Towards a post-Kyoto sustainable transport strategy

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Abstract

Two important Documents are summarized within. Focusing on GHG emissions reduction, they elaborate two scenarios and a basic objective. Concerning the measures to be taken from now to 2010, they propose a major tightening of fuel-efficiency standards for new vehicles. For the period 2010-2025, they propose rationing transport-fuel by tradable permits, as key element of the Strategy.

Our critical comments point out the high quality of the Documents and the opportunity of a complementary vision concerning the impact of the new information technologies (combining locomotion and proactive logistic management) and the objective evaluation of transportation market evolution.

Our conclusion is to collect together the necessary elements of a better conceptual and practical understanding of sustainable transportation.

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1. Introduction

The Centre for Sustainable Transportation [01], financially supported by the Government of Canada and based in Greater Toronto area, was founded in 1996. The Centre provides leadership in achieving sustainable transportation by facilitating cooperative actions, and thereby contributing to Canadian and global sustainability. In this particular field of sustainable transportation, it is at the forefront in North America and throughout the world. Along with many important publications, its current undertakings includes the “The Longer View”, a series of three nation-wide workshops on sustainable transportation in Canada. Two draft Documents headed respectively “Background Paper for a Post-Kyoto Transport Strategy” and “Draft Strategy for Transport in Canada for the post-Kyoto Period” had been submitted to discussion. The objective of this paper is to
give a brief presentation and some critical comments of these studies, referred to simply as the Documents henceforth.

2. The Documents

The Documents are authorized by Richard Gilbert, an independent consultant in urban issues who specializes in transportation among other areas. The views and analyses contained in these Documents are those of the author and not necessarily those of Environment Canada or the Centre for Sustainable Transportation.

The Documents were written before the catastrophic events of September 11. The consequences of these events, especially concerning the need to reduce oil consumption, are not specifically considered here.

The overall aim of these Documents is to provide continued discussions on how transportation in Canada can be moved towards sustainability. More precisely, the Documents follow this order. 1. Setting out and justifying three scenarios for 2010 and a target for 2025. 2. Concerned relevant data. 3. Actions required to meet the three scenarios for 2010. 4. Actions required for the period 2010-2025. 5. Concluding remarks.

For simplicity, the scenarios and target are defined in terms of reductions in GHG emissions. As indicated above, the purpose of the Documents is to help ensure that meeting the requirements of Kyoto Protocol is regarded as a beginning of the journey towards sustainability.

As a general rule, we follow here a literal transcription of selected passages of the Documents. The use of quotation marks is avoided, seeming to us to be cumbersome and useless.

2.1. Scenarios and target

Three scenarios are proposed due of the high level of uncertainty considering two selected variables: the effectiveness of Canada’s National Implementation Strategy on Climate Change (NIS) [02], and oil prices and oil availability [03].

Scenario A assumes that implementation of the NIS results in attainment of Canada’s Kyoto commitment with respect to transportation, i.e., that total emissions of GHGs from transport activity in Canada will have fallen to 6% below 1990 levels by 2010. This implies a reduction of about 40% from what might be regarded as the “business-as-usual” level in 2010.

Scenario B assumes partial effectiveness of the NIS, i.e. achievement of a 20% reduction from estimated “business-as-usual” levels.

Scenario C is based on the assumption of rising fuel prices. The NIS is assumed to be only partially effective (as in scenario B) but the higher fuel prices serve to reduce emissions of GHGs by the required additional 20 percentage points.

The target for 2025 for the present exercise is also set in terms of reductions in GHG emissions from transport (70% of the 1990 level).
2.2. Relevant data

The Documents offer relevant data on several related topics: trends in transport energy use and activity in Canada [04]; actual and projected worldwide discovery, extraction and demand for conventional oil between 1920 and 2040 [05]; trends in local pollution from transport [06]; prospects on climate change [07]. These data support the conclusion that scenario C is quite credible for the period to 2010. It could involve an 80% increase in pump prices. This could be sufficient to reduce gasoline use for personal travel by about 20% from what it might otherwise have been. The effect on freight movement may not be as strong; the effect on aviation maybe stronger.

