Common Future*. Oxford University Press, U.K., 1987.

- ¹² For the quote see Page 15 of Rand Europe et al, *SUMMA: Deliverable 2 of Workpackage 1: Setting the Context for Defining Sustainable Transport and Mobility*, June 2003, available at the URL below.
1. <http://www.summa-eu.org/control/reports/SUMMA-D2-Setting-the-Context.pdf>, Accessed March 30, 2004.
- ¹³ The definition is contained in a resolution entitled *Strategy For Integrating Environment And Sustainable Development Into The Transport Policy*—also known as the *April Resolution*—adopted by the Ministers responsible for Transport and Communications at the 2340th meeting of the European Union’s Council of Ministers, held in Luxembourg, April 4-5, 2001. The minutes of that meeting are available at the following URL:
1. <http://corporate.skynet.be/sustainablefreight/trans-counci-conclusion-05-04-01.htm>. Accessed March 30, 2004.
- ¹⁴ The document detailed in Note 12, prepared for the EU, acknowledges that the EU definition is an adaptation of the definition developed by the Centre for Sustainable Transportation.
- ¹⁵ The 1997 version of the Centre’s definition did not include the words “limits consumption of renewable resources to the sustainable yield level”. These were added by the Centre’s Board of Directors in June 2000.
- ¹⁶ The quote is from Page 29 of Hall RP, *Introducing the Concept of Sustainable Transportation to the U.S. DOT through the Reauthorization of TEA-21*. MS thesis, Faculty of Engineering, Massachusetts Institute of Technology, 2003.
- ¹⁷ The quote is from Page 15 of the Task Force report, available at the URL below.
1. http://www.liberal.parl.gc.ca/urb/Blueprint_English.pdf. Accessed March 30.
- ¹⁸ Transport Canada’s *Discussion Paper* is available at the URL below.
1. <http://www.tc.gc.ca/programs/environment/sd/discussion00/menu.htm>, Accessed March 30, 2004.
- ¹⁹ The UQAM document is at the URL below.
1. <http://www.er.uqam.ca/nobel/grip/dr/tcm/defntns.htm>. Accessed March 30, 2004.
- ²⁰ The City of Gatineau document is available at the URL below.
1. <http://www.ville.gatineau.qc.ca/planification/1VivreenVille1.pdf>. Accessed March 30, 2004.
- ²¹ The GPI Atlantic document is available at the URL below.
1. <http://www.gpiatlantic.org/pdf/freight/freight.pdf>. March 30, 2004
- ²² The wording of the Bylaw is at the URL below.
1. http://www.crd.bc.ca/regplan/rgs/reports/2003_rgs_bylaw.pdf. Accessed March 30, 2004
- ²³ The relevant ICSC document is available at the URL below.
1. http://www.icsc.ca/issues/issue12/nl_fall2000_combo.pdf. Accessed March 30, 2004.
- ²⁴ For the UITP presentation in Shanghai, see the first URL below. For the UITP brochure, see the second URL below.
1. <http://www.wbcscdmobility.org/slides/files/28slide.pdf>. Accessed March 30, 2004.
2. <http://www.uitp.com/Project/pics/susdev/Leaflet-UK.pdf>. Accessed March 30, 2004.
- ²⁵ The English version of the indicated document is at the URL below.
1. <http://www.cite-sciences.fr/france-chine/en/chinaworld/2/c13.html>. Accessed March 30, 2004

