



Economic Impact Opportunities from Expanding International Air Cargo Services in Vancouver, BC

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EXECUTIVE SUMMARY

Economic Impact Opportunities from Expanding International Air Cargo Services in Vancouver, BC

Prepared for the Greater Vancouver Gateway Council
Prepared by Economic Development Research Group, Inc.
April 1, 2011

This report evaluates the economic development benefits of expanding overseas air cargo activity at Vancouver International Airport, and it also examines the economic role of nearby Abbotsford International Airport as a secondary support for air cargo service in the Lower Mainland.

Situation Today. Vancouver International Airport (YVR) is the dominant western gateway for air passenger and air freight moving to and from Canada, with over 16.7 million passenger trips and 228,000 metric tons of cargo in 2010. These levels of activity make Vancouver International Airport the second largest and most active airport in Canada (exceeded only by Toronto). It is particularly notable that air cargo at YVR in 2010 was up substantially from 2009 levels and that 40% of its air cargo is now overseas trade (between Canada and either Asia or Europe). Foreign trade, and particularly export activity, is particularly important to the economy because it is a major source of income flowing into Canada. As an international gateway, YVR enables international business activities to locate and operate in Canada, while serving customers and clients abroad.

Operation of Vancouver International Airport generates jobs. A recent (2010) airport study found that there are approximately 23,614 jobs at Vancouver International Airport. The associated payroll for these workers represents \$1.0 billion of wages, and the impact on tax revenue to all levels of government represents over \$600 million annually. There are also broader impacts on suppliers of products and services as well as impacts of worker spending, which together generate over 46,000 total jobs and over \$1.8 billion of wages throughout British Columbia.

In addition, Abbotsford International Airport (YXX) also serves the Lower Mainland, as both a reliever to YVR and host to low cost airlines. It has scheduled passenger air service to western Canada locations and seasonal service to Mexico. It also serves charter cargo services.

Importance of Air Cargo. Freight shipped through Vancouver International Airport has an estimated value of approximately \$10 billion/year, reflecting the high value/weight ratio of the types of cargo moved long-distance by air. This

includes domestic, cross-border and overseas shipments (incoming and outgoing). Besides generating jobs at the airport for air cargo handling, there are nearly 100 businesses relating to cargo-handling and processing at the airport.

Role as an Overseas Cargo Gateway. Vancouver International Airport serves as a gateway for overseas air cargo shipments, though it competes with a regional network of Pacific Coast air cargo gateways in the US, including Seattle and Portland as well as Oakland and San Francisco. The only other major Western Canada airport with significant overseas air cargo is Calgary, which is far smaller and more specialized. Among the coastal competitors, Vancouver and Seattle-Tacoma airports carry roughly similar tonnage of overseas cargo, while Portland and Oakland have significantly less overseas tonnage. Only San Francisco International Airport has substantially larger tonnage of overseas cargo, though it is furthest away and its service area overlaps with only the fringe of Vancouver's service area.

Competitive Position of Vancouver International Airport. The Lower Mainland Air Cargo Study was conducted by the International Air Transport Association (IATA) in 2010 to assess opportunities and issues facing air cargo development in the Greater Vancouver region. Key findings emerging from that study were that Vancouver International Airport (YVR) currently has a limited number of nonstop overseas destinations, leaving voids that are filled by other west coast gateway airports. It also noted that overseas freight service at YVR is predominantly belly cargo on passenger flights with only one airline providing dedicated freighter service. The relative lack of wide-body freighter service was cited as a competitive disadvantage.

The IATA study further identified a number of additional destinations that YVR could potentially capture in the future to provide a more robust and balanced set of overseas air cargo services, ranging from Singapore to Europe. On the other hand, the IATA study did note that YVR has a wide range of multi-modal resources and a local base of forwarders that may help to convince airlines to expand new freighter service. And it noted that in the future, suggested policy changes such as elimination of a provincial fuel tax for international flights may also help support expansion of air service.

Import and Export Roles. To further establish the role of Vancouver International Airport as an inter-continental cargo gateway, the study team conducted interviews with a variety of air cargo carriers, consolidators and other cargo services. The study team also worked with a combination of US and Canadian international trade data sources to piece together a more complete profile of overseas cargo movements generated by Canadian exporters and use made of Vancouver International Airport by both US and Canadian firms. Key findings are as follows.

- **Canadian Overseas Exports and Imports.** Currently, British Columbia generates approximately 67,000 metric tons of overseas exports and imports that are shipped annually by air, with a value of nearly \$3.7 billion. Most of those shipments, representing nearly 53,000 metric tons and \$2.5 billion of value, move via Vancouver International Airport. The remainder is mostly imported product arriving via US gateway airports, due to the fact that locations such as Seattle and San Francisco now offer direct service from more overseas locations, including more wide-body freighter service and more service to/from Asia and Europe.
- **Local Support.** A substantial share of current British Columbia exports are perishables (seafood and seasonable crops such as cherries and berries) that particularly depend on timely outgoing shipment. Some agricultural crops ship via US airports, reportedly due to specific air service needs and concerns about traffic congestion in the Vancouver area. A number of carriers have pulled their General Sales Agents (GSAs) out of YVR because of insufficient size of the local market for service. Yet with better air cargo service and perhaps improved access, there may be an opportunity for Vancouver International airport to support further growth of export demand for BC-based industries.
- **American Exports and Imports.** In total, YVR handles approximately 70,000 metric tons of cargo, with a value of \$3.75 billion. These numbers are larger than the YVR's Canadian export and import figures (that were previously cited) because they also include US exports and imports that pass through YVR as their overseas gateway. These are outgoing goods trucked up and incoming goods trucked down across the border with Washington State. The US exports and imports account for one-quarter of YVR's total overseas tonnage and one-third of its value. Interviews of air cargo industry experts revealed uncertainty about whether this American-based demand will rise or fall in the future, as it will depend upon whether Vancouver International Airport becomes more or less competitive and attractive to that market in the future. That can depend on future changes in cargo air service, fee structures and customs clearing processes for bonded shipments.
- **Balancing of YVR Exports and Imports.** The balance between (incoming) overseas imports and (outgoing) overseas exports flowing through Vancouver International Airport looks very different depending on whether it is viewed in terms of tonnage or economic value. Currently, overseas exports and imports represent similar tonnage levels. But in terms of the value, overseas imports are 2.6 times larger than overseas exports. In other words, export goods currently going out of BC are lower in value than imported goods. From the viewpoint of creating Canadian jobs and income, there is an opportunity for economic gain if products with a higher value/weight ratio can be produced in Canada and then shipped overseas.

- **European Service.** Europe is expected to represent a future growth opportunity for YVR that is beyond the current focus on Asia. Exports to the UK are growing, though the US is now responsible for a major share of that growth. However, non-stop service to Europe from YVR is still currently limited.

Future Scenarios for Air Cargo Growth. The Lower Mainland Air Cargo Study by IATA laid out a set of potentially feasible forecasts for air cargo growth at Vancouver International Airport and Abbotsford Airport from 2010-2024. For this study, they are referred to as: (1) a “Baseline Scenario” representing continued annual incremental growth and (2) a “Likely Achievable Scenario” representing additional cargo growth that is likely to be achievable as long as efforts are made to enhance YVR’s capacity and competitiveness. Altogether, the Baseline scenario assumes 1.5% average annual cargo growth to 2024, while the Likely Achievable scenario assumes 5.2% annual cargo growth.

Economic Sectors to Benefit. For such expansion to occur at YVR in the future, effort must be made to capture what is now unmet demand. This can occur in two ways: (1) by capturing current overseas shipping to/from Western Canada that is now being served by US airports, and (2) to increase the size of the market for suppliers and manufacturers in Western Canada by providing them better service to a broader set of destinations. Specific industry targets include:

- Aircraft Maintenance and Support
- Cargo Logistics
- Global Logistics Management
- Fish and Fruit Products
- Technology-Based Products.

Technology-based products include aerospace equipment, communications equipment, electronics and optical instruments. Such products are of particular interest because (a) they offer a particularly high “value added (generation of local income), (b) they tend to have a high value/ weight ratio which makes them particularly dependent on air transportation, and (c) the report shows that growth of air cargo deliveries of these products can be a leading generator of provincial industry growth in the corresponding industries.

Economic Development Consequences. The project team conducted a quantitative modeling analysis of the impacts of Baseline and Achievable Growth alternatives on airport employment, supporting cargo logistics activities, savings in ground access costs and expansion of export markets. The results indicate that adoption of the Achievable Growth scenario can lead to significantly more employment and income in future years. The stakes will grow over time, as the future export opportunities expand and the benefits of avoiding export growth constraints also expand. Ultimately, the difference between the two scenarios can amount to over 19,000 jobs and over \$2.5 billion/year of business output.

Long –Term Economic Gain from Expanding Air Cargo at YVR
(Additional economic activity occurring in Year 2024 if Achievable Growth scenario occurs rather than the Baseline Scenario)

<i>Difference in Year 2024 BC Provincial Economic Activity</i>	<i>Total Impact</i>
Jobs (rounded to nearest 100)	19,600
Wage Income	\$ 850 million
Gross Domestic Product	\$ 1.30 billion
Business Output	\$ 2.54 billion

Policy Implications. The analysis conducted for this study naturally raises a number of policy questions, such as the potential need for further changes in bilateral trade policies, air service agreements, airport fees, provincial fuel taxes, ground access conditions, costs for trans-border freight movement, Air Canada cargo service locations, etc. However, it was not the purpose of this study to identify or assess specific policies. Rather, this study was designed to assess how air cargo investment and growth can have a notable impact on the provincial economy (and by inference, the national economy.) Indeed, this report confirms that the economic stakes are considerable.

1

INTRODUCTION

This report evaluates the economic development benefits of expanding overseas air cargo activity at Vancouver International Airport, and it also examines the economic effects of expanding activity at nearby Abbotsford Int. Airport.

1.1 Background: Greater Vancouver Airports

Vancouver International Airport (YVR) is the dominant western gateway for air passenger and air freight moving to and from Canada. It is Canada's second busiest airport in terms of passenger volume and cargo tons. Operation of this facility directly generates jobs in British Columbia, and indirectly generates jobs elsewhere in Western Canada. In addition, this gateway enables international business activities to locate and operate in Canada, while serving customers and clients abroad.

Exhibit 1. International Destinations Served from Vancouver Int. Airport



Source: Vancouver Airport Authority; www.yvr.ca

(Note: Singapore service is no longer offered at this time)

Abbotsford International Airport (YXX) also serves the Greater Vancouver Regional District, as both a reliever to YVR and host to low cost airlines. It has scheduled passenger air service to Western Canada locations and seasonal service to Mexico. It also serves charter cargo services.

1.2 Report Purpose and Organization

Purpose. There is significant opportunity for expansion of air cargo services in the Greater Vancouver Regional District of British Columbia. The recent *Lower Mainland Air Cargo Study*¹ provides a detailed explanation of the potential for expansion of air cargo at Vancouver International Airport, and it also assessed opportunities for air cargo expansion at nearby Abbotsford Int. Airport. That report did not, however, explain how expansion of air services would lead to effects on the broader economy by changing business markets, activity levels, costs or schedules.

