Business Council of British Columbia

Building BC for the 21st Century

A WHITE PAPER ON INFRASTRUCTURE POLICY AND FINANCING

October 2014

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Highlights

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This paper is about infrastructure in BC. It reviews what infrastructure is, the importance and benefits of infrastructure and some of the external and internal factors that are shaping the demand for infrastructure services in the province. It also reviews infrastructure that has been built in the province over the past decade. Despite BC having made substantial investments in large public assets that have served the province and its citizens well, we conclude that additional infrastructure investments are necessary to support residents' quality of life and improve BC's competitive position. The paper touches on some future infrastructure requirements, but is focused more on developing greater capacity in BC to build necessary infrastructure in an efficient and timely manner. To this end, the paper is also intended to build awareness that significant and sustained investment in infrastructure will be needed to keep the province competitive, grow our economy, enhance well-being, and protect the environment.

The paper covers economic and social dimensions of infrastructure assets. For discussion purposes, a broad definition of infrastructure is adopted: the set of elements, usually physical and structural, that supports the day-to-day functioning of the economy and society. Collectively it is the backbone of modern life and at the heart of both local and global commerce. Most aspects of infrastructure are touched on here: the private and public sector dimensions, social and economic infrastructure, and the infrastructure mandates across different levels of government are all covered. However, a focus on large economic infrastructure pertaining to transportation and transit emerges, as this is an area that is especially important to prosperity and our future economic development. It is also an area where the provincial government has a high degree of control in the planning and building of assets.

Many observers argue that governments in advanced countries often are not well-placed to meet growing and increasingly complex infrastructure needs. And to some degree this is true in BC. A major impediment is constrained public budgets, which have been the traditional source of most infrastructure finance. Population growth, an aging population, increased urbanization and congestion, escalating demands for healthcare and other services, slow economic growth, and environmental issues are all straining government resources. In the wake of the 2008-09 financial crisis and great recession, fiscal prudence has become a dominant focus for most governments across Canada. In BC, the provincial government has balanced its operating budget and is working to reduce the ratio of taxpayer-supported debt to GDP.

Adding to the complexity of financing large capital projects is the fact that voters seem increasingly reluctant to pay higher taxes or fees. If the value of an investment is evident, citizens may be willing to pay more, but the value proposition must be clearly articulated to secure public support. An especially important consideration for a small, trade-oriented jurisdiction such as BC is the fact the world has become more competitive. To succeed in the global marketplace, BC must have top quality infrastructure that supports the development of human capital and facilitates business operations and trade. Growing trade and increased economic integration are also fuelling the need for improved infrastructure.

A myriad of new public and private infrastructure will be required as will substantial expenditures on upgrading and refurbishing existing assets. The Asia Pacific Gateway, however, will remain an infrastructure

top priority. Connecting North America with Asia has become a very significant and very strategic line of business for British Columbia. Ongoing population growth in the lower mainland region means additional investment in public transit is also a priority.

Following the review of factors shaping BC's infrastructure requirements and some of the challenges, including a constrained fiscal environment, we identify a number of recommendations to help advance a coherent and proactive approach to making sure infrastructure is built in a timely and efficient manner. The recommendations are grouped into five themes:

Theme 1: Develop a long-term and comprehensive infrastructure strategy for the province. Such a strategy would support and enable long-term planning and prioritizing of infrastructure investments, in the process helping to make infrastructure decision-making less reactive and more thoughtful and proactive. It would also facilitate coordination of infrastructure planning and needs assessment across different levels of government and foster stronger governance. Another benefit of a long-term strategy is that it would provide a "pipeline" of projects and signal the government's commitment to investing in infrastructure going forward. Both of these factors would help to mitigate some of the barriers to investing in infrastructure expressed by large institutional investors. Many other advanced countries have adopted long term planning strategies that help facilitate the prioritizing of projects.

Theme 2: Focus on leveraging financing opportunities to secure and maximize a stable flow of funding for infrastructure development in BC. The main objective here is to increase access to stable flows of financing for infrastructure needs and move away from badly needed projects being postponed due to a lack of financing, as has occurred in the past. An important issue in this area is to address concerns and challenges that inhibit private sector investment. The government must also re-visit the question of the capacity for additional public financing of infrastructure projected that can help to strengthen BC's economic performance. Here we highlight the fact that historic low borrowing costs and the fact that BC has a modest debt-to-GDP ratio suggests the province should explore the potential to ramp up capital spending on priority infrastructure projects over the next 2-3 years.

Theme 3: Fully engage with the federal government and leverage federal government financial support. Here we note that the federal government has more tax raising capacity than the provinces and is better positioned than most provincial governments to fund capital projects. The role of the Asia Pacific Gateway as a national strategic asset suggests the federal government should commit to ongoing funding for capital projects related to goods movement and to improve transportation services for Canadian business sectors that depend on the Gateway.

Theme 4: Improve efficiency through use of demand management techniques and by broadening the user-pay philosophy for public infrastructure. The user-pay principle is becoming better understood and more accepted by the public for everything from metering of water to road tolls. It is increasingly viewed globally as an efficient and equitable way to finance infrastructure. We note that it may be appropriate to first expand the use of tolls in the lower mainland, with a focus on improving equity across the region.

Theme 5: Improve the regulatory environment to maximize private infrastructure investment.

Building BC for the 21st Century

A White Paper on Infrastructure Policy and Financing

1. Introduction

Infrastructure – transport networks, electricity, telecommunications, water distribution systems, sewers, hospitals, schools, etc. – is essential for economic and social development. The importance of infrastructure to the provincial economy cannot be overstated. Infrastructure is not an end in itself. Rather, it is a means for ensuring the efficient delivery of goods and services that promote prosperity and growth and contribute to a high quality of life. Looking back, the infrastructure assets developed in British Columbia over the past several decades has provided significant social and economic benefits. Looking ahead, infrastructure will continue to play a vital role in BC's economic and social development. Arguably, the importance of infrastructure will increase as economies become increasingly connected globally and as our society becomes ever more dependent on the smooth functioning of infrastructure services.

To the casual observer it may seem that we have adequate infrastructure in place today. After all, British Columbia is blessed with a solid and substantially improved road network, excellent port facilities, modern airports (including the award winning YVR), leading telecommunications and wireless capacity, and generally high quality education and health care facilities. The reality, however, is that the demand for infrastructure services will continue to expand in the decades to come. Factors such as global economic growth, increased trade flows, technological progress, population growth, urbanization, road congestion, and the need to nurture and support economic growth in BC will all place more demands on existing infrastructure assets and create the need for further investments.

There are many challenges in this area. Across most advanced economies infrastructure systems are aging, public finances are under pressure, there are differences in views on infrastructure priorities and how infrastructure should be developed and operated, and infrastructure financing is becoming more complex. When one considers the full range of economic, social and environmental forces bearing down on infrastructure needs it is clear that current financing, regulatory and planning frameworks are inadequate to respond to the challenges that infrastructure development faces over the next 20 to 30 years.

2. Purpose of The Paper

This paper focuses on developing the capacity in BC to put required infrastructure in place in an efficient and timely manner. It is also about building awareness that significant and sustained investment in infrastructure will be needed to keep the province competitive, grow our economy, enhance population well-being, and protect the environment. Bridging the existing and potentially expanding infrastructure gap is necessary to avoid costly congestion, unreliable supply lines, deteriorating municipal services, growing environmental problems and diminished competitiveness. Perhaps even more fundamentally, investment to maintain existing infrastructure and to develop new infrastructure assets is imperative to improve living standards and the quality of life. The paper considers options for increasing infrastructure investment in the province. Given limited fiscal resources, the critical importance of infrastructure, and the many demands that exist in this area, the Business Council concludes that adopting a longer-term strategy for infrastructure investment would help to ensure BC's future infrastructure needs are met and that scarce capital resources are efficiently deployed for the maximum benefit.

This paper does not set forth a list of priority projects. Inevitably, some projects are mentioned, but the main purpose is to advance an agenda in support of strategic and timely infrastructure maintenance and development. The recommendations are specifically designed to engage public policy and opinion leaders to embrace the concept of a forward-looking strategic infrastructure plan in British Columbia.

Most aspects of infrastructure are touched on here: the private and public sector dimensions, social and economic infrastructure, and the infrastructure mandates across different levels of government are all covered. The paper does not, however, address energy infrastructure issues in a significant way. Energy is clearly a central element of modern infrastructure, and in BC it has become an especially complex policy area. The development of energy resources and infrastructure was the subject of a separate paper published by the Business Council in 2013.[1] Because of the broad range of infrastructure topics, much of the discussion in this report is at a relatively high level. The one area that is examined in more detail is economic infrastructure related to the movement of goods and people, because of its strong and direct relationship to economic development and competitiveness. Transportation is also a domain in which the province has considerable latitude to define and implement a substantive policy agenda.

[1] Business Council of BC, "Building New Energy Advantages for BC: Understanding and Benefitting from the Transformation of BC's Energy Marketplaces A White Paper on Energy Policy in BC," (October 2013).

3. Infrastructure Defined

There are many definitions of infrastructure. In today's economy, infrastructure is generally thought of as encompassing a diverse range of structures and networks used by citizens and industries in the production and consumption of goods and services. One widely-cited definition that is particularly relevant in an economic sense characterizes infrastructure as "large capital intensive natural monopolies such as highways, other transport facilities, water and sewer lines, and communications."[2] Today some definitions of infrastructure are more comprehensive and encompass social infrastructure assets and services, including structures and networks related to the delivery of health care, education and social services. Using a broad definition, infrastructure is the set of elements, usually physical and structural, that supports the day-to-day functioning of the economy and society.[3] Collectively it is the backbone of modern life and at the heart of both local and global commerce.

Characteristics of Infrastructure

There are many features of infrastructure that make it complicated to develop and finance and that often lead to chronic underinvestment and the emergence of "infrastructure gap" in advanced countries. Some of the features unique to physical infrastructure assets include the following:

- Infrastructure is almost always long-lived and usually provides intergenerational benefits.
- The physical capacity of most infrastructure can usually be adjusted only in large increments.
- There tends to be high initial fixed construction costs, but relatively low operating costs or low marginal costs of supplying additional services once the assets are in place.
- Infrastructure carries with it long-term operating, maintenance and replacement costs.
- Scale, regulatory processes and stakeholder consultations can result in long lead times to develop new infrastructure.
- There may be "externalities" associated with the use of infrastructure, which are not reflected in the charges applied for services (for example, drivers of vehicles contribute to road congestion and typically do not pay the full price of using roads).
- Infrastructure may have local or broader impacts when constructed, which can give rise to legitimate concerns within communities about possible negative consequences.
- Often there are no alternatives or substitutes for the infrastructure services provided (hence the popularity of definitions of infrastructure that make reference to monopolies).
- Investment in infrastructure is likely to be "suboptimal" in the absence of government intervention and/or efficient pricing of services, owing to the presence of market failures.

[2] Gramlich, E.M. (1994). "Infrastructure Investment: A review essay," Journal of Economic Literature (32), pp. 1176-1196 (September), p.1177.
[3] Royal Roads University, Community Research Connections, Sustainable Community Development.

- Potential revenues from infrastructure can be and often are regulated in some way. Pure private sector infrastructure providers such as railways are regulated, while in the case of some public-private partnerships government generally retains the legal right to control pricing.

Another consideration that is seldom discussed in the literature concerns capacity. Instead of operating at peak loads or on what economists call the "efficiency frontier," infrastructure is often built and operated with some degree of spare capacity in order to deal with expected future growth in demand for services. For instance, the expansion of facilities at Port Metro Vancouver included spare capacity, which has permitted and accommodated substantial growth in build and container cargo volumes over the past decade. Similarly rapid transit systems, particular in urban regions with growing populations, need to accommodate increased ridership, a consideration that is especially relevant in Metro Vancouver. Spare capacity is frequently a necessary condition for a properly functioning system.

It is also important for policy makers and citizens to recognize that there are costs associated with not developing new infrastructure in a timely manner and/or underinvesting to maintain existing assets. It is common for governments to assume that existing infrastructure systems are adequate and that deferring decisions that entail spending additional money has little or no cost. There are many examples of this pattern in the management of highways systems and other road networks. Prior to being replaced, the Port Mann Bridge was congested throughout the day, resulting in long delays for bridge users and many millions of dollars in the value of lost time. The high level of congestion also contributed to frequent accidents, which worsened the problem. Similarly, there are currently long delays at the Massey Tunnel, especially for traffic going against the rush-hour flow which is reduced to a single lane. Goods movement is constrained along the TransCanada Highway near Golden; this is another area that requires immediate upgrading. Delayed responses or protracted planning periods also foster crowded hospitals in BC and other provinces. Some schools in the K to 12 system are operating beyond capacity because municipal planners have permitted new residential development to occur without coordinating with the province to build new schools in the area.

These examples point to the need for a more proactive, coordinated and strategic approach to infrastructure development rather than a reactive approach where infrastructure is upgraded only when it becomes severely congested, beyond capacity, and/or obviously outdated. Infrastructure must also be considered in the context of competitiveness and the quality and extent of infrastructure services provided by competing jurisdictions. YVR, for example, has to monitor and respond to the competitive threat resulting from the expansion of near-by airports such as Calgary, Seattle/Tacoma and Bellingham. Top notch schools and health care facilities are also important in sustaining a high standard of living and ensuring that BC is an attractive location for talented people.

Public versus Private Infrastructure

In most jurisdictions infrastructure investment is undertaken by both the public and private sectors. Historically, most infrastructure investment in Canada was led by the public sector. However, across the

advanced economies cost over-runs, construction delays, and a lack of innovation have been common and the performance of public infrastructure development often has been less than exemplary. As a result, since the early 1980s there has been a push in many countries for greater private sector involvement through P3s or privatization where physical assets are transferred or sold to the private sector.

