

External Environment Scan 2006

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**Prepared for: BC Ministry of Transportation
Highway Planning Branch**

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External Environment Scan 2006

Executive Summary

The BC Ministry of Transportation regularly conducts an External Environment Scan of pressures and trends related to the transportation industry. Last conducted in 2004, the Scan identifies trends likely to impact the demand for transportation in BC and the capability of transportation providers to meet the expected demand. While current events are important, the focus of the scan is on trends likely to be important five to ten years from now, when transportation improvements begun today are most likely to be available and in use.

The Scan is based a transportation business model that identifies the key players, resources, and outcomes for transportation providers in British Columbia. The model helps to identify trends in the demand for transportation in BC, constraints on the transportation industry, and issues for specific transportation modes.

British Columbia has a trading economy that is exceptionally open to trends in the world economy. As a result, transportation demand in BC changes with world economic conditions at least as much for reasons internal to the province.

On the other hand, the supply of transportation capacity is relatively fixed in the short term. Increasing capacity in the medium to longer term requires significant investments that do not begin to yield benefits until years in the future. An efficient and cost effective transportation system matches capacity to demand – too little capacity leads to congestion and lost opportunities, while too much consumes resources that could create more societal benefit elsewhere. Long lead times for improvements make it important to anticipate trends, and to separate short-term changes from the longer-lasting ones that justify investment in transportation infrastructure.

Transportation Gateways to World Trade

BC transportation infrastructure facilitates trade with the rest of the world – roads and railways with the United States, ports with overseas markets and airports with everywhere. The gateway function serves local economies by bringing in people and goods needed for the local economy. However, in BC the major function of transportation gateways is to facilitate exports of goods and services to other countries, and to facilitate external to external trade passing through BC. The latter includes Canadian commodities headed overseas, such as prairie grains, as well as inbound goods, such as manufactured products moving from Asia to markets in eastern Canada and the US.

Gateways also involve significant support and service activities, contributing directly to the economy of the region and the province. Finance, legal services, servicing and repair of transportation vehicles, storage and reloading of containers – all are examples of economic activity generated by a transportation gateway for its region. Local infrastructure, such as terminals, roads, communications, education and governance must all be developed and updated for a gateway to remain internationally competitive.

Demand for BC Exports

Goods make up most exports from British Columbia, and are heavily dependent on the transportation system for timely and cost-effective delivery. Export volumes are driven by a complex combination of factors that can be summarized by trends in the economies of

BC's major trading partners, and by constraints (transportation or otherwise) that limit the volume of exports that might otherwise be shipped.

The United States remains by far the largest market for BC goods, although at 64 per cent the proportion of BC exports going to the US is below the Canadian average of 84 per cent. Although there is uncertainty about deficits and currency valuation in the short term, the US economy is well positioned for ongoing growth in the medium to longer term. Open markets, dominant technological leadership and a relatively young population all give the US advantages over other developed economies, and projections under any reasonable scenario show the US to remain by far the largest world economy for the next twenty years.

Constraints on exports to the US in recent years have been related to trade disputes rather than transportation capacity. Softwood lumber trade has been in dispute for many years, with trade limited at various times by quotas, taxes and import restrictions. Cattle and beef product exports have also been limited by the US due to various concerns. Increased security and other procedures have slowed entry of trucks and drivers into the US. Transportation capacity may again become a constraint on export volumes if such disputes and concerns can eventually be resolved without limiting the overall volume of Canadian exports to the US.

Exports to markets in Asia have traditionally been important to BC and are rapidly growing. Japan, always an important trade partner, has until recently suffered economic stagnation at home, affecting foreign investment and the growth in demand for BC exports. China and South Korea have been rapidly growing customers for exports of resource based products, such as coal, and are hoped to grow in their demand for forest products.

Japan, although now recovering economically, is unlikely to regain its relative economic strength and competitiveness in the immediate future. China is well positioned for continued rapid economic growth, with a vast pool of skilled and productive labour that, while incomes are rising, is still relatively low cost. Capital formation, at home and through foreign investment, is at a high rate, and ongoing urbanization on a huge scale provides Chinese industry with an enormous internal market. Although it faces challenges in becoming a major world economic power, China is expected to approach or exceed Japan as the world's second largest economy by 2025.

External to External Trade

As a gateway for external to external trade, especially containers, the importance of BC is growing rapidly. For example, in 2006 the Port of Vancouver was experiencing 31% year over year growth in inbound container volumes. Inbound containers carry mostly manufactured goods from Asia, destined for markets in eastern Canada and the US. Most containers come in by sea and are transferred to rail cars for their journey beyond BC.

Continued growth relies on consumer spending in the Canadian and US economies, which forms a significant portion of their GDP. Countries in Asia are expected to maintain their comparative advantage in manufacturing, ensuring that growth in consumer spending will lead to continued growth in container traffic.

Constraints on trade with Asia in the short run have included shortages of available ships, higher shipping rates, and congestion in the North American ports and railway system (especially for container handling). In Canada, rail capacity constraints are primarily on mainlines on the Prairies and in switching yards. Both major Canadian

railways have been investing in capital improvements to address these concerns. Some rail congestion continues to occur in BC, although it has been considerably lessened by rationalization and sharing of routes in the Fraser Canyon, and investment in mainline improvements and intermodal transfer facilities.

Port congestion in Los Angeles-Long Beach has benefited other Pacific ports in the short term, but all west coast ports are making substantial investments in additional capacity. A new container port is being developed in Mexico largely to handle US-bound containers. Some container ships, especially those too large for the Panama Canal, are sailing directly to New York and other east coast ports from Asia.

In BC, the Port of Vancouver has investments under way that will double the number of containers it can handle. A new container port in Prince Rupert is being developed by a public-private partnership with plans to eventually handle as many containers as the Port of Vancouver currently does. In this competitive, but rapidly growing trade, all BC container ports expect to experience increased traffic with these capacity improvements.

Population Growth and Urbanization

Demographics have returned to the normal long-term pattern for BC after an interruption in the 1990's. There is ongoing net in-migration from the rest of Canada and overseas, as people seek to live in BC for lifestyle as well as economic reasons. Population growth leads to increased transportation demand for people movement and for support services such as retail, recreational and health services. Nearly all population growth in BC is in urbanized areas, with the great majority in the Lower Mainland. This means that it is primarily urban transportation demand that will be driven by population growth. The effects of population aging on transportation demand are as yet unknown, but will also be concentrated in urbanized areas, which tend to have higher average ages than the rest of the province. Most urban development in BC has been auto-oriented, though Vancouver, and more recently Victoria, have been encouraging residential development downtown. Population growth in downtowns is being monitored to see if it may require less automobile transportation infrastructure investment over time.

Tourism

Tourism is struggling worldwide after repeated shocks, some of which directly affected BC tourism such as 9/11, SARS, and wildfires. Overall tourism volumes are just now beginning to exceed pre-9/11 levels. In the long term, continued growth in tourism to BC is expected, as it is a destination appealing to an aging population with disposable income, and industry restructuring increasingly makes available cheap fares. However, since 9/11 there has been a steady decline in day trips to BC by US residents. Whether due to longer border delays from enhanced security procedures, the higher value of the Canadian dollar relative to the US dollar, or confusion about potential future documentation requirements for border crossing, this trend is worrisome, especially to border communities whose tourism traffic is largely made up of spontaneous trips by Americans.

Tourism is attractive to BC as it provides foreign income, much like exports of goods, but in an environmentally "clean" and sustainable way. However, tourism is an intensively competitive industry. For example, the Alaska cruise ship industry based in Vancouver has been losing business to Seattle-based cruises and remains vulnerable to the factors driving the shift away from Vancouver – such as security concerns, expressed US patriotism, a higher Canadian dollar, and massive infrastructure investments on the US side.

Price and Availability of Petroleum Products

Rising and more volatile world prices for petroleum products represent trends that may have a profound impact on transportation costs in the future. Higher petroleum costs can affect the demand for transportation by changing vehicle operating costs and hence travel patterns. They also affect the cost of providing transportation infrastructure, for example by increasing the cost of paving roads. Reduced fuel use due to higher costs could reduce public revenues from fuel taxes that pay for transportation improvements.

In BC, fuel prices have risen sharply, with gasoline, for example, now approaching all-time highs, even accounting for inflation, income and vehicle efficiency. Short-term price changes usually result in limited impacts on transportation behaviour, but if high prices continue they could lead to changed transportation, lifestyle and vehicle purchase decisions. In 2006 there are early signs in BC that people are driving less kilometres, and that overall gasoline purchases are beginning to drop slightly. If these trends are sustained, they could affect the demand for highway improvements, and in urban areas the demand for transit service.

High world petroleum prices stem from a complex mix of factors related to supply capacity, geopolitics, seasonal usage patterns, and fears about supply interruption. Some of these factors can be short term in effect, while others are subject to longer term constraints. While most analysts agree that the current world petroleum price contains a significant "risk premium" for short term concerns, this does not necessarily mean that high prices will go down soon. Past price spikes in petroleum spot markets were not reflected in the futures market, but this has changed. In 2006 oil futures are also priced high, suggesting that markets believe the price of petroleum will stay high for an extended period.

World petroleum reserves remain relatively large compared to immediate demand, but actual production capacity has not grown as rapidly as world demand. Where there was once a "cushion" of excess capacity (primarily in Saudi Arabia) that could be brought online to deal with sudden changes in demand and to moderate world prices, this "cushion" no longer exists. World demand almost matches world production capacity, and prices are therefore more volatile. Some organizations and nations appear to be buying extra crude petroleum as a hedge against supply interruption. There are also localized refinery capacity problems, notably in the US Gulf Coast area after Hurricane Katrina, that are constraining supply. Some of these factors that lead to higher prices and volatility could be addressed by additional investment in industry capacity, and by progress in political conflicts in oil producing areas. However, both of these are likely to take some time, if they can occur at all.

Additional investment in capacity – Traditionally, oil producing countries were loath to allow world petroleum prices to rise too quickly, for fear of reducing demand or even pushing oil-using economies into recession. Recent sustained price rises have not had this effect, reducing the incentive to invest in excess production capacity for a supply "cushion". Also reducing the incentive for additional investment to lower prices is the fact that higher prices make the remaining reserves of oil producing countries more valuable. The majority of the world's remaining reserves are in aging oilfields in the Middle East. Aging oilfields require ever more advanced technology for extraction, and newer, typically more difficult oilfields, also require significant investment. Historically, much of this technology and investment has come from major international oil companies, but these companies have increasing difficulty getting access to new or existing oil in many parts of the world.

Progress in political conflicts – Most of the world’s remaining oil reserves are in places troubled by deep conflicts, either within their own region or with the main oil-using economies of North America, Europe and Asia. While crises may flare up and subside from time to time, the underlying bases of conflict are likely to take a long time to resolve, if they can be resolved at all.

Even in the most optimistic scenarios, additions to petroleum reserves are not keeping up with demand growth, and world petroleum production will peak in the foreseeable future, declining thereafter.

All these factors suggest that higher petroleum prices, even if geopolitical and short term production problems can be solved, may continue to be a factor for a long time. Higher petroleum prices could have significant impacts on transportation costs, as there are currently few cost-effective substitutes for petroleum-based fuels in transportation. Significantly higher transportation costs would have effects both on the demand for transportation in BC, and on the financial viability of transportation providers.

Much depends on timing – if a sustained rise in petroleum costs occurs over several years, markets may continue to adapt and substitutes may become economically viable; if it occurs quickly, or if geopolitical events result in sustained interruption of supplies, considerable disruption to economies and transportation demand can be expected.

Safety and Security Concerns

The events of September 11, 2001 changed the way people in North America think about the safety and security issues that have been growing with globalization and economic integration. In London, in Madrid and in alleged plots uncovered by law enforcement agencies in Canada and the US, transportation facilities were targeted. Transportation systems represent the “front line” for people trying to enter or smuggle illicit goods into North America, from economic migrants hiding in shipping containers to shipments of weapons or drugs hidden in legitimate goods movements. Transportation systems are also the targets or tools of those who wish to disrupt or damage North American economic activity and threaten lives. Many of the benefits of globalization have come with reducing the cost and easing the processes for movement of goods and people between countries and continents. Now, with heightened concerns about safety and security, costs are rising and governments are challenged to maintain the flow of goods across borders. Significant investments are being made at gateways and for events such as the 2010 Olympic Games. However, the volume of travel and commodity movements, which are at historic highs, preclude more than a sampling approach to surveillance. In BC, much infrastructure is located in remote areas where it is difficult to protect from determined efforts at disruption, should some individual or group be motivated to do so.

Environmental Concerns

It is now generally recognized that rising temperatures worldwide are part of climate change, due at least in part to side effects of human activities, especially the burning of fossil fuels. Scientists expect rising temperatures to lead to more severe weather events, changes to precipitation and runoff patterns, and flooding along ocean shorelines. Agriculture and forestry may be affected by changed growing conditions, by insect infestation and more frequent and larger wild fires. The timing of these changes and the degree to which they would affect the economy and transportation in BC are unknown, but some signs of accelerating change have been detected in the Arctic, Antarctic and high mountain glaciers.

If climate change occurs slowly, institutions and individuals can prepare through the normal cycle of investment. Provisions against more intense storms or flooding can be built into highway infrastructure in the normal course of rehabilitation and renewal, for example. If climate change occurs more quickly, it may lead to damaged facilities and disrupted economies, or even loss of life.

Most specialists believe that some effects of climate change are now inevitable, even if fossil fuel burning were immediately and severely curtailed, due to past emissions now working their way through the oceans and the atmosphere. However, reductions going forward would reduce the intensity of future effects, it is believed, compared to what they would otherwise be.

Transportation emissions in BC contribute almost forty percent of the “greenhouse gases” that lead to climate change. Transportation emissions of greenhouse gases have grown steadily, as have those of goods-producing industries in BC, except during economic downturns. With few substitutes available for fossil fuels in the short term, transportation industries and some of their major customers are likely to be impacted by any commitments to slow or reverse the growth in emissions. Such initiatives would also likely increase costs, further reducing transportation demand.

Cost and Availability of Skilled Labour

Transportation organizations rely on specialized skills for constructing and operating transportation infrastructure, and for delivering services to their customers. Through a combination of a booming construction industry, population demographics and organizational downsizing, the transportation workforce has been restructured. The workforce currently has a disproportionately high number of people close to retirement, and few younger workers. Unemployment in BC is at historically low levels. Shortages have already been experienced in particular trades, trade supervisor and management areas. This is expected to intensify within approximately five years when large numbers of “baby boomers” in the transportation workforce will be eligible to retire. Shortages can be expected to lead to demands for wage increases higher than the general rate of inflation, and may also limit the capability of transportation organizations to conduct operations and implement infrastructure improvements. Leading transportation providers have initiated programs to encourage young workers to consider careers in transportation, including partnering with educational institutions to provide transportation-related training and education.

Cost and Availability of Strategic Raw Materials

Strategic raw materials such as steel have experienced rapid price increases or localized shortages as world demand, especially from China, has grown rapidly in the last four years. In the short term, high and volatile prices are expected to continue, although there are signs as of the end of 2006 that the driving forces behind them are moderating. Construction in China and in the US is expected to slow somewhat in 2007, reducing the growth in demand for strategic raw materials. Production capacity has increased in China and elsewhere to meet the demand. For example, China became a net exporter of steel at the end of 2004, after several years as major importer. In the medium term, a worldwide boom in heavy construction and shipbuilding may keep prices high and volatile as long as it continues. Industry consolidation is occurring with mergers among the largest steel producers that may be expected to moderate capacity growth and maintain prices in the longer term.

Specific Challenges by Transportation Mode

Road based transport

Provincial funding and Federal contributions for highway improvements are at historically robust levels. However, ongoing funding for needed improvements, especially in urban areas where most demand growth is expected, remains a challenge. Sources of revenue to fund needed improvements are limited at local and regional government levels.

Higher fuel prices, if sustained over long periods, may impact demand for fuels and hence the fuel taxes which are an important source of funding for road improvements at regional and provincial levels.

Road transportation, as the major contributor of greenhouse gas emissions in the transportation sector, is vulnerable to potential initiatives to reduce those emissions.

Rail

The North American rail network is approaching a capacity crisis, after years of mergers, consolidations and abandonment of double mainline track and branch lines. In past decades, capacity increases through new technology and working practices more than made up for downsizing of the rail network – new locomotive technology, larger freight cars, and improved dispatching methods for example. Now, the limits of capacity improvement through technology have been reached, and railroads all over North America are making significant investments in track capacity expansion to meet projected demand. Current competitive freight rates have benefited shippers, but do not yield sufficient return on capital to attract private investment for these capacity upgrades.

Some branch lines have been spun off by major railroads to be operated by small businesses, while others have been abandoned. The future viability of many branch line operators is questionable. The disappearance of branch lines has resulted in the transfer of significant volumes of good movements to trucks on public highways. On roads that are already busy, such additional truck volumes can have a significant effect on congestion and greenhouse gas emissions (railways typically have the lowest greenhouse gas emissions per ton of goods carried on land).

Air

Worldwide, the full service airline business is in trouble. Even before 9/11 major airlines were struggling with a business model that may no longer be viable. As a result, many of the world's leading airlines have been in bankruptcy or are close to it. Recent higher volumes of travel have not been reflected in returning profitability for most full service airlines. Discount airlines, such as Westjet, have demonstrated the success of their business model, but are not yet able to shoulder the bulk of the passenger and freight volumes moving by air. Not every location, especially outside the major centres, is suitable for this high volume, low frills and low cost business model.

Airlines and airports in Canada continue to face costs, including landing fees and federal government charges, that impair their international competitiveness.

In BC, smaller centres are vitally dependent on air links, typically provided by smaller carriers, for employment, services and recreation. As Canada's gateway to Asia, BC relies on air travel for moving people and high value goods to those important markets. Satisfactory resolution of the troubles of the airline industry is especially important to BC.

Security remains a major concern for air travel, in spite of significant investments since 9/11. Many air trips are discretionary, and previous experience shows that passenger volumes could drop quickly in the face of another security event.

Marine

Ocean shipping rates are at historical highs and space on ships is scarce due to demand having outrun supply, partly to meet demand in China for commodity imports and containers outbound. Congestion is occurring in major ports and at the Panama Canal. One answer to port congestion has been to build larger and larger ships, many of which are too large to use the Panama Canal or smaller ports.

Security is a major concern, especially for container traffic. Ports and law enforcement authorities are cooperating in an effort to upgrade port and shipping security to address potential threats.

The Alaska cruise business has been a major success story for Vancouver, with other BC ports increasingly hosting cruise ship visits. Recently, the cruise ship business in Vancouver has suffered its first-ever declines as cruise lines have responded to investments in the Port of Seattle by moving their home base to that location. Various factors have lessened Vancouver's advantages as a cruise ship home base, including concerns about security, a rising Canadian dollar, and possibly perceived complications related to border crossing procedures and traffic congestion in Vancouver.

The remaining Alaska cruise ship business in Vancouver appears to be at some continuing risk, as the potential to move cruise home bases to Seattle has not yet been reached, and the factors that favour the US home base have not abated.

What you will find in the External Environment Scan document

The trends identified above are discussed in more detail, with supporting data and graphics, in the External Environment Scan and its Appendices. After a discussion of the context for scanning and how transportation demand is balanced by supply of capacity, the document provides detailed discussion of the trends affecting demand for transportation in BC. There follows a discussion of issues facing each major transportation mode (road based, rail, air and marine). Finally, there is a discussion of trends that represent potential constraints on transportation providers.

The Appendices provide further information of interest. Appendix 1 provides updated Transportation Facts that form a background to the discussions in the document. Appendices 2 and 3 provide a discussion of the scanning methodology used, along with the transportation business model on which it is based. Appendix 4 provides a comprehensive list of all the trends identified and reviewed in the scan, not just the major trends highlighted in the text. In a tabular presentation, Appendix 4 itemizes observed trends, likely futures, probability, potential impact on transportation in BC and possible responses that could be initiated by the Ministry of Transportation or others.

The scan represents a snapshot in time of dynamic trends in a fast-changing world. Although the general conclusions about long-term trends are expected to be quite stable, world events can put them in a new light at any time. Readers are encouraged to seek updated information in areas with late-breaking events before making decisions with long-term consequences.