This report addresses those broader issues by identifying economic development benefits of potential and feasible air cargo expansion at these international airports. It shows how further air cargo growth, enabled by a combination of regulatory and policy actions, can create more jobs and income for British Columbia and Western Canada, and indeed benefit all of Canada. Such changes will not only generate jobs related to expanded airport activity, but also enhance freight and distribution industries, enable Canadian product manufacturers to benefit from faster and wider access to markets, and consequently enhance broad sectors of the economy. Overall, these economic impacts will generate additional GDP in the region and generate additional employment.

Organization. This report is organized into five further chapters.

- Overview - Airport Role in Provincial and Canadian Economies
- Scenarios - Alternative Futures for International Air Service Growth
- Impact Process - How International Air Service Affects the Economy
- Analysis Findings - Future Employment & Income Impacts
- Conclusions - Directions for the Future

Details of the methodology are provided in an Appendix.

¹ *Lower Mainland Air Cargo Study, Final Report*, prepared by the International Air Transport Association for the Greater Vancouver Gateway Council, 2010.

2

AIRPORT ROLE IN PROVINCIAL AND N. AMERICAN ECONOMIES

This Chapter reviews the role of Vancouver International Airport as a significant national gateway for air passenger and air freight moving into and out of Canada. It also shows the airport's role as a significant Asian gateway for North America and the dominant Asia gateway for Western Canada – enabling international business activities to locate and operate in Canada, while serving customers and clients abroad. Abbotsford Int. Airport also contributes as a predominantly regional facility, though it is expected to grow international activity in the future.

2.1 Airport Activity Levels

Vancouver International Airport (YVR) served over 16 million passenger trips in 2010. Actual air cargo volume in 2010 was over 228,000 metric tons. These levels of activity make Vancouver International Airport the second largest and most active airport in Canada (exceeded only by Toronto). (See Exhibit 2.) It is particularly notable that air cargo at YVR in 2010 was up substantially from 2009 levels (up from roughly 198,000 to 228,000), and that 40% of the air cargo at YVR is now for overseas trade (between Canada and either Asia or Europe).

Exhibit 2: Mix of Activity at Vancouver International Airport, 2010

<i>Passengers Boarding & Alighting (2010)</i>	<i>Passengers</i>	<i>Percent</i>
Domestic (between points in Canada)	8,781,417	52%
Trans-border (between Canada & US)	4,133,938	25%
Overseas (between Canada & elsewhere)	3,864,354	23%
<i>Asia Pacific</i>	(2,318,761)	(14%)
<i>Europe</i>	(1,131,881)	(7%)
<i>Other International</i>	(413,712)	(2%)
Total Passengers	16,779,709	100%
<i>Cargo Incoming & Outgoing (2010)</i>	<i>Metric Tons</i>	
Domestic (between points in Canada)	99,744	(44%)
Trans-border (between Canada & US)	38,164	(17%)
Overseas (between Canada & elsewhere)	90,479	(40%)
Total Metric Tons of Cargo	228,387	100%

Source: Vancouver Airport Authority (www.yvr.ca/en/about/facts-stats.aspx)

Abbotsford Int. Airport (YXX) currently serves over 500,000 passenger arrivals and departures annually (503,693 in 2008), mostly associated with charter and seasonal vacation travel. The airport does not yet have any dedicated air cargo facilities. The cargo operations are still in a ramping-up phase and cargo flow is currently at a level of roughly 1,000 metric tons/year (primarily domestic movements).

2.2 Airport Jobs and Wages

Jobs. A recent survey of employment at Vancouver International Airport estimated jobs and payroll associated with the airport operation and associated passenger and air freight activities as of 2010.² The study found that there are approximately 23,614 jobs at Vancouver International Airport. The associated payroll for these workers represents \$1.0 billion of wages, and the impact on tax revenue to all levels of government represents over \$600 million annually.

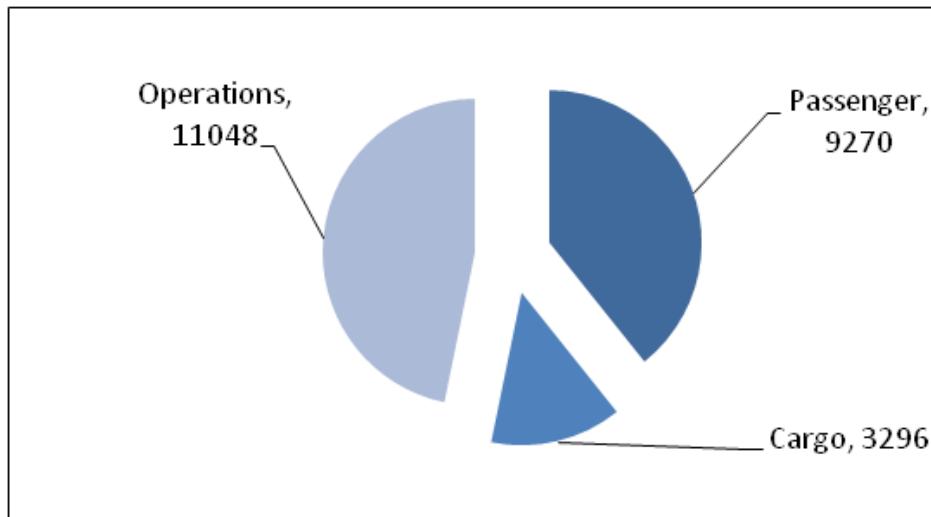
These airport-related jobs (sometimes referred to as “direct” economic effects of the airport), can be classified into three categories as shown in Exhibit 3:

- *Passenger-serving jobs (9,270):* Employment in passenger terminals, ground transportation and hotel employment serving airline passengers.
- *Cargo-serving jobs (3,296):* Employment at freight forwarders, customs brokers, and freight couriers or integrators, as well as any freight-only airlines, air cargo services and on-site manufacturers. There are almost 100 businesses engaged in cargo processing at the airport.
- *Operations-serving jobs (serving both passenger and cargo (11,048):* The majority of air carrier’s employment, airport administration and management operations, traffic control, commercial airlines and “fixed based operators” (firms providing aircraft services such as fueling, maintenance, and equipment rental services).

The most recent airport employment surveys show a trend of significant growth in cargo-serving jobs, driven by increases in employment at integrators (companies that handle courier and package deliveries). There were also some increases in airport retail, hotel and security jobs. Those trends were offset by reductions in air carrier jobs (particularly at passenger check-in facilities) and reductions in airport operations jobs.²

² *Economic Impact Assessment of the Vancouver International Airport*, Ference Weicker & Company Ltd., Jan. 2010.

Exhibit 3. Employment at YVR by Category of Airport Activity, 2010



*Source: estimate by Economic Development Research Group, based on data from: *Economic Impact Assessment of the Vancouver International Airport*, Ference Weicker & Company, 2010.*

Broader Regional Impacts. Activities occurring directly at Vancouver Airport also support a wide range of jobs elsewhere in the region. This includes “indirect effects” on suppliers of goods and services to the airport, and “induced effects” of workers re-spending most of their wages on consumer purchases. Adding these additional economic impacts leads to a total impact that is roughly double that of the direct airport jobs and income. The total national impact of YVR operation is thus estimated (in the report: *Economic Impact Assessment of the Vancouver International Airport*) to be roughly 61,769 jobs with a total GDP effect of \$5.3 billion, including \$2.5 billion of worker wages.

2.3 Role as a Pacific Coast Gateway

Role Relative to Other Airports. Vancouver International Airport serves as a gateway for overseas air cargo shipments, and competes with a regional network of Pacific Coast air cargo gateways in the US. The only other major Western Canada airport with significant overseas air cargo is Calgary and it is far smaller and more specialized. (See locations and tonnage shown in Exhibits 4 and 5.)

Exhibit 4: West Coast Airports and Associated International Trade Flows



Source: graphic by Economic Development Research Group; base map by Google Maps

Exhibit 5: Overseas Cargo at West Coast US and W. Canadian Airports, 2009

Airport	City	Overseas Metric Tons
YVR	Vancouver	77,470*
YYC	Calgary	16,689
SEA	Seattle-Tacoma	79,335
PDX	Portland	8,689
OAK	Oakland	1,292
SFO	San Francisco	222,328
LAX	Los Angeles	556,842

*Vancouver was up to 90,979 metric tons in 2010, but this table relies on 2009 figures because comparable 2010 values are not available for all other airports at the time of this report. Note that these numbers include overseas only and thus excludes trans-border movements within North America. Source: Vancouver Airport Authority and US Census, Foreign Trade Statistics.

It is clear that, for businesses in the Pacific Northwest region that depend on shipments from overseas suppliers and shipments to overseas customers, their options are primarily Seattle and Vancouver. While Portland and Oakland are also accessible to businesses within one day drive time, they serve a largely domestic cargo market and have relatively little overseas cargo activity. San Francisco is a larger gateway that competes for business from the southern fringe of YVR's service area.

Interview Findings. To further establish the role of Vancouver International Airport as an inter-continental cargo gateway, the study team conducted interviews with a variety of air cargo carriers, consolidators and other cargo services. This included discussions with staff members of Cathay Pacific, Nippon Express Canada, Summit International Trade Services, Perishables International and Aeroground Inc. The interview results were qualitative in their description of existing conditions, serving to highlight issues of concern and confirming the reasonableness of data analysis findings (presented later). Key findings are:

- American Exports. Interviewees reported that up to a third of their YVR export (outgoing overseas) cargo shipments are of US origin. They reported that up to a fifth of their YVR import (incoming overseas) cargo shipments are destined for the US. For some American firms, YVR currently provides scheduling and pricing advantages on selected routes (origin/destination locations). Whether or not that remains in the future is uncertain, as it will depend on how YVR cargo routes change over time.
- Canadian Exports. A small share of Canadian firms rely on SEA-TAC (Seattle Tacoma Airport) for outgoing overseas shipments. However, some do use SEA-TAC because it can handle larger size (and oversize) cargo on a larger fleet of wide body freighters. It also has more service to Europe, which is an area of particular demand growth.
- Local Service. A substantial share of current YVR exports involve Canadian perishables (seafood and seasonable crops such as cherries) that particularly depend on timely outgoing shipment. However, a number of carriers have pulled their General Sales Agents (GSAs) out of YVR because of insufficient size of the local market for service. That can change if BC-based industries can generate more export demand in the future.
- Service Demand Shifts. The air cargo market is changing, as courier services (FedEx, UPS, DHL) take on a growing share of air cargo that requires delivery reliability. Domestic and trans-border cargo movements are also increasingly moving to two-day truck delivery in lieu of air cargo, making the overseas market particularly important for future growth.
- European Service. Europe is expected to represent a future growth opportunity for YVR that is beyond the current focus on Asia. Exports to the UK are growing, though the US is now responsible for a major share of that growth. However, non-stop service to Europe from YVR is still currently limited, reportedly due in part to bilateral air service limitations.
- Wide Body Service. Survey respondents viewed the addition of wider body freighters as a natural consequence if YVR is to grow Asian and European activity in the future and compete for those markets.