2.3. Actions required to meet the three scenarios for 2010

The tasks become essentially those of reducing fossil fuel use for transport across Canada by 40% (scenarios A and C) or by 20% (scenario B).

Several constraints on effective action by 2010 can be noted among others: land use, rail infrastructure and attitudes to transportation. Without the spur of calamity, they could require many years, perhaps decades, to change. These constraints severely limit the methods available for reaching the 2010 target for transport.

Accordingly, the focus proposed is on means that has so far proved acceptable and effective under some circumstances, namely, fuel-efficiency for new vehicles. In order to counter potential perverse effects of the new fuel efficiency standards three ancillary measures are proposed: increase in fuel prices, incentives and penalties to encourage fleet turnover, and investments in public transit and bicycle and pedestrian amenity.

Only this kind of package of measures may have the prospect of being sufficiently effective during the current decade. Obviously, nothing of these measures should be taken as precluding the application of other measures (remove subsidies for oil production, tax exemption for employer-provided transit benefits, tax shifting, road pricing, better coordination of transport activity, car sharing, traffic calming, etc.).

2.4. Actions required for the period 2010-2025

Following the ideas established for the period before 2010, the key point is that reliance is placed on available technology. There appears then to be no such "technological fix" for the period beyond 2010. Much is promised —specifically in relation to fuel cells— but the potential of new technology seems too uncertain to depend on it for attaining of the target set for 2025. Accordingly this Strategy places reliance on measures that could work whether or not the "pollution-less" motor vehicle is developed.

Surely, sustainable transportation is not only about climate change. This is just one of several features of environmental unsustainability. The economic aspects of sustainability may be those that require the most careful attention. Continuing "business-as-usual" may in any case be more and more un-
businesslike. Therefore, three things are required in the *Strategy*: (i) that business becomes less transport dependent; (ii) that the much of the direct economic activity represented by transport is replaced elsewhere in Canada's overall economy; (iii) that in these respects Canada does not move seriously out of line with trading partners and competitors, particularly the United States. Development of these requirements is nevertheless beyond the scope of the *Documents*.

The *Documents* note also an important array of matters that should be taken into account in fashioning strategies for the period 2010-2025. Among these are increases in real transport fuel prices, increases in new vehicle prices, measures that make automobile ownership less necessary, increased use of freight by water, reducing the sprawl of urban areas, refashioning of transport activity, special attention on aviation rate of growth, etc.

As a matter of fact, the Strategy proposes a key element: *rationing transport fuel by tradable permits*. The emissions trading scheme proposed by the Netherlands government for an OECD study [08] is taken as a good example. In a well-working tradable permits scheme people would have choice. Individuals can buy or shell their allowances in permit markets.

Rationing is accepted only when there is extreme scarcity or other emergency, such as war, and then only with great difficulty. Governments can act firmly when crisis occurs. The temptation to wait until things begin to go wrong is thus understandable, but delay in the face of the inevitable can be profoundly counterproductive. This is why rationing needs before its introduction a major effort on governments' part to demonstrate the need for scarcity, and the fairness and flexibility of the tradable permit scheme. Therefore, attitude change, land use change and public transit enhancement are key complementary elements.

### 2.5. Concluding remarks

The principal aim of these *Documents* is to spur discussion about transport strategies for the post-Kyoto period, from now to 2010 and beyond to 2025. The challenges appear huge, beyond those that are ordinarily contemplated in thinking about transport futures. There is a disposition in our society to minimize such challenges, or not to engage in long-term planning at all. But there is a strong possibility that the tide of human good fortune is about to turn. Careful consideration of potential alternative options can help avoid severe adverse effects. Meeting the challenges will require resolute effective action of a kind encountered only in war and disaster. Achieving sustainable transportation will require tough measures as fuel rationing and new taxes on land.