External Environment Scan 2006

Scanning Context for Transportation in BC

Economic Context

Trade in goods and services is vital to the British Columbia economy, with exports accounting for well over 40 per cent of the provincial Gross Domestic Product (GDP). BC is relatively distant from the major world markets for its goods and services, and transportation within BC can be costly due to challenging terrain and weather conditions. As a result, transportation costs affect the international competitiveness of BC products and services. It is important that the BC transportation system, both internally and linking the province to the outside world, be efficient even if it does not in itself represent a competitive advantage.

Demand for Transportation in BC

Transportation is usually in demand as part of some other economic activity – shipping goods, travel and tourism, getting to school or work, for example. The demand for transportation is therefore derived from the level of activity in other sectors of the economy. In BC, much of the demand for transportation is driven by factors outside the province.

Economic conditions in BC's major trade partners – the USA, Asia and the European Community – drive demand for the goods and services they buy from BC, and for the goods shipped through BC to other markets. Understanding the future demand for transportation in BC requires predictions about the future level of activity in the economies of key trade partners and their industries, as well as the relative competitiveness of BC suppliers to those economies.

Tourism represents an “export” industry for BC, in that it brings in revenue from other countries in return for services provided here. Understanding tourism-related transportation demand is especially important, because not only does the transportation system bring tourists to BC, but it represents an important part of the “experience” that draws people to BC. Whether an ocean cruise, a river rafting trip, a helicopter tour in the mountains, or just the experience of driving BC highways, transportation forms an integral part of the tourism experience and hence the impressions of BC left on tourists.

External demand for transportation in BC can be constrained by outside factors. Restraints to trade (such as quotas or tariffs) may reduce the volume of BC exports from what might otherwise be shipped. Concerns about safety and security may deter or delay shipments or visits by tourists. Costs of fuel or other transportation costs may constrain demand that would otherwise be expected to materialize. Awareness of possible constraints is essential in understanding potential future demands on the BC transportation system.

Transportation demand also arises from the presence of population centres – journeys to work, school, shopping, local services and recreation all arise from concentrations of

population. BC has experienced significant population growth for most of the last fifty years. Much of this growth has come from people moving to BC from other provinces or other countries, so understanding potential future demands for transportation means predicting trends for immigration, and also in-migration to BC from other parts of Canada.

Supply of Transportation Capacity

If demand for transportation arises from many sources, largely outside the province, meeting that demand means access to a sufficient supply within BC of transportation infrastructure – roads, railways, ports, airports – and the equipment and services needed to operate them. In the short term, the supply of capacity is relatively fixed and, although it can be expanded in the medium to long term, this may require expensive investments.

When there is more capacity available than is required to meet the immediate transportation demand, transportation can facilitate additional economic activity at relatively low cost – although, even if the infrastructure is already in place, there are additional costs for fuel, labour and equipment. This can be especially attractive if the infrastructure is needed anyway for peak periods and additional transportation demand, such as tourism, can be encouraged during the off-peak periods.

When transportation demand exceeds the available supply, the results may include congestion, which increases everyone's costs and contributes to additional emissions. Congestion or shortage of capacity may delay or deter some discretionary trips. BC may lose some economic activity to competing jurisdictions if congestion costs are severe. Transportation planners usually trade off some congestion at peak periods against the very high costs of building enough infrastructure to meet every conceivable demand.

The Challenge – Managing Infrastructure to Meet Demand

Where existing infrastructure has excess capacity, economic development can be enhanced by promoting additional use of the transportation system – for example, by promoting tourism in areas where infrastructure already exists for other reasons. More commonly, the challenge is to anticipate future transportation demand early enough to initiate investments in additional capacity. Transportation investments may take seven to ten or more years before they are opened for service, and predicting demand that far ahead can be very difficult.

The Role of External Scanning

It can be helpful to monitor trends in key factors that are related to demand for transportation in BC, or to the ability of government and others to supply the needed infrastructure. The External Environment Scan is a tool used by the BC Ministry of Transportation to gather information about future trends and opportunities that may affect transportation in BC.

The scan seeks to understand emerging trends early enough to trigger action to address the trends. With infrastructure improvements and other changes taking several years or more to implement, the trends of greatest interest are those that will affect the demand for

transportation and the capability of suppliers in the coming years, especially five to ten or more years in the future.

Information is plentiful about current events and there are many credible predictions for the near term, such as the next calendar quarter or calendar year. Some of this information bears the seeds of longer-term change, but much of what is happening now and in the immediate future reflects the trends of the past. The scan must look beyond current events to identify trends that are likely to be durable and have impact several years from now.

Similarly, although it would be desirable to identify trends that will be important ten or more years from now, such long-term forecasts are highly risky in a rapidly changing world. Probably the best that can be done is to identify potential trends to be watched as time goes on, possibly for action later.

The External Environment Scan identifies factors related to transportation demand and supply based on a “business model”, which is described in detail in Appendix 3. Although there are innumerable phenomena in world events that might be interesting to study, the business model ensures that the effort of the scan is focused on the issues that matter the most to transportation in BC.

Many trends represent complex sets of events, some of which defy quantification. At best, it may be possible to identify summary statistics that give an overall understanding of the trend, even if not dealing with every detail. The External Environment Scan has identified “indicator variables”, or statistics that can be monitored to help understand trends. These statistics are necessarily based on data from the past. Where possible, reputable forecasts have been incorporated into the scan results. As such, they represent the best available indicators of future trends, but they are not predictions and should form only one of many inputs to decision making.

The External Environment Scan includes comprehensive analysis based on the entire business model. These results are tabulated in Appendix 4. Some of the more important trends and opportunities for 2006 are highlighted in the next sections of the text, below.

Trends Affecting Transportation Demand

Transportation Gateways to World Trade

BC transportation infrastructure facilitates trade with the rest of the world – roads and railways with the United States, ports with overseas markets and airports with everywhere. The gateway function serves local economies by bringing in people and goods needed for the local economy. However, in BC the major function of transportation gateways is to facilitate exports of goods and services to other countries, and to facilitate external to external trade passing through BC.

Gateways also involve significant support and service activities, contributing directly to the economy of the region and the province. Finance, legal services, servicing and repair of transportation vehicles, storage and reloading of container – all are examples of economic activity generated by a transportation gateway for its region. Local infrastructure, such as terminals, roads, communications, education and governance must all be developed and updated for a gateway to remain internationally competitive.

Demand for BC Exports

BC exports represent over 40 percent of provincial gross domestic product (GDP). However, although the GDP is made up mostly of services– almost 80 percent of economic activity in BC is in services and just over 20 percent is in the goods producing industries – it is just the opposite for exports. Goods make up about 80 percent of exports, with the remainder being services (including tourism). While some important goods producing activities occur in urban areas, areas outside major urban centres are typically much more dependent on goods producing industries, and hence on exports, for economic development.

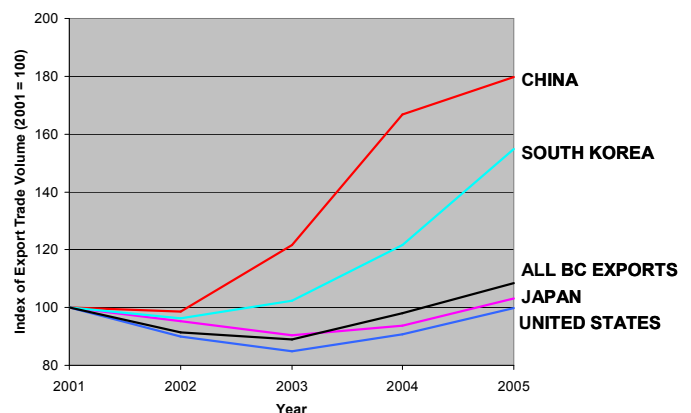
Transportation is key to most exports of goods from BC, which is located far from the end markets for most of its products. Transportation within BC, between resource extraction sites, manufacturing locations and gateways to world trade routes, is also important if BC exports are to remain competitive. With many BC exports involving relatively large shipments of heavy commodities, trends in demand for BC exports are an important indicator of future transportation demand.

The general level of economic activity in major markets for BC exports is the best available predictor of future demand for those exports, although special circumstances apply to specific commodities.

What Are the Major Markets for BC Exports?

The major markets for BC exports have shifted somewhat in recent years. Like most Canadian provinces, BC has the US

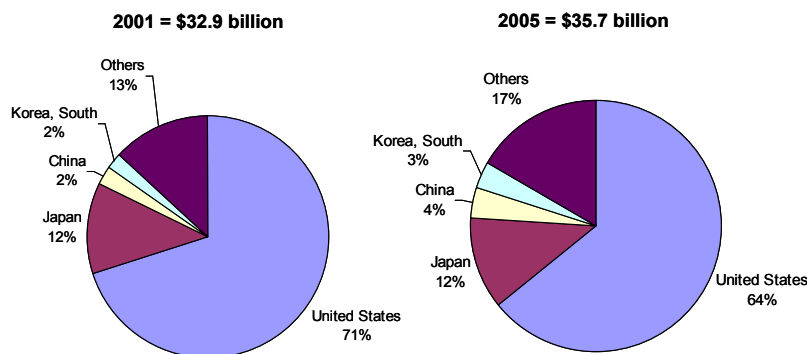
BC Export Trade by Market, 2001 =100



Source: Stats Canada Strategis

as its main trading partner, although with 64 percent of its trade going to the US in 2005 BC is much less dependent on that market than Canada as whole, at over 80 percent. Japan remains an important export market, but since the mid 1990s economic problems at

BC Origin Merchandise Export Shares by Market



Source: Stats Canada Strategis

home have kept Japanese demand for BC exports from growing. Pacific Rim countries aside from Japan, notably South Korea and China, have both been strong markets, with China growing especially strongly in the last four years. Countries of the European Union, recently expanded, are important markets for BC exports, but on a smaller scale.

What Are the Likely Future Trends in these Key Markets for BC Exports?

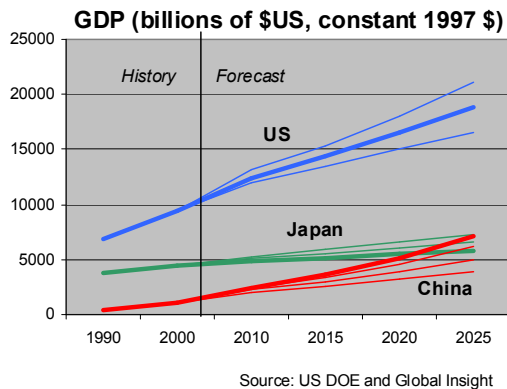
Transportation capacity is relatively fixed in the short term. While short-term changes in demand can stimulate additional use of existing infrastructure, decisions about infrastructure investments must be informed by a longer view, typically several (5-7) years or more. Thus, the trends of greatest interest are longer-term trends in the economies of export customers, beyond the current business cycle. These longer-term trends are likely to be in play when new transportation investments come online, and they are also more likely to be sustained long enough to ensure the amortization of investments in infrastructure.

Medium to long-term projections of economic activity are based on somewhat different factors than short-term projections. In the short term, households and businesses make spending decisions based on their expectations about prices, interest rates, employment and incomes, fiscal and monetary policies and foreign exchange rates. Short-term predictions about these factors can be obtained from many recognized sources, both public and private. Aggregated demand based on these factors rises and falls in the course of the business cycle, moving around the longer-term trend. However, in the medium to long term, it is the capacity to produce goods and services that ultimately determines the growth potential for any economy. The key to understanding productive capacity is to understand trends in population demographics and productivity growth, which also involves savings or capital formation rates.

These principles form the basis of published projections of world economic growth, for example by the US Department of Energy and Global Insight. Multiple scenarios have

been developed, depending on assumptions about low growth, most likely or “reference case” growth and high growth. Some of these results are summarized in the graphic below for the export markets of greatest importance to BC.

In the graphic below, different growth assumptions are highlighted for each country: for Japan, a low growth scenario, for China a very high growth, and for the US, a “middle of the road” growth rate. This is not so different from the actual pattern of recent years. However, for the medium to long term, the choice of growth assumptions does not have a material effect on the conclusions for how demand in these economies is likely to affect BC exports.



China is growing at a very rapid rate, but from a smaller base. Japan is likely to grow slowly if at all. US growth, even at middle range estimates, makes it by far the largest market opportunity for BC exports for the foreseeable future.

Because China has an economy focused on investment, with a high savings rate and massive construction of infrastructure for industrial production, it is likely to be a more important customer for BC commodities than the size of its economy might suggest.

US Economy

The US economy is by far the largest in the world, more than twice the size of Japan, the next largest. The US economy experienced a mild recession in 2001. The recession was caused by a collapse in business investment, while the recovery has been driven by sustained consumer spending, expansionary fiscal and monetary policy and a strong housing market, the latter very important for BC exports. In 2006, the US economy is slowing. Fiscal and trade deficits are at historical record levels, and housing prices and housing starts have slowed or declined in most major markets. The “Big 3” domestic automakers have experienced sharp reductions in sales, although Japanese automakers with production facilities in North America have not seen comparable drops. Some observers fear an oncoming recession while others predict a “soft landing” for the economy that will see one or two quarters of slower growth, but no recession. Consumer and business confidence levels have remained relatively high.

The US economy is well-positioned for ongoing growth in the medium to long term. Demographically, the US is younger and has a faster population growth rate than other leading industrial nations, though it still faces issues with retirement and medical care for the huge baby boomer generation. The US leads the world in many strategic industries and technologies, and labour productivity is higher than in other economies and still growing. The US has the largest domestic market in the world and, although it has a low saving rate, has been able to attract foreign investment to finance investment and its current account and fiscal deficits.

Japan's Economy

After decades of export-led growth, the Japanese economy stagnated in the 1990s with crises in banking, loss of export competitiveness and collapse of property and stock market “bubbles”. Japan surprised most analysts by showing solid growth in late 2003 and early 2004, driven by exports to China and other nations supplying the Chinese market. After a slowdown later in 2004 the Japanese economy has again shown hopeful signs of growth into 2006.

Japan retains many strengths that should support economic growth in the medium to long term. Its highly skilled work force is very productive and has a high savings rate, and its manufacturing technology is highly advanced. However, structural and demographic problems may hold the country back. Banks continue to hold huge portfolios of non-performing loans supporting bankrupt firms, based on lending during the property and stock market bubble. Japan's population is older than in any other industrialized nation, and total population has already begun to decline. Japan's population is likely to fall below 100 million by 2050, from just over 127 million today. In 2050 there would be about 1.5 persons of working age for each person over 65, down from over 3:1 in 2005. Fewer workers and higher costs to support the elderly will create downward pressure on growth and savings rates. Japan has not shown that it can deal effectively with such challenges, although the need for reform is widely discussed. A return to rapid economic growth is unlikely without major changes.

China's Economy

China has recorded the highest growth rates of any major world economy in recent years, averaging 9.6% annually in the period 1978 to 2005 according to its National Bureau of Statistics. Although economic statistics from China have been frequently questioned, there is no doubt that an enormous economic boom is occurring in at least parts of China, driven by exports and by urbanization as huge numbers of people move from rural China seeking a better life in the cities. China has a high savings rate and has been the main destination for foreign direct investment worldwide in recent years. Investment in infrastructure and in industrial capacity to produce exports has sharply increased demand in China for raw materials and industrial commodities. Although China has huge internal resources, in many cases these resources are not fully developed or transportation and logistics internal to China are not sufficiently developed to get goods to where they are needed. China has turned to world markets to meet the shortfall, pushing up commodity prices and shipping rates due to the sharp increases in demand. In 2006, the Chinese economy continues to grow at about 9% annually, driven both by exports and by a growing internal consumer market. Although the Chinese government has taken steps to slow economic growth, the Chinese economy appears to have excess productive capacity and modest inflation, both of which suggest that the economy is not “overheated” and can sustain current growth levels for some time. As the government has relatively limited (compared to more developed economies) capability to regulate activity outside the state-owned sector, the ultimate effectiveness of these measures in moderating rapid growth is not yet known.

In the medium to longer term, China is poised for continued major economic growth. China has a vast pool of skilled and productive labour that, while incomes are rising, is

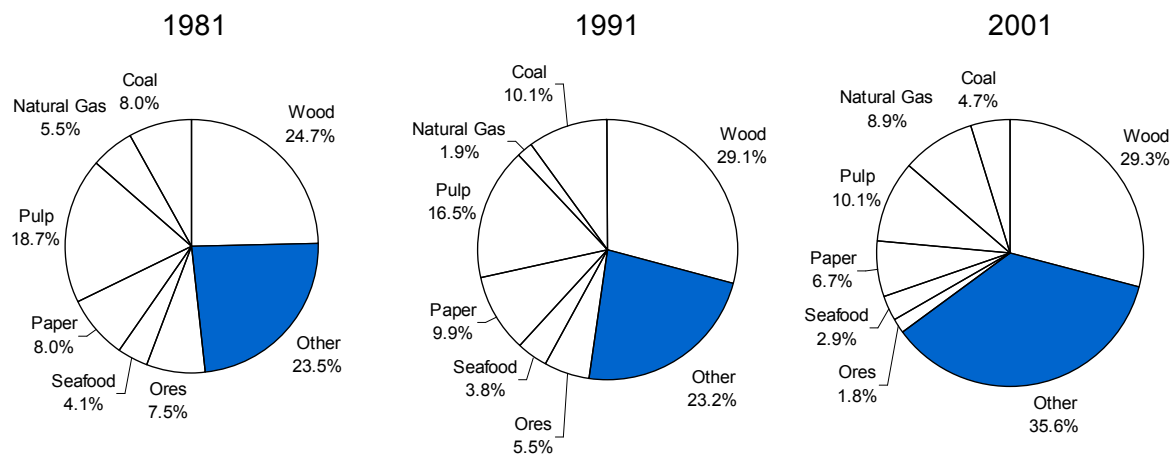
still relatively low cost. Technology obtained through foreign direct investment combined with low-cost, productive labour and large-scale production has made China a formidable competitor for manufacturing both sophisticated and simple items for export markets. Capital formation continues at a high rate, with a high domestic savings rate of around 40 percent and large foreign direct investment that brings new technology and higher productivity with it. China is developing a huge internal market that will make it less dependent on exports for economic growth in coming years. Urbanization, which is one of the main drivers of Chinese economic growth, is expected to continue with up to 200 million more people moving into Chinese cities in the next 20 years. China is expected to approach or overtake Japan as the world's second largest economy (by GDP) by 2025.

China faces a number of challenges as it grows into a major world economic power. Its banking system is carrying significant non-performing loans, and state-owned firms controlling much of the economy remain overstaffed and inefficient, but receive government support through the political system. Many observers expect membership in the World Trade Organization to stimulate reforms that will address many structural problems with the Chinese economy. China's population is aging rapidly, and health care and pensions will be issues, as will inequities of wealth distribution between regions and tensions with neighbouring countries and internal minority groups. China has already made progress that supports optimism about its ability to solve its many challenges and becoming one of the leading economic powers of the 21st century.

What Are the Main Exports from BC?

Although BC has made encouraging progress in building exports of high value added technologies and services, the majority of its exports are natural resource based. BC is a relatively small supplier in most commodity markets and therefore is a price taker rather than a price setter – that is, the prices that BC receives are driven by world market conditions rather than by actions BC can take. As a result, it is vital that BC remain cost competitive in supplying key export commodities, which in turn depends on a safe, reliable and efficient transportation system within BC and connecting through gateways to world trade corridors.