In British Columbia, some infrastructure is owned, operated and maintained by both the public and private sectors. Traditional public sector infrastructure, such as major roads and highways, transit systems, water and sewer systems, and airports, has historically been provided by the state. But even in this domain we see greater private sector involvement. The Canada Line rapid transit system connecting the airport, Richmond and downtown Vancouver is a public-private partnership built and operated by a private entity. In BC, most electricity is generated and distributed by BC Hydro, which is a provincial Crown Corporation. But there are now numerous smaller-scale private power providers selling into the electrical grid. Telecommunications, cable providers and railways are squarely in the realm of the private sector. In the area of social infrastructure, most large-scale health facilities, such as hospitals, are publicly owned. But some hospitals are operated as public-private partnerships. Even in education there are a growing number of private schools in the K-12 system and numerous private sector operators in the post-secondary arena as well. The municipal sector is one level of government where most infrastructure is still publicly delivered, but here too there are a few examples of public-private partnerships for recreation centres and, more recently, solid waste management. Some municipal water systems are also privately owned and operated.

In short, for infrastructure in BC there is a blurring of the delineation between public and private sectors and, consistent with most advanced countries, the province has moved along the path of increased private sector involvement. The role of the private sector in the future development of infrastructure is an important part of any long-term infrastructure strategy. In BC, private sector participation has increased due to private-public partnerships. Partnerships BC, the Crown organization that plans and structures partnership projects on behalf of the province, is discussed in more detail below.

Quality of Life

Quality of life and well-being includes not only wealth and employment but also the built environment, physical and mental health, education, recreation and leisure time, and social belonging. It can also be interpreted as the degree to which a population's needs and wants are being met. In a well-functioning society operated on market principles, people have sufficient income to meet their basic needs plus additional money for discretionary spending, are treated with equal dignity, have reasonable access to all public services, and have their opinions heard and respected. Levels of social well-being vary across groups and places within societies. Measuring variations in those levels was part of the social indicators movement initiated in the 1960s and taken up by geographers with analyses of territorial social indicators.

Standard of living is the level of wealth, comfort, material goods and necessities available to a certain socioeconomic class in a given geographic area. The standard of living includes factors such as income, the quality and availability of employment, the poverty rate, quality and affordability of housing, hours of work required to purchase necessities, gross domestic product, affordable (or free) access to quality healthcare, quality and availability of education, life expectancy, incidence of disease, cost of goods and services, infrastructure, national economic growth, economic and political stability, political and religious freedom, environmental quality, climate and safety.

Source: The Dictionary of Human Geography, 5th edition, Edited by Gregory, Johnston, Pratt, Watts, Hatmore, 2009 and Investopedia.

4. The Importance of Infrastructure

In the literature, discussions of infrastructure frequently explore what infrastructure consists of as well as the services it provides. In the early 1980s, economist David Aschauer rekindled his profession's interest in evaluating the impact of infrastructure in the United States with a series of papers documenting that public sector investment in infrastructure assets not only improved the quality of life, but also boosted economic growth and raised the returns for private investments. Aschauer's work suggested that the economic impact of public infrastructure investment was large, with rates of return of 50% or more.[4] Most economists view this figure as excessive, but subsequent academic studies using newer analytical techniques confirm the existence of strongly positive, if somewhat lower, economic returns on infrastructure investment.

Other analytical work examines the impact of infrastructure more generally by estimating how it affects overall economic growth. A 2009 study, for example, found that a 10% rise in infrastructure assets directly increases GDP per capita by 0.7 to 1%. Impacts in this range are in line with other recent studies.[5] This is a significant positive effect that policy-makers in BC should ponder, particularly considering that the province has had a comparatively weak record in growing per capita GDP. And it is GDP per capita which ultimately summarizes the material standard of living in a jurisdiction.[6]

Infrastructure affects aggregate economic output in a number of ways. One is directly through the planning and construction phase for projects, which often results in job creation and a direct contribution to GDP. This is a short-term impact, but it can help to lift economic output during periods of slow growth. Arguably, provincial investment in new (and refurbished) infrastructure was used effectively in the wake of the 2008-09 financial crisis and global recession. Because the government had numerous projects ready to advance, it was able to leverage federal funding and begin construction of projects with few delays. Timeliness is especially important when projects are intended to generate incremental economic activity during economic slumps. Although the province is not currently recovering from recession, the direct economic boost from infrastructure investment is something policy makers should keep in mind even during periods of positive but sluggish economic growth. In rich countries, infrastructure spending and related stimulus can significantly increase growth in the short run. The precise impact will depend on how projects are financed, how quickly they proceed, and the nature of overall economic conditions. Arguably, today's economic climate of historically low interest rates and borrowing costs amid comparatively soft economic growth is ideal for developing and moving forward with large-scale public investments.

Infrastructure also generates economic activity because infrastructure services are an input into the production process for many other sectors, including those involved in export activity. The capital stock of

[4] Baldwin, John and Jay Dixon, "Infrastructure Capital: What Is It? Where Is It? How Much of It Is There?" Statistics Canada, p. 14.

[5] Discussed in Hencke, Timo and Warwick McKibbin, 'The Economics of Infrastructure in a Globalized World: Issues, Lessons and Future Challenges," Brookings Institute (2010). Original source is César, Enrique Moral-Benito, and Luis Servén (2009). "Is infrastructure capital productive? A dynamic heterogeneous approach," mimeo, The World Bank and CEMFI, December.

[6] Note, however, that this work is based on the physical stock of infrastructure so a 10% increase in the total stock of infrastructure represents a very large capital investment.

public infrastructure includes highways; other transportation facilities, including ports and airports; water treatment and distribution systems; the assets which support public safety systems, such as police and fire protection; collection and disposal of garbage; sewage treatment; and other public services that provide the necessary environment for private production to occur. Efficient systems in each of these areas contribute to greater productivity for users.

The impact on productivity is perhaps most easily understood in the case of transportation, because an efficient transportation network reduces travel and shipping times and the costs associated with congestion, facilitates just-in-time production, and allows people to move easily around regions and throughout the province. In the realm of the private sector, telecommunication and broadband networks also have very significant benefits because they facilitate communication and the flow of information for businesses, employees and consumers.

Well-being and Quality of Life

Beyond the connection to growth and living standards, public infrastructure is also linked to the well-being of citizens. Aschauer, for example, discusses its impact on the quality of life. He focuses on tangible examples, noting that better roads reduce accidents, and thus enhance public safety; better water systems reduce disease; and, waste management services improve health and the ambient environment. Infrastructure assets often bring positive and identifiable benefits to health, safety, leisure and general aesthetics, apart from the effect on economic activity.

Both economic and social infrastructure also influence the overall quality of life by increasing mobility, making job opportunities available to more people, and enhancing access to education and skills training. Infrastructure also fosters social connections, supports civic engagement, contributes to managing environmental quality, and helps to ensure personal security. All of these aspects touch on our individual and collective sense of well-being. Carol Graham, a Brookings Institute scholar, suggests that while well-being is difficult to measure, in sum it is the "opportunity to lead a purposeful or meaningful life," which in different ways is facilitated by access to and through infrastructure, broadly defined. [7]

The Changing Setting for Investment in Infrastructure

At present, governments in advanced countries often are not well-placed to meet growing and increasingly complex infrastructure needs. A major impediment is constrained public budgets, which have been the traditional source of most infrastructure finance. Aging populations, escalating demands for healthcare and other services, slow economic growth, and environmental issues are all straining government resources. In the wake of the 2008-09 financial crisis and great recession, fiscal prudence has become a dominant focus for most governments across Canada. In BC, the provincial government has balanced its operating budget and is working to reduce the ratio of taxpayer-supported debt to GDP from the current, already relatively low level of 18%.

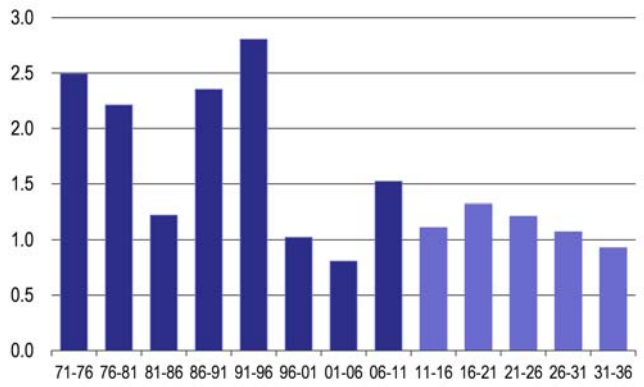
[7] The Pursuit of Happiness, an Economy of Well Being, Carol Graham, Brookings Institute.

While prudent fiscal management is highly desirable and is something that sets BC apart from some other Canadian jurisdictions, there are advantages in having some flexibility around public investments in large capital projects, notably those that promise to pay significant economic dividends. Adding to the complexity is the fact that voters seem increasingly reluctant to pay higher taxes or fees. In instances where the value of an investment is evident, citizens may be willing to pay more, but the value proposition must be clear and cogently articulated to secure the necessary public support. The world has also become more competitive. For a small jurisdiction to succeed in the global marketplace, it is essential to have top quality infrastructure that supports the development of human capital and facilitates business operations and trade. Growing trade and increased economic integration are among the factors fuelling the need for improved infrastructure.

Population

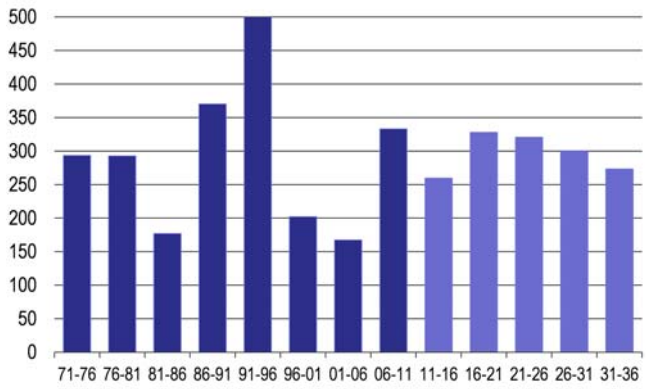
Population, demographic trends and growing urbanization warrant particular attention. Thanks largely to immigration, BC's population has increased at a healthy pace over the past 30 years and is projected to continue rising over the next two decades. Because of lower birth rates and some moderation in immigration numbers, population growth is likely to be slightly slower in the coming decades than it was during the 1970s, the 1980s and the first half of the 1990s. Average annual population growth over the past 20 years hovered in the 2.0% to 2.3% range. So far in the 2000s BC's population growth rate has eased to 1.2% on average. During the current decade the province's population is on track to grow at the same 1.2% pace. Looking further out, demographers expect BC's population will continue on a similar path, expanding by 1.1-1.2% each year in the 2020s.

BC Population: Average Annual Growth, %



Source: BC Stats.

BC Population: Absolute Increase Over 5-Year periods, 000s



Source: BC Stats.

In the context of infrastructure, because the population has grown larger in absolute terms it is instructive to consider the additional numbers of people that these growth rates imply. Over the course of the current decade, the number of people residing in BC is projected to climb by 587,000, and in the following decade by 620,000. Both of these gains are larger in absolute terms than the population increases recorded during the 1970s and 1980s. The 1990s saw a bigger larger absolute increase, due to a surge in immigrants from Hong Kong over the first half of the decade.

Global Urban Population

1990: 40%

2010: 50%

2030: 60%

2050: 70%

Today more than 50% of the global population lives in cities with between 100,000 and 500,000 people and about 10% are in cities with more than 10 million people. Almost all population growth from now forward will be in cities, largely in developing countries with populations growing at 1.5% per year. In Canada, 81% of us live in cities (2012). In BC, 86% live in cities (2011).

Source: World Health Organization and Employment and Social Development Canada.

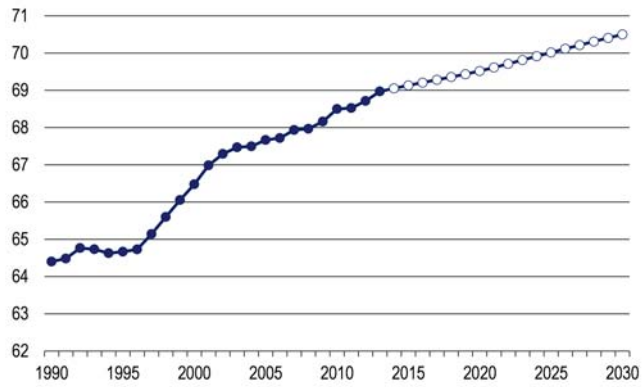
BC's population is also aging, which will put greater pressure on the healthcare system, increase the demand for specialized transportation services, and strain government resources more generally as a rising share of the population exits the workforce and the province's potential economic growth rate declines over time because of this demographic trend. Currently, about 16% of BC's population is over the age of 65. This proportion will reach 23-24% by 2031. In addition, those 65 year-olds will live longer than they did in the past. In BC males aged 65 on average now live another 20 years, and females rack on another 22.6 years. For males this is four more years than in 1980 while females are living another 2.8 years compared to 1980. Approximately 45% of the provincial government's operating budget is already consumed by health care. Although BC has had some success in "bending the health cost curve down, "demographic projections signal that more funding will flow to health services and that there will be a need for greater capacity in the health care system. At the same time, the tax base will be growing more slowly as the economy downshifts due to a rising proportion of non-working households.

Greater urbanization is also shaping the context for infrastructure demand. The collective population living in BC's four main Census Metropolitan Areas (the Vancouver, Abbotsford, Victoria and Kelowna CMAs) grew by 1.3% on average each year between 2001 and 2010. Over the same period, the population in the rest of the province rose by just 0.4% per year. This decade the four big CMAs will see population grow at a similar rate. Population growth in the rest of the province is projected by BC Stats to pick up to 0.8% per year, which we see as an optimistic outlook given the trends of the past two decades. The divergent growth patterns mean the share of BC's population living in the province's four principal CMAs has risen from 64% in 1990 to 69% today and is likely to reach 71-72% by 2031.

Against this demographic backdrop, the most significant future infrastructure requirements will come in the large Vancouver-Abbotsford urban agglomeration. The combined population of these two CMAs is on track to jump by 330,000 in this decade and by slightly more from 2021 to 2031. By 2040 Metro Vancouver's population is expected to be 1 million greater than it is today. If the Abbotsford CMA is included, the overall lower mainland population is projected to expand by 1.3 million by the end of the 2030s. Several other cities in BC will also experience population growth, further reinforcing the ongoing shift to a more urbanized province.