### 3. Critical comments

#### 3.1. Preliminary note

Our comment has a conceptual character. Its focus isn't on listing objections or remarks and on discussing the accuracy of given data and figures. The aim is to deepen the fundamental orientation of the *Documents*, to discover their genuine
sense and to enrich their impact. The reason sustaining this intention is simple.
We study related literature for a long time [09]. In our view, the Documents constitute a starting point of far-reaching effect, and address an essential topic: to continue discussions on how can transportation be moved towards sustainability.
Our critical comments cannot therefore limit themselves to list more or less numerous shortcomings. This shall certainly be done as occasion arises. In this moment, profoundly convinced of the real value of these Documents, our comments come from within. Their aim is not to draw attention on debatable points of detail, but to supply complementary arguments that reinforce their solidity and their force of persuasion. The Documents propose an original and exemplary Strategy. We don’t propose another one. Our concern is to enrich this Strategy substantively, on the basis of a theoretical integrative perspective [10].

3.2. Strong points of the Documents

They are numerous and significant. Following is a brief list without any pre-established order.

1. The Documents are elaborate, informed, well written, enlightening, moderate and constantly enriched with instructive notes and references. Their scholarly excellence is never a pure academic exercise, but a collection of sound studies oriented towards practical action in realistic and credible terms.

2. The Documents have the merit of focussing on a question of great actuality and in addressing a fundamental objective clearly formulated: to found a problem-solving Strategy that proves promising and realistic.

3. The Documents retain the original precaution of aiming a post-Kyoto plan of action wisely divided in middle run (2000-2010) and in long run (2010-2025).

4. The Documents draw particular attention on strategic factors of great significance, namely, the evolution of demographic data and of petrol production, and the climate change issue. They are also specifically sensitive to influential official texts, like “Canada’s Implementation Strategy on Climate Change” [02], “Kyoto Protocol” [11], “Word Business Council for Sustainable Development” [12], OECD’s Synthesis Report: Environmentally Sustainable Transport” [08].

5. The Documents carry an enviable societal weight appulse. They are the product of an internationally acknowledged research organization. They have been largely diffused, discussed and approved by a great number of scholars and specialists working in private and public sectors as well as in academic and associative organizations.

3.3. A complementary vision

We agree with three essential points of the Documents. (i) Fixing GHG’s reduction scenarios for 2010 and 2025, and a target for 2025. (ii) Focusing first on a major instrument and implementing several proposed ancillary and complementary measures. (iii) Not relying inconsiderably on unproven technology (in a short and middle run perspective). On this basis, our concern is to reinforce the capacity of persuasion of the Strategy proposed by the Documents, in drawing particular attention on two important issues: the potential
contribution of new technologies and the factual foundation of the Strategy, according to transportation market conditions and requirements.

3.3.1. New technologies

The Documents are evidently in keeping with the development of new technologies as an important element of transportation supply management [13]. An outstanding CST leader affirmed in a private mail. “We have to make a quantum jump in technology into the next phase of transportation in North America”. The Documents agree, judiciously, under well-determined conditions.

First, new technologies could contribute a large part of what is required, but that about half of the effort will have to come from changes in transport activity. Second, we need proven, already being marketed technologies (e.g. gasoline-electric hybrid vehicle [14]) and when other ones seem too uncertain to depend on them for attainment of the target set for 2025 (e.g. fuel cells [15]), they will be welcome when full developed. We agree these premises completely. And it is in this sense that we submit some complementary reflections in order to improve the practical impact of the Documents.

Surely, fixing GHG reduction scenarios, key instruments and a target for 2025 is an extremely valuable objective. And we have to do every effort to attain it. But we can complete things by adding another kind of target and another key instrument.