2.4 Cargo Markets & Growth Opportunities

Value of Air Cargo. The 228,000 tons of cargo moving through Vancouver International Airport annually has an estimated value of roughly \$10 billion. While the value per ton of cargo varies widely depending on the specific product or commodity being shipped, it is notable that air cargo normally encompasses the highest value products. This is illustrated by the fact that nationally, air cargo accounts for just 1% of the total tonnage of Canadian overseas exports, but 31% of the total value of Canadian overseas exports.³ The value of air cargo flowing through YVR is not precisely known, but is estimated to average around \$45,000 per ton,⁴ while typical values for marine shipments are around \$600/ton, and truck and rail shipments are typically in the range of \$1,000 per ton.³

Origin and Destination of Air Cargo. Arrows on the previously-shown (Exhibit 4) map also show the three major classes of export flows: (A) Canadian exports to overseas (mostly Asia and Europe) via YVR; (B) US Exports shipped to overseas via YVR, and (C) Canadian Exports shipped to Asia and Europe via US airports. Not shown are the corresponding three classes of import flows: (D) Canadian imports from overseas (mostly Asia and Europe) via YVR, (E) US imports from overseas via YVR; and (F) Canadian imports from overseas Asia via US Ports.

It is important to understand the tonnage and value of each of these six classes of cargo flows, since air cargo expansion at YVR can only occur through growth in some combination of these flows. These six classes of cargo flows also differ substantially in their cargo composition and weight/value characteristics –factors that will further affect the nature of corresponding economic impacts if YVR can grow its cargo role.

However, there are no published statistics that break down all of these categories of overseas cargo flows, so the authors of this report initiated an effort to “piece together” the story from a combination of Canadian and US trade statistics and aviation statistics. The results are shown in Exhibits 6 and 7, and the methodology is described in Appendix A. All data is shown for 2009 since detailed international trade statistics for the full year of 2010 were not available as of the time of this report. However, the trade patterns shown here are also supported by interview data, and while total volume of trade in 2010 was greater than in 2009, there is no reason to believe that the general patterns are different than shown here.

³ Source: Transport Canada: *Transportation in Canada 2007* and *Transportation in Canada 2009*, Table EC7 (Overseas Exports by Mode). Note: the 2007 edition shows both value and tonnage for all modes, but the 2009 edition shows only value. However, value and tonnage are both still available for marine and rail modes in Tables M28, M126, R13 and R14.

⁴ Estimated by the study team to be around \$42,000/ton for domestic shipments and \$52,000/ton for overseas shipments, though values vary from year to year as product mix changes; see Exhibit 6 for overseas value and tonnage.

The development of these estimates (shown in Exhibit 6) has also enabled insight into the apparent composition of imports and exports flowing through Vancouver Airport (A+B for exports, and D+E for imports). In addition, it shows YVR's market capture of Canadian imports and exports (A+C for exports and D+F for imports).

Exhibit 6: Estimates for Value & Tonnage of Export and Import Flows, 2009

<i>Market Segment Class</i>	<i>Value (in \$M's)</i>	<i>Metric Tons</i>
<u>Exports</u>		
A BC Exports to Overseas via YVR	\$555	22,046
B US Exports to Overseas via YVR	\$477	10,501
C BC Exports to Overseas via West US airports	\$31	203
<u>Imports</u>		
D BC Import from Overseas via YVR	\$1,929	30,802
E US Imports from Overseas via YVR	\$787	6,506
F BC Imports from Overseas via West US Airports	\$1,148	14,024

Source: estimates developed by Economic Development Research Group based on: (1) Statistics Canada data on value of import/export trade, and (2) US Census Bureau, Foreign Trade Statistics on air cargo gateways and cross-border movements between Washington State and British Columbia for overseas trade. See Appendix for an explanation of these calculations. Since the calculations are based on trade statistics, the estimated \$ values in each row of the table are considered more accurate than the estimated tonnage values. However, total YVR tonnage shown here is also consistent with Statistics Canada data shown at <http://www.statcan.gc.ca/pub/51-203-x/2009000/t012-eng.htm>.

From Exhibit 6, we can make three major observations that affect opportunities for YVR to grow its level of cargo activity.

- *YVR Market Capture of Canadian Import/Export Markets* – Currently, British Columbia generates nearly 67,000 metric tons of overseas imports and exports that are shipped annually by air, with a value of nearly \$3.7 billion.⁵ Most of this air cargo goes through Vancouver International Airport (representing 68% of the total BC import + export value). Nearly all of the remainder goes through US gateway airports. This “leakage” of shipments to US ports occurs because Seattle and San Francisco now offer direct service to/from more overseas locations, including more freighter service. Concerns about traffic congestion on routes accessing YVR may also contribute to some use of US airports, particularly for Lower Mainland agricultural products. With better air cargo service, there may be an opportunity for Vancouver International airport to gain a larger share of that market.

⁵ BC overseas imports and exports are computed as categories A+C+D+F in Exhibit 7

- *American Exports Using YVR* – Currently, Vancouver International Airport handles around 70,000 metric tons of incoming and outgoing overseas shipments, with a value of \$3.75 billion.⁶ US exports and imports passing through YVR as their overseas gateway account for roughly 32% of YVR's total overseas tonnage. These are outgoing goods trucked up and incoming goods trucked down across the border with Washington State. The share represented by American-based demand could rise if Vancouver International Airport were to become more competitive and attractive to that market. That could happen in the future with expansion of cargo air service, changes in airport fee structures and streamlined customs clearing processes for bonded shipments.
- *Balancing of YVR Exports and Imports* – The balance between (incoming) overseas imports and (outgoing) overseas exports flowing through Vancouver International Airport looks very different depending on whether it is viewed in terms of tonnage or economic value. Currently, overseas exports and imports represent roughly similar tonnage levels. But in terms of the value, overseas imports are 2.6 times larger than overseas exports.⁷ In other words, export goods currently going out of BC are lower in value than imported goods. From the viewpoint of creating Canadian jobs and income, there is an opportunity for economic gain if products with a higher value/weight ratio can be produced in Canada and then shipped overseas.

Exhibits 7A and 7B, which follow, show a breakdown of the estimated commodity mix associated for each of the six market segments identified earlier in Exhibit 6. These tables provide insight into the type of commodities that are flowing to and from overseas via Vancouver International Airport, and the types of products that are not currently flowing via this airport. Key findings are as follows:

Export Commodities

- *Exported Products* - In terms of tonnage (Exhibit 7B), the primary BC exports to overseas are fish, fruits and vegetables. But when viewed by value (Exhibit 7A), the largest categories of export are industrial machinery, fish, electrical products and instruments.
- *YVR's Canadian Export Market Share* – BC overseas exports using YVR (column A in Exhibit 7B) generally have a similar profile as BC overseas exports using other airports (column C in Exhibit 7B). However, there are a few notable differences. YVR appears to have very little market share for exports of plastic, toys/games, live plants or flowers and charcoal

⁶ YVR overseas shipments are computed as categories A+B+D+E in Exhibit 7

⁷ YVR imports are computed as categories A+B in Exhibit 7; exports as D+E in Exhibit 7.

Tonnage values are similar: exports are 32,547 tons and imports are 37,308 tons. But values differ greatly: exports are \$1.032 billion and imports are \$2.716 billion.

products, which are produced in BC and shipped overseas by air. Currently, those products are more likely to be trucked down to fly out of US airports.

- *YVR's American Export Market Penetration* – YVR also serves a share of American exports of inorganic chemical & precious metal, live plants or flowers, plant-based resins, animal fur-related products, and footwear.

Import Commodities

- *Imported Products* - In terms of tonnage and value, the primary BC imports from overseas are industrial machinery, electronics products and medical equipment. Apparel from Asia also accounts for a significant share of the tonnage, though a smaller share of the value of imports.
- *YVR's Canadian Import Market Share* – BC overseas imports using YVR generally have a similar profile as BC overseas imports using other airports. However, there are some notable differences. YVR appears to have a high market share for BC imports of instruments and apparel, but a very low market share for BC imports of pharmaceutical products (which are more likely to be flown in via US airports).
- *YVR's American Import Market Penetration* – YVR also serves a share of American imports of pharmaceutical products.

These notable differences in commodity mix provide insight into opportunities to expand current markets and capture new markets for air cargo expansion at Vancouver International Airport. Those issues are discussed later, in Chapter 3.

Abbotsford Airport. Flowers are now the main commodity now shipped out of this airport on a seasonal basis. However, it is expected that in the future it will be possible to export Fraser Valley raspberries and blueberries to China from this airport, instead of the current practice of trucking fruit down to US airports for those outgoing shipments.

Exhibit 7(A). Estimated 2009 Overseas Import/Export Breakdown -- by Value (\$ millions)
(includes only overseas trade; excludes trade within North America)

HS Code	Description	A: Export Canada via YVR	B: Export US via YVR	C: Export Canada via US	D: Import Canada via YVR	E: Import US via YVR	F: Import Canada via US
3	Fish, Crustaceans, etc.	\$103	\$12				
6	Live Trees, Plants, Bulbs, Flowers.		\$9				
7	Edible Vegetables, Roots & Tubers	\$10	\$5		\$5		
8	Edible Fruit & Nuts; Citrus, Melon	\$17	\$16	\$7	\$2		
21	Miscellaneous Edible Preparations	\$4					
26	Ores, Slag And Ash						
28	Inorganic Chemicals; Precious Metals		\$12				
30	Pharmaceutical Products					\$658	
31	Fertilizers	\$1					
33	Essential Oils, Perfumery				\$9	\$1	
34	Soap, Waxes, Polish, Candles						
35	Protein/Starch/Glue	\$8					
39	Plastics And Articles						\$6
42	Leather Art; Saddlery; Handbags				\$29		
43	Fur Skins And Artificial Fur		\$94				
44	Wood Charcoal	\$1					
52	Cotton - Yarn & Fabric					\$1	
58	Woven Fabrics, Tufted Fab, Lace					\$1	
61	Apparel Articles - Knit Or Crochet	\$7	\$4		\$49	\$2	\$32
62	Apparel Articles - Not Knit				\$43	\$1	\$57
63	Textile Art; Needlecraft Sets						\$1
64	Footwear, Gaiters Etc.		\$11		\$11		\$3
73	Articles Of Iron Or Steel				\$10		\$4
83	Miscellaneous Articles Of Base Metal		\$2				
84	Industrial Machinery	\$101		\$16	\$633	\$50	\$389
85	Electric Machinery; Sound & TV	\$98	\$82	\$1	\$682	\$37	\$455
87	Vehicles, Or Tramway, And Parts				\$16		\$3
88	Aircraft, Spacecraft, And Parts		\$103				
90	Optic, Photo Etc, Medic Instruments	\$78	\$76	\$3	\$135	\$11	\$55
94	Furniture; Bedding, Lamps; Prefab						\$9
95	Toys, Games & Sport Equipment;			\$1			\$42
98	Special Classification Provisions	\$16				\$3	
	Other	\$111	\$51	\$2	\$306	\$23	\$93
	Total	\$555	\$477	\$31	\$1,929	\$788	\$1,148

Source: estimates developed by Economic Development Research Group based on: (1) Statistics Canada import/export trade data for British Columbia and Alberta, and (2) US Census Bureau, Foreign Trade Statistics on air cargo gateways and cross-border movements between Washington State and British Columbia for overseas trade. See Appendix for an explanation of this calculation process. In general, the estimated breakdown of values by commodity is considered more accurate than the estimated tonnage levels.