One of the challenges from an infrastructure perspective is that despite urbanization, much of BC's wealth and exports will continue to be produced by natural resource-based sectors and the numerous resource dependent communities that exist in the province. British Columbia's geographic setting has always presented some unique challenges for infrastructure development. We are a province of vast distances and mountainous terrain, with a population that is both widely dispersed and concentrated. Historically, this has had two notable consequences for infrastructure investment. First, road, electricity, pipeline and telecommunications links have had to be forged over long distances to service people living in many, sometimes remote, locations. Second, due in part to the high cost of servicing a large province with many scattered communities, a significant portion of this infrastructure has been supplied and funded by government.

Increasing Urbanization: Share of BC's Population Living in the Province's Four CMAs, %



Source: BC Stats. CMAs=Census Metropolitan Areas, they are Vancouver, Abbotsford/Mission, Victoria and Kelowna.

Another factor that has influenced infrastructure planning and development is that the bulk (more than 90%) of all land in BC is owned by the provincial Crown. This unusual feature of the province's political economy has historically served to accentuate government's role, both in stimulating the development of resource industry sectors and in building the infrastructure necessary to service them. The Agricultural Land Reserve has also shaped land use planning and infrastructure development, notably in the lower mainland. Looking ahead, although private sector involvement in infrastructure has increased over time, it is clear that the provincial government will continue to have a central and critical role in the planning and development of most kinds of infrastructure assets and in the associated funding arrangements. One advantage of increased urbanization is that higher population densities improve economies of scale for infrastructure and make rapid transit systems and some other infrastructure assets/services more economically viable. Greater density, however, also increases the demand for infrastructure. Policy makers and community leaders will need to balance the pressures that come with a more urbanized population with the need to serve the smaller communities where much of BC's wealth and exports are still generated.

Trade, Global Linkages and BC as the Gateway to Asia

Globalization and the restructuring of international production have altered the nature of infrastructure and the types of assets necessary to support modern economic activity. Globalization has resulted in the rapid growth of international flows of capital, goods and knowledge and the substantial reduction of barriers to the international flow of goods, services and capital. Over the past three decades global growth in trade has dramatically outpaced economic growth. In BC, between 1981 and 2012 the value of goods and services exported from the province, measured in inflation adjusted dollars, grew by 170% and imports into the province rose 230%. In comparison, the overall economy expanded by a more modest 110%.

The Asia Pacific Gateway will remain an infrastructure top priority. Connecting North America with Asia has become a very significant and very strategic line of business for British Columbia. Substantial investments in the Gateway have already been made. But this is an area that will require continuous monitoring and additional investments to ensure that our key port and air linkages remain competitive. BC's (and Canada's) trade in goods and services with Asia will continue to expand thanks to comparatively strong economic growth in China and some other emerging Asian countries. The rapid rise in wealth and in the size of the middle class means that BC can anticipate a steady increase in visitors from the Asia Pacific region, particularly China. Trade agreements, such as the Canada-South Korea agreement and the Transpacific Partnership, will further reinforce Canadian trading relationships in Asia and work to increase the volume of goods flowing through BC ports.

Notwithstanding a setback in the 2008-09 recession, global trade continues to grow at a solid (if somewhat slower) pace. Canada's two-way trade with Asia now exceeds pre-recession levels and is expected to expand over the coming decades. Globally and in North America, the shipping and port business is highly competitive. A number of US ports are mounting their own expansion plans. To win new and maintain existing business, BC ports need to emphasize the twin advantages of two-way cargo capacity and proximity to Asian markets. Vancouver is one day, and Prince Rupert two days, closer to Asia than California ports.

Shipping Distances: West Coast Ports to Shanghai

The Greater Vancouver Gateway is a major economic engine for the province and a critical part of the lower mainland's economic and industrial base. Together the Gateway facilities, which encompass Port Metro Vancouver, Vancouver International Airport, and various rail lines, truck/rail intermodal facilities, road links and border crossing facilities, directly support 82,000 jobs and account for $7.2 billion in GDP in the province. When the indirect benefits associated with companies supplying Gateway organizations and the induced impacts on the economy (associated with spending by people working in the Gateway cluster) are considered, the total impact of the Greater Vancouver Gateway on the BC economy rises to over 182,000 jobs and $15.8 Billion of GDP.[8]

From a strategic viewpoint it is essential to think about the lower mainland as a single economic region with an integrated infrastructure network. Similarly, as the Business Council has long argued, the region should be viewed as a single economy with a tightly interconnected labour market of more than 1 million jobs. The fact that the economic benefits of the Gateway are distributed throughout the region is

[8] Economic Development Research Group, "Economic Impact of the Greater Vancouver Gateway: Final Report," prepared for the Greater Vancouver Gateway Council (September 2014).

underscored by the dispersion of Gateway-related jobs across Metro Vancouver, as shown in Table 1. Municipalities and senior levels of government should be working together to coordinate infrastructure development for the benefit of the region and ultimately the province.

Table 1
Gateway Related Employment by Municipality

Municipality	Direct	TOTAL*
Burnaby	2,005	12,337
Coquitlam	907	4,508
Delta	13,776	18,534
Langley City	401	1,677
Langley DM	2,000	6,029
Maple Ridge	185	1,918
New Westminster	1,900	4,145
N. Vancouver City	1,005	3,235
N. Vancouver DM	2,993	5,309
Pitt Meadows	237	739
Port Coquitlam	3,657	6,002
Port Moody	124	855
Richmond	27,744	41,633
Surrey	6,317	20,913
Vancouver	9,153	38,182
West Vancouver	5,416	6,641
Other municipalities	62	663
Greater Vancouver	*77,884*	*173,320*
Elsewhere in BC	*4,100*	*9,122*
BC Total	81,984	182,442

* Total includes indirect and induced jobs.

Source: Economic Development Research Group, "Economic Impact of the Greater Vancouver Gateway: Final Report," (Sept 2012). Other municipalities include: Anmore, Belcarra, Bowen Island, Lions Bay, and White Rock.

Port Metro Vancouver [PMV] is at the heart of the Greater Vancouver Gateway. Counting all spinoffs, it alone is estimated to generate nearly 80,000 jobs (of the 182,000 Gateway-supported jobs just noted) in the province. Perhaps even more importantly, it plays a vital role in trade, notably in the exporting of BC and Canadian goods. Resource-based products that go through PMV include: lumber, pulp, potash, coal, sulphur, and a host of agricultural commodities. Shipping costs make up a significant share of the delivered price of most resource products, so having efficient transportation connections to overseas markets is an important component of keeping BC and Canadian products competitive in foreign markets. PMV also handles growing volumes of non-resource products, which leave predominantly in containers. The Port facilitates trade with more than 160 countries and is truly a national asset with 95% of port activity focused on Canadian import/export markets.

PMV and the Port of Prince Rupert have both seen large increases in container throughput, which is a testament to their competitiveness. Between 2000 and 2008, container volumes moving through PMV rose by 103%, the biggest gain among west coast ports. With the 2008 recession, container traffic slipped but still grew a further 10% between 2008 and 2013. Port Metro Vancouver ranked third among North American west coast ports in container volumes handled in 2012.

Vancouver International Airport (YVR) is the second largest airport in Canada, for both cargo tonnage and numbers of passengers. In 2012, it handled almost 228,000 tonnes of cargo—a slight increase from 226,000 tonnes in 2007. The majority of cargo is international trade while a small share involves shipments to other parts of Canada.

Efficient air connections to other parts of the globe are essential for BC to capitalize on expanding tourism markets in Asia and the US, increased business travel, and growth associated with the province's large

international education sector. Demand for passenger air travel to and from the BC continues to climb. YVR handled nearly 17.6 million passengers in 2012, a 1% gain over pre-recession levels.

Intermodality is a key trend in the global freight transport business. It refers to the integration of shipments across modes, typically using single administrative systems and rates where goods move in containers. Containerization has produced huge gains in productivity and has spurred substantial advances in global trade. With the rise of intermodal systems for transporting goods and commodities over long distances, rail and truck modes have to some extent become more complementary than competitive.

Globalization, the development of longer and more complex supply chains, and the shift to "just-in-time" manufacturing are all contributing to greater use of multiple freight conveyances. The case for integrated planning for road and rail infrastructure expansion becomes clear when one realizes that these modes combine to transport 45% of all BC-origin exports, as well as half of all of the imports cleared through customs ports of entry in the province.

Since each of the transportation modes is under different governance and financing regimes, developing a stronger Pacific Gateway in BC depends on integrated planning. That the various modes must work together to efficiently move people and goods around a region, across the province, and to and from external markets presents a challenge for building and managing transportation infrastructure. For example, decisions about increasing rail network capacity to handle a greater volume of imported goods cannot be made without reference to the impact of additional rail traffic on ports (where are the extra sidings going to go?) or the road network (how can congestion be managed with more trucks on the road?). This points to the benefits of an integrated approach to transportation infrastructure investment, such as the provincial government's Gateway Program. The emergence of an integrated, collaborative governance structure around the Gateway Strategy is a positive sign and serves as a promising development model for other, multi-modal infrastructure projects.

Communications and Information Revolution

The internet has become an essential part of society's infrastructure in the 21st century. It has altered the way people work and interact and the way businesses operate and serve customers. The transformation has been very rapid. It has taken less than two decades for the commercial internet to become fundamental to business operations. About 2.5 billion people are connected to the internet today, a third of the world's population; projections point to 4 billion users by 2020, equal to more than half of the global population.[9] The digital economy is growing at more than 10% a year, significantly faster than the economy as a whole. Continuous access to commerce, communications, and entertainment has become a part of daily life for billions of people. Just how large the internet now looms as part of the economy's infrastructure backbone is reflected in the fact that the UN and a number of countries have declared internet access to be a "fundamental right" of all citizens, while Finland and Spain have gone so far as to mandate connection speeds of at least 1 megabit per second for everyone.[10]

[9] World Economic Forum, "Delivering Digital Infrastructure: Advancing the Internet Economy" (April 2014), p. 7.
[10] World Economic Forum, "Delivering Digital Infrastructure: Advancing the Internet Economy" (April 2014), p. 12.

Most businesses today across multiple industry sectors rely on telecommunications services and information and communications technology [ICT] infrastructure to operate. ICT should be viewed as core enabling infrastructure, akin to transportation networks. Just as transportation infrastructure allows trade and other forms of economic activity to take place, the Internet and other ICT infrastructure makes information flow much more efficiently and in ever greater quantities. It has become central to the modern economy, to economic growth and to the well-being of citizens. Its importance was elevated in BC when the Premier's Technology Council (PTC) identified infrastructure, on-line government services, and the knowledge-based economy as pillars of the contemporary economy. The government was successful in cooperating with private sector providers to deliver improved broadband communications across the province and to connect education systems, research centres, and university facilities.

Digital service delivery has the potential to revolutionize fields such as health care and education, where much technology-driven change and disruption is already apparent. Governments can lead by example, realize substantial cost savings and improve service delivery by adopting digital delivery in the areas of education and training, health care, and public services. Denmark, which many see as a world leader in this area, has set out a new public-sector strategy to achieve full digitalisation of the Danish Healthcare Sector by 2017.[11] Online applications are transforming the way people get training and study at all levels of education. The challenge for most institutions is not whether to use the internet in education but rather how to do so effectively and in a way that does not detract from quality.

As more people and businesses come online, more companies invent innovative ways to serve their needs. Cloud services, machine-to-machine communications (M2M), and the Internet of Things are all new and fast- growing phenomena that will push the volume of digital traffic to continue growing exponentially. Making sure communication infrastructure can keep up with the steady increase in traffic is a top priority in a society that relies on the seamless flow of information. The internet and electronic communications more generally need to be recognized as infrastructure and services that are at the heart of the province's future economic success.

Environmental Concerns

Environmental considerations are now an important aspect of project development in all advanced economies and often have a substantial influence on infrastructure demand and design. In developing major infrastructure projects, attention must be paid to the natural habitats of flora and fauna, animal habitats, water resources, land use, potential deforestation, heritage sites, energy requirements, ambient air and water emissions, greenhouse gases, materials used and the impact of infrastructure activity on the human environment (at the community, local and regional levels).

In Canada and the US, the need for public consultation and often complex environmental review processes add significantly to project timelines. Infrastructure development in urban settings also involves local community consultation. From a strategic viewpoint, these processes underscore the necessity to improve the long-term planning and implementation processes around infrastructure.

[11] See National Strategy for Digitalisation of the Danish Healthcare Sector 2013 - 2017.

While review processes add complexity and costs, large infrastructure projects, particularly in the transportation area, can also deliver environmental (in addition to economic) benefits. One obvious example is public transit, which can reduce traffic congestion and emissions as more people use transit services instead of relying on their own vehicles. Well-designed roadway and highway infrastructure can also yield health benefits by reducing ambient air pollution, noise pollution and commuter stress and fatigue. Liquid and solid waste treatment facilities are also positive for the environment. The environmental costs and benefits of infrastructure should be clearly articulated and included as an integral part of long-term strategic planning.

First Nations Engagement

The engagement of First Nations will be important to future infrastructure development in the province. Social and economic gaps between Aboriginal and other Canadians remain. From an economic development and social well-being perspective, Aboriginal participation in proposed infrastructure projects of all types can help to close these gaps. It is necessary to foster inclusion and engage with communities in order to realize the Aboriginal employment and business opportunities that may be created through the development of new infrastructure.

The business community in British Columbia increasingly is engaging directly with First Nations to establish conditions for greater investment certainty in resource project development and to ensure that Aboriginal people benefit from such development. In BC, energy-related infrastructure, such as new pipelines, may be developed by the private sector. Because these pass through multiple jurisdictions, proponents developing linear infrastructure must work closely and respectfully with numerous First Nations communities. When relationship-building is done well, all parties stand to benefit. First Nations can gain from forging the critical economic connections that support own-source revenue flows, a greater capacity for development and job creation, and stronger linkages to activities that support First Nations' rights and title interests. Industry benefits from project certainty that is enhanced through partnerships, and proponents can gain access to First Nations' local knowledge, workforce and business ventures. Industry proponents must commit to constructive dialogue around infrastructure, demonstrate a commitment to environmental sustainability, and support Aboriginal communities' participation in the development of linear infrastructure.