BC Exports by Type (Excludes External to External Flows, e.g. Grain)



Source: BC Stats

Overview of Key Markets and Export Commodities

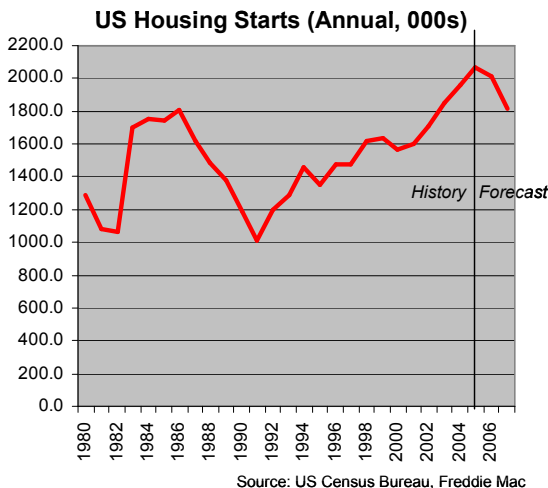
Export Goods	Key Markets	Indicator Statistic	Trend	Constraints	Trend
Wood (Lumber & panel products)	<ul style="list-style-type: none"> USA Japan 	<ul style="list-style-type: none"> US housing starts US GDP growth GDP growth (Japan) 	<p>Falling from recent peak levels, still high</p> <p>Japanese growth uncertain</p>	Trade barriers	Progress in agreeing on managed trade (softwood lumber agreement)
Coal	<ul style="list-style-type: none"> Asia (esp. Japan) 	<ul style="list-style-type: none"> GDP growth (China) 	Japan, Korea importing more to supply steel to China	Competition from other supplier countries	BC kept in mix of suppliers to preserve competition
Pulp and Paper	<ul style="list-style-type: none"> USA Asia 	<ul style="list-style-type: none"> US GDP growth GDP growth (China) 	BC exports competitive during high end of world market price cycle	Exchange rates	Rising \$CAD versus US\$
Grain	<ul style="list-style-type: none"> Asia (esp. Japan) 	<ul style="list-style-type: none"> GDP growth (Japan) 	Large volumes cleared at low prices	Capacity in grain handling system (farm to ports)	Restructuring and shifting investment burdens
Containers*	<ul style="list-style-type: none"> Asia (esp. China) 	<ul style="list-style-type: none"> Canada GDP growth US GDP growth 	Continuing high growth, depends on consumer spending	Capacity in ports, rail system, Panama Canal	Current volumes are close to system capacity

Note: Containers are not an export product in themselves, but carry manufactured and other goods of all types. Containers flows are indicative of export flows, but involve double counting in certain areas, such as lumber and pulp, where specialty products may also travel in containers.

Wood (Lumber and panel products)

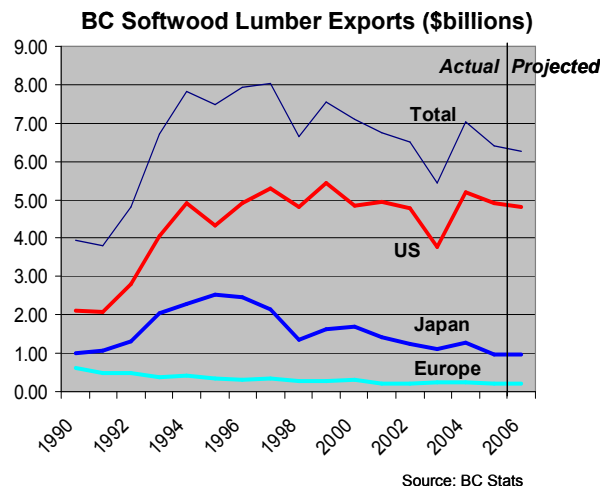
Lumber and panel products, nearly all softwood, are the most important export of the BC forest industry. The main markets are in the US and Japan. Most of these products are used in light construction (houses and smaller apartment and commercial buildings). This activity rises and falls with economic activity in the purchasing countries, specifically those economic factors related to housing investments (financing costs, employment, construction costs, availability of land).

Logs for processing move by truck or, along the coast, by barge and log boom, to mills for processing or directly to export gateways. BC wood products produced at those mills move by rail and truck, with trucking being the dominant choice for shorter hauls. Trucks move wood products to rail reload centres where mills are not directly served by rail, or where rail lines located away from the mill present cost advantages (such as trucking across the US border to access US rail mainline service.) Wood products move by truck and rail to marine gateways for overseas shipments, and a few coastal mills have direct access to deep sea shipping at their locations.



US housing starts in 2005 were at historically high levels. In 2006 housing starts are dropping, though still in the high end of the historical range. Most observers forecast continued reductions in new housing starts and moderation or decline in housing prices in key US markets. A rapid drop in the housing market could push the US economy into recession, which would affect demand for BC exports generally. A “soft landing” for the housing market would see demand for BC products continuing, though at somewhat lower levels than at the peak of the housing market.

The main constraint on the BC lumber industry in supplying strong US markets has been the long-running softwood lumber dispute. Trade barriers arising from this dispute have definitely affected export volumes and placed a strain on the BC lumber industry. Traditionally, Canada has supplied about one third of the lumber used in the US, with BC providing about half of that. With continued strong demand in the US and limitations on domestic supply capacity, the dispute has had the result of increasing overseas imports of lumber into the US. Each side in the dispute has scored interim victories, but the outcome is yet to be determined. While the dispute continues, it stimulates greater efficiency in the BC industry, but affects the long-term viability of individual companies, depending upon their circumstances.



The Japanese economy is still troubled after years of recession and deflation. There are hopeful signs of recovery in 2006, driven by export demand largely from China, but these have not translated into growing demand for BC lumber and panel products. Japan has been and remains an important customer for BC wood but significant growth is unlikely to occur for several years in exports to Japan.

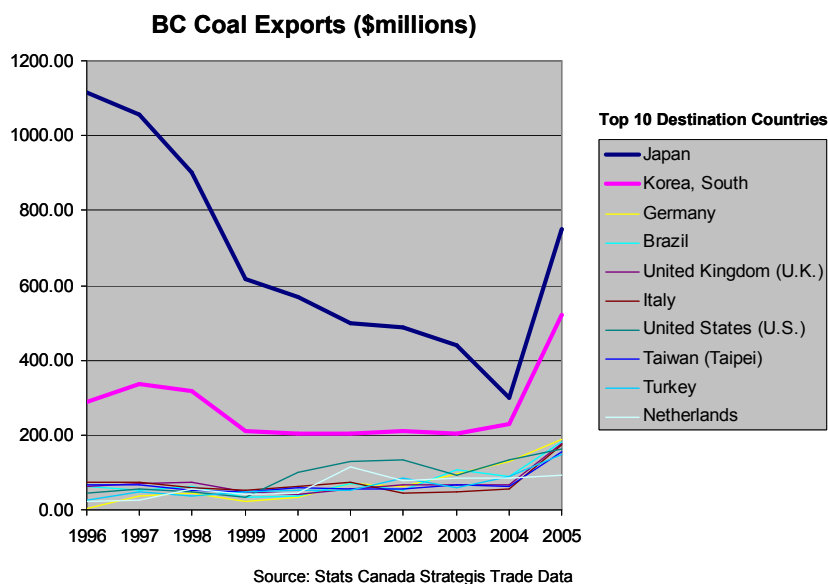
Coal

Coal moves from mines in BC and Alberta through port gateways at Vancouver and Prince Rupert to export customers in Asia, primarily Japan but also South Korea. This is metallurgical coal, which is converted to coke and used in steel mills, as opposed to thermal coal used for generating electrical power.

BC is at a competitive disadvantage in world metallurgical coal markets, due to distances and impurities in the coal. Both traditional competitors, such as Australia, which

dominates the export market for metallurgical coal (70+%), and new competitors, such as India and Indonesia, have lower costs of production, shorter distances to ports, and are located closer to major consumers in East Asia. Coal from BC and Alberta contains higher amounts of sulphur and other impurities that, while they can be dealt with by available technology, raise the cost to the end user.

Coal exports through BC have benefited from efficient extraction and transportation, but also from the desire of major customers in Japan to maintain multiple sources of supply. In this situation, efficient transportation is important to continuing success, but export volumes have been limited more by market conditions than by transportation capacity in BC.

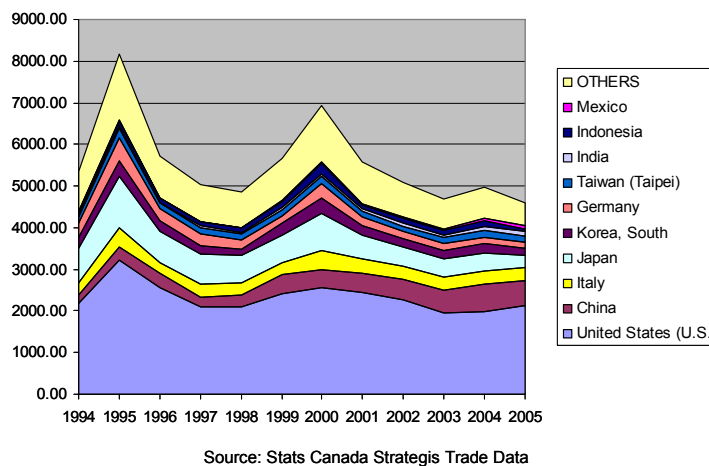


Since 2004, major increases in coal exports to Japan and South Korea, driven by demand from China for their steel exports, has restored much of the previous export demand for BC coal. In the same period, exports to other markets have grown as part of the general improvement in commodity markets driven by demand from Asia.

Pulp and Paper

Pulp and paper production capacity worldwide exceeds market demand, with the result that market prices fluctuate significantly. BC's pulp and paper industry is a relatively high cost producer, so demand for BC pulp and paper at profitable prices is robust only in parts of the price cycle. The largest customer for BC pulp and paper products is the

BC Pulp and Paper Exports (\$millions)



United States. Japan, while still important, has been replaced by China as the second largest market for BC pulp and paper exports. Smaller amounts are sold to countries around the world. The competitiveness of BC pulp and paper exports is affected by movements in the US/Canadian dollar exchange rate.

Coastal BC pulp mills typically serve deep sea ships directly at their location, while interior mills rely primarily on rail for long haul exports. Shorter hauls and much of the inputs for all mills are carried by trucks, with some hazardous chemical inputs typically shipped by rail. BC pulp and paper mills make extensive use of wood chips from lumber milling operations, so prices and capacity are impacted by changes in the volume of lumber being cut, and hauls of wood chips to mills are dynamic depending on available wood chip supplies. Recent accelerated harvests of bug-killed wood have made wood chips plentiful and lower-cost to pulp and paper producers.

Grain

Canada is a relatively small producer of grain compared to countries such as India and China, but along with the US, Australia and Argentina, Canada is one of the few countries with a sizable and consistent surplus over domestic needs available for export. On average, close to three-quarters of the wheat produced in Western Canada is exported. Canadian grain for export is shipped east through Thunder Bay and west through Vancouver to approximately 70 countries around the world. Shipments through Vancouver have grown to be very important with the emergence of strong markets in Asia.

Canada's grain exports, though of recognized high quality, are relatively small in quantity compared both to export volumes of competitors and to the production and consumption in countries such as China and India. As a result, the demand for Canadian grain is highly sensitive to crop success or failure in other nations. Subsidies in certain countries have kept world grain prices relatively low, while a rising Canadian dollar has made Canadian grain more expensive. In addition to these challenges, the Canadian grain handling system is experiencing capacity and structural changes. Rationalization of country elevators and railroad branch lines has transferred additional costs to farmers at a time when they have faced low grain prices, drought and greater competition for overseas markets. The transportation system is vital to continued export success, but cannot on its own address most of these issues.

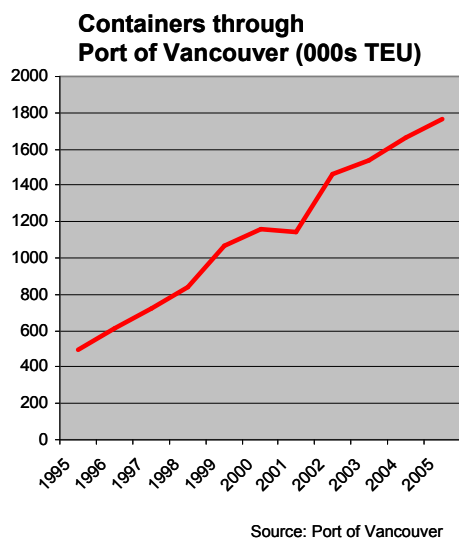
Grain exported through BC moves to gateway ports, primarily Vancouver, by rail. In the northeast of the province, where grain is also produced, it moves by truck to elevators for transfers to railcars. Most of the grain flowing through BC ports comes from the Prairie provinces, so capacity and congestion on both transcontinental railway mainlines is of major concern, as is efficient operation of transfer yards and port facilities.

External to External Trade

Containers

Containers travelling by ship to ports on the West Coast of North America carry mostly manufactured goods from countries in Asia. Although some containers are delivered

locally in BC, most are carried by rail to markets in eastern Canada and the United States Midwest and Eastern Seaboard. Good rail connections to Chicago and New York make Vancouver competitive with ports in the US, but Vancouver handles a relatively small



portion of this US traffic compared to the US ports of Seattle-Tacoma and Los Angeles-Long Beach.

Container flows have been growing, reflecting the importance of imported manufactured goods in the Canadian and US economies. Continued growth relies on consumer spending in these economies, which forms a significant portion of their GDP. Countries in Asia are expected to maintain their comparative advantage in manufacturing, ensuring that growth in consumer spending will lead to continued growth in container traffic.

Capacity limitations are becoming a concern in the container handling system, at sea, in West Coast ports and in the rail system of North America. The Panama Canal is also near capacity. Some low value container shipments are being made direct to East Coast ports from Asia, but most goods are expected to continue to move through West Coast ports and the North American rail system as major investments are made in capacity expansion. The new container port at Prince Rupert, combined with significant investments in the Port of Vancouver and rail lines connecting BC with the rest of Canada and the US, are intended to preserve or enhance the competitive position of BC in handling the growing container volumes from Asia.

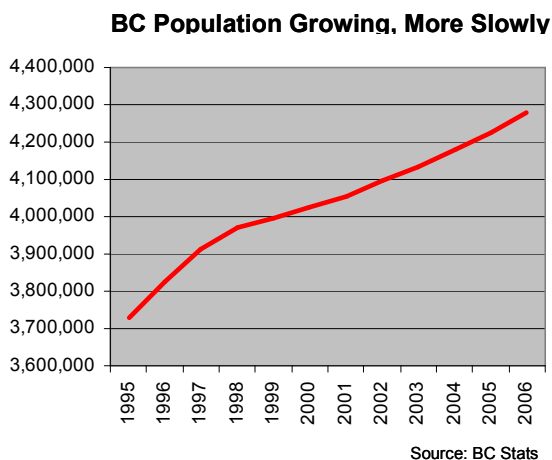
Many containers are hauled empty back to Asia from North America. The Port of Vancouver has been innovative in arranging for export loads, including logs, lumber and specialized bulk goods, that earn revenue for the BC economy from container movements that would otherwise represent only costs to the system.

Population Growth and Urbanization

The BC economy has relied for much of its growth on people moving to the province for employment or lifestyle reasons. In-migration from other parts of Canada, and immigration from other countries, have supplied much of this population growth, especially in recent years as birth rates in BC have dropped well below replacement levels.

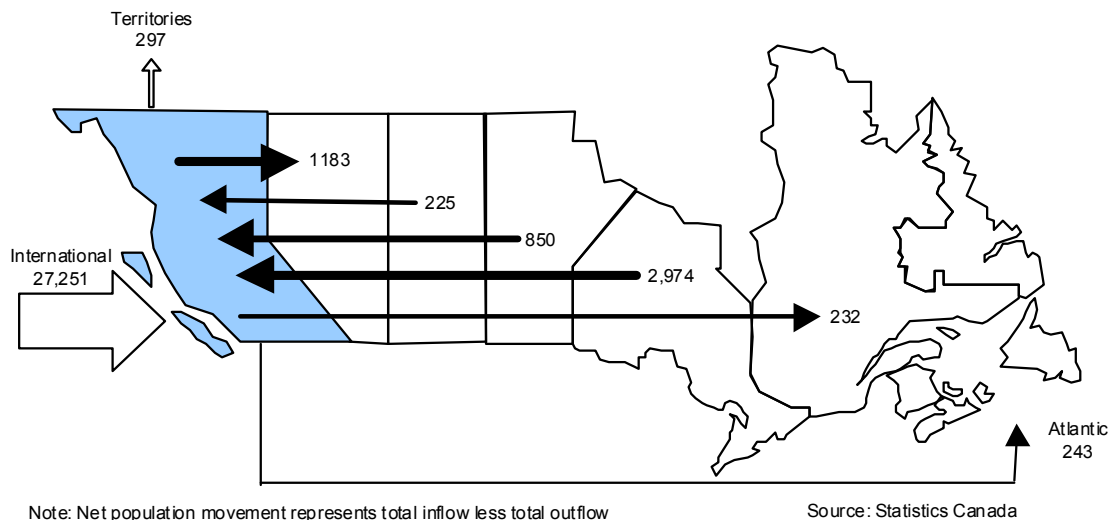
While much of the export component of the BC economy comes from outside the metropolitan areas, most of the population (over 85%) lives in urban areas. This proportion has been increasing, much as it has in other economies around the world.

Centres of population give rise to transportation demand, to bring in needed supplies, and to facilitate journeys to work, school, shopping, cultural and community services and recreation. Vehicle ownership, and goods and people movement by all transportation modes, have grown along with population in BC, often even faster. Population growth is thus an important indicator of future transportation demand.

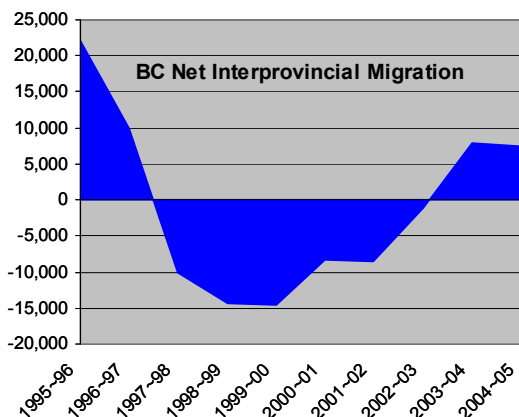


Population growth in BC has been more or less continuous for the last fifty years, with two exceptions during recessions when people leaving the province to find employment outnumbered those arriving. BC population is growing again after the slowdown in the 1990s, with the most important sources being immigrants from outside Canada, and people moving to BC from other parts of Canada. New residents continue to reflect longstanding trends in BC toward urbanization and an aging population.

Net Interprovincial and International Migration in BC, 2003



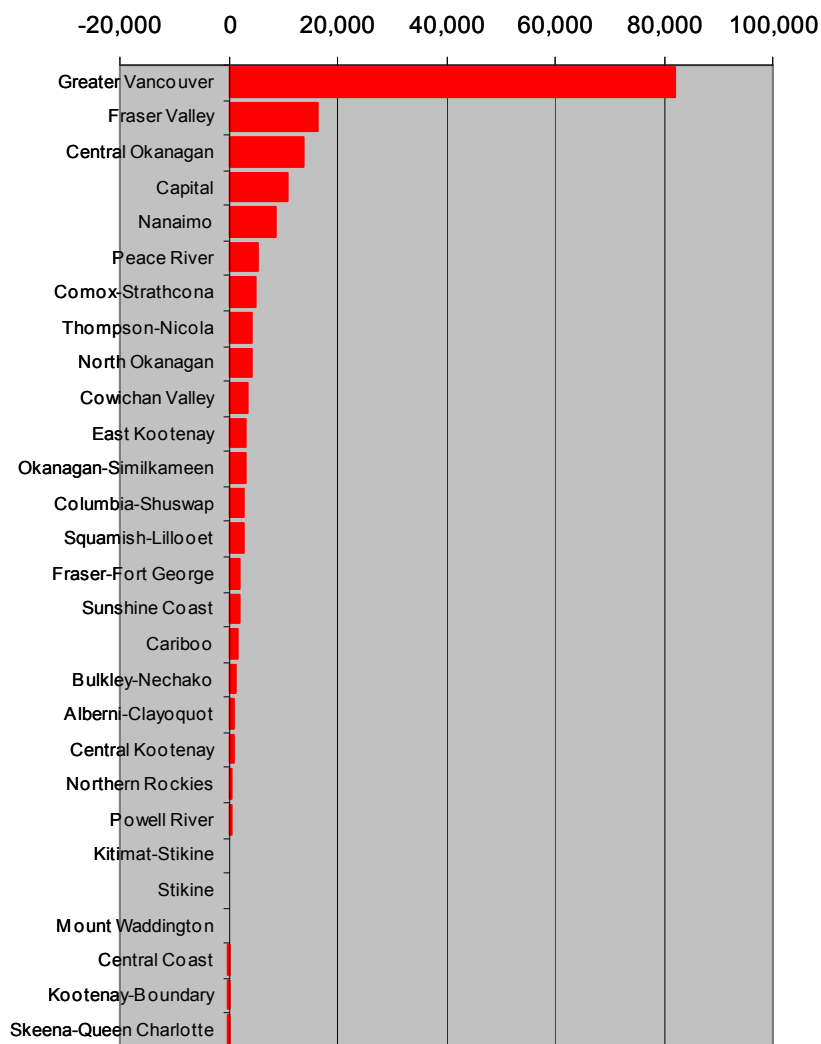
Canadians Rediscover BC



Source: BC Stats

From 1998 to 2003, net migration of Canadian residents out of BC contributed to slower population growth. This trend reversed in 2004, when a more typical pattern of net migration into BC was restored. Economic conditions, including growth in employment, in BC are key to understanding migration of younger workers and families. Older migrants are also affected by economic conditions in BC, but people in mid to late career or retirement may place greater emphasis on housing prices, cost of living and lifestyle issues.