- ²⁶ The Baltic 21 process document is available at the URL below.
1. <http://www.ee/baltic21/publicat/R8-Annex-1.doc>. Accessed March 30, 2004.
- ²⁷ For the use for California's Department of Transportation, see the URL below.
1. http://www.dot.ca.gov/hq/tsip/tspm/tspmpdf/pm10_01susdefrpt.pdf. Accessed March 30, 2004.
- ²⁸ For the use by California Polytechnic State University, see the URL below.
1. <http://planning.calpoly.edu/projects/indicators/database/transportation.html>. Accessed March 30, 2004.
- ²⁹ For the use in Texas, see the URL below.
1. <http://swutc.tamu.edu/Reports/167107-1.pdf>. Accessed March 30, 2004.
- ³⁰ For the use in Rockdale, NSW, see the URL below.
1. http://www.rockdale.nsw.gov.au/images/pdf/Transport%20Plan_2002/TransportPlan2002_Part4.pdf. Accessed March 30, 2004.
- ³¹ The relevant part of the *TDM Encyclopedia* is at the URL below.
1. <http://www.vtpi.org/tdm/tdm67.htm>. Accessed March 30, 2004.
- ³² The use for the Western Australia government is at the URL below.
1. <http://www.dpi.wa.gov.au/metro/policies/southmetro/issuesandoptions.pdf>. Accessed March 30, 2004.
- ³³ The use by the Victoria Local Government Association is at the URL below.
1. <http://www.vlga.org.au/publications/public/items/00189-upload-00001.doc>. Accessed March 30, 2004.
- ³⁴ The use by the City of Freemantle is at the URL below.
1. http://www.freofocus.com/council/resource/2003.01.20_Council.pdf. Accessed March 30, 2004.
- ³⁵ A crude indication of use is the number of 'hits' using the Google search engine. On March 30, 2004, this was 109 for the Centre/EU definition and 54 for the shorter OECD definition, which appears to be the next most cited definition of sustainable transportation.
- ³⁶ The Centre's Sustainable Transportation Performance Indicators Project made extensive use of its definition of sustainable transportation. Reports are on the Centre's Web site at the URL below. See also the discussion of this project in the document detailed in Note 12.
1. <http://www.cstctd.org>. Accessed March 30, 2004
- ³⁷ The use by the Community Transport Association Wales is at the URL below.
1. <http://www.cymru.gov.uk/themessustainabledev/content/review/action-responses/ctaw-w.htm>. Accessed March 25, 2005.
- ³⁸ The final report of the European Commission's Expert Group on Sustainable Urban Transport Plans, December 2004, is available at the URL below.
1. <http://www.rupprecht-consult.de/download/SUTP%20expert%20group%20FINAL%20REPORT%20050128.pdf>. Accessed March 25, 2005.
- ³⁹ The GART managing director's presentation is at the URL below.
1. http://www.aalborgplus10.dk/media/a06_duchene.ppt#268,1,Slide 1. Accessed March 25, 2005.

- ⁴⁰ The Arctic Council document is at the URL below.
1. http://www.arctic-council.org/files/infopage/160/ac_outline.pdf, Accessed March 24, 2005.
- ⁴¹ ECF's comments are at the first URL below. The document being commented on is at the second URL below.
1. http://europa.eu.int/comm/environment/urban/pdf/stakeholder_consultation/european_cyclists_federation.pdf. Accessed March 24, 2005.
2. http://europa.eu.int/comm/environment/urban/pdf/stakeholder_consultation/factum.pdf. Accessed March 24, 2005.
- ⁴² Professor Timmermans' paper is at the URL below.
1. http://www.smartgrowth.umd.edu/InternationalConference/ConferencePapers/Timmermans_Transit%20Oriented%20Development.pdf. Accessed March 24, 2005.
- ⁴³ The Mo.ve document is at the URL below.
1. http://www.move-forum.net/documenti/b_05102004160305.pdf, Accessed March 24, 2005.
- ⁴⁴ Mr. Richardson's paper is at the URL below.
1. <http://www.vlga.org.au/publications/public/items/00229-upload-00001.pdf>. Accessed March 24, 2005.
- ⁴⁵ The ASI report is available at the URL below.
1. http://www.factum.at/asi/download/ASI_D21_final.pdf. Accessed March 24, 2005.
- ⁴⁶ The indicated plan for South West Perth is available at the URL below.
1. <http://www.southwestgroup.com.au/SWGUpload/Travelling%20Together.pdf>, Accessed March 24, 2005.
- ⁴⁷ The coalition's document is at the URL below.
1. <http://stcwa.org.au/>, Accessed March 24, 2005.
- ⁴⁸ For the working document for the meeting, see the URL below.
1. <http://www.elisabeth-schroedter.de/downloads/Broschuere.pdf>, Accessed March 24, 2005.
- ⁴⁹ The University of Moncton's material is at the URL below.
1. <http://www.umoncton.ca/ecosage/siteweb-pedale/en/transport.html>, Accessed March 24, 2005.
- ⁵⁰ The Detour brochure is at the URL below.
1. <http://www.detourpublications.com/about.html>. Accessed March 24, 2005.
- ⁵¹ The UITP document is at the URL below.
1. http://www.railway-mobility.org/docs/uitpticket_en.pdf, Accessed March 24, 2004.
- ⁵² The IPENZ document is available at the URL below.
1. <http://www.ipenz.org.nz/ipenz/practicesupport/Sustainability-combined.pdf>, Accessed March 24, 2005.
- ⁵³ The Parsons Brinkerhoff document is at the URL below.
1. http://www.pbworld.com/news_events/publications/network/issue_59/59_12_baca_case_study_outcomes.asp, Accessed March 24, 2005.
- ⁵⁴ The Summit's program, which featured the definition, is at the URL below.
1. <http://www.cutaaactu.ca/pdf/YouthSummit2004.pdf>, Accessed March 24, 2005.