Exhibit 7(B): Estimated Overseas Import/Export Breakdown -- by Metric Tons
(includes only overseas trade; excludes trade within North America)

HS Code	Description	A: Export Canada via YVR	B: Export US via YVR	C: Export Canada via US	D: Import Canada via YVR	E: Import US via YVR	F: Import Canada via US
3	Fish, Crustaceans, etc.	10,248	1,145				
6	Live Trees, Plants, Bulbs, Flowers.		953	12			
7	Edible Vegetables, Roots & Tubers	3,839	1,820		2,113		
8	Edible Fruit & Nuts; Citrus, Melon	3,974	3,751	2	411		
21	Miscellaneous Edible Preparations	244					
28	Inorganic Chemicals; Precious Metals		291				
30	Pharmaceutical Products					4,538	
31	Fertilizers	247					
33	Essential Oils, Perfumery				356	33	
35	Protein/Starch/Glue	193					
39	Plastics And Articles			4			209
42	Leather Art; Saddlery; Handbags				420		
43	Fur Skins And Artificial Fur		779				
44	Wood Charcoal	238		21			
52	Cotton - Yarn & Fabric					26	
58	Woven Fabrics, Tufted Fab, Lace					43	
61	Apparel Articles - Knit Or Crochet	175	100		1,750	71	1,143
62	Apparel Articles - Not Knit				1,433	33	1,425
63	Textile Art; Needlecraft Sets						77
64	Footwear, Gaiters Etc.		275		367		100
73	Articles Of Iron Or Steel				828	34	327
83	Miscellaneous Articles Of Base Metal		144			29	
84	Industrial Machinery	537		98	5,146	407	2,992
85	Electric Machinery; Sound & TV	218	182	2	4,012	218	2,600
87	Vehicles, Or Tramway, And Parts				457		86
88	Aircraft, Spacecraft, And Parts		135				
90	Optic, Photo Etc, Medic Instruments	197	192	8	758	62	306
94	Furniture; Bedding, Lamps						182
95	Toys, Games & Sport Equipment;			12			703
98	Special Classification Provisions	338				54	
	Other	1,597	734	43	12,750	958	3,875
	Total	22,046	10,501	203	30,802	6,506	14,024

Source: estimates developed by Economic Development Research Group based on: (1) Statistics Canada import/export trade data for British Columbia and Alberta, and (2) US Census Bureau, Foreign Trade Statistics on air cargo gateways and cross-border movements between Washington State and British Columbia for overseas trade. See Appendix for an explanation of this calculation process. In general, the estimated breakdown of values by commodity is considered more accurate than the estimated tonnage levels.

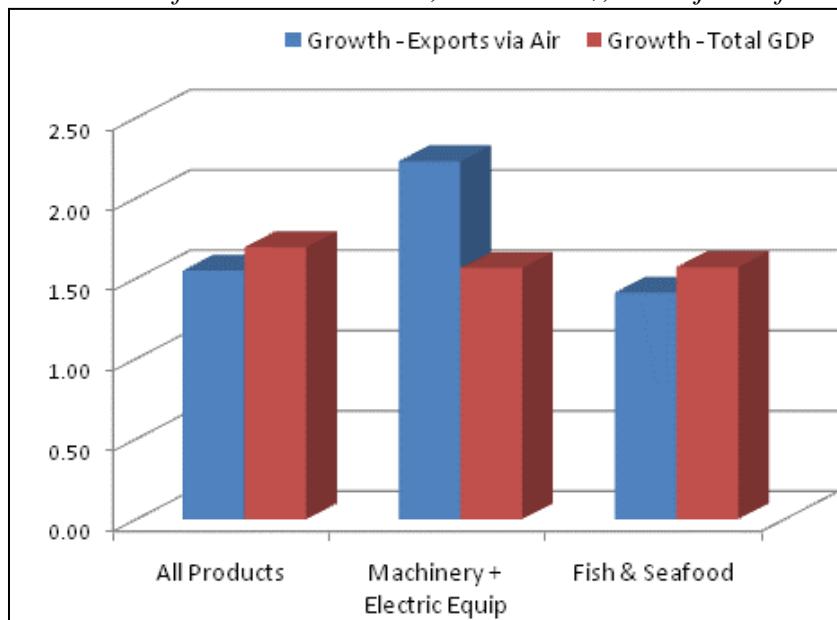
2.5 Relationship of Exports and the Economy

The role of international air freight is also changing over time. Exhibit 8 shows the how British Columbia's air cargo exports have grown over time, relative to the growth of BC's overall economy (as measured by Gross Domestic Product). The comparison is made at three levels:

- for all products;
- for machinery and electrical equipment (together, the leading technology-based export product group by total value, as shown in Exhibit 7A); and
- for fish and food products (the leading export product group by tonnage, as shown in Exhibit 7B).

The results show that, overall, the value of British Columbia's exports via air tends to grow at a similar rate as BC's total economy. Yet, when we look at key export industries, we see that technology-based manufactured products have experienced growth in air exports at a rate significantly faster than the growth in total GDP for those industries. This is a particularly notable finding because export markets are a major driver of economic development, which brings new income flowing to BC and elsewhere in Western Canada. And technology products are a growth industry that offers the prospect of adding more "value added" (net income) to the economy. Altogether, this suggests that supporting growth of international exports via air can encourage continued growth of technology products and income in Western Canada.

Exhibit 8. Growth in Value of Exports and GDP
(measured as ratio of 2007 to 1997 value, in nominal \$, not adjusted for inflation)



Source: Statistics Canada, international trade data

3

SCENARIOS: ALTERNATIVE FUTURES FOR AIR SERVICE GROWTH

Future expectations of air cargo at Vancouver International Airport and Abbotsford Int. Airport will be driven by three sets of factors:

- Recent trends in airport activity growth and change, which reflect underlying shifts in the nature of aviation demand;
- Long-term expectations for global trade growth and particularly the Pacific Rim.
- Competition in air services offered, in terms of the countries and cities served by Vancouver International Airport and competing airports; and

Ultimately, these three factors lead to a set of future scenarios representing either more optimistic or more pessimistic assumptions. The rest of this chapter discusses each of those factors.

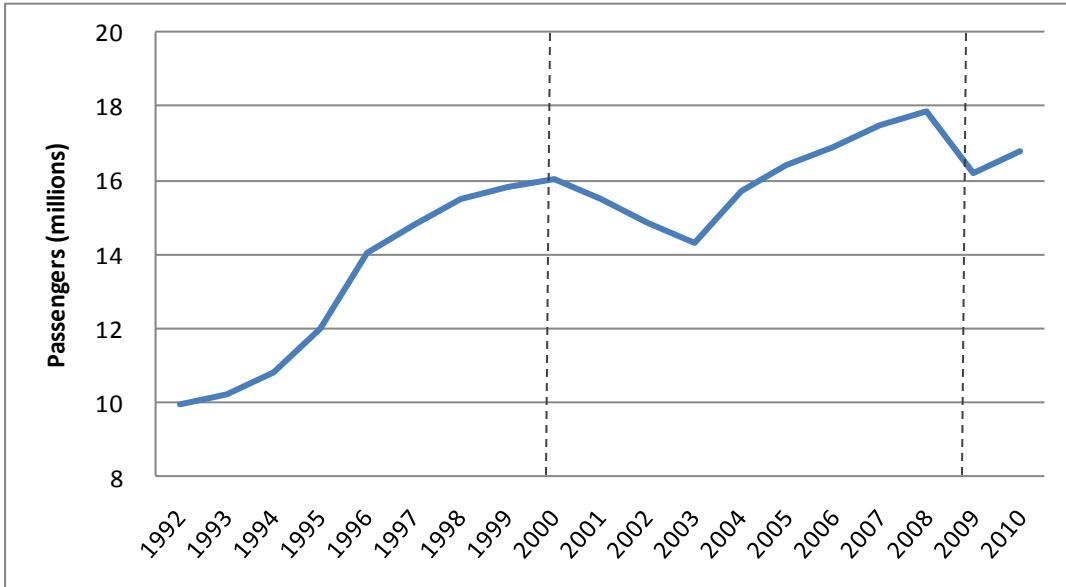
3.1 Recent Trends

Vancouver International Airport (YVR). Exhibits 9(A) and 9(B) show annual passenger levels and total cargo tonnage levels at Vancouver International Airport over the eighteen year period from 1992 to 2010. Both graphs show that YVR use has grown over time, as the passenger volume in 2010 is 69% higher and the cargo volume is 58% higher than corresponding figures for 1992.

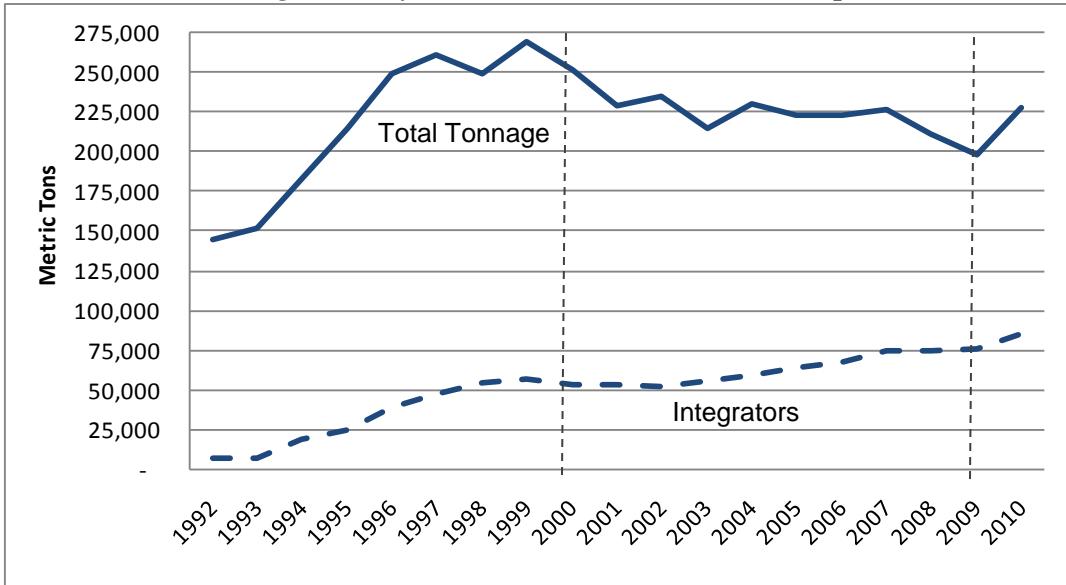
However, the graphs also reveal that this growth has varied over time. From 1992 to 2000, passenger growth grew at an average rate of 6.2% per year, and cargo grew at an even faster average rate of 7.2%/year. Then there was a period of interruption from 2001-2009, as passenger levels stagnated and cargo levels fell. These changes are attributable to: (a) a downturn in aviation activity following the terrorist event of Sept. 11, 2001, (b) the Air Canada (AC) acquisition of Canadian Airlines in 2001, followed in subsequent years by AC's decision to reallocate cargo capacity from Vancouver to Toronto, (c) the SARS epidemic of 2003 and (d) a global economic recession that was most severe in 2008-2009. However, the growth trend has now picked up again, as passenger volume grew 4% and cargo volume grew 15% from 2009 to 2010.