Complementary target. 2100: the world will be equipped with thousands of kilometers of ultra high-speed train railways, in order to attain a proportionate equilibrium between road, rail, air and water transportation. 2025: several ultra high-speed trains will grow very popular in North America. 2010: first steps in this direction will be accomplished; to put into service one or more of such trains, endowed with a powerful effect of demonstration for launching an endless chain. N.B. 2100, a term fixed by the well-known IPCC, completes and enlightens fairly the 2010 and 2025 perspectives [16].

Complementary key element. We refer to changes that combine two kinds of new information technologies, high-speed electric rail and proactive management. This grouping addresses a quite essential feature on the way of sustainable transportation. Let us note some basic insights on each of them briefly.

3.3.1.1. High-speed electric rail

Salient features High-speed electric rail constitutes a new technology proven and available. There are two grand types, HST (high-speed trains, like the French TGV [17] with peaks of 200 mph) and MLT (magnetic levitation trains, like the German Transrapid [18] with peaks of 350 mph). Both begin to call serious attention of important groups in American private and public sectors [19].

Advantages MLT more particularly presents important advantages. Very high speed. Lightness. Low noise. Inter-city and intra-city freight and people carrying capacity. Easy inter-modal connections. Entirely electronic equipment for locomotion and for responding to customers needs. Efficient use of distributed electricity. Little environmental impact if the electricity is produced from renewable resources. Low energy consumption and low operating costs. No emission of combustion gases. High security standards. Underground, surface and
elevated versions. Minimal land consumption and no division of the landscape. Operational under extreme weather conditions and high protection from snow and ice. Competitive with private cars for commuting needs and with aviation short trips, the environmentally most damaging of all transportation modes [20]. At middle and long run, systematic introduction of MLT could be the best way to see congestion and pollution out of metropolitan areas all over the world.

**Requirements.** The best technology proves abortive without the aid of an array of complementary devices. Technological innovation is extremely expensive. It has to overcome numerous and tricky obstacles and implement indispensable requirements and conditions. In this connection, we discuss below briefly the specific need of logistic proactive management and, more generally the objective foundations of great societal innovation.

### 3.3.1.2. Proactive logistic management

**Salient features.** Technological innovation must be accompanied by a solid structure of proactive management, founded on advanced logistic and endowed with economic means in keeping with the total amount of investment in machinery. *Proactive management* [21] is the identification mark of a dynamic business. It takes into consideration the actual situation and the complementary elements needed to make its operations more profitable. Its specific function is to organize promotion and information in order to attract all potential customer and to retain them surely. Founded on information technologies, telecommunication, e-commerce, marketing and advertising, electronic ticketing, etc., *advanced logistics* [22], includes all operations destined to master the supply chain, from planning to delivering and after-sale service. Its function is to assure the best product, at the best place and moment, and at the best conditions for entire satisfaction of actual and potential customers [23].


**Requirements.** The costs of real proactive management are extremely high. All potential customers must be perfectly informed and expensive cost-benefits analysis must provide the optimal ratio between investment, promotion and development. Carmakers do it almost perfectly. Analysts put forward that 10% [24] of their turnover (billions of dollars) pay advertising costs. These costs are only a side of the coin. They are engaged because they generate profits. It must be added that as matter of fact, the implementation of new locomotion technologies isn’t a simple matter of costs and benefits. Let us therefore complete our views with some thoughts on societal innovation.

### 3.3.2. Objective evaluation of transportation market evolution

Transportation constitutes a ubiquitous and huge world market. The evolution of transportation’s supply and demand in the last 50 years of industrial civilization involves billions and billions of dollars. Transforming the transportation system in search of sustainability implies inevitably an immense structural modification of investment, in machinery and organization. If this modification has to be
thought realistically, it needs of course a great mass of money, and as Max Weber brilliantly contended [25], a highly motivating idea. What idea can motivate and support so a monumental, unparalleled overturn?

The Documents propose the absolute necessity of such a great transformation. They suggest wisely that the idea that moves it, comes essentially from a combination of circumstances (intolerability of continuous air pollution, growing scarcity of oil-fuels, long term awareness and required resolute action of a kind encountered only in war and disaster). It can be added that among these circumstances, there is another one that deserves particular attention. It is indeed a kind of philosophic-historical idea that must be put in question. Let us explain it briefly.

