



Transportation – The Way We Move Part II

This is part two of a two part Environment and Energy Bulletin that explores the topic of transportation. Part one focused on the context, statistics and some key issues that set the stage for part two, a high level discussion of policy options for managing transportation and related infrastructure issues going forward.

In this second Environment and Energy Bulletin we briefly examine approaches for managing the environmental impacts of transportation, including reducing fuel subsidies, adopting low carbon fuel standards, reforming urban planning, deploying new technologies, and using fiscal instruments to drive improved efficiency and lower emissions. These measures fall into four main buckets: transportation demand management/mobility management, urban planning, regulation and moral suasion/advocacy.

British Columbia's geography has meant that for much of its early history access to resources located around a smattering of isolated communities was largely by ship, with some interconnected wagon trails. The invention of the steam engine and more advanced communications methods facilitated the development of railways, connecting BC to the rest of Canada. Arguably, the completion of the Canadian Pacific Railway in 1885 was one of the most important pieces of transportation infrastructure in the country's history. The emerging network of infrastructure since then has enabled BC to become a leading supplier of primary resources. Today, without shipping, highways, railways, air transport and public transportation, we would not be able to realize the benefits from our bounty of resources or from the proliferation of modern knowledge economy-related services.

But as shown in the previous Environment and Energy Bulletin, the issues we face in transportation are complex. The sector accounts for almost 40 percent of the province's greenhouse gas emissions (versus 25 percent for Canada), and globally it will be responsible for almost 100 percent of the oil and refined petroleum products consumed in 2035.¹ Overall transportation is the biggest consumer of energy, as moving people and goods is fundamental to the functioning of the entire economic system. Transportation falls under the purview of multiple levels of government which can lead to a clash of interests and different perspectives touching on policy, regulation and operations. There has been declining investment over the past couple of decades in all aspects of maintaining the transportation system, which now requires large quantities of capital to build, operate and maintain infrastructure – roads, bridges, tunnels, and public transit. As somewhat of a counter trend, BC has taken steps to upgrade and expand the Lower Mainland's transportation system, in particular, with sizable investments over the past several years in the Port Mann Bridge/Highway 1, the Canada Line, the South Fraser Perimeter Road, now and the Evergreen Line. However, new funding models are needed to deal with future

¹ The expectation is that oil and refined petroleum products will also be dominate in BC's transportation sector.

transportation requirements in a world where governments are strapped for cash.

Transportation is also a source of other local air emissions and health related issues. Increasingly, not only how we transport but what we transport is a concern to people living in densely populated urban centres, as well as in some smaller communities through which major rail and road arteries pass. At the same time transportation is vital to any successful economy, and specifically for BC where it occupies an even more critical role given that the province depends on trade and serves as Canada's primary gateway to Asian markets. Getting goods and people to market is not optional. As was pointed out in Part I, there is no magic solution to the kinds of transportation-related issues we are grappling with. It will be difficult to change our habits. Change will require collective action and a shift in focus towards valuing mobility versus being fixated on a particular mode of moving people and goods.

What are the Options/Approaches?

While the options for managing transportation are not reviewed extensively in this paper they generally fall into four categories: transportation demand management (TDM) or what is now often referred to as mobility management (MM), urban planning, regulation and moral suasion/education.

TDM/MM is a general term for strategies that result in more efficient use of scarce transportation resources, as opposed to expanding roads, airports and other motor vehicle facilities. Mobility management emphasises the movement of people and goods, particularly in congested urban areas.² The range of TDM/MM actions and strategies includes: alternative work schedules to reduce traffic flows at peak times; flex time and

teleworking; bicycle improvements and bike-transit integration; park-and-ride and car sharing; pay-as-you-drive vehicle insurance and ridesharing; pedestrian infrastructure improvements; diversification with small-wheeled transport; and various other transit options. TDM/MM also may include financial incentives and disincentives such as congestion and distance-based pricing (i.e., road pricing), fuel taxes, high-occupant-vehicle priority lanes, parking pricing, speed reductions, street reclaiming and vehicle use restrictions.