Exhibit 9: Passenger and Cargo Activity Levels at YVR: 1997-2010

9(A) Passenger Activity at Vancouver International Airport



9(B) Cargo Activity at Vancouver International Airport



Source: Vancouver International Airport, <http://www.yvr.ca/en/about/facts-stats.aspx>

Exhibit 9B also shows that the cargo volume carried by integrators (such as UPS, DHL, FedEx, Purolator and Cargo Jet) has continued to grow over time, rising from under 5% to over 37% of total tonnage at YVR. This reflects YVR's strong position in this fast-growing cargo market segment, and its success in filling the gap left by the earlier reduction in Air Canada's cargo capacity at YVR.

Abbotsford Int. Airport (YXX). The airport started scheduled jet passenger service in 1997. Available statistics show growth in passenger levels from 1999 (200,000 passengers) to present (over 500,000). Airline flights are primarily to Calgary and Edmonton, though there are also seasonal services to vacation destinations in Mexico during the winter. Abbotsford currently does not have any dedicated air cargo facilities. Cargo operations there are still in a ramping-up phase and cargo turnover is currently around 100 metric tons per month (1,200 per year). While existing air cargo activity is largely oriented to regional shipments, there are larger opportunities for future growth into broader cargo markets, as discussed in the next part of this chapter.

3.2 Air Service Competition

Motivation. It was previously shown in Exhibit 7 that Vancouver International Airport is currently capturing and serving a significant share of overseas import and export markets for British Columbia, though it is also missing a share of activity that is “leaking” to other airports. Specifically, a share of those markets is being served by US airports via cross-border truck movement. To capture a larger share of those markets, it will be necessary for Vancouver International Airport to establish air cargo services to/from more destinations. That will require a greater breadth and quality of air cargo services to be available (at competitive prices).

Current Patterns of Competition for Overseas Air Service. Air cargo can be served by international airlines in two ways: (a) via dedicated freight flights or (b) via belly cargo in passenger aircraft. In deciding where to offer freighter service, an airline will often select one airport within the trade area of a same-day truck delivery zone. The primary exception is when an airline already offers passenger services, and thus can offer belly cargo service at low incremental cost.

These patterns can be seen in Exhibit 10 on the next page, which portrays the nature of overseas air carrier (cargo and passenger) services offered at six selected comparison airports. The table shows major overseas airlines (and associated nonstop destinations) providing frequent scheduled freight and passenger service to each airport. The footnote also lists major domestic airlines and the associated nonstop destinations. In addition, there are charter, seasonal and vacation-oriented airline services at each airport which are not represented in that exhibit.

Besides showing Vancouver International Airport, the Seattle and Portland airports are also listed because they represent the primary competing airports within the same-day truck delivery area from Vancouver. Calgary and San Francisco are also relevant at the fringe of this market area. Los Angeles is beyond this market area, but is shown as a point of reference because it represents the kind of air service achievable when international flights are concentrated in a single airport serving a large consolidated market.

Exhibit 10. Overseas Air Carriers Offering Scheduled Service, by Airport
P=Passenger only service (with belly cargo), F=Freighter only service; P/F = Both

Overseas Region and Associated Airlines	Airport Served					
	YVR Vancouver	SEA Seattle-Tacoma	PDX Portland	YYC Calgary	SFO San Francisco	LAX Los Angeles
CHINA						
Air China	P (2)		F	F	P/F	P/F
China Cargo Airlines	(3)				F	F
Great Wall Airlines	(3)					F
Shanghai Airlines Cargo						F
Cathay Pacific (Hong Kong)	P/F				P/F	P/F
REST OF ASIA						
Japan Airlines	P			P	P	
Japan - Nippon Cargo Airline				F	F	
Korea - Asiana		P		P/F	P/F	P/F
Korean Air	P (2)	F		P/F	P/F	P/F
Philippines Airline	P					
Singapore Airlines	(1)			P	P/F	
Taiwan - China Airlines	P (2)	F		P/F	P/F	
Taiwan - EVA Air	P (2)	F		P	P/F	
EUROPE/OTHER						
France – Air France		P		P	P	
Germany - Lufthansa	P (2)	F		P	P	P/F
Luxembourg - Cargolux		F		F		F
Netherlands - KLM /Delta	P	P	P	P	P	P
Netherlands - Martinair		F				F
New Zealand – Air NZ	P					
UK – British Airways	P	P		P		
Australia - Qantas				P	P/F	

Note: "Overseas" regions are defined as beyond North America, South America, Hawaii and Caribbean Islands. See text for further discussion of the air services covered by this exhibit.

Recommendations of the Lower Mainland Air Cargo Study:

- (1) YVR previously had air cargo service. There is an opportunity to regain it.
- (2) Opportunities for air cargo expansion into YVR: recommended by IATA
- (3) Airlines that have left SEA and may consider YVR in the future,

Source: Lower Mainland Air Cargo Study. IATA, 2010.

Notes regarding overseas air passenger services by major domestic airlines:

YVR – also has Air Canada service to China, Japan and London

YYC – also has Air Canada flights to China, Japan and London

SEA – also has US carrier flights to China and France

PDX – also has US carrier flights to Japan

SFO – also has US carrier flights to China, Japan, France, New Zealand, UK

LAX – also has US carrier flights to China, Japan, France, New Zealand, UK,

Shortfalls and Opportunities at Vancouver International Airport. Several observations emerge when viewing Exhibit 10 and its end notes. First, Air Canada nonstop overseas services at YVR are limited – primarily to China, Japan and the UK. Service to those same countries are also offered by foreign flag carriers. Additional overseas destinations are offered by foreign flag carriers from other nations (across the Pacific -- Korea, Philippines, Taiwan and New Zealand; across the North Pole to Europe -- Germany and Netherlands). While there is a good level of passenger service, the freight service is predominantly belly cargo on passenger flights; only Cathay Pacific (based in Hong Kong) features dedicated freighter service at YVR.

Yet there is significant opportunity for attraction of more overseas cargo service. In contrast to Vancouver, Seattle airport has a greater set of dedicated freighter services – provided by Korean Air, China Air (Taiwan), EVA Air (Taiwan), Lufthansa (Germany), CargoLux (Luxembourg) and MartinAir (Netherlands). Portland and Calgary airports both have dedicated freighter service to the China mainland by Air China, while Calgary also has dedicated freighter service by Korean Air, Asiana and CargoLux. San Francisco has dedicated freighter service by these same overseas airlines, plus freighters to Japan by Nippon Cargo Airlines and to China mainland by China Cargo Airlines.

The *Lower Mainland Air Cargo Study*⁸ was conducted by the International Air Transport Association (IATA) to assess opportunities and issues facing air cargo development in the Greater Vancouver region. It noted that Seattle formerly had freighter service to China provided by Great Wall Airlines and China Cargo airlines; the report suggests that those airlines may now represent an opportunity for attraction to YVR. It also recommended that YVR target expansion into freighters by overseas airlines that already offer scheduled passenger service -- Air China and China Airlines, EVA air, Korean air, and Lufthansa.

The IATA study noted that YVR has multimodal resources and a local base of forwarders that may help to convince airlines to expand new freighter service. The IATA report also identified Singapore airlines as another expansion opportunity. It noted that in the past, Singapore Airlines had requested an increase in their weekly passenger flights from 3 to 7, but that request was rejected and led to the airlines discontinuing service at YVR because it was unable to build what it considered to be a needed network volume.⁹ Yet with expanded bi-lateral agreements more recently negotiated under Canada's "Blue Sky" policy, the Singapore Airlines decision to suspend service may be reversible.¹⁰ Additional

⁸ *Lower Mainland Air Cargo Study*, prepared by the International Air Transport Association for the Greater Vancouver Gateway Council, 2010.

⁹ Western Economic Diversification Canada indicates that around the same time Singapore Airlines was also reducing services to some other markets with which the Airline had negotiated an open skies agreement.

¹⁰ The Singapore agreement now allows any number of air carriers from either country to operate non-stop passenger and all-cargo air services as frequently as desired between any city in Canada and Singapore.

changes such as elimination of a provincial fuel tax for international flights may also help support expansion of air service.

Support for additional air cargo services is expected to come from three markets: (1) shifting Western Canada firms that are now importing and exporting overseas shipments via US airports, (2) expanding the base of US firms that are exporting and importing goods via YVR, and (3) growing the manufacturing base of BC to increase demand for international exports and imports. All three elements are discussed in this report, in the context of both the Chapter 2 analysis of the current provincial economy and YVR's economic role in it, and the Chapter 4 analysis of how future air service changes can further affect the economy.

3.3 Future Potentials

Scenario forecasts. The *Lower Mainland Air Cargo Study* by IATA laid out a set of potentially feasible forecasts for passenger and air cargo growth at Vancouver International Airport from 2010-2024. Two scenarios from the report are used in this analysis: (1) a “Baseline Scenario” (corresponding to IATA’s low scenario) representing continued annual incremental growth and (2) a “Likely Achievable Scenario” (corresponding to IATA’s most likely scenario) representing additional cargo growth that is likely to be achievable as long as efforts are made to enhance YVR’s capacity and competitiveness.

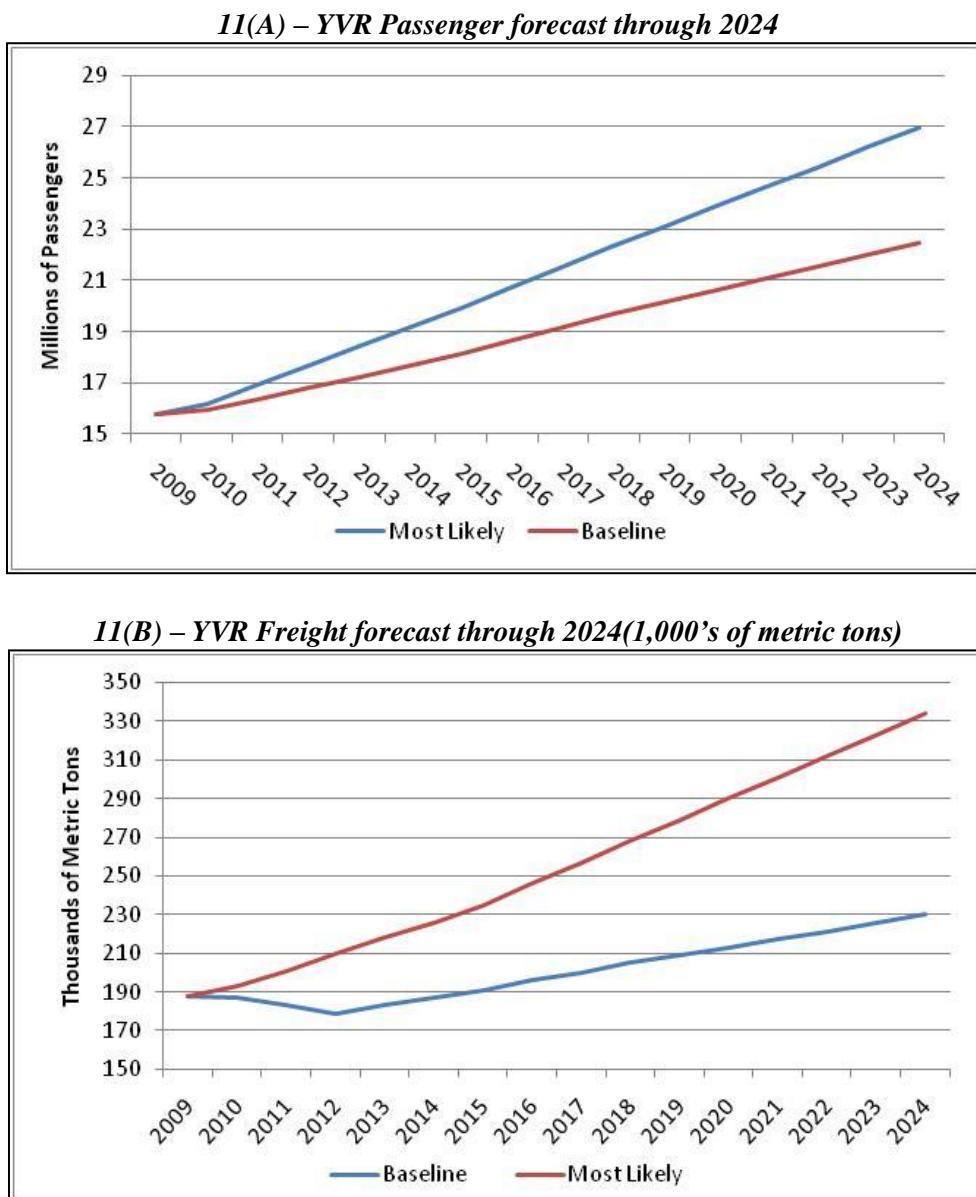
The IATA report also included an optimistic “High Level” scenario forecast for growth at Vancouver International Airport that presumed more aggressive effort to secure market share from other airports. That scenario is not analyzed in this study to keep a more conservative focus on most likely achievable future results. Details of assumptions behind these forecasts are provided in the IATA report.