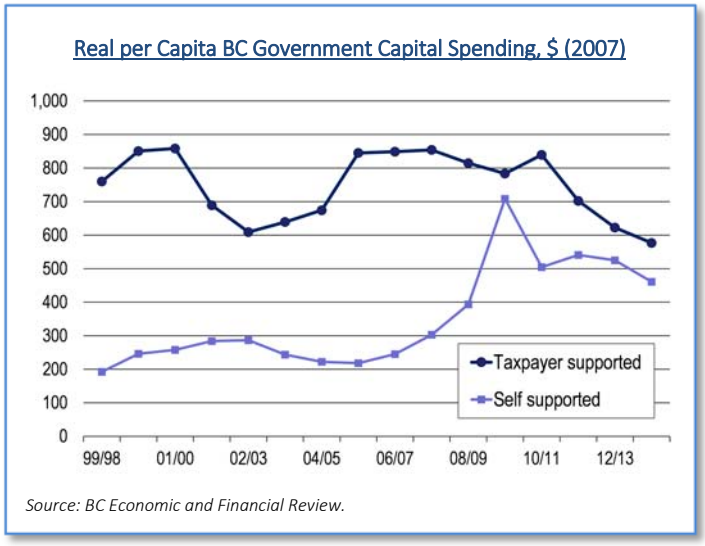
Government also needs to foster an open and sustained dialogue when looking at major infrastructure projects and consider how opportunities for economic benefits can be made available to affected First Nations communities. It is time for both the federal and provincial governments to increase their internal capacity to address Aboriginal interests related to infrastructure development.

For many First Nations communities in BC there is also a pressing need for new and upgraded community infrastructure. A more detailed discussion of this dimension of First Nations' infrastructure is contained in the following section.

Limited Fiscal Resources and the Infrastructure Deficit

Most experts who have studied the data believe that governments across North America have underinvested in infrastructure for many years. In Canada, fighting deficits and debt coupled with the competing priorities of health care and education have squeezed the dollars available for capital spending – on both new projects and the maintenance of current assets – at both the federal and provincial levels of government. In the 1960s, governments in Canada combined made capital investments in infrastructure equivalent to 5% of GDP. By 2000, the figure had fallen to 2%. More recently, this ratio has climbed back to around 4%, but decades of systematic underinvestment have left a sizable accumulated shortfall (although there is some debate over the magnitude).[12] Some analysts believe the decline in public sector capital spending is contributing to slower Canadian productivity growth that began in the 1970s.

In BC, provincial government capital spending amounted to $5.7 billion in fiscal 2013/14, which is down from a high point of $7.1 billion in the year preceding the 2010 Winter Olympics. Recent restraint has resulted in provincial government capital spending (in inflation adjusted dollars) falling from nearly 1,500 per person to just over $1,000 per person. Most of the decline is attributable to reductions in tax-payer supported capital spending, which in part reflects the government's desire to reduce the tax-payer supported debt-to-GDP ratio. The majority of self-supporting capital spending is done by BC Hydro. In recent years, the Port Mann Bridge project was the second largest source of self-supported capital spending.



Source: BC Economic and Financial Review.

With much of Canada's major public infrastructure built in the 1950s and 1960s, the aging of existing infrastructure assets is also adding to the need for stepped up investment. According to a 2003 study, about 41% of Canada's infrastructure was put in place within the preceding 40 years, 31% of public assets were between 40 and 80 years old, and the remaining 28% was more than 80 years old. As a summary indicator, the same study indicated 79% of the service life of Canadian roads, water networks and sewage systems had passed at the time the report was written.[13]

Overall average measures of age point to a general need for refurbishment of public infrastructure assets. A more recent study from Statistics Canada, however, indicates that the average age of public infrastructure in Canada has been falling almost steadily since 2001.[14] Nationally, this rejuvenating trend was fuelled by large investments in highways and roads in Ontario and Quebec. In BC, the average age of infrastructure

[12] Vander Ploeg, Casey and Mike Holden, "At the Intersection: The Case for Sustained and Strategic Public Sector Investment," Canada West Foundation (2013), p. 5.
[13] Technology Roadmap 2003-2013 (June 2003), p. 11.
[14] Gagnon, Mychele, Valerie Gaudreault and Donald Overton, "Age of Public Infrastructure: A Provincial Perspective," Statistics Canada (February 2008).

has also been trending lower since 2002 and is in line with the national age profile. Note that a reduction in average age is indicative of a general trend towards a younger stock of investments. It does not imply that each asset is younger or in better condition or that a greater proportion of assets meets specific quality standards. There are diverging trends within the broad asset categories, which are masked by the overall trend.

In BC, highways and roads account for 59% of the stock of public infrastructure. This is the only asset category where the average age was reported to be above the national average. The average age of bridges and overpasses in BC, however, was below the national average and water supply systems in BC are the youngest in the country. Despite an aging trend in wastewater treatment facilities, the average age of this asset category in BC is below the national average. Similarly, sewer systems are aging, but their collective average age is below the national average.

Given the age profile of infrastructure, more financial resources will need to flow into the maintenance, upgrading and rehabilitation of existing assets. This is particularly true at the municipal level, where the average age of sewer and water systems is rising and in some communities have passed their useful life. In Canada, local government is now responsible for maintaining the largest share of the nation's capital stock among the three levels of government. Over the past five decades, the federal share of public infrastructure has sharply declined, from 26.9% in 1955 to only 5.3% in 2007, while that of the municipal or local level of government increased from 26.7% in 1955 to 54.9% in 2007. The provincial share has been quite stable, but it fell below the municipal share in 1992 and stood at 39.8% in 2007.[15]

The fact that, collectively, municipalities in Canada are now responsible for a bigger share of infrastructure is not surprising. Canada's population has become progressively more urbanized since the 1940s and cities across the country have absorbed the vast majority of population growth. This creates a demand for more sewers, water treatment and distribution systems, waste handling facilities, local roadways, recreation centres, and other infrastructure assets under local control. Development has expanded the tax base of local governments but municipal politicians sometimes observe that because they rely predominantly on revenues from property taxes, the revenue-generating capacity of municipalities has not kept pace with mounting infrastructure requirements. The Federation of Canadian Municipalities endeavoured to document this shortfall back in 2007, suggesting that the cost of upgrading municipal infrastructure amounted to some $123 billion. The Federation also argued that a further $115 billion was required to meet the demand for new infrastructure assets and services.[16]

Spending restraint is shaping the fiscal environment at both the provincial and federal levels of government, and in some instances at the municipal level as well. The province of BC is on target to post a small operating budget surplus this year and plans to maintain a balanced budget in the years ahead. This creates challenges and an underlying setting of ongoing fiscal restraint. In the current economic climate government should be prepared for revenues to grow only modestly. Our outlook is for BC's economy to

[15] Brox, James A., "Infrastructure Investment: The Foundation of Canadian Competitiveness," IRPP Policy Matters, (August 2008), p. 12.
[16] Mirza, Saeed, "Danger Ahead: The Coming Collapse of Canada's Municipal Infrastructure," The Federation of Canadian Municipalities (November 2007).

grow in the 2.0% to 2.5% range (real GDP) over the next few years. At the same time inflation remains subdued so nominal GDP, which is strongly correlated with growth in tax base, will also increase at a pace that is below BC's historical norms.[17]

Mounting demands for more spending and limited revenue growth will leave the provincial government with little manoeuvring room for current expenditures. Capital outlays, however, are a somewhat different mater. They are not included in the operating budget, although interest expense from borrowing for capital projects does come out of current expenditures. Capital spending does impact the provincial debt. With a debt-to-GDP ratio of 18.4%, BC has a relatively low debt burden by Canadian standards. The composition of this debt is mostly the result of past capital outlays. Debt accumulated from previous operating deficits amounts to $9.8 billion, or 22% of all taxpayer-supported debt.[18] The remaining $33.2 billion of debt is mainly attributable to past capital investments in highways, transit, hospitals, and schools. In other words, the majority of BC's taxpayer supported debt is from investments in necessary and productive long-lived capital assets, many of which fall under the heading of physical infrastructure.

Globalization and Competitiveness

The World Economic Forum's Global Competitiveness Report[19] identifies 12 pillars of competitiveness. Infrastructure is number two on the list. It includes the following attributes: quality of overall infrastructure, roads, railroads, ports, air transport, electricity supply, availability of airline seat kilometers/week, mobile telephone subscriptions/100 people, and fixed telephone lines/100 people.

Canada ranks 14th on the WEF's overall competitiveness scale, with a score of 5.20 out of 7. With respect to infrastructure, Canada ranks 12th with a score of 5.08, and comes 7th on health and education with a score of 6.55. Countries ahead of Canada on overall competitiveness include, starting at the top, Switzerland, Singapore, Finland, Germany, United States, Sweden, Hong Kong, the Netherlands, Japan, UK, Norway, Taiwan, and Qatar. Interestingly, there is a fair amount of overlap in the infrastructure component of the competitiveness index with Hong Kong, Singapore, Netherlands, Germany and the United Kingdom all ranked as having world-leading (top 10) infrastructure. While the WEF does not rank sub-national regions, the 2012 Mercer Quality of Living Survey ranked Vancouver 5th in the world among 49 cities overall, and 9th in terms of infrastructure.[20] Vancouver International Airport is ranked 8th among the world's best airports[21] and is also judged the best airport in North America. Taken together, British Columbia's position on infrastructure can be considered to be fairly strong.

[17] This ignores any impact on provincial government revenues from the development of a sizable LNG industry. Should the LNG industry become established in BC, government revenues are likely to grow faster than nominal GDP.
[18] Taxpayer-supported debt excludes debt accumulated by BC Hydro and some other provincial entities.
[19] The WEF Global Competitiveness Report, 2013-2014.
[20] 2012 Quality of Living Worldwide City Rankings, Mercer Survey.
[21] World Airport Awards.

5. BC's Infrastructure: Recent Improvements But More Needs to be Built

The BC government has long been the principal driver of many important infrastructure projects. British Columbia's economic expansion and prosperity have been inextricably linked to the development of highways, electricity systems, border links, ports, and airports. Significant long-lived physical assets constructed over the past four decades have shaped the province's industrial base and helped to drive economic development. Hydro-electric dams and transmission lines have provided BC with relatively low-cost power and supported resource and industrial development, while major highways such as the Coquihalla have greatly improved access to the interior and supported stronger population growth in the communities which the highway connected to the lower mainland. The provincial ferry system has enabled the growth of economic activity on Vancouver Island. The private sector has also played a significant role in building and operating infrastructure in BC: railways transport resources to markets, pipelines carry natural gas from distant locations to urban centres and across the border, and modern information and communications networks, including having a high percentage of the population with access to high speed internet services, have been critical to BC's success in the past 50-75 years.

Since the turn of the century, numerous large public infrastructure projects have been undertaken in BC, primarily in the areas of public transit, Gateway infrastructure, roads and highways, new bridges, hospitals and educational facilities. Private sector investments meanwhile have boosted rail and telecommunications capacity. This section examines the different components of provincial infrastructure, recaps some of the more recent investments, and makes a case for additional investment, particularly in economic infrastructure.

Gateway Infrastructure

We begin with the Gateway because of its prominence as an example of core infrastructure and its importance as an economic engine in the province. Upgrades and extensive expansions of Gateway infrastructure have permitted the province to leverage its geographic location to reap benefits from sustained economic growth in Asia.

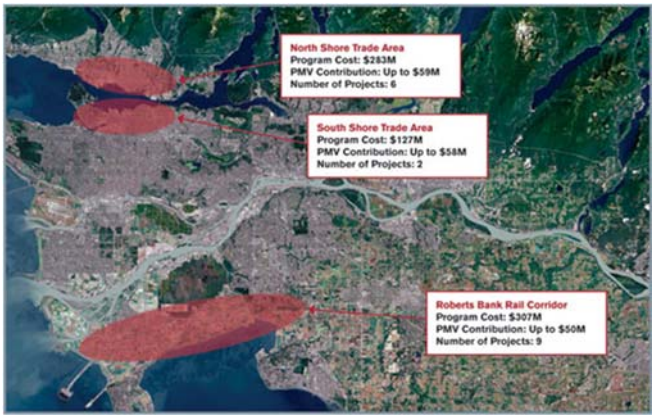
The recent merger of three previously separate lower mainland ports – Vancouver, Fraser and North Fraser – has facilitated the branding of PMV around the world and helped to streamline operations. It also has given the land-starved Vancouver Port access to marine sites at the two Fraser River ports, while the latter now benefit from greater access to funds and borrowing capacity at PMV. Looking ahead, continued economic expansion in Asia[22] means that both of BC's major Ports can expect to see solid growth in the coming decades. Container traffic through Canada's Pacific Gateway is expected to more than double over the next 10-15 years. Current projections indicate that approximately four million TEUs (twenty-foot equivalent units) of additional capacity will be needed to meet West Coast container demand by 2030.[23]

[22] Although economic growth in emerging Asia has recently slowed, projections from the IMF and private forecasting agencies indicate that GDP growth in China and the rest of emerging Asia will continue to run above the rates expected for North America and Europe.
[23] Port Metro Vancouver, Container Capacity Improvement Program.

Government, the Port and the rail operators have all made significant investments in infrastructure to increase capacity, improve productivity, ease congestion in the lower mainland and ensure that goods can be moved into and through the Vancouver Gateway in a timely and efficient manner. Some of the noteworthy recent capital projects include:

- South Fraser Perimeter Road: the $1.26 billion 40-kilometre highway that now connects Deltaport to Highway 1 and the Golden Ears Bridge will enhance international freight movement and reduce impacts on municipal roads. The federal government contributed $365 million to the project.
- Roberts Bank Rail Corridor Road/Rail Grade Separations: $307 million invested in road/rail grade separations (up to nine), and other traffic management measures along 70-kilometres that connect international container and coal terminals with North America's rail network.
- Pitt River Bridge and Mary Hill Interchange: this $198 million seven-lane bridge connects transportation facilities on both sides of the Pitt River to facilitate the flow of international goods through the lower mainland.
- Burrard Inlet's North Shore Projects: $283 million invested in projects to improve rail and road access in the North Vancouver area through grade separation, low level road re-alignment, and other road enhancements.

Recently Completed Gateway Infrastructure



Recently Completed Point Roberts Rail Corridor Projects

- South Shore Trade Area: $127 million in the South Shore area for the Powell Street Grade Separation and the Stewart Street Elevated Structure.