Population Change 2001-2005 by Regional District

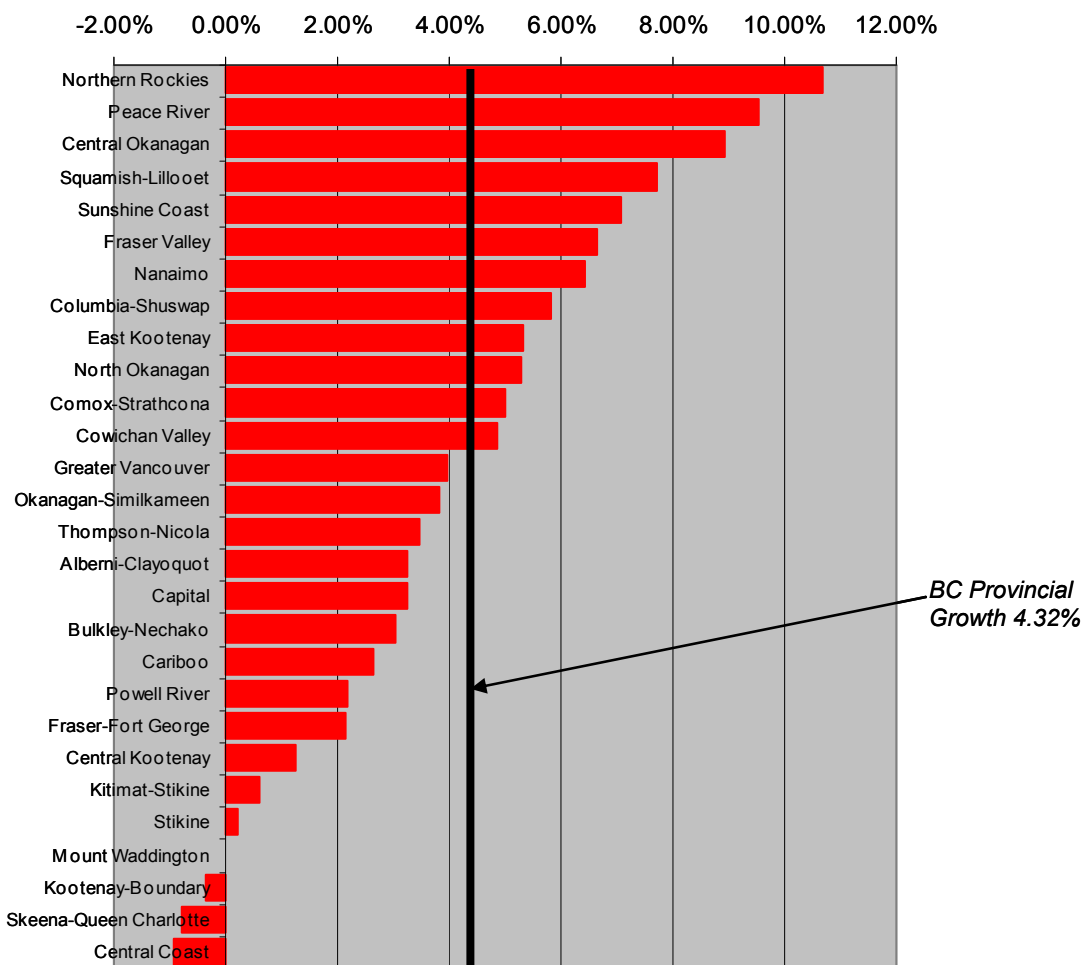


Source: BC Stats

Population growth in BC reflects strong trends to urbanization. In terms of actual numbers of people, nearly all population growth has occurred in Regional Districts in the Lower Mainland, Vancouver Island and the Okanagan, with the bulk of that in Greater Vancouver Regional District.

When viewed as a percentage of existing population, areas with the largest population growth are much more dispersed, with many Regional Districts in resource-producing or recreational areas showing growth higher than the provincial average growth rate of 4.32 percent over the period.

Population % Change 2001-2005 by Regional District



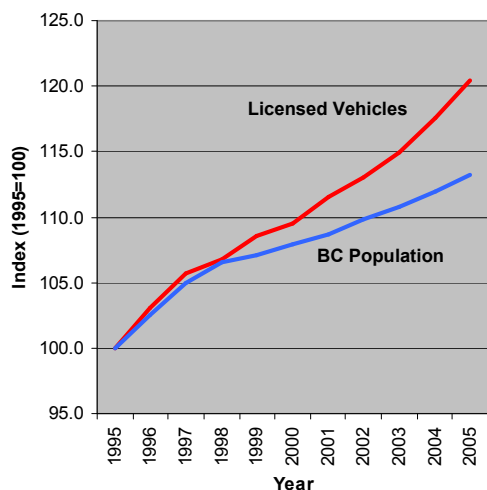
Source: BC Stats

The proportion of the BC population of legal driving age is slowly rising, as people live longer and as fewer children are born or move into BC. Defined as people over 15 years of age, the population of legal driving age is expected to surpass 86 percent by 2030, up from 83 percent in 2004 and 72.4 percent in 1971. It is not yet known what will be the implications of having more people over 65 and especially over 80 in the driving population. Trends suggest that more people are relatively healthy and active later in life and hence are more likely to be driving at advanced ages, but the frequency and pattern of driving habits of an older population are still emerging.

Vehicle ownership and use in BC has consistently grown more rapidly than population. In much of the province, long travel distances and lack of effective alternatives make use of the automobile a necessity. In urban areas, longer distances to work, school and recreation combine with higher labour force participation and coming-of-age of the “baby boomlet” to drive growth in vehicle ownership.

Population trends observed in BC have important implications for the transportation

Licensed Vehicles Growing More Quickly than BC Population (1995=100)



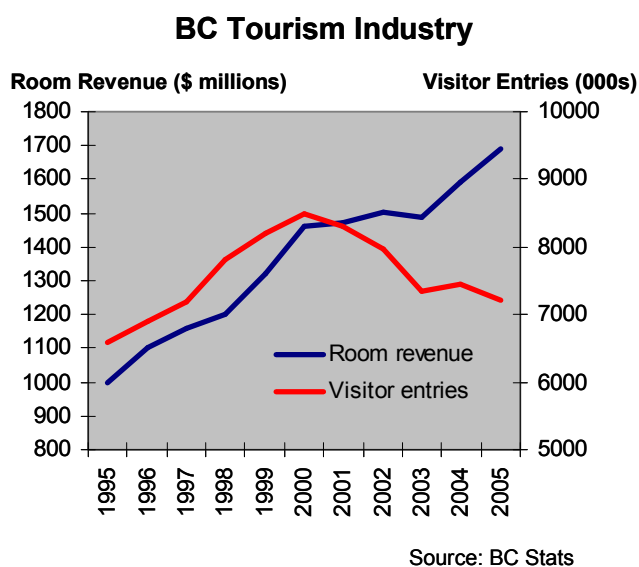
Source: BC Stats

system. Population is growing, but nearly all the growth is in urban areas, many of which already experience traffic congestion. The proportion of the population that is of driving age is rising. Vehicle ownership is growing faster than population, and indications are that vehicles are being driven further each year. These trends combine to suggest that transportation systems in urban areas will continue to face additional demand, especially for vehicle use. Where the transportation system is close to capacity or experiencing congestion, these conditions will get worse unless some other factor intervenes (such as reductions in demand due to fuel price increases, or increases in supply through investment in infrastructure.)

Tourism

Tourism is one of BC's major export industries, in that it brings in revenues from foreign sources for what are usually sustainable uses of BC resources. Tourism earned BC \$4.0 billion in foreign exchange in 2001, ranking it third in BC for foreign income after wood products and energy exports.

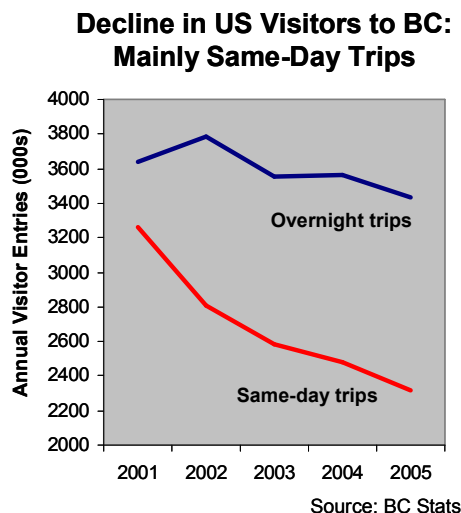
BC's spectacular scenery and diverse recreational opportunities have contributed to its recognition by travel industry publications as a world-class tourist destination. Tourists, defined as anyone more than 60 kilometres from home, purchase a wide range of goods and services, much as residents do, from a wide range of businesses. It is therefore difficult to isolate the contribution of tourists to the economy, but credible estimates have been made by relating expenditure patterns to indicators of tourism activity. Two such indicators are room revenues in accommodation and numbers of visitors to BC from elsewhere.



Tourism in BC has been hard hit by events, many of them elsewhere. Tourism everywhere dropped sharply after the September 11th attacks on the US, and BC experienced a drop as well. The SARS epidemic in China and Canada in 2003 also had a marked effect of tourist volumes. After severe declines since 2001, the total numbers of visitors to BC are not growing again, even though the number of visitors from overseas is slightly up.

Visitors from the US account for over 80 percent of the total visitors to BC. Since 2001 the total numbers of US visitors have dropped steadily, but the most striking trend is the reduction in same-day trips, which in 2006 are approaching 50 percent of their numbers pre-2001. This trend is not unique to BC, but is seen at border crossings all across Canada.

The downward trend, especially in same-day trips, may have multiple causes. The higher Canadian dollar makes travel to Canada less affordable for residents of the US. Additional delays at border crossings related to enhanced



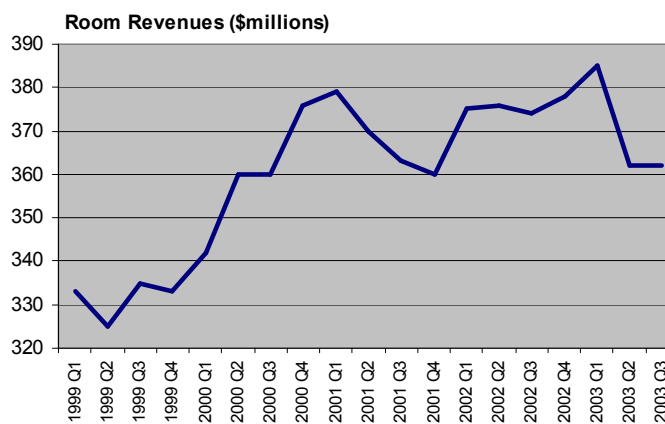
security procedures could especially deter same-day trips. American public opinion and private views about Canada and its government policies may be involved somehow. Whatever the cause, the downward trend appears to be enduring, and will have a major effect on economic activity related to serving visitors from the US.

An additional concern comes from pending changes in border crossing documentation to be required of both Canadians and returning Americans entering the US. Alternatives currently under discussion all involve documentation not typically carried by US residents that would take many weeks or months to obtain. For tourism destinations in BC highly dependent on spontaneous travel decisions, this has the potential to reduce visitor volumes in a very major way. Already, some observers see reduced travel due to confusion about what the requirements are and when they will be imposed.

The other measure of tourism activity, room revenues in accommodation, displays a very different pattern from visitor entries. Room revenues slowed in 2001 and 2003 due to events in those years, then resumed a general upward trend. This may mean that a smaller number of visitors are spending more on accommodation, or that travel by residents on business or pleasure is up significantly, or both.

Quarterly room revenues show a more complex pattern, in that tourism appears to be set back for a short time by particular events, then recovers until another event strikes.

Overall, room revenues and hotel occupancy rates continue to edge up on an annual basis, with the greatest gains in the Northeast, Mainland/Southwest and Cariboo tourism regions.

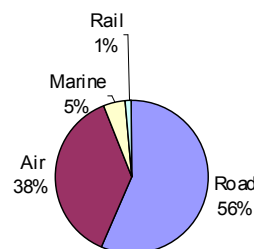


Source: BC Stats

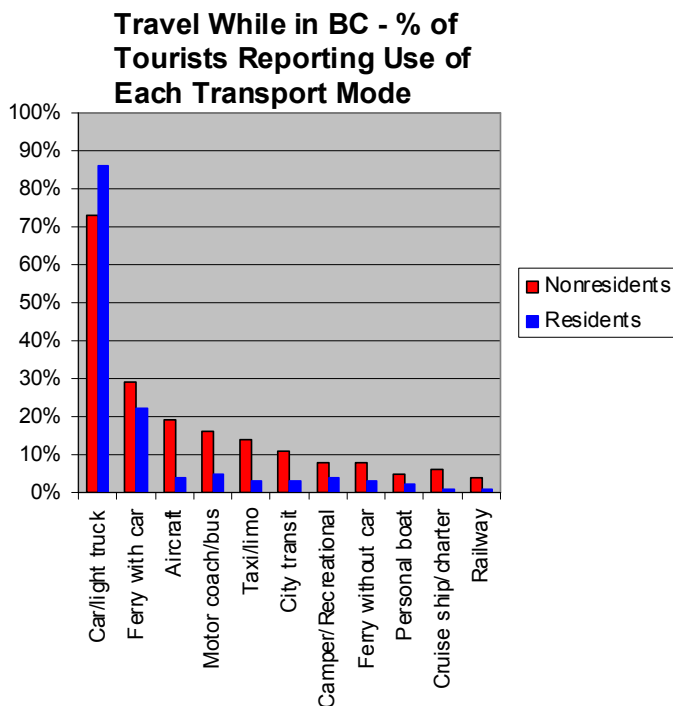
Transportation is one of the most significant components of a tourist's travel experience. In 2002, almost 40 percent of all tourism spending in Canada, a total of \$19.9 billion, was spent on transportation – more than food, beverages and accommodation spending put together.

Air travel and personal vehicles are by far the dominant modes of travel in the tourism industry. Passenger air travel accounts for nearly 60 per cent of all tourism spending in Canada. The nearly \$4.4 billion spent by tourists at the gas pumps pales in comparison to the \$11.6 billion tourists spent on air travel in 2002. Comparable figures for BC, based on BC's share of Canadian visits of 11 percent, are \$489 million and \$1.285 billion.

How Visitors Travel to BC



Source: COTA: A Tourism Transportation Strategy for BC



Source: COTA: A Tourism Transportation Strategy for BC

A significant number of visitors travel to BC by air, but once in BC various forms of road travel dominate by far. Residents of BC touring within their own province make somewhat less use of aircraft, motor coaches, taxis and charter boats as might be expected, showing an even greater preference for road travel than non-resident visitors.

Tourism trips often involve use more than one mode, combining air and use of an automobile or motor coach for example. Smooth, safe and efficient mode transfers are important to the quality of the travel experience.

BC's transportation system approaches or reaches capacity at peak periods, especially in urban areas and at popular attractions. The resulting congestion can be a competitive factor for BC tourism, as can congestion or complications related to border crossings for tourists arriving from elsewhere. Transportation and logistic improvements can return many times their cost in tourism revenues if they address such competitive factors in a way that attracts more tourists to BC. Although other jurisdictions competing for BC tourists may also suffer from congestion, they may also be making investments to overcome it.

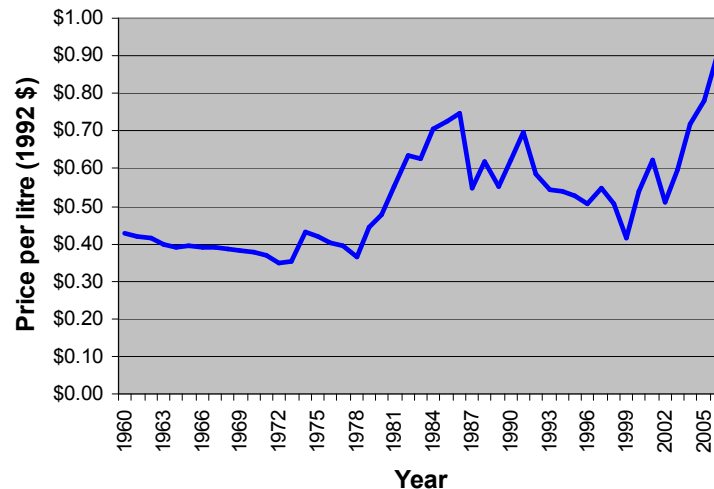
Price and Availability of Petroleum Products

World petroleum prices reached all-time highs early in 2006, dropping somewhat later in the year. Fuel prices (especially gasoline) in BC were higher in 2006 than they have ever been, again softening somewhat later in the year.

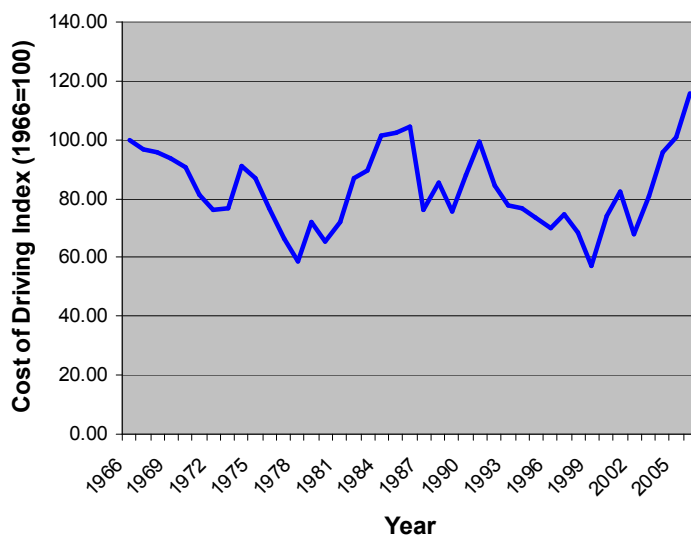
Past periods of high fuel prices have not significantly affected driver behaviour. Analysis of the “real” price (corrected for inflation, vehicle efficiency and average incomes) in the past showed that while nominal prices were high, the cost of driving in real terms was lower than at many times in the past when auto purchase and land use decisions were made. This changed in 2006.

For the first time in decades, the real costs of driving have risen above previous levels. The “real” price corrected for inflation reached all-time highs in 2006.

**Price of Fuel per Litre
(Vancouver, constant 1992 \$)**



**Cost of Driving (Affordability) Index
(Fuel Costs) 1966=100**



With vehicle fuel efficiency and average industrial wages relatively stagnant or decreasing, this means that the fuel cost of driving (in terms of the number of hours worked to afford to drive a given distance) has increased in a short time to the highest levels in 40 years.

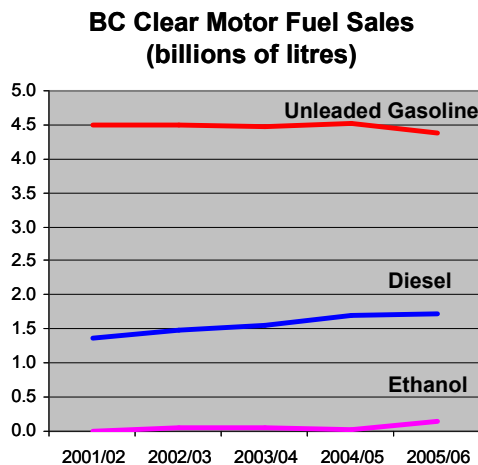
There are early indications of reduced demand for fuel in BC in response to these higher costs. The longer costs stay high, the more likely it is that consumers will change vehicle ownership, use and lifestyle patterns. This could involve using vehicles powered by alternative fuels, making greater use of transit and

other modes, or changing living arrangements to reduce dependence on transportation.