Forecasts for Vancouver International Airport. (Exhibit 11). The IATA’s Baseline Scenario projects annual passenger volume rising to 23 million by 2024, representing 1.2% annual growth. The Likely Achievable Scenario grows to nearly 28 million passengers/year, representing 2.8% annual growth. Both forecasts assume long-term growth rates that are consistent with, but slightly less than, what has historically occurred.

Cargo activity at Vancouver International Airport is expected to grow at faster rate than passenger volumes, reflecting a global trend of cargo growth and the strength of YVR as a hub for integrators and freight logistics. The Baseline Scenario for cargo assumes 1.5% average annual growth to 2024. The Likely Achievable scenario assumes 5.2% annual cargo growth to 2024 (which is still less than historic trends outside of the 2001-2009 period of events). These cargo forecasts were based on economic forecasts from Oxford Economics, and reflect total incoming and outgoing domestic, trans-border and overseas shipments.

Of course, the actual rate of future cargo growth at YVR can also depend on the extent to which there are any relative changes in YVR's prices and services available to shippers and freight shipping companies. This study did not examine the competitive advantages of YVR relative to other west coast airports, but rather built upon the IATA report that examined competitive issues and developed the scenarios adopted here. The scenarios shown here assume no change in relative prices, though they do assume expansion of capacity and supporting services to allow these activity levels to be realized.

Exhibit 11. Forecast Future Activity Growth at Vancouver Int. Airport
 (from IATA's Lower Mainland Air Cargo Study)



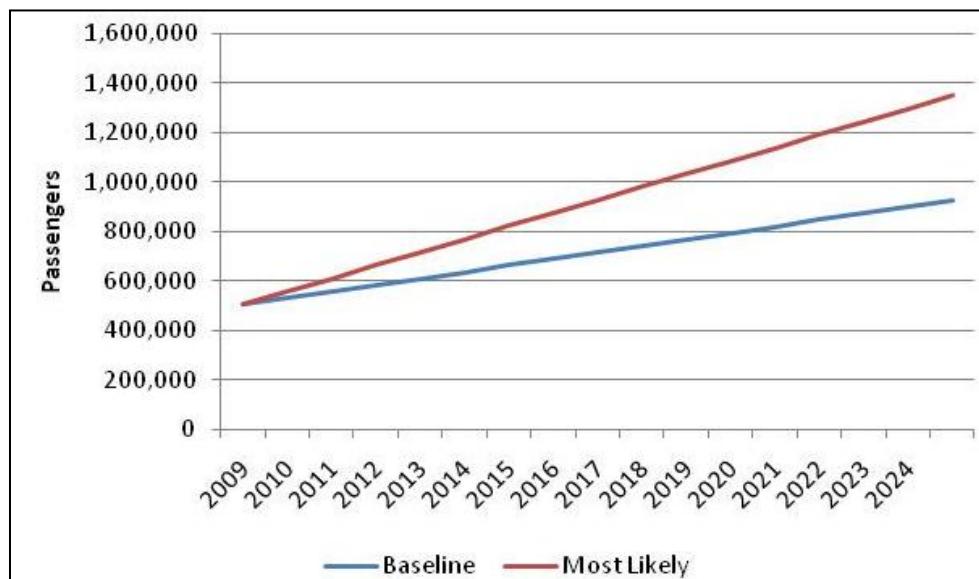
Forecasts for Abbotsford Int. Airport (Exhibit 12). The IATA study scenarios show that Abbotsford Airport will continue to grow, focusing on low cost airlines serving regional Western Canada and longer-distance vacation destinations. The Baseline Scenario assumes the annual passenger volume will rise from the current 500,000 to around 926,000 by 2024, representing 5.2% annual growth. The Likely Achievable Scenario grows to 1.25 million passengers per year, representing 10.4% annual growth. The latter assumes continuation of the rapid growth rate achieved by the airport during the 1999-2009 period.

Cargo activity at Abbotsford is expected to eventually grow in the form of belly cargo on low cost airlines. The IATA study noted that the minimum annual tonnage to attract services from an all-cargo aircraft operation occurs when volumes grow to at least 4,000 metric tons, and does not anticipate attraction of dedicated cargo services until this threshold has been reached.

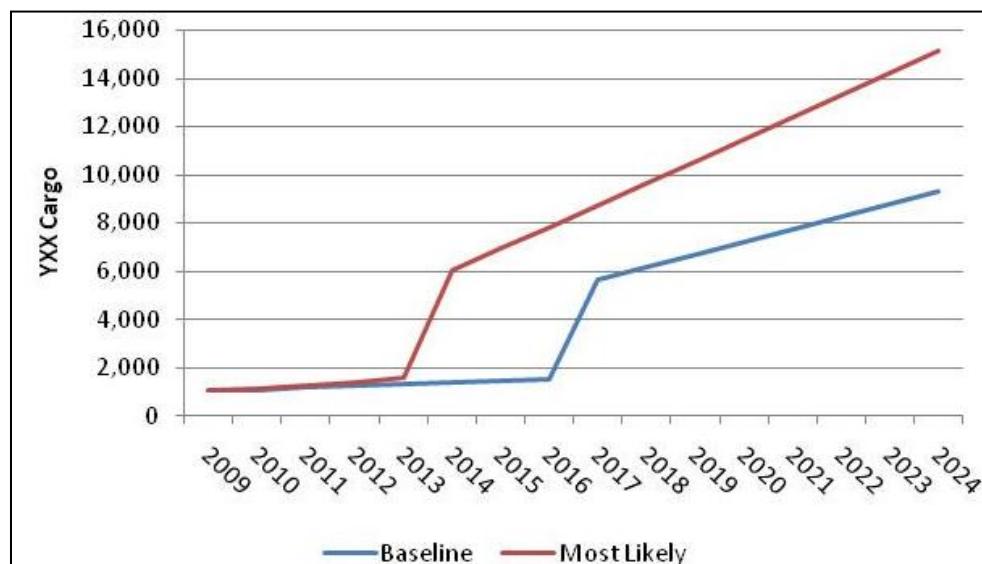
In the Baseline Scenario, import and export tonnage grows from 1,200 metric tons to over 9,000 metric tons over the 2010-2024 period, representing 16% average annual growth. In the Likely Achievable scenario, it grows to over 15,000 metric tons during that period, representing 20% average annual growth. In each case, cargo growth at YXX is slow until a point is reached where there is sufficient demand for cargo services there. That point, corresponding to a range of 3,000 to 5,000 metric tons/year, is projected to occur around 2016-2017 in the Baseline Scenario and 2013-2014 in the Likely Achievable Scenario.

Exhibit 12. Forecast Future Activity Growth at Abbotsford Int. Airport

12(A) – YXX Passenger forecast through 2024



12(B) -- YXX Cargo forecast through 2024(metric tons)



Source: Lower Mainland Air Cargo Study- IATA

4

IMPACT PROCESS: HOW INTERNATIONAL AIR SERVICE AFFECTS THE ECONOMY

Expansion of air cargo activity at Vancouver International Airport and elsewhere in the Lower Mainland can lead to further job and income growth in British Columbia and elsewhere in Western Canada. There are three major “growth paths” by which Vancouver airport expansion can affect the growth and development of the BC and broader Western Canadian economy. There are: (1) airport activity expansion, (2) broader aviation diversification, and (3) regional economic diversification. All three of these growth paths lead to: (4) wider impacts on the economy. This Chapter describes each of these four elements of impact on the economy, as well as public policy support required to enable them, and ways in which private sector investment and job creation can result.

4.1 Airport Activity Expansion

Future Scenarios. Scenarios for future airport activity growth, based on the IATA study, were defined earlier in Section 3.3. Under the “*Baseline Scenario*” (in which existing competitive conditions remain into the future), there will naturally be gradual growth in aviation activity at both Vancouver and Abbotsford airports. And with that gradual growth, there will be proportional increases in both airport jobs and jobs in supporting industries, following the employment and wage patterns described earlier in Section 2.1.

Under the “*Achievable Future Scenario*,” though, greater growth in airport activity can occur in the future as effort is made to broaden air cargo services – by capturing new cargo markets and reducing the current “leakage” of Canadian dollars now going to US airports. Also, this future scenario incorporates a faster rate of air cargo growth than passenger growth, and that also shifts the mix of jobs and income. In particular, air passenger growth supports more retail and traveler support services in the passenger terminal, while air cargo growth supports more off-site cargo, distribution and ground transportation jobs – many of which offer higher pay than the retail and service occupations offered in the airline terminal.

For Vancouver International Airport, the goal of broadened air cargo service can be achieved through efforts to: (a) attract scheduled air cargo service to a wider set of destinations, and (b) secure upgraded cargo service to include more

dedicated freighters (rather than reliance on the limited capacity inherent in belly cargo on existing passenger flights). The *Lower Mainland Air Cargo Study* suggests that this should include expansion of freighters beyond the existing Hong Kong service, to also include other areas that now have only passenger service (with belly cargo). That would include other parts of Asia – such as mainland China, Japan, Korea, Singapore and Taiwan. It would also include European countries – such as Germany, Netherlands and the United Kingdom.

For such expansion to occur at YVR in the future, effort must be made to capture what is now unmet demand. This can occur in two ways.

- First, there is some demand for overseas cargo shipping to/from Western Canada that is now being served by US airports. With broader capacity, wider locations served and competitive pricing, some of those trips could potentially be attracted to use YVR (and save the cost of trans-border trucking transfers).
- Second, there is potential for some suppliers and manufacturers in Western Canada to increase the market for their products if greater air cargo capacity and service to a broader set of destinations was offered. The limited belly capacity now available from YVR to Asia and Europe is in contrast to greater capacity freighter services available at Seattle and San Francisco (as was shown earlier in Exhibit 10). By expanding air service capacity (or eliminating limitations holding back capacity growth), there can potentially be long-term increases in volumes of orders for both incoming supplies and outgoing products.