Some Gateway projects outside of the lower mainland include:

- Twinning of Simon Fraser Bridge: this $43 million project reduces traffic congestion and facilitates the movement of goods between the Port of Prince Rupert's container facility and the Prince George Inland Container Terminal.
- Prince Rupert Port Container Security Program: $28 million for a Canada Border Services Agency Marine Container Program to ensure secure and efficient border services for the Fairview Container Terminal.

- Prince Rupert Road, Rail and Utility Corridor: this $90 million project will provide road and rail access, along with utility services, to land on Ridley Island at the Port of Prince Rupert for the development and expansion of deep-sea terminals.

British Columbia's impressive success in developing Gateway-related infrastructure is in part a reflection of the advantages of a strategic, coordinated and long-term plan. Early on, the Greater Vancouver Gateway Council highlighted the economic importance of the Port and related transportation infrastructure. The Council then developed a list of transportation infrastructure investments that would enable Metro Vancouver to accommodate growth in Port-related activity and support the efficient movement of goods into and through the region. For more than a decade, the Gateway Council advocated for these projects, most of which have now been built. Former Premier Gordon Campbell was a strong supporter of the development of Gateway infrastructure and helped to engineer a high level of federal/provincial collaboration on the Asia Pacific Gateway Strategy.

Infrastructure: Key to Singapore's Success

Just four or five decades ago Singapore had problems that plague many emerging countries: overcrowded cities, poor living conditions and a severe lack of infrastructure. Today, Singapore is a thriving city and international business hub characterized by a high standard of living in a clean and green environment and has been ranked as having the best infrastructure in the world. This success did not come by chance but through an intensive, thorough and far sighted planning process.

Singapore has become a global transportation hub. Post-colonial governmental policies have expanded the deep-water seaport that had been at the heart of Singapore's economy during colonial times. The port has been expanding since 1960s to cope with increasing demand and to strengthen its trade links with major world economies. The Singapore government is planning for the island state to become a global integrated logistics hub -- a multi-modal hub, covering and integrating land, sea and air transport. For example, transhipment cargo arriving at the Port will be transported by road to, and flown seamlessly out of, Changi Airport and special customs treatment will no longer be restricted just to goods moving within a free trade zone around the seaport or the airport.

The other strategic asset is Singapore's airport facilities. To strengthen trade links with major world economies, the Singapore government's goal is to form d the Future Air Transport Hub. Singapore's first commercial airport had been based at Paya Lebar, close to residential areas. If Paya Lebar had continued to host the airport, it would have entailed sterilization of large tracts of economically useful lands because of the height control on buildings near the airport. Landing at Paya Lebar Airport also meant that aircrafts had to fly over congested city areas. Singapore's airport management and its associated and related companies and their infrastructure management have impressed many foreign airport operators, inspiring overseas operators to initiate partnerships and investment opportunities with them.

** Mercer 2012 Quality of Life Survey ranked Singapore as having the best infrastructure among 212 cities.*
According to the World Economic Forum's rankings Singapore is the second most competitive economy in the world and infrastructure is a key element of the overall ranking

The Greater Vancouver Gateway is not the full story of BC as Canada's gateway to Asia. The Northwest Corridor is a second western transportation corridor linking Canada to Asia. It originates with Pacific Port locations at Prince Rupert, Kitimat, and Stewart, spans four western provinces and extends into the central US. While the Corridor is essentially defined by the routing of the Yellowhead Highway, it is not restricted to it. Several geographic hubs and sub-corridors within the Corridor provide connections with other major transportation arteries that reach into the Northwest Territories and the Yukon. The Corridor is uncongested and comprised of a well-connected network of highways, railways, airports and marine port facilities. This network provides key connections to producer and consumer markets in North America, Asia, Europe, South America and Africa.

The establishment of container-handling facilities at the Port of Prince Rupert was a key step in strengthening BC's gateway economy. It enhanced BC's gateway position and elevated the importance of the Northwest Corridor. During the recession of 2008-09, Prince Rupert was the only west coast port to see growth in business volumes. Four-fifths of the cargo going into Prince Rupert is bound for the United States. The port, Canadian National Railway and other organizations have and are making significant investments that will ultimately increase Prince Rupert's container-handling capacity to 2 million TEUs per year, putting it on par with Seattle and Tacoma. Some of this success is attributable to the fact that the container terminal at the Port of Prince Rupert offers the benefit of being North America's closest port to major Asian markets by up to three days – it is 36 hours of sailing time closer to Shanghai than Vancouver, and 68 hours closer than Los Angeles. It also provides the shortest sea/land transportation corridor between the North American Heartland - Edmonton, Winnipeg, Minneapolis, and Chicago – and Asia-Pacific markets.

BC has enjoyed great success as a Gateway to Asia. But governments and all operators of Gateway infrastructure must closely monitor traffic flows, congestion and potential choke points and make further investments in the coming decade to ensure that BC remains a competitive Gateway. In Metro Vancouver, the New West rail bridge and the rail bridge crossing the Burrard inlet at the Second Narrows both need to be twinned in the near future. Truck traffic will continue to grow as container volumes steadily rise, putting more pressure on trucking routes such as the Knight Street corridor running through Vancouver into Richmond.

Roadways and Metro Transit

As with the port-related infrastructure, much has been accomplished in improving roadways and public transit in the Metro Vancouver region. But with the population of Metro Vancouver and the Fraser Valley together projected to jump by almost 800,000 between 2011 and 2031, substantial additional investments in transit and transportation are going to be required. With much of the population having already shifted south of the Fraser River, the most pressing and immediate needs for rapid transit arguably are found in the Surrey/Langley region. At the same time, increased density and population growth are putting tremendous pressure on transit services along Vancouver's Broadway corridor. Indeed, some of the biggest infrastructure funding and coordination challenges in BC are in the realm of public transportation.

TransLink was the world's first multimodal transportation authority that took responsibility for creating an efficient transportation network to move both people and goods. To build this network TransLink was granted authority over public transportation as well as major regional roads. It is also responsible for coordinating transportation development with land use plans encompassing the 20 or so individual municipalities that make up the region.

The responsibilities of TransLink are different from those which fall on similar authorities in other cities, where major road planning and maintenance are separate from public transportation operations. TransLink also has some related taxation authority, although in practice raising additional funds through new levies has met with public resistance and remains subject to provincial government approval.

In Metro Vancouver investments in the transit system have delivered large benefits for commuters, road users and the regional economy. In recent years, the original Expo Line has been extended, the Millennium Line running through Burnaby was added, and the Canada Line connecting downtown Vancouver with Richmond and YVR was completed in advance of the 2010 Olympics. The Evergreen Line running into Coquitlam is now under construction. Bus capacity has been increased and integrated with the new rapid transit facilities. A number of provincial road projects have done much to improve road capacity and reduced travel times. Although it was a provincial initiative, the new Port Mann Bridge and the Highway 1 expansion have greatly improved traffic flow in that corridor and will permit TransLink to operate buses over the bridge (prior to the new bridge being built, this wasn't feasible because congestion meant bus schedules could not be maintained). The South Fraser Perimeter Road, also a provincial initiative, stands out as a major and welcome addition to the regional road network. Municipalities across the region are also working to improve roadways, particularly in cities that are experiencing above average population growth such as Surrey.

Proposed Transportation Infrastructure Projects

- Replacement of Massey Tunnel with a Bridge
- Replacement of Pattullo Bridge
- Replacement of New Westminster Rail Bridge
- Completion of North Fraser Perimeter Road including improvements to Front Street and connectivity to new 6 lane Pattullo Bridge
- Improvement to Highway 13 between Highway 1 and the US Border including straightening of alignment close to border and widening to accommodate completion of CBSA commercial inspection facilities at Aldergrove, BC
- Rail Access to North Shore including appropriate connections on South Shore
- Improved access and egress on north end of Second Narrows Bridge
- Mountain Highway underpass in North Vancouver
- Widening Highway 1 from Kamloops to Alberta border

In spite of these investments and the resulting improvements in mobility across the region, transit service in the lower mainland is still insufficient. Routes are often congested and transit users are frequently passed by because busses are full. For drivers, roadways remain heavily congested across the region. Congestion negatively impacts the quality of life and health for commuters and workers throughout Metro Vancouver and is a growing concern for business involved in goods movement. Without additional capital

investment and enhanced services, congestion will become far worse as the population grows. Such a scenario can only erode the region's competitive position as a Gateway and the quality of life for area residents.

Each transportation infrastructure project presents an opportunity to improve the effectiveness of the overall regional transportation system well into the future. Greater consideration needs to be given to how new projects complement (or detract) from future regional transportation and development alternatives.

The recent report from the Mayors' Council outlines an ambitious expansion plan for Translink and the public transportation and road network in the Metro Vancouver region. Priorities in the report include:

- A new 4 lane bridge to replace the Pattullo Bridge (which has probably exceeded its useful lifespan).
- Light rail transit in Surrey and both Langleys.
- An extension of the existing Skytrain Millennium line from Clark Street to Arbutus Street along the Broadway corridor.
- A 25% increase in bus service across the region, which includes 200 additional kilometers of B-line or better routes and more frequent all-day service as well as expanded peak hour service.
- A 50% increase in SeaBus service.
- A 30% increase in HandyDART service.
- 2,700 kilometers of bikeways, including 300 kilometers of fully traffic-separated routes.
- The plan also recognizes the need to maintain and upgrade 2,300 kms of the Major Road Network.

Total capital costs for the infrastructure set out in the Mayors' Council report amounts to $7.5 billion. At the same time, the additional operating and financing costs would see Translink's annual budget increase from $1.4 billion to $2.2 billion. To meet the new funding requirements, Translink will require nearly $4 billion in federal and provincial contributions, according to the Mayors' Council. The anticipated increase in ridership is projected to generate an additional $500 million in fare revenue, and a toll should cover the cost of the Pattullo Bridge. The imposition of a third toll for a Fraser River crossing may be problematic and would exacerbate concerns over intra-regional equity with respect to the user-pay principle for transportation services. This makes it more urgent to look to longer-term and more equitable solutions to tolling and road-use fees as a tool to finance transit and manage road volumes across the region.

Outside of Metro Vancouver, public transit garners less attention, likely reflecting the fact that the province's other urban areas do not have the same congestion problems and also lack a population base sufficient to support building expensive, capital-intensive rapid transit systems. Still, some other cities around the province will require upgrades to road networks and expanded public transit options over time. Transit service in many smaller communities around the province is good. However, for many smaller municipalities purchasing even a few new buses represents a large capital expense and so creates funding challenges.

Provincial Ferry System

The coastal ferry system, operated by BC Ferries, provides year-round vehicle and passenger service on 24 routes to 47 terminals, with a fleet of 35 vessels. BC Ferries is one of the largest ferry operators in the world. In 2013/14, it carried 19.7 million passengers and 7.6 million vehicles. The ferry system is an essential transportation link that connects coastal communities and facilitates the movement of people, goods and services.

In April 2003, BC Ferries was transformed from a Crown corporation into an independent, commercial organization under the Company Act. The Company is governed by an independent Board of Directors appointed by the BC Ferry Authority. Over the past five years, BC Ferries spent approximately $560 million on new vessels, vessel upgrades and modifications, terminal marine structures and information technology. Over the next five years, the company plans to spend approximately $1.4 billion on capital projects. Infrastructure upgrades are essential so the Ferries are reliable for the passengers and communities that depend on them.

The coastal ferry system has been facing cost pressures for more than 20 years, with ridership volumes decreasing in recent years as fares have steadily risen. In 2012 and 2013, the provincial government engaged coastal communities and ferry users from across BC about strategies to ensure the long-term sustainability of the coastal ferry network. Some service cutbacks are being implemented in response to waning demand and funding constraints. There continues to be pressure on the BC government to allocate more funding to help pay for ferry operations in order to reduce the pressure on fares and limit service reductions for coastal communities.

Case Study – Infrastructure in Copenhagen

Recognition of the central importance of infrastructure and a strategic plan supported by adequate funding to build necessary projects in a timely manner are themes that emerge from studying the recent history of Copenhagen's infrastructure development.

The Greater Copenhagen Area, which is defined as a functional economic region, has a population of approximately 3.5 million people. This includes 2.5 million in the Greater Copenhagen Area on the Danish side and one million living on the Swedish side. Copenhagen is ranked highly for its transportation services and infrastructure, with good quality road and rail connections, high average speeds on its roads (despite some increase in road congestion), and good public transport (despite some crowding on public transport systems in peak periods). Copenhagen also has one of Europe's highest rates of bicycle use and is widely seen as a leader in bicycle infrastructure.

Shipment and logistics have long been among Denmark's most important export sectors. Copenhagen is one of Europe's major ports and has expanded to become the biggest Nordic port for cars, Northern Europe's largest cruise ship port, and an important terminal for ferries (vehicles and passengers). It also handles containers and is a significant dry and liquid bulk port, including handling sizable volumes of oil shipments.

Since the turn of the century, Denmark and Copenhagen have made changes in the planning and management of major infrastructure that has helped the region become successful.

Change was initiated by a government decision to improve infrastructure planning, which led to the creation of the Danish Infrastructure Commission in November 2006. The Commission's terms of reference stated that its "overall objective is for Denmark to maintain and develop its position as one of the countries in the world with the best transport systems, despite the fact that growing traffic volumes are increasing the requirements in the long term."

The Commission issued a report in early 2008. It concluded that if Denmark was to achieve economic growth and secure its position as a country with world-leading transport systems, a greater focus on infrastructure was necessary. The Commission recommended "…a targeted effort which will strengthen the public as well as the individual transport system. We must concentrate our efforts where the economic return is the highest."

The Commission adopted six principles for future planning of the transportation system:

… Continued

Case Study – Infrastructure in Copenhagen *(continued)*

1. Transport is about quality of life and prosperity – about connections between people, families and businesses.
2. Infrastructure contributes to ensuring that people can get to work, and that products and goods can be transported to their destination in the shops and to consumers. This makes infrastructure a vital cornerstone for the country's welfare and prosperity.
3. Mobility is a key element in the competitiveness of businesses – and thus also for the growth conditions of Danish society. Efficient transport systems contribute to ensuring that goods can be produced in the best and least expensive location. The production and distribution of goods become simpler and less expensive, because faster and more reliable delivery to the consumers is ensured.
4. High mobility contributes to businesses being able to attract the right manpower.
5. At the same time, it is important to be aware that developments in the climate and environmental areas may influence planning of infrastructure as well as urban planning.
6. It must be expected that the measures available to Denmark are constantly being developed, and that technological possibilities that cannot be imagined today will be developed.