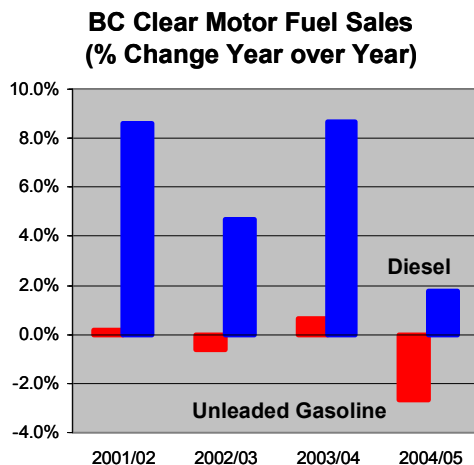
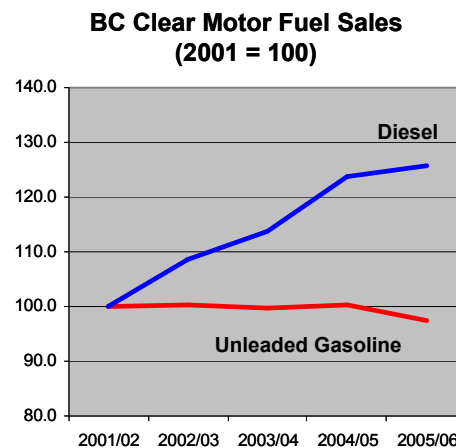
Demand for road transportation is not very sensitive to price increases in the short term. Use of a vehicle is virtually required in many areas due to the dispersed style of land use and lack of workable alternative transportation. Fuel costs are a relatively small part of the total cost of vehicle ownership, although they are a very visible out-of-pocket expenditure tied to vehicle usage. Evidence from past oil price spikes suggests that in the short term, there is a small decrease in demand when prices rise, as people combine trips, defer discretionary trips and use other modes where they are available. However, in the medium to long term, people factor fuel costs into vehicle purchase decisions and the perception of sustained higher fuel prices has led in the past to higher sales of fuel-efficient vehicles, for example.

Trends into 2006 suggest that people are responding to higher prices, both by substitution of alternate fuels for gasoline, and by driving less.

Diesel fuel is usually slightly cheaper per litre than gasoline, and most vehicles will travel further on a litre of diesel fuel than on a litre of gasoline. For this reason, diesel fuel sales can be an indication of vehicle purchase decisions made for fuel economy. Diesel fuel sales are also an indication of changes in the volume of heavy trucking, which has been rising in BC. Ethanol is another substitute for gasoline, usually mixed in relatively small amounts into gasoline to reduce costs.



Clear motor fuel sales in BC have shown evidence of fuel substitution in the years before 2006, followed by an overall drop in fuel consumption.



Diesel sales, especially, have been growing rapidly relative to gasoline sales.

Starting in 2004/05, overall sales of clear fuels began to drop. Statistics Canada reported overall kilometres driven in BC dropped by about ten percent in 2005. If these trends were a response to rising fuel prices, they may be expected to have intensified in 2006 as prices reached all-time highs.

Petroleum prices in general, more than just fuel costs, can have profound effects on transportation. The price and availability of petroleum affects the transportation industry both by raising its costs, and by suppressing demand for transportation. Fuels costs are the major variable costs after labour for most transportation businesses and, with margins tight in competitive markets, relatively small changes in fuel costs can have major impact on profitability. Infrastructure construction and maintenance is petroleum intensive, especially for road infrastructure where asphalt paving represents a significant part of the costs.

Higher petroleum costs affect the general economy by an incomes effect, where families and businesses spend more on petroleum products and thus have less money available to purchase other goods and services, and through a pricing effect. The price of nearly all goods and services include a component for transportation, often over long distances. Higher transportation costs lead to higher costs for all goods and services. Both of these effects have a dampening effect on economic growth, which in turn reduces the demand for transportation.

Fuel taxes also represent a major revenue source for public financing of infrastructure improvements. If sustained higher fuel costs cause consumers to buy less fuel subject to tax, there will be less public money available to fund improvements, some of which have already been committed to in BC.

With all these major implications for transportation in BC, trends in the price and availability of petroleum products are a key factor for transportation planners. While petroleum prices have softened somewhat in the latter part of 2006, trends in the factors driving petroleum prices suggest that in the medium to long term, petroleum will cost more than it has in the past.

World petroleum prices reflect the balance of demand and supply, and include a “risk premium” to reflect uncertainty about the future. Demand has been rising, especially from developing economies in Asia, more rapidly than supply. Geopolitical and extreme weather events have added to uncertainty, as have changes to the way petroleum development has been financed.

Demand for petroleum products

Seasonal patterns of usage for heating and for motor fuels affect the short term demand for petroleum products. Advanced economies have typically become less dependent on energy per unit of GDP over time, as the economy tends to produce more services. However, even in advanced economies, there are currently few viable alternatives to petroleum based fuels in transportation. In the developing economies, huge projected increases in vehicle ownership and usage will require significantly more petroleum products, and developing economies are typically more reliant on energy to produce a unit of GDP. Environmental pressures on countries such as India and China that are heavily reliant on coal for energy production also increase the demand for petroleum and natural gas. Taken together, all these factors suggest demand for petroleum in the medium to long term will continue to rise, perhaps sharply at times.

Supply capacity

World petroleum reserves remain relatively large compared to immediate demand, but actual production capacity has not grown as rapidly as world demand. Where there was once a “cushion” of excess capacity (primarily in Saudi Arabia) that could be brought online to deal with sudden changes in demand and to moderate world prices, this “cushion” no longer exists. World demand almost matches world production capacity, and prices are therefore more volatile. There are localized refinery capacity problems, notably in the US Gulf Coast area after Hurricane Katrina, that are constraining supply.

In the short to medium term, investment in additional production capacity could help match supply to demand, but this may not happen rapidly. Traditionally, oil producing countries were loath to allow world petroleum prices to rise too quickly, for fear of reducing demand or even pushing oil-using economies into recession. Recent sustained price rises have not had this effect, reducing the incentive to invest in excess production capacity for a supply “cushion”. Also reducing the incentive for additional investment to lower prices is the fact that higher prices make the remaining reserves of oil producing countries more valuable. The majority of the world’s remaining reserves are in aging oilfields in the Middle East. Aging oilfields require ever more advanced technology for extraction, and newer, typically more difficult oilfields, also require significant investment. Historically, much of this technology and investment has come from major international oil companies, but these companies have increasing difficulty getting access to new or existing oil in many parts of the world.

In the medium to long term, availability of petroleum reserves is likely to become more important for world petroleum production capacity. The world has significant reserves of petroleum and exploration continues to make new finds. However, the rate of additions to proven reserves is falling and no major new oil field has been discovered for some time. Production continues to rise to meet growing demand worldwide, especially in the two largest petroleum consuming markets, the US (currently at about 20 billion barrels daily) and China (currently at about 7 billion barrels daily but growing more quickly). While the world will not run out of oil for many years yet, many experts agree that world oil production will peak soon, perhaps as soon as 2007 if China’s economy continues to accelerate, or perhaps as late as 2015 if world economic growth slows or goes into recession.

The “peak oil” hypothesis holds that once peak oil production has occurred, increasing demand for petroleum is expected to outstrip the available supply. The expected outcome would be rising prices for petroleum, perhaps gradually or in a series of sudden price movements, but definitely sustained. As there are few substitutes for petroleum products that are currently viable for use in the transportation industry, a sustained change in petroleum prices could make transportation much more expensive. It is not known what might be the ultimate effect of these higher fuel and transportation costs, but some possible changes now being discussed as part of the “peak oil” hypothesis include:

- Demand for petroleum based fuels may drop, perhaps because alternative fuel vehicles become more common, or perhaps due to consumers changing lifestyle and travel patterns to minimize the use of high-cost fuel. For jurisdictions reliant

on fuel tax revenues to fund transportation infrastructure, this could seriously affect revenues;

- Demand for transportation may change, with greater consumer willingness to live in compact communities, use public transit, or travel less;
- International travel and goods movement, especially air travel, may become so expensive that global production and trade patterns may be affected;
- Places with large existing investments in auto-oriented land use patterns and petroleum based agricultural and industrial production may find some of these investments stranded, as their relative market value drops to reflect the higher cost of petroleum.

In any future scenario for petroleum supply, much depends on timing – if a sustained rise in petroleum costs occurs over several years, markets may continue to adapt and substitutes may become economically viable; if it occurs quickly, or if geopolitical events result in sustained interruption of supplies, considerable disruption to economies and transportation demand can be expected.

Risks and Uncertainty in Petroleum Supply

Most of the world's remaining oil reserves are in places troubled by long-standing conflicts, either within their own region or with the main oil-using economies of North America, Europe and Asia. While crises may flare up and subside from time to time, the underlying sources of conflict are likely to take a long time to resolve, if they can be resolved at all.

Wars and other events lead to supply disruptions that raise prices, but even the prospect of trouble causes petroleum futures to be bid higher. There is some evidence that the resulting volatility has attracted investments from hedge funds and others seeking to maintain rates of return no longer available from conventional investment instruments. This has the effect of both bidding up the price of petroleum and making it more sensitive to perceptions of risk, increasing the volatility of prices. Volatility discourages investment in additional production capacity by increasing the uncertainty about return on investment.

National oil companies are taking a larger role than international oil companies in ownership, exploration and production of petroleum around the world. National oil companies are driven by other factors besides efficiency and matching supply and demand. In major oil producing countries such as Russia and Venezuela, petroleum supply has become a major element of foreign policy and thus subject to the vagaries of the political process. Going forward, the emerging dominance of national oil companies in the parts of the world with significant remaining petroleum reserves will tend to increase uncertainty about supply, and hence the price, of petroleum products.

Challenges Faced by Specific Transportation Modes

Road

Provincial funding is at historically robust levels, and Federal contributions are higher than they have been for some years. However, funding remains a major challenge, especially for urban improvements. Most of the increased demand for transportation exists in urbanized areas, as does most of the severe congestion experienced by travellers and commercial trucking. However, sources of revenue at local and regional levels are limited compared to the needs. Opportunities for successful public-private partnerships to supplement public funding exist, but not everywhere that there are needs.

Fuel costs have risen to historically high levels. If high prices are sustained in the medium term, demand for fuel may be affected enough to impair fuel tax revenues, an important source of funding for highway improvements at both provincial and regional levels.

Road transportation, which contributes the lion's share of greenhouse gas emissions from the transportation sector, will be vulnerable to potential initiatives to reduce greenhouse gases, such as implementation of the Kyoto Accord.

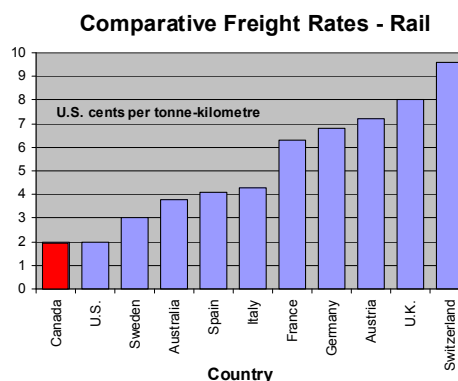
Rail

The North American rail system is approaching a capacity crisis, with limited options to fund expansion. Significant investments have been made in BC for grade and alignment improvements, and directional running agreements in the Fraser Canyon have increased capacity and reduced running costs for both Canadian National and Canadian Pacific Railway. However, bottlenecks further east limit capacity for moving goods to and from the West Coast.

Technological advances and industry restructuring have had profound impacts on rail transportation. Huge growth in freight volumes has been accommodated since 1950 largely without requiring investment in new track capacity. The switch to diesels and advances in diesel locomotive technology allowed longer, heavier trains on the same track. Bigger freight cars allowed more freight to be hauled in a given train length. Computer technologies for traffic control and car tracking allowed increased throughput from the same or fewer tracks. In combination, these advances allowed the industry to cut costs by downsizing infrastructure (abandonment of double track and branch lines) while handling more and more freight.

Now, the limits of capacity improvement through technology are being reached. In their most congested corridors, railways must now make investments in track capacity expansion, such as eliminating curves and grades, lengthening passing sidings, and constructing double track mainlines, all very expensive improvements.

Railways in Canada have been very efficient and have kept freight rates low relative to other



Source: Report of the Australia Productivity Commission, April 2000

countries. However, railways typically earn less than the cost of capital, with the result that they expect difficulties attracting sufficient market capital to fund the large investments needed for capacity improvements.

Increasing freight rates to make capital available for investment or failing to invest in additional rail capacity would result in large increases in truck traffic on public highways. Pointing to the costs to the public of wear and tear from heavy trucks, and to the much larger emissions of greenhouse gases from trucks compared to trains, the railway industry has argued for public participation, possibly through public-private partnerships, in railway capacity improvements. Successful examples exist elsewhere, notably the Alameda Corridor in Los Angeles, which improved freight capacity on the railways while reducing congestion and emissions on the public roads.

The railway industry in North America has experienced extensive consolidation, with only six major railways left. It is widely expected that there may be more mergers in future. Canadian National has already attempted a merger with Burlington Northern Santa Fe, and Canadian Pacific has been working more closely with the Union Pacific on everything from computer systems to route sharing. Canadian National recently absorbed the operations of BC Rail in BC. After many North American mergers, consolidation has often resulted in closure or downgrading of rail lines, removal of service facilities and potentially longer truck hauls to rail reload sites for some customers.

The major railways in North America have increased their focus on mainline operations. Marginal branch lines have been abandoned, or spun off to branch line operators. For many branch lines in BC as elsewhere, long-term viability is an issue. Newly independent branch lines can be kept running for a while due to lower costs (from labour concessions and streamlined working rules) and aggressive local marketing and customer service. However, branch lines typically do not generate enough income for track and bridge rehabilitation, or for infrastructure upgrades needed to handle the bigger cars now required for interchange to the main line railways. The disappearance of a branch line railway typically results in significant increases in truck traffic on public highways, for hauling freight to reload centres on main lines or perhaps use of trucks for the entire journey to the end customer. On roads that are already busy, this could have a significant effect on traffic congestion and on greenhouse gas emissions.

Air

Worldwide, the full service airline business is in trouble. Even before 9/11, major airlines were struggling with a business model that seems to be no longer viable. As a result, many of the world's major airlines have already been in bankruptcy, or are close to it. The existence of a national flag carrier has been forcibly displaced in most countries by costs and operational realities that render the concept no longer viable. Competition from discount airlines, widely emulating the successful Southwest Airlines business model, has destroyed the pricing power of the majors on busy (and some not so busy) routes.

In Canada, Air Canada displays the malaise common to full service carriers worldwide. Now just emerging from bankruptcy after wresting concessions from labour and creditors to keep it going, Air Canada, recently returned to profitability, retains elements of its monopolistic market share protected by the Federal government, but even with these

advantages, questions remain as to how viable the airline can be in the medium to long term, given trends in the industry. The future of air travel worldwide is uncertain, with the trend away from carriers in the style of Air Canada. Airlines earn low margins, making it difficult to attract capital, favouring large foreign carriers with enormous economies of scale. And all airlines are very sensitive to rising fuel costs.

Westjet has made a spectacular success with the discount airline business model, in spite of industry conditions post 9/11 and impediments such as security fees, and barriers to accessing routes and gates. However, Westjet and other discount airlines are limited in the rate at which they can grow and not every situation is suitable for this high volume, low frills and low cost business model.

The troubled future of the airline industry is of great importance to BC communities. As Canada's main gateway to Asia, BC relies on air travel for moving people and high value goods to and from these key market areas. Communities in BC rely on air travel to access services, education and employment in larger centres. Small communities already face challenges to maintain the air service they rely on. Some have retained service by accepting small carriers with smaller planes, or have offered incentives to carriers to serve their locale.

Security remains a serious concern for air travel, due to the exposure of the air travel system to disruption, and due to the discretionary nature of many trips. Passenger volumes are slowly climbing back toward pre-9/11 levels, but could fall again if further events occur, even though significant investments have been made in air security.

Marine

Ocean shipping rates are at historical highs and space on ships is scarce due to demand having outrun supply, partly to meet demand in China for commodity imports and containers outbound. Congestion is occurring in major ports and at the Panama Canal. One answer to port congestion has been to build larger and larger ships, many of which are too large to use the Panama Canal or smaller ports.

Security is a major concern, especially for container traffic, where the threat of stowaways, explosives and bio-threats, smuggling of illegal aliens and drugs is being addressed with new technologies and new procedural standards. However, the number of containers moving through ports is vast, and not all of the new technologies and procedures are yet deployed at West Coast ports. Ports and law enforcement authorities are cooperating in an effort to upgrade port and shipping security to meet the potential threats.

The Vancouver-based Alaska cruise ship industry has been a success story for the Port of Vancouver and all in BC who benefit from its economic impacts. However, investments in a cruise ship base in Seattle have been rewarded by transfer of the home base for several cruises to that city. This was reflected in the first-ever significant decline in Vancouver cruise ship passengers experienced in 2003, a trend which has continued.

Seattle based ships still must stop in Canada to comply with the US Jones Act, prohibiting foreign registered ships from sailing directly between two US ports. However, the short stops being made in Victoria or Prince Rupert do not contribute benefits that make up for the loss of travel through Vancouver pre and post cruise by

passengers, nor for the ship provisioning and other revenues that come with being the cruise home base.

Most passengers on the Alaska cruises are from the US, meaning they must go through border crossing formalities and urban traffic to get to Vancouver and join their cruise. Post 9/11 and with traffic congestion in Vancouver, this may be a perceived or real deterrent to US based passengers. Solutions considered to address these concerns include sealed buses or rapid transit trains moving “in bond” from Vancouver Airport directly to the ships, so that passengers do not have to deal with border formalities or congestion on the way to their ship. This would make pre and post cruise tourism in Vancouver, with its related accommodation and other revenues to the BC economy, impractical.

Aside from practical considerations, Americans may prefer an all US route for any number of reasons that may or may not put Canada in a favourable light.

Rising Canadian dollar exchange rates have made Vancouver less economically advantageous over Seattle, for both cruise lines and tourists.

The remaining Alaska cruise ship business in Vancouver appears to be at continuing risk, as the potential to move cruise home bases to Seattle has not yet been reached, and the factors that favour the US home base have not abated.

Potential Constraints on Transportation Providers

Safety and Security Concerns

The events of September 11th, attacks on public transportation in Madrid and London, and media reports of further attacks foiled by the authorities have heightened public awareness of safety and security issues that have been growing with globalization and economic integration. Transportation systems represent the “front line” for people trying to enter or smuggle illicit goods into North America, from economic migrants hiding in shipping containers to shipments of weapons or drugs hidden in legitimate goods movements. Transportation systems are also the targets or tools of those who wish to disrupt or damage North American economic activity and threaten lives.

Many of the benefits of globalization have come with reducing the cost and easing the processes for movement of goods and people between countries and contents. Now, with heightened concerns about safety and security, costs are rising and governments are challenged to maintain the flow of goods across borders.

Investments are being made in greater surveillance and in new technologies that promise to speed legitimate travelers and goods movements on their way while identifying those that warrant intervention. These systems are still being perfected, and they come at a considerable cost. Where these costs are recovered from users or carriers (as with the Federal airport security tax) they have a dampening effect on demand and may even threaten the viability of the service.

International travel has slowly recovered to levels seen prior to September 11th, 2001, and world commodity trade is at historic levels driven by economic growth in several leading economies. It remains to be seen what will be the longer-term effects of heightened safety and security concerns, and the additional costs and delays arising from countermeasures.

In the interim, transportation systems in BC have enormous amounts of infrastructure in relatively remote areas. Although heightened security has been put in place at ports and other modal interchange points, and technologies can help with surveillance and monitoring, long stretches of highway and railway infrastructure remain virtually impossible to protect from a determined opponent. Incidents of sabotage or disruption of transportation facilities have been relatively rare in the past, but cannot be ruled out for the future. Much will depend on whether Canadian or international groups with grudges against society choose to escalate their attempts to bring attention to their issues through direct action.