Urban land use planning is becoming a more important area that merits attention if we want to make progress toward having healthy communities with a flourishing business sector. The reason is that by 2050 there will be as many people on the planet inhabiting urban centres as are alive today (7 billion+).^{3,4} On our current path, urban transportation-related energy consumption is expected to double by 2050; by then, even with technology improvements, the world's population will collectively emit nearly 1 billion tons of CO₂e annually, largely from private motorized travel.⁵ Car-based transport in urban areas as it exists today will not be sustainable in many heavily populated urban areas.

Interestingly, the [Massachusetts Institute of Technology Cities Science](#) lab is initiating a number of relevant research projects touching on urban analytics and modeling, incentives and governance, mobility networks, place of living and work, electronic and social networks, and energy networks – all in an attempt to influence a “data-driven approach to urban design and planning.” In 2013, the International Energy Agency and the Organization for Economic Co-operation and Development published [Policy Pathways: A Tale of Renewed Cities](#) to raise the profile of the transportation-energy link and suggest some practical policy solutions. This

² [Mobility Management](#), Todd Litman, Victoria Transport Policy Institute.

³ [Population growth](#).

⁴ [World Health Organization](#).

⁵ [Policy Pathways: A Tale of Renewed Cities](#), IEA, 2013.

study provides an extensive review of transport related issues in more than 30 cities around the world. It notes that land use planning along with MM will generate the greatest benefits since they recognize the structural reasons of why and how people move in a city.⁶

Mode	Capacity (users/hour/lane)	Speed	Space (m ² /user)
Car (expressway)	3,000	40	47.0
Car (urban street)	1,050	12	40.0
Motorcycle	2,400	12	17.5
Pedal/Cycle	5,400	12	8.0
Bus (55 seats)	7,700	10	4.5
Tram (250 seats)	24,000	10	4.5
Metro Rail	40,000	25	2.5
Bus/Train (150 seats)	18,000	10	2.0
Pedestrian	23,500	4.7	0.7

Regulation includes such things as implementing carbon content fuel standards and fuel efficiency standards for new vehicles, establishing and levying taxes (carbon and fuel), setting air emissions standards, and of course the normal safety, product and licensing related regulations. For the most part regulation of transportation has been about product standards and safety, with environmental protection mainly addressed during construction of infrastructure. It was not until 1975, largely in response to the 1973 international oil embargo and the related price spike, that the United States first implemented Corporate Average Fuel Economy (CAFE) standards, with 1978 being the first model year these were applicable. The standard rose to 27.5 miles per gallon by 1985. No further increases were legislated until 2007. New CAFE

standards applicable to the 2017 model year will increase to 54.5 mpg or 4.3 L/100 by 2025. Canada has agreed to adopt the same standards as the US. The success of these standards will depend in part on consumer preferences, and there is some skepticism that the goals set by policy-makers will actually be achieved.⁷

In terms of renewable and low carbon fuels (LCF), California adopted the first standard in 2007, followed by the European Union in 2009 ([Regulation \(EC\) No 443/2009](#)) which set CO² limits for cars rather than mandating fuel standards per se. LCF standards put the burden of greenhouse gas reductions squarely on fuel suppliers. Unfortunately, this emphasis is misplaced since fuels (generally) are responsible for only one-sixth of total life-cycle GHG emissions. Of interest, in September 2013 the EU voted to reduce the food-crop content of biofuels because of concerns about both their carbon content and displaced food crops.

Taxes in various forms both generate revenues and send signals about society's values. The debate over whether the BC carbon tax has reduced fuel consumption is discussed in various papers prepared by the Business Council. Suffice it to say that, at a minimum, such taxes do provide a signal of intent and have some influence on consumer and business behavior at the margin. Taxes of any kind must be used with caution in a small export-oriented economy like British Columbia. In the case of the BC carbon tax, we must be careful that we don't put ourselves in an uncompetitive position by raising energy costs here well beyond those in other North American jurisdictions.

⁶ [Land Use Planning and Urban Transport](#), Rudolf Petersen, Wuppertal Institute, 2004 – Sustainable Urban Transport Project.

⁷ Reducing Transportation GHG Emissions in Canada: A Dialogue on a Lower Carbon Future – Toronto Roundtable.

What Have We Done?