To better manage infrastructure, political reforms also took place. Prior to 2007, the responsibility for infrastructure planning in Denmark was divided between the three levels of government: the state, 14 counties and 271 municipalities. Following the reforms, five counties were formed and the national government took over responsibility for 2,200 kilometers of road infrastructure previously under the counties' jurisdiction. The reforms also saw the number of municipalities reduced to 98. Municipalities became responsible for all local infrastructure planning, and assumed responsibility for 7,600 kilometers of counties' roads. Today the Danish state only manages 5% of the total road network, but these are the nation's major roadways, which account for nearly half the total traffic volume.

Recognizing the importance of Denmark's gateways for connecting the country to the rest of the world, the Commission also undertook a comprehensive study of the economic contributions of infrastructure and the growing need for efficient international passenger and goods movement.

Following the Commission's work, an Agreement Green Transport Policy was established in January 2009. The Agreement has widespread political support and sets out a number of additional principles:

- Roads have an important function within the transport system, and road capacity shall be extended primarily in the most congested areas, but also where economic growth and industrial development require an upgrading of existing infrastructure.
- Public transport shall absorb most of the future growth in traffic; railways shall be reliable, safe and ultramodern.
- Reduce CO2 emissions from transportation and carry out a green reorientation of the existing vehicle taxation scheme.

The Agreement led to the adoption of long-term planning to analyse future large-scale infrastructure demands and identify strategic options for developing Danish infrastructure beyond 2020.

A major Infrastructure Fund with approximately €12 billion in total funding was created. The Fund is financed partly by tax revenues and partly by other sources, such as one-off returns from the sale of public assets and savings on built projects. There are sufficient funds for all decided projects through to 2020. The large Fehmarn Belt fixed link and Copenhagen Metro projects rely on user charges with financing supported by state guarantees.

The Capital Region of Denmark Organisation was created three years ago after the regional political administrative reforms took place. It is a political organisation and has an Elected Council with regional tasks in health, social services, regional development and public transport. Like each of the Regions, the Organisation is required to prepare a Regional Development Plan. The plan is intended to present a common regional vision targeting the challenges and options across authorities, sectors and geographies.

In the Greater Copenhagen Area, the 2007 reforms split planning responsibilities between the national Government (which assumed the main infrastructure and planning responsibilities) and the Capital Region Organisation (which was given responsibility for the Regional Development Plan, advisory in nature).

Source: Transcontinental Infrastructure Needs to 2030/2050: Greater Copenhagen Area Case Study, OECD, June 2011.

Air Transportation

British Columbia's airports have long contributed to and supported international and domestic commerce. While past expansions at the domestic and international terminals at Vancouver International Airport (YVR) have allowed the airport to handle more passengers, forecast increases in passenger travel are prompting YVR to develop plans for a third runway that will enable it to accommodate roughly double the number of passengers (33 million) and 484,000 takeoffs/landings by 2027. Like the ports, the relative proximity of BC's primary airport to Asia provides a time saving for connections to the trans-Pacific market, thus furthering the goal of making YVR a more competitive hub within North America and supporting the future growth of the tourism industry in the province.

While YVR is an example of smart infrastructure development, we note that in contrast to the situation at YVR most leading American airports have access to infrastructure financing tools such as tax-exempt bonds and also benefit from significant direct public sector investments. The US has also been more aggressive than Canada in negotiating liberalized market access arrangements with other countries. Bilateral agreements with important Pacific Rim trading partners like South Korea would facilitate greater trade and travel between Canada and growing Asia economies and should be a priority for the federal government going forward.

Prince George is working to leverage its geographic position to develop its airport as a refuelling and tech stop for cargo flights. In this regard, Prince George International Airport has built the third longest commercial runway in Canada at 3,490m (11,450 ft). It has also put in place fuel storage capacity and is building its Crossdock Facility. Phase one of the Prince George Global Logistics Park Development is ready to go, consisting of approximately 45ha subdivided into 19 light industrial lots ranging in size and price and located adjacent to the Prince George Airport. Ultimately the Prince George Global Logistics Park (PGGLP) will encompass 1,200ha.

Communication infrastructure

Today 93% of British Columbians have internet access. The provincial government has made a commitment to achieve complete connectivity coverage by 2021. BC is a recognised leader in broadband connectivity: back in 2007 the Premier's Technology Council reported that BC was the best in Canada on this metric, which was attributable to the Connecting Communities initiative. The innovative "reverse costing model" developed by the government and private sector partners has made it possible to provide broadband connections to small and/or remote communities that would otherwise not likely be served if left to market forces alone. This approach - where the smaller the community the lower the price to connect it – meant not only that the network was extended, but that local private enterprises could provide the last mile of connectivity from the network to businesses and homes.

BC continues to advance broadband coverage. In July 2011, the province signed a 10-year strategic telecommunications agreement with TELUS, which leverages telecommunications benefits for people in rural and remote areas (rural benefits). The agreement obliges Telus to provide over 1,700 kilometres of new cellular coverage along unconnected highway segments and upgrade connectivity to qualifying communities. As of August 2014, 983 kilometers have been completed.

Significant progress has been made in the level of success in enabling First Nation communities to access broadband internet services. The province provides assistance in the development of upgrade strategies for telecommunication infrastructure that allow service providers to connect homes, businesses and schools to the internet. In 2007 just 85 of 203 (42%) First Nations communities had broadband facilities. By 2014 coverage had expanded to 190 out of 203 communities, or 94% and the target, with 100% coverage in sight by 2016/17.[24]

These achievements exemplify the leadership BC has shown in the area of broadband connectivity. Developing wired or wireless last mile connectivity for communities around the province is a key step in enhancing the competitiveness and productivity of small to medium sized enterprises, which make up 98% of all businesses operating in BC.

Other elements of the province's ICT infrastructure include BCNET and PLNet, each of which is a subset of SPAN/BC. The high-speed BCNET connects research universities and institutions at speeds 10,000 times faster than the commercial Internet, keeping BC's scientific and technological research community competitive with other leading jurisdictions. PLNet was the initial vehicle for providing Internet access to all of BC's public schools, and has expanded over the past decade to include other post-secondary institutions, providing secure data transfer and storage capacity, as well as equity in service delivery regardless of location.

In BC the development of industry sectors such as ICT, biotechnology, clean technology, tourism, film and new media underscores the need to be globally well-connected through fast, reliable internet and telecommunications infrastructure and high quality ICT services. .

Social Infrastructure

BC has also built and upgraded schools and hospitals around the province. A new hospital was built in Abbotsford, and Surrey Memorial underwent a major expansion, both via innovative P3 projects. A new hospital and health centre is under construction in Burns Lake. The North Island Hospitals Project is now well underway, with the arrival of the first tower cranes on the selected hospital sites. Still another hospital is being built in Haida Gwaii. In healthcare, there is intense pressure to add capacity (e.g. for seniors care) and also to upgrade or replace aging infrastructure assets.

In most parts of the province, declining populations of school aged children are limiting the pressure for new schools. But in some cities, such as Surrey, strong youth population growth means new schools will need to be built. The province has on ongoing seismic upgrade program for BC's schools. Since 2001 the government has spent or committed $2.2 billion to seismically upgrade or replace 213 schools deemed to be high-risk. The Ministry of Education reports that an estimated further $600 million will be necessary address the remaining 126 high-risk schools.

In the higher education realm, the universities have expanded their existing facilities and some have established satellite campuses. Capital spending at the post-secondary level is well-planned. All the province's post-secondary institutions were required to submit 5-year capital spending plans back in 2012.

[24] Ministry of Technology, Innovation and Citizen's Services, 2014/15-2016/17 Service Plan (February 2014).

These plans will be updated as required. BC's post-secondary institutions are also well-positioned to finance their capital expansion plans. However, the Business Council believes there is an argument for removing the capital budgets of at least some post-secondary institutions from the provincial government's "reporting entity" to allow greater flexibility in funding the development and acquisition of long-lived capital assets such student dormitories, which involve almost no risk to taxpayers and are supported by predictable revenue streams.

Municipal Infrastructure

In Canada, municipal governments are largely responsible for local roads, solid waste pickup, drinking water, wastewater and storm water management along with cultural and recreational amenities. Here the picture may be more mixed depending on the age of the municipality and its infrastructure. Many analysts argue there is intense pressure for additional funding at the municipal level to keep up with escalating infrastructure demands and the deterioration of some existing assets. In spite of constrained funding, local governments have made investments and upgrades to water and sewer systems and waste handling as required, with much of this being done through the province's regional districts that work to provide utility services to municipalities.

First Nations Infrastructure

Many First Nations communities around the province have inadequate to very poor local infrastructure. There is a need to need to significantly strengthen the construction, operation and maintenance of community facilities, such as water and wastewater systems, education facilities, on-reserve housing, roads and bridges, administration offices, and even the remediation of on-reserve contaminated sites.

The New Building Canada Plan provides some dedicated funding for First Nations infrastructure under the Gas Tax Fund and the National Infrastructure Component of the New Building Canada Fund. This funding is being allocated to the First Nations Infrastructure Fund managed by Aboriginal Affairs and Northern Development Canada.

First Nations communities will continue to benefit from the permanent and indexed federal Gas Tax Fund over the next decade. Federal Gas Tax Fund allocations for First Nations will continue to be based on First Nations population on reserve. From 2014 to 2019, this will represent $139 million. The First Nations allocation for 2019 to 2024 will be based on 2016 census data. An additional $155 million over 10 years will be allocated from the National Infrastructure Component of the New Building Canada Fund.

The First Nations Infrastructure Fund focuses on five priority areas: improving First Nations energy systems (linking to power grids, sustainable energy systems), broadband connectivity, solid waste management (including landfills and recycling), road and bridge projects, and community planning and/or skills development projects that will support long-term sustainable community development of First Nation communities.

Public Private Partnerships

More than a decade ago, the BC government introduced a public private partnership (PPP) program to facilitate and accelerate the delivery of public infrastructure projects such as bridges and hospitals. A PPP

is a long-term, performance-based agreement between the public sector and the private sector in which the latter party is responsible for the financing, design, construction and operation of an infrastructure project. The public sector maintains ownership of the asset and oversight of program delivery.

While a PPP approach is not appropriate for all public infrastructure projects, the PPP delivery model makes sense for a sub-set of large, complex infrastructure projects that can benefit from effective risk transfer and optimize the use of private financing.

British Columbia is recognised nationally and internationally as a leader in public procurement. BC's Capital Asset Management Framework requires that all major infrastructure projects are considered in terms of viability for PPP delivery. In 2002, the government created Partnerships BC, a provincial Crown organization, to serve British Columbians through the planning, delivery and oversight of major infrastructure projects, particularly those suitable for the PPP delivery model. Partnerships BC has participated in the procurement of more than 40 infrastructure projects with an investment value of over $17 billion - $7 billion of which is private sector capital. Arguably, the organization has significantly advanced the capacity to build infrastructure in the province by leveraging private sector financing and expertise in both construction and operational elements across a wide variety of projects. Partnerships BC should continue to improve the province's procurement process based on its knowledge of international best practices and local expertise.

Partnerships BC – List of Design Build/P3 Projects

Operational/Complete

- Abbotsford Regional Hospital & Cancer Centre
- BC Cancer Agency's Centre for the North Project
- Britannia Mine Water Treatment Plant
- Canada Line
- Charles Jago Northern Sport Centre
- Fort St. John Hospital Project
- Golden Ears Bridge
- Gordon and Leslie Diamond Health Care Centre
- Jim Pattison Outpatient Care and Surgery Centre
- Kelowna and Vernon Hospitals Project
- Kicking Horse Canyon
- Modular Classroom Project
- Pitt River Bridge & Mary Hill Interchange
- Royal Jubilee Hospital Patient Care Centre
- Sea-to-Sky Highway
- Sierra Yoyo Desan Road
- Smart Metering Program
- South Fraser Perimeter Road Project
- Surrey Memorial Hospital Redevelopment and Expansion: Emergency Department and Critical Care Tower
- Surrey Pretrial Services Centre Expansion Project
- Vancouver Island Health Authority (VIHA) Residential Care & Assisted Living Capacity Initiative
- William R. Bennett Bridge

Under Construction

- BC Children's and BC Women's Redevelopment Project
- Evergreen Line Rapid Transit Project
- Interior Heart and Surgical Centre Project
- John Hart Generating Station Replacement Project
- Kitsilano Secondary School Renewal Project
- Lakes District Hospital and Health Centre Replacement Project
- North Islands Hospitals Project
- Oak Bay High School Replacement Project
- Okanagan Correction Centre Project
- Port Mann/Highway 1 Improvement Project
- Royal Inland Hospital Clinical Services Building Project
- Queen Charlotte/ Haida Gwaii Hospital Replacement Project
- SRO Renewal Initiative
- Vernon Jubilee Hospital Inpatient Bed Project
- Wood Innovation and Design Centre Project

Announced/In Procurement

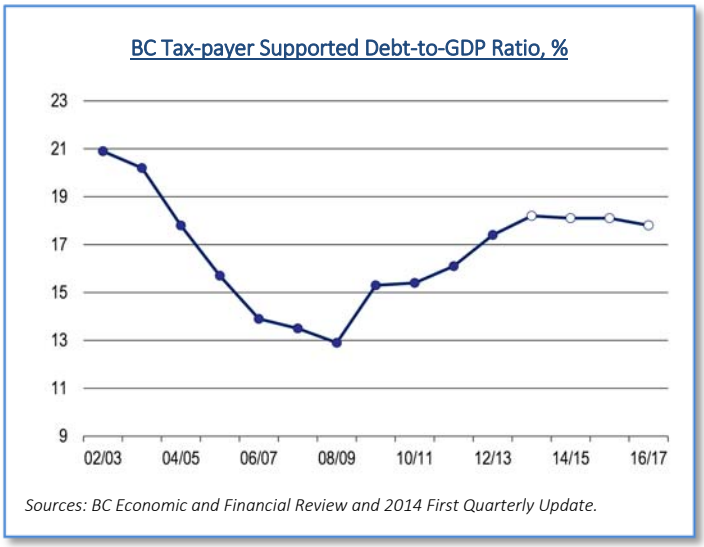
- Capital Regional District: McLoughlin Wastewater Treatment Plant Project
- Emily Carr University of Art + Design Redevelopment Project
- Penticton Regional Hospital Project
- Site C Clean Energy Project Worker Accommodation
- City of Surrey Biofuel Processing Facility Project

Source: Partnerships BC http://www.partnershipsbc.ca/files-4/projects.php.