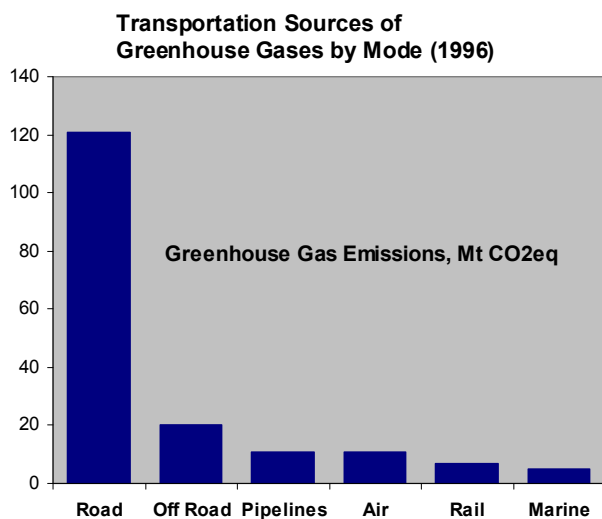
Significant investments and coordinated efforts are being made to enhance the safety and security of the 2010 Olympic and Paralympic Winter Games to be held in BC, including securing transportation links. International attention will be drawn to BC for these events, and along with the higher profile comes the need for enhanced safety and security measures.

Environmental Concerns

It is now widely recognized that rising temperatures worldwide are part of climate change, at least partly due to growing concentrations of “greenhouse gases” in the atmosphere, accelerated by the side effects of human activities, especially the burning of fossil fuels. There is less consensus as to how the world community should address global warming. The limits to emissions contemplated in the Kyoto Accord are seen by some as a first step towards much greater change, while they are rejected by others as too expensive or unlikely to have a material effect on the climate.

The direct effects of global warming on the transportation system and economy of British Columbia may or may not be years away, perhaps beyond the planning horizon of the External Environment Scan. Some argue that recent weather extremes are the beginnings of the effects of global climate change, while others point out that the long-term historical record includes other clusters of years with extreme weather events. There is mounting evidence that some effects of climate change, such as melting of polar and glacial ice sheets, are occurring much faster than was predicted. Massive forest destruction by pine beetles formerly controlled by colder winters is also seen by some as an early effect of climate change.

Uncertainty about the timing and magnitude of the effects of climate change is compounded by disagreement about the appropriate response to it. Canada’s commitment to implementation of reductions in greenhouse gas emissions under the Kyoto Accord is now in question after announcements in 2006 by the Federal government. However, any significant effort to reduce greenhouse gas emissions is likely to have some impact on transportation.

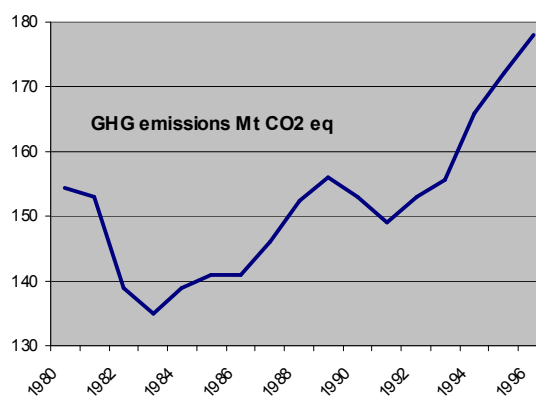


Source: Environment Canada Greenhouse Gas Inventory 1997

Transportation in BC contributes almost 40 percent of greenhouse gas emissions in the province. The great bulk of these emissions come from road transport. Reductions of the order contemplated in the Kyoto Accord would be unlikely to be met without some reductions in emissions from transportation.

After marked emission reductions resulting from fuel efficiency mandates for passenger vehicles in the early 1980s, transportation emissions have grown steadily since, interrupted only by

Historical Emission Trends in Transportation



Source: Environment Canada Greenhouse Gas Inventory 1997

the effects of general economic downturn in the early 1990s. Halting growth in emissions, let alone reductions as contemplated in the Kyoto Accord, without unacceptably slowing the economy would be a challenging task.

Goods producing industries in BC would also be affected by any measures to reduce greenhouse gas emissions. If these efforts resulted in higher costs for BC goods, they might be expected to reduce volumes shipped and have an impact on transportation demand in BC. Such potential effects would be magnified if, as expected, the US refrained from participation in agreements to reduce greenhouse gases. The competitive position of BC goods in the US market, as well as for overseas export markets and for trans-shipments through BC versus US ports, would be impaired if the US did not participate in greenhouse gas reduction programs to the same extent as Canada.

Skilled Labour – Availability and Cost

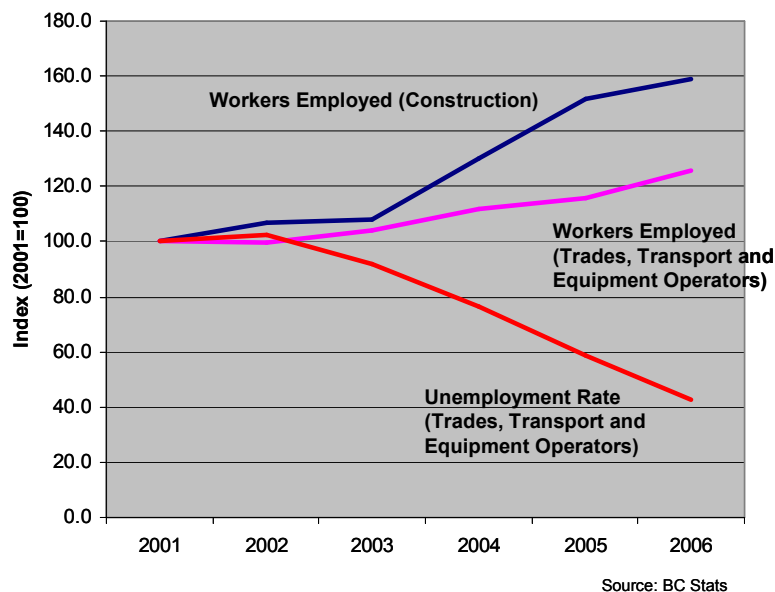
Transportation organizations rely on specialized skills for constructing and operating transportation infrastructure, and for delivering services to their customers. Through a combination of population demographics and organizational downsizing, the transportation workforce has been restructured. The workforce currently has a disproportionately high number of people close to retirement, and few younger workers. Shortages have already been experienced in particular trades, trade supervisor and management areas. This is expected to intensify within approximately five years when large numbers of “baby boomers” in the transportation workforce will be eligible to retire. Shortages can be expected to lead to demands for wage increases higher than the general rate of inflation, and may also limit the capability of transportation organizations to conduct operations and implement infrastructure improvements.

Recent trends in the components of the BC labour force most involved with transportation organizations show clearly the effects of rising demand and constrained supply of workers with the needed skills. As employment has risen sharply in these skilled categories, the available pool of unemployed workers with those skills has dropped dramatically.

Long-term trends in the nature of work suggest that the labour force in future will require more people who work with both their head and their hands – skilled technicians with post-secondary training, as opposed to relatively unskilled workforce entrants who are trained on the job. This trend is driven by greater involvement of technology in all types of work, which is driven in turn by the need to increase productivity and remain competitive with economies that have lower labour costs.

Analysis of potential skilled labour shortages must include economic activities that draw from the same pool of skills. This is because there are not enough people entering the overall workforce to make up for the impending round of retirements, and even if there were, there is not time for them to obtain the skills and experience necessary to replace all the workers leaving. Immigration is unlikely to solve the problem, because immigrants are not admitted in sufficient numbers to replace all retirees and those immigrants who do enter Canada either do not have the skills required or prefer to enter other occupations. Workers may stay in the workforce beyond normal retirement age, but in physically

Tight BC Labour Market for Skilled Workers in Transportation



demanding occupations there is a limit to how many workers are willing or able to do this for any extended period. Actual experience in Canada and elsewhere suggests that on average retirement is occurring earlier each year, rather than most people working longer.

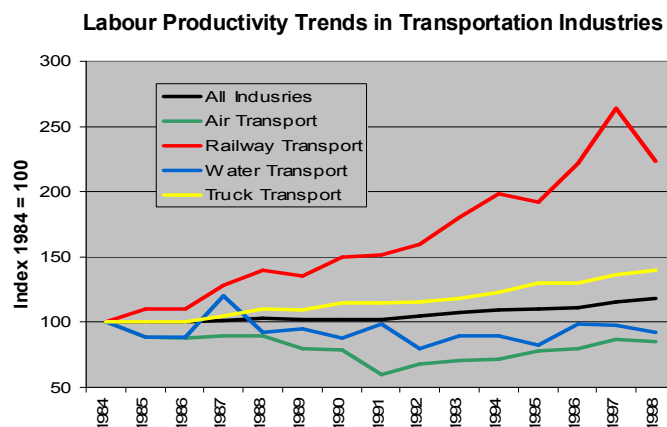
It is prudent for all transportation organizations to develop a strategy to deal with the risk that shortages of skilled labour may raise their costs and/or limit their project options in future years. Large organizations have started programs to train and attract more young workers, although this option is less practical for smaller companies that cannot afford to carry training and apprenticeship costs. Other possible approaches include publishing project plans to create greater certainty in the industry about what will be required and working closely with partners to gain the greatest benefits from globalized industry capacity.

The impact of labour shortages on highway construction and operations in the future is unknown. To date, projects and operations have not been greatly impacted as there have been sufficient workers displaced from primary industries or brought in from other jurisdictions by globalized contractors to meet the needs for construction and operations. Depending on assumptions about the future, these sources could be sufficient to cover labour needs for up to ten years into the future.

The railway industry in Canada has studied the potential shortages of skilled workers and developed a strategy to deal with it. In a study (Canadian Railway Industry Human Resources Study 2002, Railway Association of Canada) it was identified that half the current railway workforce is likely to have retired by the end of this decade. The industry believed that this turnover is manageable if the industry responds in a timely fashion to the hiring and skill development implications of this turnover.

The study identified that high retirement rates among heavy duty mechanics in the shop, and equipment mechanics and skilled trades in bridge and structures in maintenance-of-way, present the greatest human resources challenges to the railway industry in the near term. These occupations typically take four or more years to develop fully qualified personnel, and there did not appear to be enough people in the pipeline to take up the vacancies created by retirement over the next several years.

The strategy undertaken to deal with pending shortages of skilled labour includes increasing the productivity of the current work force, as well partnering with educational institutions to increase the pool of qualified workers for key railway jobs. The railway industry has made great progress in improving the productivity of labour, compared to other transport modes. Programs have been established at five community colleges across Canada to train and graduate qualified workers for mainline and short line railway operations.



Source: Labour Force Survey and CANSIM, Statistics Canada

Cost and Availability of Strategic Raw Materials

Construction and operation of transportation infrastructure uses large quantities of raw materials. Steel is extensively used in construction and maintenance for transportation, especially in road and rail transport. Steel prices shot up in 2004 and have remained high and volatile since.

Surging demand in China for steel, largely for construction, caused China to enter world markets for steel and for steel making inputs (scrap steel and metallurgical coal), pushing up prices. Worldwide demand for steel exceeded supply, and prices rose sharply due to a short term shortage of factor inputs (scrap metal and coking coal).

Since 2004, China has become both the largest consumer of steel globally and also the largest producer. In addition to meeting its own needs for construction and consumer goods, as of 2005 China became a net exporter of steel to world markets, sending prices down. Steel is seen in China as a strategic industry and remains controlled by state owned enterprises, which are typically less sensitive to market price signals and slower to respond than private sector organizations. State subsidies have led to overcapacity in some types of steel production, and industry fragmentation with a large number of steel producers in China.

In other parts of the world, consolidation in the steel industry has reduced the number of steel producers and provided for rationalization of some higher-cost production facilities. This has facilitated a rise in steel prices in 2006.

These trends have had the effect of modifying the normal cycle of commodity pricing, where rises in prices typically result in corrections as more production capacity is brought online, and vice versa. The net effect is to amplify the normal swings in commodity prices, with steel prices being both higher and more volatile into 2006 than might otherwise have been expected. With the dominant role of China in both global demand and supply for steel, a similar pattern of high and volatile prices can be expected for some time to come.



Appendix 1 BC Transportation Facts

Sources are identified in the next section, matched to the individual facts by key numbers

Transportation Industry General

1. The B.C. population served is 4,168,123 residing in an area of 95 million hectares.
2. B.C.'s gross domestic product (GDP) in 2003 was \$142.4 billion, up from \$135.5 billion in 2002 representing a 5.1 percent growth year over year, compared to the Canadian growth rate of 5.2 percent.
3. In 2003 B.C.'s transportation and warehousing industry represented \$7.2 billion in constant 1997 dollars, or about 6 percent of the GDP.
4. B.C.'s transportation and warehousing industry employed 114,300 people in 2003, almost as many as in the construction industry.
5. 2001 Gross freight movement in BC was over 360 million tonnes.
6. The 2001 Gross freight movement (tonnage) in BC % by origin/destination, with modal share:
 - a. 38% within BC (65% rail, 35% truck),
 - b. 35% to/from overseas (100% marine),
 - c. 20% to/from rest of Canada (80% rail, 20% truck),
 - d. 7% to/from USA (40% rail, 60% truck).
 - e. Air is a very small percentage but high in value.
7. Almost 40 percent of greenhouse gas emissions in BC are attributable to the transportation sector.

Road Mode

Governance

1. There are 65,981 km of highway in B.C., of which 41,675 km are provincial, 1,306 km are federal, and 23,000 are municipal. This is 7% of the Canadian road system. Resource roads, which may be private or on provincial crown land, are not included in the totals.

Capacity (Infrastructure and Equipment)

2. Of the provincial highway, 11,225 km are numbered (11,000 km surfaced, 225 km gravel) and 30,450 km are non-numbered (13,200 km surfaced, 17,250 km gravel). Source MoT
3. BC highways include 5456 km of the over 24,000 km in the National Highway System.
4. There are 2,727 bridges on the provincial system.
5. There are 36 weigh scales: 9 self-weigh, 18 full service, and 9 "24x7".
6. There are 15 Canada/US highway border crossings in B.C.
7. The provincial system of inland ferries operates 16 vessels on 15 routes, and handles 1.7million vehicles and 3.2million passengers annually.
8. As of Dec 31, 2003, there were 1,828,770 licensed passenger motor vehicles and 589,314 licensed commercial vehicles in B.C.
9. Over 35,000 trucking companies are registered in B.C.

Utilization

10. Highway traffic volumes grew xx% between 1993 and 2003 (MoT perm counter stats)
11. Road freight movement in BC in 2002 totalled 28,041,000 tonnes, up from 26,967,000 tonnes in 2000.

Stakeholder Impacts

12. Road freight carried 20.2 percent of tonne-kilometres in BC in 1995, but contributed 67.7 percent of greenhouse gas emissions.

Rail Mode

Governance

1. Transcontinental railways have long been regulated by the Federal government.
2. With the transfer of most of BC Rail to operation by the Canadian National (CN), provincial regulation of railways has been delegated to others.
3. Most rail assets in BC are privately owned and operated under Federal regulation. Exceptions include the rail bed of BC Rail, and the commuter trains of the West Coast Express.

Capacity (Infrastructure and Equipment)

4. In 2003 there were 6,835 km of mainline railway track in B.C.
5. There are 6 B.C./U.S. rail border crossings.
6. There are 19 truck/rail reload centres in B.C.
7. Major freight railways include:
 - a. Canadian National (CN) Rail, connecting to the rest of Canada
 - b. Canadian Pacific Railway (CPR), connecting to the rest of Canada
 - c. Burlington Northern Santa Fe (BNSF) connecting to Washington State.
8. Short line freight railways include:
 - a. Southern Railway of BC, linking Fraser Valley points to the Vancouver gateway
 - b. Okanagan Valley Railway, connecting Okanagan shippers to the CPR mainline
 - c. RailAmerica/E&N Railway, serving communities on Vancouver island
 - d. Kelowna Pacific Railway, connecting Okanagan shippers with the CN mainline
 - e. International Rail Road Systems, providing reload connections to BNSF at Columbia Gardens in the West Kootenay.
 - f. Grand Forks Railway, providing local service to mills in Grand Forks.
9. Passenger service operators include
 - a. West Coast Express, operating commuter trains between Vancouver and Mission
 - b. Via Rail Canada, providing transcontinental service from Vancouver and local service on Vancouver Island
 - c. Amtrak, providing service between Vancouver and Seattle and points beyond

10. Excursion train operators include:
 - a. Rocky Mountain Rail Tours operates 75 pieces of equipment on two routes from the coast to Alberta
 - b. White Pass & Yukon Railway (serving mainly cruise ship passengers stopping in Skagway, Alaska)
 - c. Okanagan Valley Wine Train, operating out of Kelowna (not operating in 2004)
 - d. Kettle Valley Steam Train, operating out of Summerland
 - e. Kamloops Heritage Railway
 - f. Various heritage sites offer train rides within their boundaries
11. The greater Vancouver Gateway is served by three critical rail corridors:
 - a. CN/BNSF mainline that serves the commodity and container terminals
 - b. CPR mainline that serves the Port of Vancouver
 - c. Deltaport subdivision owned by BC Rail connecting CN/BNSF and CPR to the Westshore Terminals coal port and Deltaport container terminal
12. The Lower Mainland has 22 principal rail yards.
13. The Washington Group operates a railcar barge service to Vancouver Island, and CN Rail operates AquaTrain service from Prince Rupert to Whittier, Alaska.
14. Several private railways operate at Lower Mainland marine terminals & industrial plants

Utilization

15. The total cargo moved in 2001 by rail in B.C. was about 99 million tonnes.
16. Passengers moved by West Coast Express average about 8000 per day, for a total of over 18 million since the service began in 1995
17. Passengers on the Rocky Mountain Rail Tours numbered over 65,000 in 2003, and totalled over 650,000 since the service began operating in 1990

Stakeholder impacts

18. Railways paid taxes in BC in 2002 totalling \$77,914,000.
19. Although rail currently carries approximately 60 percent of surface goods by volume in Canada, it contributes only 4 percent to overall national GHG emissions.
20. In BC in 1995, the rail mode carried an estimated 68.0 percent of tonne kilometres but contributed 28.2 percent of greenhouse gas emissions.

Air Mode

Governance

1. Airports and airlines in BC are regulated by the Federal government. International, national and many regional airports are owned by the Federal government, some of which are operated by local authorities that pay rent to the Federal government.
2. There are four airports in BC in the National Airports System (out of 26 Canada-wide), at Kelowna, Prince George, Vancouver and Victoria. Of these, all are leased to local authorities.
3. There are 19 regional and local airports that have been leased to local authorities.

Capacity (Infrastructure and Equipment)

4. B.C. has 89 aerodromes “certified” for safety (i.e. have scheduled services and/or are in an urban environment) and 212 “registered” aerodromes (i.e. non-scheduled services and/or in a rural setting).
5. There are 213 licensed scheduled and charter commercial air operators in BC.
6. Air Canada and its subsidiaries (Jazz, Tango, Zip) are the prominent domestic and international air service providers in BC. Westjet also provides extensive service within BC and connecting to the rest of Canada.
7. International and transborder flights are provided by 33 foreign and domestic airlines operating through Vancouver International Airport.
8. There are 78 commercial helicopter operators operating over 250 commercial helicopters out of a total of 667 helicopters registered in BC - 36% of Canada’s total.

Utilization

9. In 2002, B.C. had over 1.6 million aircraft movements - 23% of Canada’s total. In 2003 Vancouver International Airport (YVR) handled 288,800 aircraft movements.
10. Vancouver International Airport (YVR) handled 14.3 million passengers in 2003. The next busiest airports in 2003 were Victoria with 1,182,821 passengers, Kelowna with 863,645 passengers, Abbotsford with 420,853 passengers and Prince George with 339,819 passengers.
11. Total Cargo moved in 2003 at YVR was 215,839 tonnes of which 54,842 tonnes (25.4%) was by integrators such as Purolator, FedEx, UPS and 160,997 tonnes (74.6%) was by other carriers.

Stakeholder Impacts

12. Greenhouse gas emissions for air travel are approximately equivalent when measured by distance travelled per passenger (150 grams per person kilometre for air versus 170 g per person kilometre for light vehicles such as cars and light trucks).

Marine Mode

Governance

1. Ports and marine operations are regulated by the Federal government.
2. Pilotage services are provided by the Pacific Pilotage Authority, reporting to the Federal Minister of Transport.
3. Major ports are owned by the Federal government, but operated by local authorities that pay rent to the Federal government.
4. B.C. has 6 Canada Port Authorities: Vancouver, Fraser River, North Fraser River, Prince Rupert, Nanaimo, and Port Alberni.
5. Other deepwater ports, primarily serving adjacent industrial facilities, include Campbell River, Powell River, Kitimat, Squamish, and Stewart.
6. There are 81 ports in BC classified by Transport Canada as regional/local ports.
7. There are 21 ports in BC classified by Transport Canada as remote ports.