4.2 Broader Aviation Diversification

Aircraft Maintenance and Supporting Services. With future expansion of passenger service and even greater growth of overseas air cargo services, there can be opportunities to further expand the role of YVR as a center for aircraft servicing, maintenance and related support activities. This would increase both the breadth and depth of expertise and specialized services offered at the airport, and widen the range of supporting business functions.

Cargo Logistics. With greater overseas air cargo service at YVR, there can be even greater opportunities for diversification of international trade and cargo handling functions, strengthening the role of Vancouver as a global gateway to North America and as a logistics center. In particular, Vancouver already represents Canada's busiest seaport and second busiest airport, with strong networks of connecting rail and highway routes serving western Canada and the Northwest quadrant of the US. As a consequence, the region has a large base of

freight forwarders and intermodal shipping companies. Expanding those activities will lead to downstream economic impacts in the catchment area for related supporting logistical industries, such as warehouse and distribution centers.

Global Logistics Management. A base of shipping companies and integrator cargo carriers located in Vancouver also provides capabilities for integrated, multi-national and multi-modal shipment planning and shipment tracking. These functions could potentially be grown to establish Vancouver as a recognized global logistics center, similar to that established at Amsterdam (Netherlands) and more recently established at Dubai (United Arab Emirates). Such opportunities would, however, require YVR nonstop access to a broader set of international trade origins and destinations.

4.3 Regional Export Product Development

A fundamental tenant of economic development is that, in order to increase income and hence jobs in a region, it is necessary for there to be more money flowing into that region (relative to costs of inputs). This is accomplished primarily by increasing business sales to outside parties (commonly referred to as exports). By reducing limitations on air cargo capacity and destinations served at YVR, the markets for some Western Canadian products can be expanded.

Fish and Fruit Products. British Columbia is already a major overseas exporter of fish and shellfish (fresh and frozen), as well as cherries. With freighter service enlarging capacity to Asia and Europe, and service expanded to Southern Asia and more European destinations, there would be opportunities to expand markets for those products and also expand the breadth of specialized products offered and sold by Canadian seafood producers. Development of fish farming is one example of a potentially viable business growth and diversification opportunity associated with expansion of markets.

Technology-Based Products. British Columbia has long had income generated by exports of resource-based (wood, metal, minerals) products, relying on marine transport. Over time, higher paying jobs have been increasingly generated by “moving up the supply chain” -- to develop manufactured products such as apparel, transportation equipment and industrial machinery.

With the application of increasingly sophisticated technology and labor force skills, export products with particularly high “value added” (generating proportionately greater net income) have been developed in BC, largely in the categories of aerospace equipment, communications equipment, electronics and optical instruments. The equipment and instruments tend to have a high

value/weight ratio and their exports abroad thus tend to be disproportionately dependent on air cargo services. With a more diverse set of global customer markets available via nonstop air, there can be greater opportunity for existing industries to offer even more technologically sophisticated and specialized technology products to overseas markets. This can be a particularly realistic scenario because data shown earlier (in Section 2.4) indicates that development of international exports for technology-based manufacturing industries can be a leading driver of further expansion of those industries.

Ultimately, the growth of technology industries in BC and Western Canada will depend on the ability of those industries to provide specialized products delivered to global customers at a competitive cost and delivery schedule that meets their customer and supply chain needs. There are several factors affecting those requirements, including the quality, quantity and cost of available labor, production processes, fuel and global transport services. While nonstop air cargo services is only one factor, in some cases it can be a major contributing element in determining future export opportunities for specialized technology products. For that reason, it can be particularly important that development of global air service capacity, frequency and destinations be viewed in the context of long-term economic development strategy.

4.4 Wider Impacts on the Economy

All three of the preceding growth paths –airport activity expansion, aviation diversification and regional product development – represent forms of “*direct economic growth*” that can be enabled and supported by air service improvement. They lead to broader “multiplier” impacts on growth of the entire economy through three mechanisms.

- First, there are *indirect impacts*” on growth of businesses supplying supporting products and services (e.g., furniture, supplies, materials) to the directly affected growth industries.
- Second, there are “*induced impacts*” on consumer spending throughout the economy, as workers at directly and indirectly affected industries spend their incomes on food, clothing, shelter and other purchases.
- Over a longer term, there can also be longer-term “*dynamic effects*” as labor markets and customer markets expand with a growing economy.

An economic model of the British Columbia economy, based on Statistics Canada data, is used to estimate these wider effects on the economy. That model is explained in the report Appendix.

5

ANALYSIS FINDINGS - FUTURE ECONOMIC IMPACTS

This chapter provides the findings from an economic impact analysis of the effect of air cargo growth at YVR on broader provincial job growth. Two scenarios for future growth of air cargo at the airport are compared to show their economic consequences. While the modeling process used here can potentially be expanded to encompass a wider range of scenarios concerning airport fees, provincial taxes or federal regulations, no such scenarios were assumed for this current study.

5.1 Economic Modeling Methodology

The economic impact of air cargo expansion involves a four step process:

1. Scenario Development –Baseline and Likely Achievable Growth scenarios were adopted based on the IATA study's baseline and the more conservative of their two growth scenarios (see Exhibit 11). The overseas share of projected air cargo growth and its commodity composition was calculated on the basis of current characteristics (Exhibits 7-8), and trade growth trends.
2. Specifying Direct Economic Consequences – The two scenarios were translated into three types of direct economic consequences: (a) a capacity constraint on overseas import/export cargo capacity under the baseline, that disappears under the growth alternative scenario; (b) a lower cost of business operation in BC under the growth alternative, associated with savings in money and time delay that would otherwise occur by having to truck a share of goods to/from US gateway airports, (c) an increase in airport and air cargo handling employment in BC associated with the larger size of YVR operation under the growth alternative scenario.
3. Economic Model – TREDIS (Transportation Economic Development Impact System) was used to calculate the costs and economic growth consequences of changes in airport capacity, access times and reliance on using alternative airports. The model used Statistics Canada and BC Stats economic data for calibration of an economic impact model that can calculate consequences for the economy of BC. (See Appendix for further documentation.)
4. Calculation of Overall Economic Impacts – Results were portrayed in terms of year-by-year change in four metrics: (a) employment, (b) wages, (c) value added and (d) business output.

The economic impact modeling process focused on the impact of alternative scenarios for Vancouver International Airport (YVR). While Abbotsford Airport (YXX) also has an important economic role that will grow in the future, it is clear that YVR will remain the principal gateway for overseas trade. Abbotsford is projected to play an increasing role, particularly for passenger activity, though future scenarios project its cargo role to also grow from 0.5% of air cargo tonnage among the two airports to as much as 4% in the future. But even then the cargo role is likely to focus more on North American air cargo movements.

5.2 Economic Impact of Airport Growth

This section examines the economic consequences of expanding future activity levels at YVR under alternative future scenarios. The additional effects of alternative scenarios on BC's export base and cost competitiveness are examined in the next section (5.3).

Scenarios for Airport Activity Growth. Additional employment is required to support the forecasted increase in passenger volume, cargo volume and airport operations projected for YVR from now through the year 2024, under both Baseline and Likely Achievable Growth scenarios. However, the forecast growth is substantially greater under the Likely Achievable Growth Scenario.

While this study focuses on air cargo growth, freighters will never account for all of the incremental cargo growth and thus there will always be a significant share of air cargo that travels in the belly of passenger aircraft. Accordingly, the scenarios also assume some passenger growth as well as cargo growth. However, the economic impact of the growth in passenger activity is not considered in this study except as an element of airport employment change. Any further effects on visitor spending, business, tourism and recreation outside of the airport are not addressed or considered by this study.

Direct Job Impact of Airport Activity Expansion. Exhibit 13(A) shows projected employment at YVR under alternative scenarios. The employment projections were derived by applying projected rates of passenger and cargo growth (from the IATA study, as presented in Section 3.3) to the current airport employment statistics (presented in Section 2.2). The results indicate that employment at Vancouver International Airport is projected to expand under Baseline conditions, leading to over 6,600 more airport-related jobs added by 2024. However, the additional effect of expanding airport services under the Achievable Growth Scenario will further grow the airport by nearly 9,500 more jobs beyond that level.

5. Analysis Findings: Future Employment and Income Impact

Exhibit 13. Projections of Direct Airport-Related Employment at YVR in Year 2024, Under Alternative Scenarios and Perspectives

(A) Total Airport Jobs

<i>Scenario</i>	<i>Total Direct Airport Jobs</i>	<i>Difference from 2010</i>	<i>Difference from 2024 Baseline</i>
2010 - Actual	23,614		
2024 - Baseline	30,266	6,652	
2024 - Achievable Growth	39,713	16,099	9,447

(B) Categorizing Additional Jobs Created by the Achievable Growth Scenario (Difference from Baseline)

(A) Increase in Total Airport Jobs	9,447
(B) Cargo-Related (High Estimate)* (total excluding passenger-related jobs)	6,988
(C) Cargo-Related (Low Estimate)*	5,015

*See text for definitions of categories

Source: calculated by Economic Development Research Group, using year 2010 data from the Economic Impact Assessment of the Vancouver International Airport (Ference Weicker & Company, 2010) and applying forecasts of passenger, cargo and aircraft operations growth from the Lower Mainland Air Cargo Study (IATA, 2010).

Cargo-Dependent Jobs. – There are three ways to view the direct impact of airport growth scenarios:

(A) All Airport Jobs – Air cargo growth and passenger growth are highly related and often go hand-in-hand, since a major portion of air cargo travels in the belly of passenger aircraft. That is why the IATA air cargo study included projections of passenger growth as well as cargo growth for future scenarios. Line “A” of Exhibit 13(B) shows the projected impact of the Achievable Growth scenario on total airport employment.

(B) Cargo-Related(High Estimate) – Since this report focuses on impacts of air cargo expansion, it can be useful to examine the impact of airport expansion *excluding* passenger-related airport jobs (such as retail, airline check-in, and air terminal operation). This leaves jobs directly related to air cargo handling, as well as airport jobs that serve both cargo and passenger movement (such as aircraft servicing, airport administration and air traffic control). Line “B” of Exhibit 13(B) shows the projected impact of the Achievable Growth scenario on airport employment excluding passenger related activities.

(C) Cargo-Related Impact (Low Estimate) – A more conservative accounting of air cargo related job growth includes the same job categories as identified in category “B” above, including cargo processing jobs but only a portion of

5. Analysis Findings: Future Employment and Income Impact

projected growth in aircraft servicing, administration and airport operation jobs. The portion is based on the relative contribution of cargo to projected future airport activity growth.¹¹ Line “C” of Exhibit 13(B) shows the projected impact of the Achievable Growth scenario on this definition of cargo-related airport employment.

Wider Economic Impact of Airport Activity Expansion. The Achievable Growth scenario will not only create more airport jobs (as previously shown in Exhibit 13), it will also lead to broader effects on the regional economy. These broader effects are due to increased orders for suppliers and increased worker spending. Their overall impact is shown in Exhibit 14.

Focusing just on the effect of increasing cargo-related job growth, the TREDIS economic model indicates that at least 9,800 additional jobs (with wages of at least \$370 million/year) will result from increased air cargo-related activity generated by the Achievable Growth scenario. Further effects on BC’s export base are discussed in the next section.