6. Finance

In many advanced economy jurisdictions infrastructure investment is lagging and there are investment deficits. As the previous section discussed, BC has done quite well in the development of new infrastructure that supports economic growth and efficiency. But we believe there is still room to strengthen infrastructure planning, investment and delivery. Moreover, ongoing population and economic growth promises to increase demand for infrastructure of various kinds across most regions of the province. In the face of mounting demands for health care and other social services, the funding and financing of large capital intensive projects will remain a challenge. How will we pay for the infrastructure necessary to keep BC competitive and to ensure British Columbians continue to enjoy a high quality of life?

In British Columbia infrastructure financing comes from a number of sources. The province is responsible for large intercity highways, hospitals, schools and other infrastructure assets such as the Vancouver Trade and Convention Centre. Municipalities are responsible for local infrastructure such as roads, water and sewage services and recreation facilities. The federal government also has an interest and a role in projects of national significance, such as major ports and border infrastructure upgrades; Ottawa also provides financial support for both provincial and municipal projects. A significant part of infrastructure is in the private sector, particularly in telecommunications and railways. Insufficient capital spending is generally not an issue for private sector infrastructure. For rail and telecommunication companies, the main concern is the regulatory climate established by government (mainly the federal government) and ensuring they can make a sufficient return on the capital deployed.



Sources: BC Economic and Financial Review and 2014 First Quarterly Update.

The government and private sectors use several different instruments to finance capital investment. Government financing rests mostly on tax revenues and funds garnered through borrowing. Private finance is made up of loans, bonds, and equity. User fees can be adopted to recover capital expenditures once the infrastructure is up and running, but generally they are not available during the construction phase.

In spite of the move to public sector fiscal retrenchment, the provincial government continues to allocate substantial funds to capital projects. In its most recent budget, $4 billion is earmarked for taxpayer supported capital projects. But consistent with the restraint theme and a desire to limit and over time reduce the taxpayer supported debt burden relative to GDP, taxpayer supported capital spending is slated to decline to $3.7 billion in the next fiscal year and then to $3.3 billion the following year. Self-supported capital spending in the province amounts to between $2 and 2.5 billion over the next couple of years.[25] So

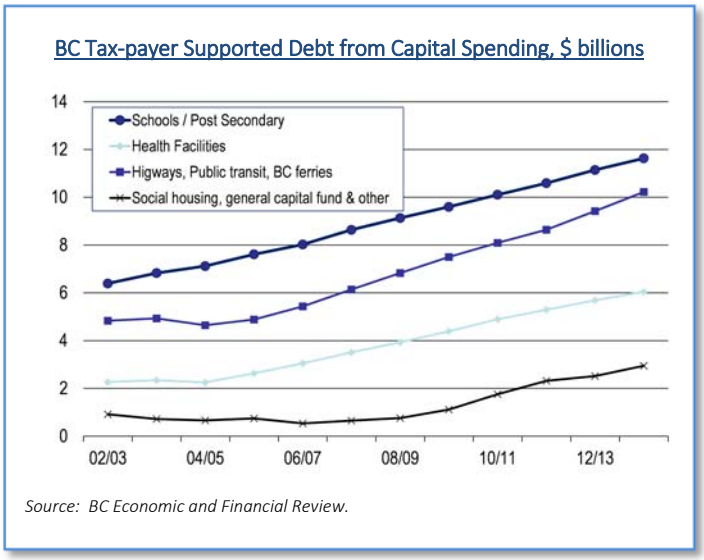
[25] Most of this is based on capital spending and related borrowing by BC Hydro.

combined, total government-influenced capital spending in BC will be $6.6 billion this fiscal year but then fall to about $5.3 billion over the next two years.

As noted, the Federal government routinely supports investment in infrastructure projects. Partly in response to the 2008-09 economic downturn and partly to enhance Canada's competitiveness, the federal government is currently running a 10-year Build Canada Fund which will provide $53 billion for provincial and municipal infrastructure. The plan is comprised of a number of different components:

- The Community Improvement Fund, which together with Gas Tax funding and the Goods and Services Tax Rebate for Municipalities will provide over $32 billion to municipalities for projects such as roads, public transit and recreational facilities, and other community infrastructure.
- Another $14 billion New Building Canada Fund, which sets aside $4 billion for infrastructure projects of national significance and also features a $10 billion Provincial-Territorial Infrastructure Component for projects of national, regional and local significance.
- An additional $1.25 billion for P3 funding (administered by PPP Canada, a federal government agency).

While this funding is welcome, the amounts are relatively small when spread over a 10-year period and across all 13 provinces and territories. The funding will not adequately address current and projected infrastructure development requirements. The province and municipalities should take full advantage of the available federal funding, but they will also need to seek additional resources to pay for future infrastructure projects. The Build Canada Fund will also come to an end within a few years and it is not clear at this point what mechanisms the federal government will employ to support infrastructure investment at the end of the current 10-year program.



Source: BC Economic and Financial Review.

Canadian municipalities now oversee the largest share of the stock of infrastructure among the three levels of government and have had to take on added responsibilities for new infrastructure investment in recent years. Municipalities remain heavily reliant on property tax to pay for both services and infrastructure. Some have argued that property tax is a source of revenue that does not tend to grow at the same pace as the cost of service delivery and so it not an effective way to fund infrastructure needs over time.

Overall the backdrop for capital funding for infrastructure points to the benefits that may be realized from a greater private sector role in infrastructure financing, which will only be available in sufficient amounts if government has a good understanding of the incentives and risks that confront private investors in infrastructure assets.

Private Investment in Public Assets

Over the past few decades private financing and operation of infrastructure assets has developed on a fairly large scale across a number of advanced economy jurisdictions. In part, this can be explained by technological innovations that help to reduce transaction costs if user fees are put in place, electronic tolling being one of the most obvious examples. There is also greater public acceptance of the principle that users rather than taxpayers in general to pay for certain kinds of infrastructure services. There is also more acceptance of private sector participation in the operation and financing of infrastructure and recognition that such private sector involvement can foster efficiency gains. Probably the most decisive factor supporting a growing private role in financing and operating infrastructure has been the fiscal constraints facing governments, even if in BC's case the government clearly has room to undertake additional borrowing to fund infrastructure investment. Finally, the low interest rate environment that has existed for the past six years and the uncertain outlook for equity markets are prompting pension funds and other institutional investors with long time horizons to seek out investments such as infrastructure assets that are likely to generate reasonable rates of return.

Mobilizing additional resources to support and pay for the growing demands for infrastructure will require new financing sources and instruments. Currently much of the increase in infrastructure financing is associated with banks.[26] For private sector funding, banks will always be important financiers, especially in early stages of development. The Canadian bond market also has a long track record of providing debt financing for infrastructure projects, including numerous P3s in the province, independent power projects and operational infrastructure assets (such as YVR, BC Ferries and the Vancouver Port Authority). Still policy makers and officials looking to put new public infrastructure in place should recognize that banks are not always well-positioned to hold very long-term assets on their balance sheets and bond financing is often not an alternative. A broader group of investors should to be sought.

Why invest in infrastructure? For pension funds one of the main reasons is that such investments are expected to produce predictable and stable cash flows over time. In today's financial environment these are very likely to produce returns in excess of those obtainable in traditional fixed income markets. One of the key benefits of investing in infrastructure is the prospect of a stable, long-term income stream. Another advantage of this emerging asset class in the eyes of large investors such as the Canadian Pension Plan Investment Board is that infrastructure projects offers the opportunity to deploy large sums of capital.

Pension plans also have to deal with the risks of mismatches in their assets and liabilities. Infrastructure investment can be attractive to institutional investors such as pension funds because the long-term nature of infrastructure assets better aligns with the long-term horizon of pension liabilities. In addition, infrastructure projects are often linked to inflation, so they can help pension funds hedge against inflation exposure.[27] Infrastructure is not correlated with traditional investment classes, which also helps to diversify a fund's portfolio.

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[26] Ehlers, Torsten, "Understanding the Challenges for Infrastructure Finance," Bank for International Settlements (August 2014), p. 1.
[27] OECD, Pension Funds Investment in Infrastructure, A Survey (September 2011), p. 78.

The first Canadian pension plans started investing in infrastructure more than 14 years ago and have built up a significant allocation to the sector since then. Canadian pension funds such as Ontario Teachers, Caisse de Dépôt et Placement du Quebec ("CDP"), OMERS, the Canadian Pension Plan Investment Board ("CPPIB") and OPTrust are increasingly active in the infrastructure marketplace. These investors have acquired the knowledge, expertise and resources to invest directly in infrastructure assets.[28] According to the Pension Investment Association of Canada, in 2006 pension funds had invested almost $21 billion in infrastructure, which at the time represented 2.4% of all assets. By 2013 infrastructure investment had increased almost four-fold to $79 billion, taking infrastructure's proportion of total investments to almost 5%.[29] The CPPIB now has 6.4% of its assets allocated to infrastructure.

Owing in part to its comparatively small market as well as the continued public ownership of most assets, Canada is not the only market considered by Canadian pension funds looking to gain exposure to infrastructure projects. These funds have traditionally looked at opportunities originating in other parts of North America and Europe.[30] Having said that, the CPPIB did purchase a 10% interest in Ontario's Highway 407 for US$894 million a few years ago, which may signal a greater interest in opportunities in Canada. According to a recent OECD survey, pension funds in Canada expect an internal rate of return (IRR) on infrastructure investments between 9% to 13%, net of fees, and target the 13-16% range for greenfield projects, both of which are significantly higher than expected returns in the bond or equity markets.[31]

Barriers to Institutional Investment in Infrastructure

Despite their greater interest in infrastructure, there are still barriers that inhibit institutional investors from deploying more of their capital toward this asset class. One of the main reasons for the shortfall of the supply of infrastructure finance is the lack of a pipeline of appropriately structured and timed projects.[32] Infrastructure investment entails complex financial and legal arrangements. Because infrastructure projects sometimes involve natural monopolies such as highways or water distribution systems, governments like to retain control to protect against any potential abuse of monopoly power. The result can be very complex legal arrangements to ensure that risks and payoffs are appropriately proportioned.

Another related factor is that building up the necessary expertise in any relatively new asset class is costly. Investors are far more likely to incur these costs if they see a predictable pipeline of investment opportunities rather than one or two potential projects. Some large pension plans, such as the CPPIB, have built up in-house expertise in the area but this fund is in a position to invest in infrastructure around the world and most of its infrastructure assets are outside of Canada. A more predictable, long-term pipeline within Canada would encourage smaller pension and other institutional funds to develop their knowledge and capacity in this area.

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[28] OECD, Pension Funds Investment in Infrastructure, A Survey (September 2011), p. 78.
[29] Pension Investment Association of Canada. http://www.piacweb.org/publications
[30] OECD, Pension Funds Investment in Infrastructure, A Survey (September 2011), p. 78.
[31] OECD,"Pension Funds Investment in Infrastructure, A Survey (September 2011), p. 78.
[32] Ehlers, Torsten, "Understanding the Challenges for Infrastructure Finance," Bank for International Settlements (August 2014), p. 3.

Another potential issue is that the amount of equity involved in some individual infrastructure projects may be too small to draw the interest of a large pension fund. A huge fund such as the CPPIB is typically looking to deploy hundreds of millions of dollars on a single project, considering the expertise and analysis that is required to support each investment decision. Also, not all infrastructure investments are attractive as a hedge against inflation since some may be structured to provide a fixed return that does not rise in line with inflation.

The long timelines involved in the infrastructure development business also give rise to risks and complexities. Many infrastructure projects generate cash flows only years after they are started. Some of the economic characteristics discussed earlier make the financing of infrastructure challenging. Specifically, infrastructure investment tends to involve large up-front fixed costs, followed by a low marginal cost for each additional user once the fixed capital is in place. Historically, large Canadian pension funds have been reluctant to take on construction risk, opting instead to target large operational assets. Combined with the long average lifespan of many infrastructure assets, this can pose difficulties for private investors, who need to recoup their investments and costs. Governments would also like to ensure that essential infrastructure is developed in sufficient amounts and produced efficiently. Unlike traditional investments, most infrastructure is unique in terms of the services it provides, and infrastructure is not a particularly liquid asset. It should be noted that this reluctance to take on risk associated with greenfield projects is diminishing, in part because of increasing competition for assets along with the growing scarcity of large, high quality operating assets funds to invest in.

7. Building Greater Infrastructure Capacity: Recommendations

Infrastructure, in all of its dimensions, is the backbone of a modern economy. It also happens to be an area where the provincial government has considerable authority and the ability to lead– it can decide how much, where and when to invest across many areas of infrastructure development. Municipal governments also have some control over where and what infrastructure to invest in. Below are a number of recommendations that are intended to strengthen BC's capacity to maintain and develop new infrastructure (and maintain existing assets) that we believe is needed to ensure that BC's citizens are served by efficient and up-to-date infrastructure networks. The recommendations are grouped around five broad themes. Overall, the recommendations are intended to help build capacity in the broad arena of provincial infrastructure finance and development.

Theme 1: Develop a long-term and comprehensive infrastructure strategy for the province. Such a strategy would support and enable long-term planning and prioritizing of infrastructure investments, in the process helping to make infrastructure decision-making less reactive and more thoughtful and proactive. It would also facilitate coordination of infrastructure planning and needs assessment across different levels of government and foster stronger governance. Another benefit of a long-term strategy is that it would provide a "pipeline" of projects and signal the government's commitment to investing in infrastructure going forward. Both of these factors would help to mitigate some of the concerns expressed by large institutional investors. A long-term strategy would also facilitate the prioritizing of projects and make better use of the public's involvement in pertinent consultation processes. Some of the details and components of a long-term infrastructure strategy are outlined below:

Ontario to Formalize Long-term Infrastructure Planning

Ontario is in the process of enacting legislation that, if passed, would support long-term strategic infrastructure planning to build a stronger economy that supports more jobs and apprenticeship opportunities.