- ⁵⁵ The government of Jamaica's document is at the URL below.
1. http://www.cabinet.gov.jm/psru/pdf/env_Stewardship/Fleet%20Guidance%20Document.pdf, Accessed March 24, 2005.
- ⁵⁶ The APTA document is at the URL below.
1. http://www.apta.com/government_affairs/policy/documents/trends_affecting.pdf. Accessed March 24, 2005.
- ⁵⁷ The CITE report is available at the URL below.
1. http://www.cite7.org/Technical_Projects/Interim%20Research%20Report.pdf, Accessed March 24, 2005.
- ⁵⁸ The VITP document is at the URL below.
1. http://www.viatec.ca/stss/pdf/online_final.pdf, Accessed March 25, 2005.
- ⁵⁹ The Coalition's material is at the URL below.
1. <http://www.cleancitieswinnipeg.org/SustainableTransport.htm>, Accessed March 25, 2005.
- ⁶⁰ The University's document is at the URL below.
1. <http://www.syc-cjs.org/gitp/en/resources/usaskreport.pdf>, Accessed March 25, 2005.
- ⁶¹ Dillon's document is at the URL below.
1. <http://www.regentparkplan.ca/pdfs/sustain/appendix3f.pdf>, Accessed March 25, 2005
- ⁶² The current TERM indicators can be most readily accessed at the URL below.
1. http://themes.eea.eu.int/Sectors_and_activities/transport/indicators, Accessed March 25, 2005.
- ⁶³ See the source detailed in Note 62.
- ⁶⁴ This document is available at the URL below.
1. <http://reports.eea.eu.int/TERM2004/en/TERM2004web.pdf>, Accessed March 24, 2005.
- ⁶⁵ Data relevant to Canadian aspects of the first nine of the issues discussed in the 2004 TERM report are available as follows:
1. Data on transport volumes for all modes are available from Statistics Canada (including the Canadian Vehicle Survey), Transport Canada (T-Facts), and Natural Resources Canada. Often, transport activity is estimated from fuel use.
 2. Data of air pollutants is available from Environment Canada.
 3. Data on greenhouse gas emissions is available from Environment Canada and Natural Resources Canada.
 4. Data on use of biofuels is available from Statistics Canada and Natural Resources Canada.
 5. These data are essentially those for Issue 1 above.
 6. Access to basic services is challenging from a data perspective. Data for the kind used in the TERM report showing relative access to jobs by car and by public transport within an urban region, are available for one or more urban regions in Canada through analysis of origin-destination surveys (e.g., the Transportation Toronto Survey for south-central Ontario). Also used in the TERM report for this issue transport volume data of the kind used for Issue 1 and data on the per-capita numbers of particular kinds of establishments, e.g., hospitals. The last kind of data are available to some degree from Statistics Canada and from provincial and municipal licensing authorities.
 7. Data on the relative costs of transport modes are available from Statistics Canada.
 8. The matter of internalizing costs of transport is complex, as much in terms of assumptions to be made (e.g., the value of a life lost in a vehicle collision) as for availability of data. Transport Canada's Research and Traffic Group has done recent relevant work and more may be in progress.

9. Data on Canada's transportation infrastructure and investments are available from Transport Canada. Infrastructure Canada may be developing refinements of such material that allow the ready comparisons by mode achieved for the TERM report.

⁶⁶ This document is available at the URL below.

1. <http://www.cstctd.org/english/docs/STPI%20Phase%203%20report,%20final.pdf>. Accessed March 24, 2005.

⁶⁷ Details of the SUMMA program are available at the URL below.

1. <http://www.summa-eu.org>. Accessed March 24, 2005.

⁶⁸ This report is available at the SUMMA's Web site, detailed in Note 67 (under the tab 'Deliverables').

⁶⁹ For an example of criticism of the concept of sustainable transport and the business of defining it, see the URL below.

1. <http://www.feweb.vu.nl/re/stella/Proposition/gebruikte%20stellingen%20+%20reacties.htm>. Accessed March 30, 2004.

⁷⁰ The quote is from Transport Canada's *Consultation Report*, available at the URL below.

1. <http://www.tc.gc.ca/programs/environment/sd/consult0406/rollup.htm>. Accessed March 30, 2004