3.3.2.1. The basic idea of the actual transportation system. The actual transportation system is not foundation-less, although its basic prevailing idea is mostly implicit. Everyone does agree indeed that huge investment combining cars, petrol and roads is the best way for years to come to satisfy the gigantic demand of land transportation. And everyone knows as much that this is a most powerful and rewarding business. This business is so heavy, so diversified and so solidly accumulated during long decades, that no alternative system is henceforth conceivable. Big technological and managerial changes are above our forces. Radical alternatives are therefore not available. The particular case of expanding electric high-speedy trains constitutes at best a marginal initiative. Massive introduction of these trains is absolutely unimaginable for two simple reasons: it would be exceedingly expensive and it is so poorly popular that it would never pay. Surely, many see the conventional land transportation system more and more polluant< congestive and pricey. It is however hopeless. A radical change seems definitely impossible.

3.3.2.2. Questioning this idea. The idea is strongly established and seems invincible. In fact, it is anti-historic, simplistic, desperately backward and source of a paralyzing inertia [26]. Above all, it is very far from being objective, justified and convincing. Why?

Cars and petrol cannot be a historic exception. Before Thomas Edison it was evident that humans would ever light up with candles. Cars and trucks have proliferated like typewriters did, quite abundantly. But typewriters were replaced by personal computers in a very short time, just because the computers became affordable and a better choice. The history of technological advancement gives countless of such examples. This advancement isn't the fruit of neither positive nor negative convictions, but the consequence of important investment made with profit expectation [27]. This is why freight and people will be transported massively by high-speed electric trains, just when they will be made affordable and will constitute a better choice than cars and trucks.

Technological shift towards high-speed trains is very costly at each stage of their life-cycle (invention, application, commercialization, diffusion, saturation, senescence) [28]. Each stage requires funding, but only "learning by doing" allows costs of technology decrease exponentially and make innovation possible. Should the new system be more costly or less cost-effective than the
conventional one? Who can assure it accurately? Really, the famous prevailing idea seems to lie on a very weak basement and doesn’t support an objective judgement.

3.3.2.3. A problem solving issue. We have on the one hand, high-speed electric trains and advanced proactive logistic management technologies that could provide important environmental and social benefits and respond to the search for alternative solutions towards transportation sustainability. We have on the other hand, a general conviction on the untouchability of our land transportation system, a seminal idea truly anti-progressive and totally unproved.

There is maybe a way to overcome this divergence surely and definitely. Three interdependent elements are required from now on, urgently. (i) A comprehensive study that (continuing and completing CST Documents), elaborates a Strategy, at short, middle and long term, on a transportation renewal, by massive and progressive implantation of high-speed electric trains combined with proactive logistic management. (ii) An unbiased assessment (environmental, social, political, economic and financial) of this Strategy applied to a concrete implantation plan, endowed with a powerful demonstration effect. (iii) A firm engagement in lobbying appropriate public and private experts and decision-makers, in North America quite particularly, in order to promote a substantial analysis of this Strategy and to fulfill its implementation if preliminary work is proving positive.

4. Conclusion

We aimed to collect together the necessary elements of a better understanding, conceptual and practical, of a Strategy that leads effectively toward sustainable transportation in a social and economic development perspective. We urgently need a serious effort in R&D on progressive and massive implementation of high-speed trains and proactive logistic management. We have to apply plenty of mitigation measures, but a global transformation is indispensable to serve a new transportation market expanded all over the world. We have all what is required for collaborate with experts and prominent decision-makers to fight inertia and to free ourselves from the constraint of outdated products and procedures. We can so rebuild freight and persons mobility, perfect renewable energy resources and at last meet essential requirements of contemporary society. A better understanding of this basic strategic action is a *sine qua non* condition to elaborate decision support measures involving one of the greatest challenges of our time.

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