The proposed Infrastructure for Jobs and Prosperity Act would require the province to regularly table a long-term infrastructure plan in the legislature covering a period of at least 10 years. The proposed act also includes guiding principles to help planning align with demographic and economic trends to maximize the value of provincial infrastructure investments and promote innovation, competitiveness, and job creation and training.

This mandate increases the attractiveness of PPP transactions, since these transactions provide a cost-effective commercial approach to infrastructure development and help reduce government debt by transferring risk to the private sector. Factors that would be considered when prioritizing planned projects include the following: a full consideration of all related capital and lifecycle costs; a long-term return on investment; a maximized tax-base growth; and protection of the environment through a consideration of the impacts of severe weather on infrastructure.

Recognizing the province's need for skilled trade workers, the proposed legislation would also require the government to involve apprentices in the construction of certain provincial infrastructure projects.

Strengthening communities by supporting strategic growth is part of the Ontario government's plan to invest in people, build modern infrastructure, and support a dynamic and innovative business climate.

If passed, the act would require the first long-term infrastructure plan to be tabled in the legislature within three years, with following plans tabled every five years.

Many of the principles contained in the province's long-term infrastructure plan, Building Together, are reflected in the proposed legislation.

- Follow the Ontario model and formalize a long-term infrastructure planning process. As detailed in the accompanying text box, Ontario has introduced legislation to establish a 10-year strategic infrastructure plan that would require the public sector to consider economic trends and competitiveness when planning infrastructure projects.
- Provide the BC Treasury Board with the mandate and authority to manage the development and implementation of the Provincial Infrastructure Strategy.
- As part of the planning process, identify infrastructure investments that provide the highest returns and prioritize on this basis.
- Explore opportunities to establish infrastructure corridors across BC.
- Step up engagement with First Nations to obtain their support for infrastructure projects within their traditional territories and ensure their communities benefit from new infrastructure investments.
- Encourage municipal participation in the strategic planning process and work to enhance a regional approach to infrastructure planning in key BC regions. Strengthen the province's ability to ensure that infrastructure that is in the provincial and national interest is built in a timely manner.
- Encourage the development of a high level transportation/urban development plan for the lower mainland with a long-term view to add context to the prioritization of transportation infrastructure projects. The plan and regular updates should be undertaken by an independent body.
- Elevate public awareness and place greater emphasis on the need for high quality and reliable infrastructure to support economic growth and a high standard of living.
- Ensure First Nations' interests are addressed and integrated into infrastructure planning and priority-setting.
- Increase the involvement of a wide range of stakeholders in the infrastructure process.

Theme 2: Focus on leveraging financing opportunities to secure and maximize a stable flow of funding for infrastructure development in BC. The main objective here is to increase access to stable flows of financing for infrastructure needs and move away from badly needed projects being postponed due to a lack of financing, as has occurred in the past. An important issue in this area is to address concerns and challenges that inhibit private sector investment. The government must also re-visit the question of the capacity for additional public financing of infrastructure projected that can help to strengthen BC's economic performance. Some specific recommendations under this heading include:

- Leverage Partnerships BC. This organization is a global leader in the field of public-private partnerships and should continue to be used to advance the attractiveness of BC's market for private sector investments in infrastructure.
- Amend the province's accounting policy framework and the manner in which it affects capital investment activity by entities which are mainly outside of the government itself but still part of the wider provincial public sector. In particular, re-assess the current treatment of self-supported debt at BC universities which currently shows up, dollar-for-dollar, as debt on the province's books.
- Consider establishing a provincial infrastructure fund administered by a stand-alone agency. Such a fund could be financed by one-off sales of provincial assets and possibly a small share of tax revenues or user fees.

- In Metro Vancouver, work with TransLink to establish a framework to allow it to share in incremental increases in land values associated with the development of new/expanded rapid transit infrastructure. Some of this revenue could flow into the proposed infrastructure fund.
- Work to identify and address issues that deter pension funds and other institutions from investing in infrastructure assets in order to encourage institutions to make more capital available for infrastructure projects in BC.
- Examine the legal and regulatory frameworks affecting infrastructure with a view to supporting the emergence of fresh sources of capital and new business models for infrastructure development. Step up efforts to reduce the length and complexity of the planning-to-implementation process.
- Review capital requirements and taxation capacity at the municipal level of government to determine whether additional sources or methods of taxation may be appropriate for municipalities to help them meet current and future infrastructure requirements.
- Examine options for better transit and transportation planning in Metro Vancouver and other urban settings. Enhance regional coordination and advance the capacity for incremental transit funding from land value capture along transit routes.
- In light of historic low borrowing costs and BC's modest debt-to-GDP ratio, explore the potential to ramp up capital spending on priority infrastructure projects over the next 2-3 years. This may include consulting with rating agencies to understand the financing implications of a slightly higher debt-to-GDP ratio. This recommendation recognizes that the current economic climate represents a uniquely opportune time to invest in large-scale infrastructure. BC has the third lowest net debt-to-GDP ratio among the provinces and a debt burden that is easily manageable by international standards. In relation to the size of the economy, the province has scope to borrow additional funds for infrastructure projects should the government decide to do so.

Theme 3: Fully engage with the federal government and leverage federal government financial support.

The federal government has more tax raising capacity than the provinces and is better positioned than most provincial governments to fund capital projects. The role of the Asia Pacific Gateway as a national strategic asset suggests the federal government should commit to ongoing funding for capital projects related to goods movement and to improve transportation services for Canadian business sectors that depend on the Gateway.

- Make infrastructure the top priority in all discussions between the province and the federal government.
- Continue to advocate for the national importance of the Asia Pacific Gateway. Collaborate with other western provinces to fashion an agenda to further strengthen the competitiveness of the Gateway.
- Work with the federal government to reduce rents on airports to free up more capital to re-invest in infrastructure and provide ports and airports with resources to help them compete with counterparts in the US.
- Seek regular federal contributions to a new BC infrastructure fund.

Green Bonds

Green bonds are instruments which tie the proceeds of a bond issue to environmentally-friendly investments. Issuers of green bonds raise money promising to spend it on projects such as wind farms, solar facilities, forestry initiatives, public transit, or energy efficient factories or buildings. Globally, in 2013 about $3 billion of such bonds were sold. In the first six months of 2014, the sum reached almost $20 billion, nearly twice as much as in 2013 as a whole.* All green bonds are investment grade; many have been two or three times oversubscribed; half were issued by companies, which marks a switch from 2013 when most green bonds were sold by international agencies such as the World Bank.

The World Bank and its sister organisation, the International Finance Corporation, were pioneer issuers of "labelled" green or climate bonds, where proceeds are allocated to climate-related projects. The European Investment Bank was also an early issuer with its Climate Awareness Bonds. Along with the greater diversity of projects being funded by Green Bonds, more organizations and governments around the world are making use of Green Bonds.

As noted, the term "Green Bond" refers to bonds where the proceeds are for climate or environmental projects but they are also labelled as "Green". A broader category, sometimes referred to as "climate-themed bonds", refers to labelled as well as unlabelled bonds. As with some Green Bonds, the proceeds from unlabelled bonds are directed to climate projects but are not necessarily labelled green.

Green bonds are similar to traditional bonds, except that their proceeds are clearly earmarked for financing approved environmental projects. With traditional corporate bonds investors don't really know what the funds will be used for by the issuing organization. Green bonds, however, require transparency, as investors have to be assured that funds are used appropriately and that the supported projects are delivering the intended environmental benefits. Issuers of green bonds usually maintain this transparency through formal monitoring and verification by auditors and third party environmental specialists.

The outlook for green bonds is very promising, but they are still subject to the same valuation analyses as any other debt instrument. In order for green bonds to attain mainstream success, their structure, rate of return and risk profile must be similar to traditional bonds. The key difference is that Green Bonds will attract new investors who are interested in climate friendly and other green projects.

According to a 2014 report prepared by the Climate Bonds Initiative, 75% of the climate-themed bond universe is made up of bonds which have an implicit or explicit backing from a government entity. The vast bulk of climate bonds have been bought by institutional investors like pension funds and fund managers. In the Netherlands and South Africa banks have also offered green bonds to individuals; and some fund managers, using World Green Bonds, have created special funds that individuals can invest in.

In Canada, the government of BC recently entered the green debt market. On July 2, 2014, the province issued a green bond on to finance the North Island Hospitals Project. It is the first time a green bond has been used to fund a public-private partnership project in North America and the first time a green bond has been issued to finance a piece of public infrastructure in Canada. The 32.3-year bond was issued by Tandem Health Partners, the consortium delivering the North Island Hospitals Project, and raised about $231.5 million.**

The project is classified as green because of the reduced environmental footprint of the new building. The BC government set the technical criteria for the development of the North Island Hospitals Project, which include LEED gold certification and various energy and greenhouse gas targets.

The issue was oversubscribed by investors who were attracted by BC's triple-A credit rating as the province is the provider of annual service payments to Tandem Health Partners. Buyers were well distributed across insurance companies and fund managers, with traditional buyers of public-private partnership project bonds participating as well as a number of new buyers. This successful issuance positions BC to leverage the new and emerging green bond market in Canada for other infrastructure projects.

The government of Ontario is also launching its own green bond program. The bonds will help Ontario finance transit and other environmentally-friendly infrastructure projects. They bonds will capitalize on the province's ability to raise funds at relatively low interest rates, and serve as a tool for the government to address critical infrastructure needs. The Eglinton Crosstown LRT was selected as the green project that will receive funding from the inaugural bond issue, which is expected to be up to $500 million in size. Ontario is making the first green bonds available through its current dealer group to Canadian and international institutional investors.+

** Climate Bonds Initiative, "Bonds and Climate Change: The State of the Market in 2014."*
*** BC Ministry of Finance, July 2, 2014, news release.* *Ontario Ministry of Finance, September 18, 2014, news release*

Theme 4: Improve efficiency through use of demand management techniques and by broadening the user-pay philosophy for public infrastructure. The user-pay principle is becoming better understood and more accepted by the public for everything from metering of water to road tolls. It is increasingly viewed globally as an efficient and equitable way to finance infrastructure.

- Expand the use of tolls in the lower mainland, with a focus on improving equity across the region. While road pricing may be the most comprehensive approach to demand management, starting with an expanded tolling network (based on low toll charges) across the region may be more manageable and politically achievable.
- Review the provincial legislation restricting the implementation of tolls when an alternative route is not available.
- Educate the public and users of infrastructure on the benefits of user-pay models and the economic and social gains that flow from better infrastructure services.
- Support the use and consistent application of metering for water consumption across municipalities.
- Explore the potential to make greater use of peak-pricing models. This approach is used with public transit but could be expanded to other areas of infrastructure service provision.
- Review and implement technologies to divert waste from landfills and convert organic materials to energy and compost to support the cost of waste management.

Theme 5: Improve the regulatory environment to maximize private infrastructure investment.

- Work with the federal government to ensure private sector providers of infrastructure (telecommunications and rail) are able to earn an appropriate return on investment to ensure sufficient levels of investment are made.
- Incorporate regulations and private sector infrastructure into any provincial infrastructure plan that is developed. For example, a forward-thinking step in the telecommunications sector would be to build "fibre redundancy" into the larger commercial centres in the interior. This would open up opportunities for businesses to make more use of advanced technology applications, further diversifying and strengthening the northern and interior economy.
- Within the BC Utilities Commission's mandate elevate the importance and recognition of the need for high-quality and reliable infrastructure and the linkages to economic growth and competitiveness.
- Continue to promote and advance the standardization of documentation used for the procurement of infrastructure to reduce transaction costs, increase predictability and conform BC practices to those of other progressive jurisdictions.
- Consider the development of standardized "P3" light documentation to permit the use of the P3 approach on a smaller scale by municipalities and other public bodies.

8. Concluding Thoughts

A province or region's infrastructure affects the quality of life enjoyed by citizens, the competitive position of businesses, and the scope for long-term gains in productivity and incomes. Infrastructure produces collective benefits, regardless of whether it is owned/operated by government entities, privately, or through a public-private mix. Although this paper covers most dimensions of infrastructure, assets that are most closely linked to economic activity are especially relevant to competitiveness and productivity. Economic infrastructure is of fundamental importance because it supports all other sectors of the economy. High quality, up-to-date transportation, communications, and social infrastructure is critical to the ability of small open economies like British Columbia to trade in global markets.

The paper reviews some of the more significant infrastructure investments made in the province over the past decade, which have added to and strengthened the infrastructure network. The reality is, however, that greater global economic integration, population growth, demographics and the need to enhance BC's competitive position means we cannot be complacent about infrastructure.

BC is Canada's Gateway to the Asia Pacific and growth in two-way trade flows with that dynamic and rapidly growing region will continue unabated. Trade with Asia could double over the next decade and may be three times its current level by 2030. Tourism and business travel will also rise steadily in line with the massive increase in the middle class in China and other emerging Asian economies. In the context of infrastructure, future population growth and the aging of BC's population are especially relevant considerations: essentially we need to be planning for the same increase in population as BC experienced in the past decades. And the fact that the population will be increasingly urbanized means the pressure for infrastructure will be greatest in cities. Without adequate investment in roadways, bridges and public transportation, urban areas will become heavily congested.

The paper also highlighted a growing number of challenges for infrastructure development. One of the most significant is the fact we are in an era of restrained and limited government fiscal resources. Adding to this pressure, much of BC's existing infrastructure assets are aging, which means more resources will have to flow into maintenance and refurbishment. The project development process involves increasingly detailed and lengthy regulatory processes, heightened levels of scrutiny and expanded consultations with affected groups. For large capital projects in British Columbia, the environmental and social impacts to be addressed are as important as the economic benefits to be gained. First Nations concerns are also central in the development of a growing array of infrastructure in BC.

Although the paper contains many recommendations, there are a few fundamental points that readers should take away. One is that we will need to invest more in infrastructure in BC. The trends and factors shaping BC's future make it imperative to build and upgrade all dimensions of infrastructure, but especially economic infrastructure. A second leading priority is the need to develop a comprehensive strategic plan for infrastructure. A long-term plan would establish a pipeline of projects, help identify priority infrastructure and foster greater regional coordination in building new assets. Finally, in light of constrained fiscal resources, government should be looking to new and innovative ways to finance infrastructure in the province.

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