Keeping a focus on the environment, which in transportation is largely about managing impacts from construction, land use trade-offs, local air emissions, and greenhouse gases, British Columbia has experimented with a number of transportation-related actions in recent years.⁸

- Time and funding limited incentives for both clean energy vehicle purchases and building modifications (e.g., to support electric vehicles).
- Marine and port installations that enable cruise ships to turn off their diesel engines when docked, and electric plug-in options for port trucks to reduce fuel use (e.g., no idling) and local air emissions.
- Implementation of DriveBC, a route planning tool that allows drivers to connect and view main highway roads for congestion and to plan alternative routes.
- Adoption of a Low Carbon Renewable Fuels regulation aimed at decreasing the carbon intensity of transportation fuels by 10 percent by 2020, with compliance having started in July 2013.
- Research, development and market testing of hydrogen and natural gas buses.
- Investment in public transit, with a focus on Metro Vancouver.
- Implementation of a carbon tax that started at \$10 per ton of CO₂ equivalent GHG emissions in 2008, rose steadily to reach \$30/ton in July 2012, and has now been frozen for five years.

Challenges With What We Have Done

On the whole, these are laudable steps but overall they are not a full solution given the magnitude of GHG and other air emissions stemming from transportation. Furthermore,

while it is natural to focus on industry, in BC households and consumers are a big part of the equation. For example, personal vehicle use represents 40 percent of the province's GHG emissions. Granted, the non-point source nature of these sources of GHGs makes them difficult to manage, but we still need to question the generally accepted view that "industry" can and should bear most of the costs of managing greenhouse gas emissions overall. This is a false premise in the case of transportation - individuals have a significant role to play.

In terms of the listed initiatives themselves, vehicle and related building incentives to enable electric vehicle plug-in will have been available for about 2.5 years by May 2014, which is the end date of the program. This timeframe is insufficient to have any meaningful effect on consumer choices. Investment in a vehicle is a major household decision with 5-15 year implications. A short-term program, therefore, is likely to capture only those who would have been making a purchase during that time anyway, or who have sufficient disposal income to make a choice for other reasons. Second, the program chooses a technology type – electric. But should it be government or automobile manufacturers who provide incentives to consumers? The Business Council suggests that government's role is to make sure the infrastructure is there to enable the market to evolve in the desired direction, rather than purporting to select a preferred technology. Route planning and related tools are helpful if they are easily accessible and useable. DriveBC is a good way to inform drivers about highway conditions. The next step would be to encourage the development of a mobile device application that could be adapted to major urban centres. After all, congestion mainly occurs in urban centres where most of British Columbians live. These applications could take advantage of an emerging smart grid of cameras, GPS, coordinated traffic lights, other sensing technology, etc. This might set the

⁸ [Making Progress on BC's Climate Action Plan.](#)

stage for the introduction of autonomous vehicles, the basics of which we already use – cruise control, auto-parking. Such vehicles could help to facilitate a transformation of cities and of the movement of goods and people. Car manufacturers are actively experimenting with this technology.

More and more of the world's population is living in cities, which by 2050 are likely to house 7 of every 10 people – that is, at the upper end, about as many people who are on the planet today will be living in cities by 2050.⁹ How we look at cities and the role of proactive urban planning will be critical to how we move people and goods and manage transportation issues generally. In particular, the nature of work is changing, partly as a result of rapidly evolving mobile communications. What is lagging is the cultural acceptance and legal context that would help society shift away from the traditional “all in one place” working environment and suburban-oriented automobile dependent land use. There is some evidence in Vancouver as well as in the academic literature that increased density in urban regions has the effect of making forms of transportation other than personal vehicle use more attractive.¹⁰

Low carbon fuels (LCF) have a place within the basket of fuel choices now offered to consumers. BC's LCF standard, however, is complex and costly relative to other greenhouse gas reduction options.¹¹ In particular, the development of the technology and markets for the required compliance paths (i.e. very low carbon intensity biofuels, alternate fuel vehicle technology, electric vehicles) generally lies outside of the control of BC's transportation fuel providers. Original

equipment manufacturers' blending limits and the lack of available low carbon intensive biofuels are out of step with the aggressive compliance schedule proposed by BC. Meeting the provincial government's LCF objectives will require a large number of different alternative fuel vehicles and a supporting infrastructure, which currently don't exist. The increasing number of governments worldwide that are backing away from support for biofuels calls into question the wisdom of the LCF-type regulations now being implemented in BC.