Capacity (Infrastructure and Equipment)

8. Port of Vancouver
 - a. Comprises 25 major marine terminals, most centrally located in Vancouver's Burrard Inlet. The exceptions are the Deltaport container terminal, and Westshore Terminals' coal handling facility, which are located at Roberts Bank, 35 km from the city centre.
 - b. There are 17 bulk terminals for coal, grain, potash, sulphur and wood chips (about 80% of port tonnage) and 3 general cargo terminals, the latter handling mostly (95%) forest products.
 - c. Two container terminals, Centerm and Vanterm, are located in the port's inner harbour. The Deltaport container terminal is located at Roberts Bank. Collectively, the container handling capacity of these terminals is 1.7 million TEUs.
 - d. The passenger terminals at Canada Place and Ballantyne Pier are primarily used as the home port for Alaska cruise ships.
9. Fraser River Port
 - a. Located on the main arm of the Fraser River for 100 km upstream from its mouth
 - b. There are 2 terminals that handle general freight, containers and automobiles
10. Port of Prince Rupert
 - a. There are six terminals including dedicated handling facilities for grain, coal, forest products, specialty grains, cruise passengers and general cargo.
 - b. New facilities are under development to accommodate the handling of containerized cargo and cruise ship activities.

Utilization

11. Port of Vancouver Shipping Statistics in 2003:
 - a. The Port of Vancouver is Canada's busiest port and ranks sixth in North America in terms of cargo volume (tonnage).
 - b. Total Cargo – 66.7 million tonnes (down from 72.9 million in 2001 & 76.6 million in 2000 but up from 62.8 million in 2002)
 - c. Bulk cargo – 50.9 million tonnes, up from 47.6 million tonnes in 2002
 - d. Break bulk cargo – 3.2 million tonnes, marginally down from 2002
 - e. Foreign Containers – 1.539 TEUs (20 foot equivalent units), up from 1.458 million TEU's in 2002 and an alltime high for the port
 - f. Cruise Passengers – 953, 376, sharply down from 1,125,252 in 2002, the highest to date
 - g. Foreign vessel arrivals – 2640, up from 2,509 in 2002 but down from the peak of 3,049 in 2000.
12. Fraser River Port Shipping Statistics 2003:
 - a. Fraser River Port is the second largest in Canada by tonnage and the second largest in North America by number of automobiles received
 - b. Total Cargo – 35.9 million tonnes, of which 6.2 million tonnes was international
 - c. Containers – 252,510 TEUs (20 foot equivalent units), up from 100,544 TEUs in 2002
 - d. Vehicles received – 445,000

- e. Deep-sea arrivals – 774, up from 753 in 2002
- 13. Port North Fraser Shipping Statistics 2003:
 - a. Total cargo – 15 million tonnes, down from 17.2 million tonnes in 2001, most of which consisted of logs, wood fibre and by-products
- 14. Port of Prince Rupert shipping statistics 2003
 - a. Total cargo – 4.3 million tonnes, down from 4.5 million tonnes in 2002, and far below the peak of 13 million tonnes in 1997
- 15. In 2003 the BC Ferry Authority operated 40 vessels on 25 routes servicing up to 48 ports of call. It carried 21.4 million passengers and 8.3 million vehicles in 2003.

Stakeholder Impacts

- 16. Marine freight in BC in 1995 carried 11.8 percent of the tonne kilometres but contributed 4.1 percent of greenhouse gas emissions.

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4. Source BC Quick Facts <http://www.bcstats.gov.bc.ca/data/qf.pdf> TC Transport Trends http://www.tc.gc.ca/pacific/publication/tt_spring04.htm
5. Source MoT BC Transportation Facts 2003
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Road Mode

Governance

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Capacity (Infrastructure and Equipment)

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Utilization

10. (MoT perm counter stats) Source: Yet to be obtained from MoT.
11. Source TransportCanada Statistics Canada Special Tabulations PPA03 http://www.tc.gc.ca/pol/en/T-Facts3/Statmenu_e.asp?file=truck&Lang=

Stakeholder Impacts

12. Source *Greenhouse Gas Reduction Opportunities for the Freight Transportation Sector* by J. Caceres and D. Richards <http://www.davidsuzuki.org/files/freight.pdf>

Rail Mode

Governance

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3. Source http://www2.news.gov.bc.ca/nrm_news_releases/2003OTP0103-001046-Attachment2.htm http://www.fact-index.com/w/we/west_coast_express.html

Capacity (Infrastructure and Equipment)

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http://www.railcan.ca/documents/trends/2003_10_14_RailwayTrends2003_en.pdf
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Stakeholder impacts

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Stakeholder Impacts

16. Source *Greenhouse Gas Reduction Opportunities for the Freight Transportation Sector* by J. Caceres and D. Richards <http://www.davidsuzuki.org/files/freight.pdf>

Appendix 2 External Scanning Methodology

With so much changing in the world today, how can transportation decision makers decide which trends are important or relevant to their organizations? The Ministry of Transportation has conducted the External Environment Scan on the basis of a “business model” that identifies the key factors affecting demand for transportation services, the ability to supply infrastructure and services, and the impacts all of this has on government and society at large. While many pressures and trends in the outside world are of potential academic interest, those that are likely to directly affect the transportation business are identified and tracked through the business model.

The business model has been used to categorize the topics of interest into subject areas and themes within subject areas. For each theme, alternate predicted futures were derived from literature research, interviews and consultation with knowledgeable persons. The probability or likelihood of each predicted future and its likely impact on the transportation business environment were also derived through this process. Finally, elements of possible responses by the Ministry of Transportation or other transportation providers were identified for consideration by decision makers as part of the management planning process.

External pressures and trends can represent opportunities to provide better or less expensive services, or they can represent threats to the ability to maintain services at an affordable cost. The scan addresses both opportunities and threats. Internal characteristics of the Ministry of Transportation that may represent strengths or weaknesses of the organization are not in scope for the scan, due to its focus on the external business environment. In a way, the External Environmental Scan can be understood as the external component of a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis that is often a part of strategic planning.

The external scan methodology described above has been followed since 1993 and both the business model and the themes have proved to be quite durable through changing times. The Ministry has found this process to be a robust and helpful one.

In 2002, the Ministry expanded the scan methodology to include a more integrated multi-modal view of transportation, covering all modes of transportation and all providers of transportation infrastructure. This necessitated some expansion of the business model and additions to themes of interest, especially related to common carriers. However, there is a great deal of continuity with past scans, as many of the factors that affect the Ministry also affect other providers of transportation infrastructure and services.

The predictions of potential futures and the identification of possible responses for the External Environment Scan have been divided into three distinct timeframes, consistent with commitments made in the Ministry of Transportation Service Plan 2004/05 – 2008/09:

From Now until 2009

In this timeframe, the commitments of the provincial government have been made in the Service Plan, and implementation of those commitments is under way, including implementation of “*Opening Up BC - A Transportation Plan for BC*”. While monitoring

of the external environment continues for this timeframe, it is expected to have an impact only if there are sudden and significant shifts in the business environment, so great that it makes sense to disrupt the program implementation already under way.

From 2009 to 2012

The Service Plan has committed the Ministry to an ongoing process of consultation, with providers of other modes of transportation, and with regions throughout the province about priorities for funding. Implementation activities arising out of these consultations will be started, and many will be completed, during the 2009 to 2012 timeframe. In addition, there are ongoing commitments for this period to longer-term partnership projects, as described in “*Opening Up BC – A Transportation Plan for BC*” The External Environment Scan thus provides important contextual information about the likely pressures and trends to be considered by the participants in the consultation and implementation processes.

After 2012

Predicting the future is difficult in a changing world, and more difficult for periods farther into the future. Some trends, such as demographics, can be predicted with confidence once underlying assumptions are agreed to; most trends remain subject to rapid changes in the economy, geopolitics and societal trends and fashions. Nonetheless, there is considerable value in thinking about how the future may unfold and how it may affect transportation demand and investments in supply. This is especially important where a provider of infrastructure could gather information today, or develop capabilities that would help get ready for the likely futures. The External Environment Scan identifies pressures and trends for the timeframe beyond 2012, less as an attempt to predict the future and more as a logical basis for allocating scarce planning resources in the present.

Appendix 3 BC Transportation Business Model

Introduction to the BC Transportation Business Model

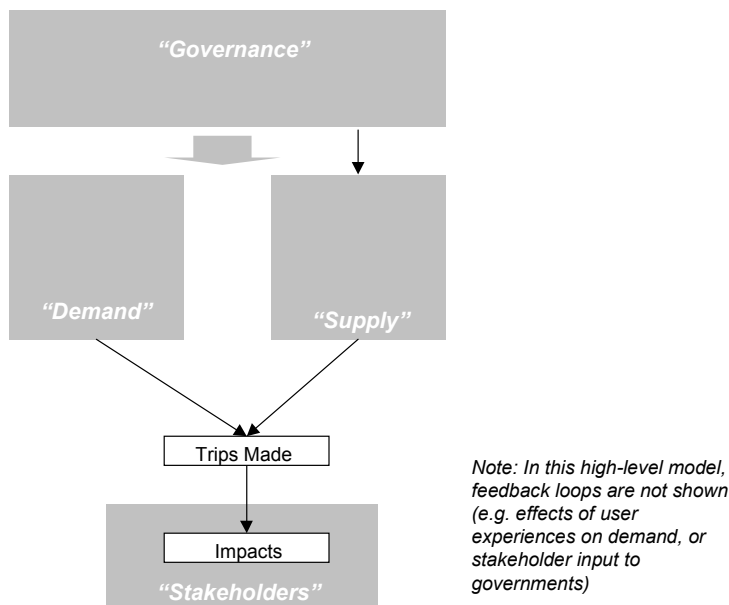
Central to the transportation business is the concept of a trip – movement of goods or people or both from one point to another. The origin and/or the destination point may be outside or inside British Columbia, and the trip may be made using any combination of transportation modes (such as air, marine, rail or highway). Trips can be as short as a run down to the store, or as long as a shipment going half way around the world.

A trip represents the conjunction of “demand” for the trip (the desire on the part of some person or organization that the trip be made) and “supply” of the infrastructure and services needed for the trip to take place. Not all trips that are desired may take place, perhaps due to lack of infrastructure capacity or unavailability of service at the desired time or cost.

Demand, supply and trip-making all involve the users and providers of transportation infrastructure. The construction and operation of transportation infrastructure, and the making of trips by travelers or on behalf of shippers of goods, have impacts on others not directly involved. These “stakeholders” experience both good and bad effects collectively known in the model as “impacts”. Stakeholders may take action themselves, or they may seek redress for their concerns through government policy and actions.

The entire transportation business operates within a “governance” framework of laws, regulations and policies of all levels of government with responsibilities in British Columbia, and elsewhere within British Columbia’s trading partners.

High Level BC Transportation Business Model



The governance framework affects all aspects of the transportation business, including the location of infrastructure, entry and operation of common carriers to the business,

costs of operation and opportunities for expansion. In addition, government providers of infrastructure receive direction about priorities, financing and service levels.

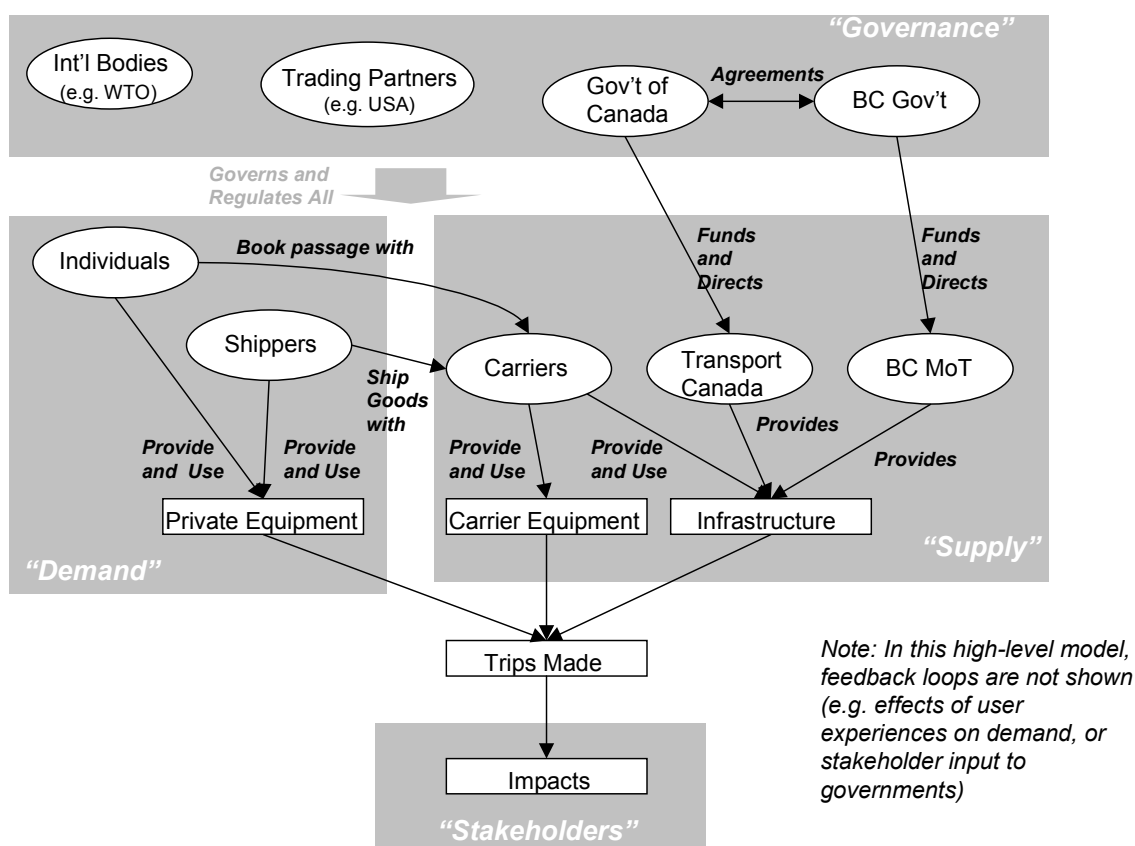
Government policies and actions are affected by feedback from transportation users and stakeholders, who may be concerned about transportation system performance or by the impacts of trip making on the economy, communities, or the environment.

Who are the key players?

Within each of the major parts of the model identified above, there are key players who carry out the roles identified:

Governance:

B.C. Transportation Business Model



The British Columbia Government has major governance responsibilities within the province, including taxation and regulation. In addition, the provincial government provides direction to the Ministry of Transportation, and to common carriers that operate as provincial crown corporations. The BC government also forms agreements with the Government of Canada, notably for funding and operating transportation facilities of national significance.

The Government of Canada has significant responsibilities for taxation and regulation, specifically of the railways and marine and air gateways connecting the province to the world. The federal government also negotiates agreements with foreign governments and

world bodies with governance roles, and legislates for the implementation of those agreements once ratified.

Governments of Trading Partners, such as the United States, have significant impacts on the economy and transportation industry of British Columbia, for example through regulating access to their transportation systems by Canadian equipment and carriers, or by controlling the volume and nature of trade goods coming across their borders. Even where there is no regulation or prohibition of particular activities, transportation can be severely affected by the way in which border crossing formalities are implemented.

World Bodies with Governance Roles, such as the World Trade Organization, increasingly influence the economy and transportation system of British Columbia. As an open economy heavily dependent on trade, British Columbia is affected by rulings about environmental or pricing aspects of trade that may make BC products more or less attractive to buyers in other countries. Transportation specifically is affected by international agreements and bodies that regulate the size, configuration, frequency and destination of common carrier routes and equipment.

Demand:

Individual persons and businesses use transportation for journeys to work, school, shopping and recreation. Transportation links to other parts of the world are vital for tourism. Individuals and businesses may use their own vehicles or they may arrange with common carriers for passage to their destinations.

Shippers of goods move or arrange for the movement of goods across town, across the province and around the world. Shippers may operate their own equipment or they may use the services of common carriers.

Supply:

The BC Ministry of Transportation provides highway infrastructure and related services throughout the province. Provincial highways link BC with the United States and the rest of Canada and connect the diverse regions of the province. Roads in provincial jurisdiction also provide important access to communities and natural resources in parts of the province outside major urban areas.

Transport Canada provides infrastructure for marine and air service, primarily terminals or docking facilities. In recent years, Transport Canada has moved to commercialize larger facilities such as the Port of Vancouver and Vancouver International Airport, or has transferred smaller facilities to local authorities. Transport Canada is still directly involved in providing infrastructure and services at some remote locations.

Common carriers operate transportation equipment and sometimes provide transportation infrastructure to move goods or people. Common carriers offer service to anyone, as distinguished from transportation services that are only for the use of a specific organization, for example a railway owned by a mining company that only brings ore from the mine to a processing plant.

Some common carriers are operated by the government, such as BC Ferries and BC Transit which operate as provincial crown corporations, or Via Rail which operates as a federal crown corporation.

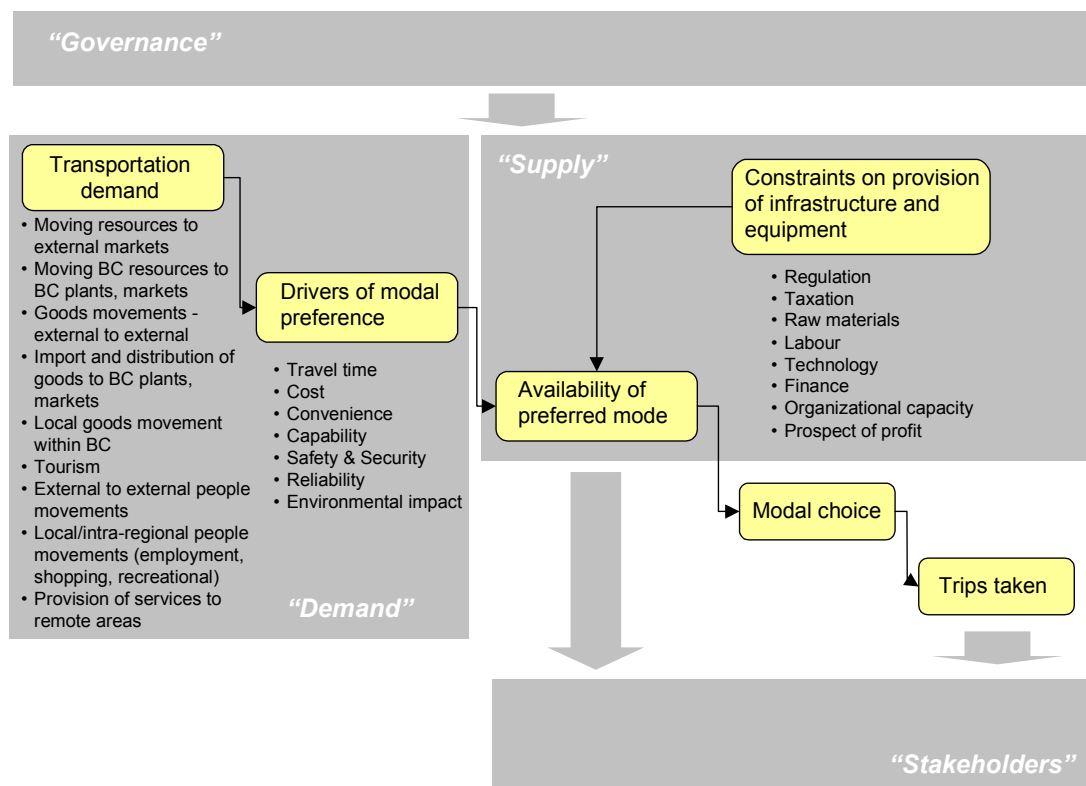
Stakeholders:

Stakeholders may be individuals or they may be organized groups with a focus on a particular subject matter. Some groups are local and informal while others are parts of worldwide non-governmental organizations with extensive resources and media access. Stakeholders may also be users of the transportation system in other parts of their lives – for example the parent concerned about truck traffic near a school may also be an automobile driver who impacts air quality in other parts of the community.

What are the key factors affecting transportation demand and supply?

Using the business model, key factors affecting demand and supply have been identified for tracking and prediction. These are shown on a version of the business model:

Key Factors Affecting Transportation Demand and Supply



This view of the model is based on choices made by individuals and shippers. The activities that typically lead to transportation demand are listed in the diagram underneath the box labelled “Transportation demand”. To some extent these activities can be predicted by analysis of the underlying drivers, for example the state of foreign markets for export demand, or the growth of population for local and intra-regional people movements.

Having established a desire to move people or ship goods, an individual or shipper typically will have preferences as to which transportation mode (air, marine, rail, truck, bus, private automobile etc.) would best be used to meet that demand. Factors that might be expected to affect the choice are listed in the diagram under the box labelled “Drivers

of modal preference”. Choices by individuals or shippers can to some extent be predicted (or influenced) according to the state of the factors or drivers listed.

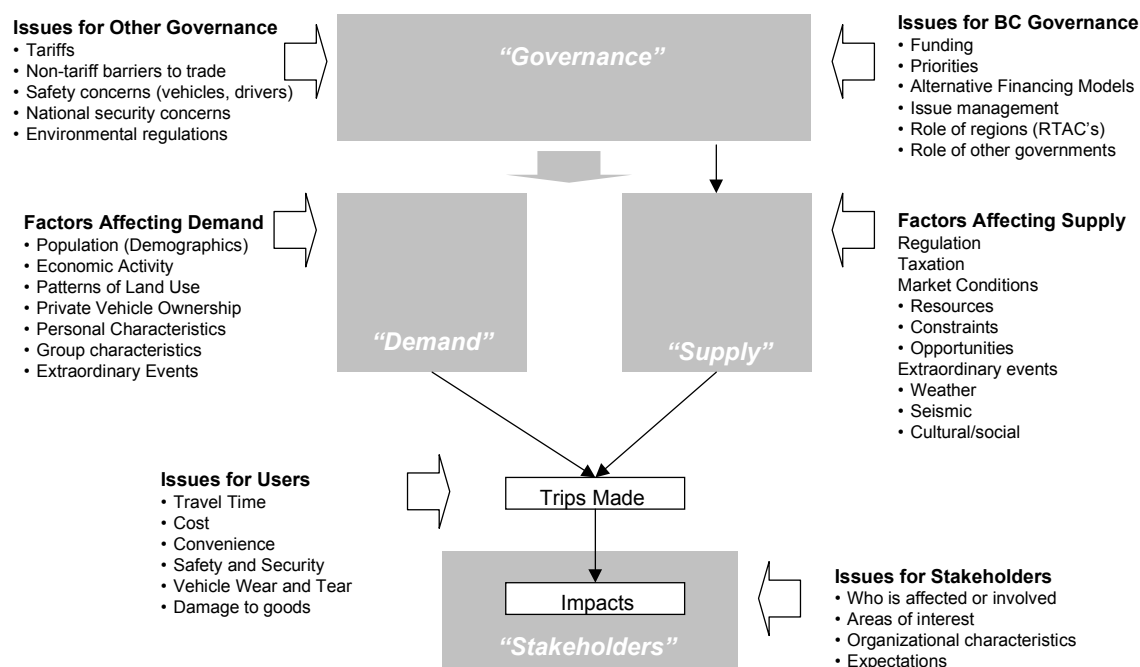
It may not be possible in every case for individuals and shippers to use their preferred transportation mode, or even to make the trip at all. There are many constraints on the providers of infrastructure and services that may limit the availability of the desired transportation services, at least in the timeframe and at the cost preferred by the individual or shipper making the choice. Major constraints on infrastructure providers are listed in the diagram under the box labelled “Constraints on provision of infrastructure and equipment”. Factors in the external business environment that affect these constraints might also be expected to affect the availability of the transportation infrastructure and services desired.

This view of the model provides a list of key factors that affect demand and supply for transportation. These key factors form the basis of the scenarios identified in the External Environment Scan, and also provide a framework for understanding the impact of all other factors tracked in the scan.

What are other factors worth tracking?

The above discussion reflects the expansion of the business model for 2002 to include demand and supply for all transportation modes. However, at a greater level of detail there are a number of other factors related to transportation that have been tracked in past issues of the External Environment Scan. As these remain of interest, the diagram shows how they relate to the revised business model. Details of predicted futures and possible responses for these factors are included in the tables in Appendix 4.

Factors for the External Environment Scan



Appendix 4 Tabulated Scan Findings

The tables that follow in this Appendix contain a summary of the findings of the External Environment Scan 2006 according to a standardized format based on the BC Transportation Business Model discussed earlier in this document. In the tables, the following terms are used:

Observed Trends – This reflects the trends that are evident as of 2006, based on data available at that time. In some cases, there may be observed trends that appear to be inconsistent with each other, if data exist to support multiple pressures or trends at work.

Predicted Futures – This reflects the opinion of knowledgeable individuals and organizations as published elsewhere or as determined during the development of the External Environment Scan. Care has been taken to identify as predicted futures not just “conventional wisdom”, but also alternative futures that transportation organizations may find it prudent to prepare for.

Probability – The predicted futures have differing probabilities of coming to pass, depending on a wide range of circumstances. The External Environment Scan, in support of the Provincial Highway Plan, has identified three time periods of interest: “before 2009”, which is covered by the current MoT Service Plan; “2009-2012”, which will be covered by the service plans developed out of consultations and longer-term partnerships included in the current Service Plan; and “beyond 2012”, for which preparations may be needed now to ready transportation organizations for service delivery in the future. The probabilities shown in the tables are necessarily imprecise and somewhat subjective, representing a consensus view of the consultants and others involved in their preparation.

Potential Impact on Transportation – The pressures and trends identified in the External Environment Scan have their greatest interest where they have some impact on the transportation system or the ability of transportation organizations to carry out their mandates. This column of the tables provides a high-level statement of threats or opportunities that the predicted futures may provide for transportation organizations.

Possible Response Elements – Transportation organizations sometimes can prepare for predicted futures and seize opportunities or mitigate impacts. The “possible response elements” are candidate actions that could be part of an organizational response, but the candidate actions must be considered by each transportation organization in the context of fiscal, organizational and other priorities. Readers are referred to the strategic plans or service plans of the relevant transportation organizations for further information about actual commitments.

Subject Area 3.0 Constraints on Supply of Transportation

ID	Input or Resource	Transportation System Components Involved	Observed Trends	Predicted Future(s)	Probability			Potential Impact on Transportation	Response Type	Possible Response Elements
					Before 2009	2009 - 2012	After 2012			
3.1	Land for rights-of-way	All	Increasing intensity of demand for limited land base by diverse land uses, probably with more coordinated land use planning processes at the regional and provincial level	Trend will continue to intensify	High	High	High	Difficulty in obtaining and protecting corridors for transportation, with higher costs and possibly frustration of ability to construct new infrastructure	Plan of action	Participation at early stages in coordinated land use planning processes with clear statements of functional requirements as opposed to proposed solutions; Inclusion of the inter-relationship of land use and transportation planning decisions in analysis of transportation alternatives;
			Rising prices for land in urbanized areas, moderate prices in rural areas	Trend will continue over long periods, with volatility from time to time	High	High	High	Land costs in urban areas may impact location and design of transportation infrastructure; land costs will be less of a constraint in rural areas	Watching Brief	Monitor land costs and consider corridor protection, land banking and design practices that require less right-of-way.
			Longer time requirements for right-of-way acquisition due to competing interests and requirement for due process	Trend will continue, even though moderated somewhat by deregulation initiatives	High	High	High	Longer times to accomplish improvements requiring land acquisition (5 to 20 years) require longer range planning and more interim solutions	Plan of action	Greater reliance on corridor management planning to identify needs sooner and begin land acquisition process early in project life cycle
3.2	Labour market	All	Labour shortages are appearing in some skilled trades	Potentially significant shortages of skilled labour in some trades in high demand due to construction boom, due to aging population, streaming of students away from skilled trades and limited availability of immigrants with skills that can be applied	High	High	High	Higher costs as supply and demand increase wages for skilled workers; potential project delays due to shortages	Plan of action	Plan for higher costs of skilled labour; organize work to make best use of limited skilled labour resources within organizations and in supplier community; encourage senior governments to facilitate use of skills by foreign-trained workers

Subject Area 3.0 Constraints on Supply of Transportation

ID	Input or Resource	Transportation System Components Involved	Observed Trends	Predicted Future(s)	Probability			Potential Impact on Transportation	Response Type	Possible Response Elements
					Before 2009	2009 - 2012	After 2012			
3.3	Raw materials	All	Oil prices are now at historic highs and oil futures suggest prices may remain high for a while. Reasons given for high prices include growing demand from multiple markets, lack of investment in production capacity and supply uncertainties related to geopolitical events	Oil prices will remain volatile due to geopolitical events, and may drop somewhat while remaining high in the near term; later, as production maxes out, growing demand will eventually create upward price pressures; new technologies and alternate fuels may arrive in time to be viable substitutes before oil prices skyrocket	Med	High	High	If oil prices stay high, transportation demand could be dampened, by slowed economic growth as well as by buyer resistance to high fuel prices. Volatile oil prices may affect transportation demand for short periods; costs to infrastructure and service providers will bounce around, affecting profitability or even threatening viability, delivery of core mission	Plan of action	Plan for volatility of oil related costs of business (e.g. fuel costs, paving costs); monitor long term trends for changes in predicted futures; plan for short term effects on travel patterns of price volatility; monitor long term changes in travel behaviour due to fuel cost and availability
		All, but especially rail and highways	Steel prices have risen sharply, with some interruptions to supply and price volatility around higher levels	Steel prices may stay volatile for the short term with changing demand, supply and industry consolidation, but should moderate in the medium term as new production and logistics are brought on line and especially if Chinese demand slows	High	Med	Med	Prices for reinforcing rod and steel structural shapes may cause project prices to go over plan, forcing reduced scope or impacting other projects	Watching Brief	Monitor steel prices and availability; consider alternative structure designs (e.g. concrete) to reduce steel use and therefore costs
		All, but especially highways	Portland cement prices and availability have been problems in some markets	Continued short term price increases and shortages in markets dependent on imported cement due to demand and shipping problems; new capacity should result in correction in medium term	Med	Low	Low	Prices for large concrete projects may be affected in the short term	Watching Brief	Monitor Portland cement prices; investigate alternative supply sources if prices move outside comfort range
		All, but especially highways	Gravel has become scarcer and more expensive	Usage of known deposits to exhaustion and removal of sources from production due to land development or environmental concerns will continue, leading to price and availability problems	Med	High	High	Increased cost for construction and maintenance activities that are heavy users of gravel; reduced reliance on natural deposits and more rock crushing to manufacture or beneficiate gravel	Watching Brief	Monitor costs and availability through gravel management programs to identify areas where changing gravel availability, quality and cost may have a significant effect on projects and maintenance.
3.4	Technology change	All, but especially goods movement	Continued major improvements in computer and networking technologies for customer service and support	Technology continues to advance, although the industry remains intensely competitive and prices volatile	High	High	High	Major opportunities to enhance customer service while reducing operating and back-office costs	Plan of action	Implement formal innovation management program to keep transportation organizations' technology advancing at an appropriate pace

Subject Area 3.0 Constraints on Supply of Transportation

ID	Input or Resource	Transportation System Components Involved	Observed Trends	Predicted Future(s)	Probability			Potential Impact on Transportation	Response Type	Possible Response Elements
					Before 2009	2009 - 2012	After 2012			
			Technical advances are being made in traffic management and control technologies such as ITS, but only isolated implementations to date	Major advances in traffic management and control technologies such as ITS, with spin-off benefits to other roads and to vehicles	Med	High	High	Opportunities to get more throughput with existing infrastructure, along with safety and performance improvements;	Plan of action	Implement formal innovation management program to keep transportation organizations' technology advancing at an appropriate pace
			Advances in control and delivery methods and machines used for maintenance, rehabilitation and construction	Technical advances will continue, driven by available technologies and cost pressures	High	High	High	Opportunities to get more construction, rehab and maintenance accomplishments for given funding	Plan of action	Implement formal innovation management program to keep transportation organizations' technology advancing at an appropriate pace
3.5	Industry capacity	All, especially highways	Public agencies increasingly looking to private entities to deliver infrastructure and services	Types of services, costs and availability of private sector services will be driven by perceptions of market demand and rates of return	High	High	High	Program delivery capabilities may be constrained by ability of industry to adjust to variable program levels and needs	Plan of action	Identification of areas where public agencies are the major or dominant purchaser, and publication of understandable plans for nature and volume of work available on an ongoing basis
3.6	Industry restructuring	All	Consolidation of industry players with increased focus on core business	Financial and market pressures will continue to favour economies of scale in particular lines of business, deter conglomerate structures	High	Med	Med	Departure of mainline railways from branchline operations; consolidation of motor carriers into fewer and larger entities; restructuring of air carriers "only the strong survive"	Include in consultation	Assess impact of industry restructuring on infrastructure needs, futures
3.7	Construction costs	All	Construction costs rising rapidly across the board (1.5-2.0% per month)	Construction cost drivers will continue to push prices up faster than general inflation	High	Med	Med	Costs escalate quickly during delays or long projects, putting capability to complete in jeopardy	Plan of action	Build contingency into construction estimates for rapid cost inflation; tighten timelines and project management to control escalation; share escalation risk with contractors
3.8	Cost and availability of financing	All	Interest rates are at historical lows	Interest rates will rise somewhat, but remain at historically low levels	High	Med	Med	Greater availability and affordability of long-term finance for capital works	Watching Brief	
3.9	Aging infrastructure	All, but especially northern and rural roads	Average age of infrastructure is rising, especially for connectors such as rural and northern roads	Pressures on funding will make it more difficult to maintain and rehabilitate infrastructure fast enough to hold the line on condition; shortfalls in one year cannot typically be made up later with available budgets, as costs rise quickly for delayed rehabilitation.	High	High	High	As infrastructure ages, it requires more effort and expenditure to maintain condition and services; competitive jurisdictions with newer infrastructure have an advantage in attracting business and tourism	Plan of action	Increase emphasis on rehabilitation at optimal time, if necessary by trading off other desirable goals; seek additional rehab funding; seek to transfer to other levels of government inventory no longer performing significant provincial role

Subject Area 3.0 Constraints on Supply of Transportation

ID	Input or Resource	Transportation System Components Involved	Observed Trends	Predicted Future(s)	Probability			Potential Impact on Transportation	Response Type	Possible Response Elements
					Before 2009	2009 - 2012	After 2012			
3.10	Gateway connections	Gateways and trade corridors	Competitive jurisdictions are investing heavily in gateways and corridors, including where they connect to BC	Continued investment by competitive jurisdictions in gateways and trade corridors to draw business and tourism to them	High	High	High	Investments by others may change the competitive position of BC, shifting travel growth elsewhere to the disadvantage of the BC economy, such as is already happening in the cruise ship industry.	Plan of action	Monitor competitive developments by others and their potential impact on BC; prepare strategy for BC to match competitive moves or better, get out in front of competitors. Continue current program of investment in gateway capability
								Demand and service levels at border points may exceed transport and border processing capacity on the BC side of the border		Identify corridors being developed by others and projected volumes, types of traffic. Plan and implement improvements on BC side accordingly

Subject Area 4.0 Stakeholders

ID	Theme	Transportation System Components Involved	Observed Trends	Predicted Future(s)	Probability			Potential Impact on Transportation	Response Type	Possible Response Elements
					Before 2009	2009 - 2012	After 2012			
4.1	Who is a stakeholder	All	Stakeholders are concerned about impacts of transportation. There is a growing number and diversity of interest groups to the point where nearly every person may fall within areas represented by one or another group	With more intense use of transportation systems, concerns about impacts will grow in all segments of society.	High	High	High	Possible delay or frustration of transportation initiatives through inattention to the needs of one or more groups	Plan of Action	Identify the interest groups, their major values and concerns, contact persons, and ways to involve them in routine transportation planning processes early enough to incorporate their concerns into planning processes and projects
4.2	Impact areas they are interested in	All	Interest areas have been broadening to include safety, environmental, community and other concerns.	Increased focus on economic, social and/or community and environmental impacts; due process and consultation processes	Med	Med	Med	Possible delay or frustration of transportation initiatives through inattention to impact areas of interest	Plan of Action	As above
4.3	Stakeholder expectations or proposals for change	All	Increasing expectations that transportation infrastructure and operations will not have environmental impacts on stakeholders, or that compensation will be available	Continued strengthening of this trend	High	High	Med	Potential delay or frustration of transportation initiatives, or requirement to pay compensation on different criteria (such as the "no net loss" concept)	Plan of Action	Monitoring development of new standards for impact and compensation, along with the requirements on transportation organizations for process and back up information to meet such standards
			Expectation that consultation will occur at all stages of transportation planning, construction and operation	Expectations may grow on part of those directly impacted and of special interest groups	Med	Med	Med	Projects are impacted by effort and elapsed time to offer consultation opportunities and process and respond to input	Watching Brief	Monitor trends elsewhere, provide transportation organization perspective when consultation processes are being designed
			"Consultation fatigue" (people are asked too often to provide input on too many things, so they stop participating)	Public consultation processes are increasingly dominated by special interest groups with the resources to participate, so that consultation processes become platforms for familiar advocacies	High	High	High	Public consultation processes do not reflect accurate picture of what the public really thinks	Plan of Action	Review of consultation practices elsewhere, to support a creative approach to capturing accurate data about the public's concerns and ideas for transportation projects
			Consultation processes are becoming longer and more complex	Consultation processes become longer, more complex, and result in insoluble conundrums of conflict about policy or impacts	Low	Med	Med	Delay and possible frustration of transportation initiatives while consultation processes are ongoing	Watching Brief	Monitor trends elsewhere, provide transportation organization perspective when consultation processes are being designed

Subject Area 4.0 Stakeholders

ID	Theme	Transportation System Components Involved	Observed Trends	Predicted Future(s)	Probability			Potential Impact on Transportation	Response Type	Possible Response Elements
					Before 2009	2009 - 2012	After 2012			
4.4	Stakeholder organization	All	Increasing willingness of interest groups or their members to resort to civil disobedience or direct action rather than accept the results of due process, although direct action is still quite rare	More events of direct action involving transportation infrastructure, perhaps as an incidental target in campaigns on other issues	Med	Med	Med	Possible delays to travelers and goods movement, potentially damage to infrastructure and equipment	Plan of Action	In addition to the above plans, plans for business continuity identifying potential threats, likelihood and impact, and appropriate countermeasures
			Cooperation or coordination between stakeholder groups	Stakeholders will increasingly join forces for common causes	Med	Med	Med	Possible increased opposition to transportation initiatives, but opportunities to coordinate responses and deal with multiple groups at once	Watching Brief	Monitoring trends in interest group affiliations and plans to identify and address common concerns with them
			Stakeholders are seeking different roles, depending on their resources and level of interest	Stakeholders will increasingly take different roles, ranging from complete independence to full partnership	Med	Med	Low	Increased expectations on transportation organizations to be flexible in their approach and to provide opportunities for stakeholders to participate at different levels in processes of joint interest	Include in consultation	Plan for a variety of ways for stakeholders to participate in planning processes, and publish opportunities and success stories to encourage stakeholders to see transportation organizations as more flexible and accommodating in their processes

Subject Area 5.0 Other Trends of Interest

ID	Theme	Transportation System Components Involved	Observed Trends	Predicted Future(s)	Probability			Potential Impact on Transportation	Response Type	Possible Response Elements
					Before 2009	2009 - 2012	After 2012			
5.1	Climate change	All	Increasing temperatures and more volatile weather events leading to record damage to property, possibly due to global warming	Global warming and climate change may result in more frequent and more severe exceptional weather events	Med	Med	High	Widespread damage and potential loss of life due to weather-related events; limited or unavailable insurance coverage for private individuals and businesses means more expectations on public agencies during and after events	Watching Brief	Monitor trends, identify points of vulnerability, adjust disaster response plans, brief officials regularly, undertake engineering mitigating measures as appropriate
5.2	Seismic events	All	Exceptional earthquake ("the big one") is predicted, but has not yet occurred	Exceptional earthquake ("the big one") was 100% probability in 50 year horizon - with each passing year, probability of the event in any given year is rising	Low	Low	Med	Significant damage and destruction to transportation infrastructure, potential loss of life for transportation users and workers	Plan of Action	Establish hierarchy of facilities with extra engineering measures to ensure key components remain functional; plan for survival of road users and employees; educate and train through practice for survival and recovery