As for BC's carbon tax, the Business Council believes there has been some reduction in fossil fuel use attributable to the tax, but less so than is claimed by some environmental organizations. In a [recent article](#) we observed that for “vehicle owners, the carbon tax translates into an extra cost of 6.7 cents for a litre of regular fuel. As of late July, this amounted to about 5 per cent of the overall cost of a litre of gas purchased in Metro Vancouver. It would be surprising if motorists significantly reduced gas consumption solely due to a 5 per cent increase in the tax-inclusive price. This is especially so when one considers that gas prices can easily vary by 10 per cent in a single month (and by 2-3 per cent on a daily basis).” Several other factors apart from the carbon tax have affected reported domestic fossil fuel purchases and consumption in BC, including the steep decline in production and employment in the forest industry from 2008 to 2011; a sharp jump in cross-border shopping and out-of-province fuel purchases by BC residents; the effective mothballing of BC Hydro's Burrard Thermal power plant; completion of the Canada Line; and rising regional fuel and parking taxes in Metro Vancouver.

In terms of other regulatory responses, British Columbia has very little influence on vehicle standards. Canada has committed to improving both light and heavy-duty vehicle fuel efficiency standards beginning in model years 2017 and

⁹ [World Health Organization, Urban Population Growth.](#)

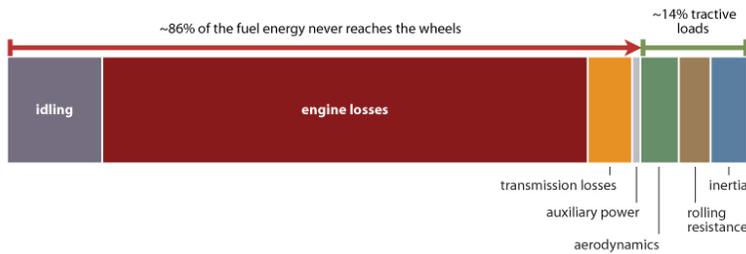
¹⁰ [Land Use Planning and Urban Transport](#), Rudolf Petersen, Wuppertal Institute, 2004 – Sustainable Urban Transport Project.

¹¹ That is, the abatement of one ton of CO₂ through the standard is very costly measured against other options for reducing emissions.

2014, respectively.¹² These regulations align with action taken in the US, which makes sense given the integrated vehicle market and Canada’s role as a technology taker in the realm of automobiles.¹³ However, as pointed out in a recent discussion on reducing transportation emissions facilitated by the Public Policy Forum, Canada may be able to support “product development and automotive supplier innovation” as well as a niche market for advancement in diesel technology.¹⁴

In terms of air emissions, British Columbia has dealt effectively with air quality concerns in the Metro Vancouver and Fraser Valley regions. Any additional measures to increase the stringency of standards (i.e., lower limits) have to be weighed against the additional costs to businesses and consumers judged against the likely very minor incremental gains in air quality improvement.

Energy flow through a typical internal combustion engine drivetrain



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Conclusion

Given the importance of transportation to commerce, trade, individual mobility and personal convenience, governments all around the world and industry are directing more attention to transportation-related issues. The automobile is inefficient, wasting over 70 percent of the energy it uses. The International Energy Agency has pointed out that we need to be more energy efficient, despite the continued discovery of new sources of fossil fuels.¹⁵

The Business Council is initiating a review of infrastructure policy and financing, which will include a sub-theme of transportation. More fundamentally there is a need to rethink how we move.

“For personal transportation systems to sustain quality growth, systemic imbalances will have to be eliminated and business models updated. The focus must be on both business performance and broader societal impacts, delivering marketable performance and wider societal benefits, and meeting the changing expectations of all stakeholders. The future system needs to offer low-energy consumption, low emissions, and safe, modern personal transportation that co-exists with other forms of individual and collective transportation.”¹⁶

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¹² [Regulations Amending the Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations](#) and [Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations](#)

¹³ That is we receive technology, developed elsewhere, and adapt it to our own needs, rather than developing its own unique technology.

¹⁴ [Public Policy Forum](#).

¹⁵ <http://www.thetelegram.com/News/Local/2013-09-26/article-3406745/Bay-du%E2%80%88Nord-biggest-find-outside-Norway%3A-Statoil/1>.

¹⁶ World Economic Forum, [Global Agenda Council on Personal Transportation Systems 2013](#).