Exhibit 14. Wider Economic Impact of YVR Airport Expansion
(Difference between Achievable Growth And Baseline Scenario In Year 2024)

<i>Additional Jobs Above the Baseline Growth Scenario</i>	<i>Jobs</i>
All Airport Jobs	
At Airport (direct effect)	9,447
Elsewhere in BC (indirect & induced effects)	9,100
Total Economic Impact of YVR Expansion	18,547
Cargo-Related Jobs (Low and High Estimates)	
At Airport (direct effect)	5,015 – 6,988
Elsewhere in BC (indirect & induced effects)	4,830 – 6,730
Total Economic Impact of YVR Expansion	9,845 – 13,718

(* all dollar values are estimated in constant year 2010 dollars

Source: Calculations by Economic Development Research Group using direct impact from Exhibit 13 and economic multiplier impacts from the TREDIS economic model (described in Appendix).

Note: Total job impacts shown here for 2010 are smaller than those reported in the 2010 Vancouver International Airport report because this table includes wider impacts on the BC economy, while the other report shows wider impacts on the entire Canadian economy.

¹¹ The split of future employment growth (60% to cargo) is based on the fact that air cargo has a higher forecast growth rate at YVR (than passenger volume), and that is being driven in part by expansion of integrators and overseas services, both of which yield particularly high job growth.

5.3 Economic Impact of Changing Overseas Trade Access

This section examines the economic consequences of alternative future air cargo expansion scenarios on BC's export base and cost competitiveness. These effects are in addition to those associated with expanding future activity levels at YVR, which were examined in the previous section (5.2).

Scenarios for Export Trade. The expansion of YVR air cargo activity under the Achievable Growth scenario (previously shown in Exhibit 11) presumes that capital investments will be made sufficient to enable the handling of at least 332,000 annual metric tons of cargo by the year 2024. (Note that the IATA air cargo study also provided a high scenario in which capacity needs could rise to nearly 500,000 metric tons of activity.) The Achievable Growth scenario also presumes that future air service regulations and policies will enable new services (expanding destinations and freighter capacity), while fees and taxes will be at a level that keeps YVR cost-competitive to attract those cargo flows.

Direct Impact on Export Trade. Under the Baseline scenario, there will be less growth of cargo flowing through YVR (roughly 100,000 fewer metric tons than under the Achievable Growth scenario), of which a major share (approximately half the difference or 50,000 metric tons) would be overseas shipments. That includes most notably Canadian exports headed for overseas destinations and foreign-made imports that are used in Canadian products. The difference in growth of overseas tonnage flowing through YVR is projected to have a value of \$2.2 billion annually (when values are expressed in constant year 2010 dollars).

Under the Baseline scenario, some of the lost import and export flows will still take place, but merely go via US airports such as Seattle. Affected shippers and consignees based in BC would ultimately pay the financial cost and time cost associated with trucking across the border and going 243 km (152 miles) to/from Seattle-Tacoma Airport or points even further away.

To illustrate the magnitude of these travel and time costs, consider that the 50,000 metric tons not occurring at YVR in the Base Case would have to instead be diverted to Seattle (or other airports even further away). That would add 1.5 million VKT (vehicle-km of travel) of annual truck movements. There are also associated time delay costs, as the trip to Seattle takes between 3.5 and 4 hours, though that travel time is likely to grow in future decades as traffic delays increase. That delay is applied to over 6,000 truck trips added annually to carry the additional load. The US-Canada border crossing can also increase schedule reliability uncertainty. The TREDIS model calculated the added trucking-related expense to industry in BC at \$4 – 6 million annually (depending on truck load factors for return trips.)

But that is only part of the story, for the preceding numbers do not account for the high cost of delay for perishables. Nor do they reflect the fact that those added costs are calculated to be born mostly by those industries that reflect the greatest future export growth opportunities for BC – food and seafood products, flowers, specialized machinery manufacturing, electronics products and instruments.

Total Impact on Export Trade. The potential constraint on future capacity and range of destinations has a far broader impact on competitive market opportunities and thus the attractiveness and viability of expanding and locating future manufacturing in BC. Some of the \$2.2 billion/year of cargo not accommodated at YVR would not otherwise be generated in BC, as businesses would avoid some expansion and locate some new activity elsewhere in the world where air cargo access times and expenses are more attractive.

The TREDIS economic model incorporated calculations of future business cost and access differences between the Baseline scenario and Achievable Growth scenario. It calculates the implication of these differences for long-term growth of the BC economy. The results indicate that there will be a direct effect of \$700 million/year of BC business manufacturing output which will occur under the Achievable Growth scenario but not under the Baseline scenario. That, in turn, will lead to larger indirect and induced impacts on the rest of the economy, leading to a total impact on provincial business output of \$1.26 billion/year. These total impacts are shown in Exhibit 15. Since these impacts are associated with use of YVR by BC-based industries in future years, they are above-and-beyond the previously addressed impacts of airport activity expansion.

Exhibit 15 Wider Economic Impact of Overseas Trade Expansion
(Difference between Achievable Growth And Baseline Scenario In Year 2024)

<i>Difference in Year 2024 BC Economic Activity</i>	<i>Due to Additional Mfg. Export Activity</i>
Jobs (rounded)	9,800
Wage Income (\$ billions)	\$ 0.48 b
Gross Domestic Product (\$ billions)	\$ 0.71 b
Business Output (\$ billions)	\$ 1.26 b

Source: calculations by Economic Development Research Group using the TREDIS model (described in the Appendix).

5.4 Total Economic Impact

Exhibit 16 adds together results from Sections 5.2 (airport activity expansion impacts) and Section 5.3 (overseas trade impacts). Results are shown in terms of the expected total direct, indirect and induced/dynamic impact of the two scenarios. These results may be interpreted two ways.

- First, they can be seen as the gain to the BC economy (and most likely all of Canada) if effort is taken to enable the Achievable Growth scenario to occur rather than let the Baseline scenario take place.
- Alternatively, they can be seen as the loss to the BC economy (and most likely all of Canada) if the Baseline scenario is allowed to take place and additional opportunities associated with the Achievable Growth scenario are never fulfilled.

Altogether, the analysis indicates that the Achievable Growth scenario, which is based on expansion of air cargo facilities and services at YVR, would lead to further growth in the BC economy that would not occur under the Baseline scenario. The additional economic activity will phase in over time, based on the pattern at which air cargo services are expanded.

Exhibit 16 Long –Term Economic Gain from Expanding Air Cargo at YVR
(Additional economic activity occurring in Year 2024 if Achievable Growth scenario occurs rather than the Baseline Scenario)

Difference in Year 2024 BC Economic Activity	Due to Additional Airport Activity	Due to Additional Overseas Trade	Total Impact
Jobs (rounded)	9,800 - 13,700	9,800	19,600 - 25,300
Wage Income (\$ billions)	\$ 0.37 - 0.52	\$0.48	\$0.85 - 1.00
Gross Domestic Product (\$b)	\$0.59 - 0.82	\$\$0.71	\$1.30 - 1.65
Business Output (\$ billions)	\$1.28 - 1.79	\$1.26	\$2.54 - 3.27

Source: calculations by Economic Development Research Group using the TREDIS model (described in the Appendix). Airport activity growth impacts are derived from Exhibit 14, overseas trade impacts are from Exhibit 15.

The expected impact by the year 2024 will be over 19,000 additional jobs with over \$850 million/year of additional wages. This is equivalent to over \$1.3 billion of added GDP. Readers are warned, however, that impacts on wages, GDP and business output cannot be added together, since they are all highly overlapping measures representing different ways of viewing the same economic growth.¹²

5.5 Policy Implications

Relationship of Air Cargo Gateways and Economic Growth. The provision and location of air cargo facilities and services can have a major impact on business location and growth, particularly in today's increasingly global economy. And export industries are particularly important because they bring in outside money to drive further economic growth.

Looking to the future, overseas markets represent a particularly important source of future growth for many of Canada's export industries. Prior analysis (in Sections 2.3 and 2.4) indicated that international exports via air are driving growth of technology-based manufacturing industries such as industrial machinery and electronic equipment.

For Western Canada, the availability of overseas air cargo service at key gateway airports can be particularly critical because of the fact that there are also US gateway airports available within a few hours of truck travel. Relying on US airports to service the growth of Canadian industries is not optimal for many reasons – it represents a leakage of economic activity, it contributes to undesirable energy use and environmental consequences, and it weakens the attractiveness of Canada as a business location for global businesses. Yet that is what can result if there is not sufficient attention paid to ensuring that Canadian gateway airports are able to expand in terms of both capacity and breadth of (Asian and European) destinations for which there is growing demand.

Vancouver International Airport, as Canada's primary western gateway, plays a particularly critical role in ensuring that BC-based industries have direct and nonstop access to both Asian and European destinations. Other secondary airports, such as Abbotsford, can also play an important and growing role in serving smaller scale and more specialized cargo needs, while allowing the larger gateway airport to expand service and capacity to major overseas destinations.

¹² This measure of GDP or Value Added represents the business income created by economic activities, defined as the value of products sold minus the cost of materials used to produce them. It can also be viewed as the portion of business output that is either paid to workers as wages, distributed as corporate profits or reinvested in facilities.

5. Analysis Findings: Future Employment and Income Impact

Foreign Trade Zones. Another potentially relevant competitive factor relates to the availability of foreign trade zone (FTZ) status at Vancouver International Airport. Currently, there are FTZs at other west coast gateways including Seattle-Tacoma, Portland, San Francisco and Los Angeles. Canada is the only G-8 nation to not have a formal FTZ program, as the federal government favours broad-based tax and tariff liberalization.

Foreign Trade Zones (FTZs) are of relevance to value-added manufacturing operations for export industries, particularly those that import raw materials or intermediate components and process them into higher value intermediate components or finished products designed for re-export or final assembly elsewhere. For these industries, FTZs can offer exemption and/or deferral¹³ of customs duties and sales and value-added taxes, streamlined customs processes and single window service for interactions with government agencies.

To remain competitive with FTZs in global markets, the Canadian government has implemented a series of targeted FTZ-type programs that are available anywhere in the country. This includes the Duty Deferral Program, Export Distribution Centre Program and Exporters of Processing Services Programs. Taken together, Canada tax and duty-deferral regime provide benefits to businesses comparable to those found in FTZs while having the advantage of not being site specific.

Nonetheless, two notable differences exist between these Canadian programs and traditional FTZs in other countries. One relates to the extent of value added activity that can be exempted/deferred from duty/taxation, which is greater in other countries. The other is the presence of a “single window” feature for businesses to obtain all of the promised financial benefits from one on-site office. At Winnipeg’s CentrePort Canada, the federal government has launched a multi-jurisdictional single-window task force pilot project, which allows manufacturers to interact with up to seven government agencies¹⁴ as well as provincial and local government agencies. It is hoped that lessons learned from the Winnipeg FTZ will eventually allow for establishment of a similar “single window” for government services at the Vancouver gateway, so that exports at YVR can also help drive growth of value added manufacturing and distribution activities there.

Other Taxes, Fees and Regulations. This study has not specifically examined details of bilateral trade policies, “Open Sky” and “Blue Sky” air service agreements, airport fees, provincial fuel taxes or costs for trans-border freight

¹³ Deferral means that taxes are only paid on finished goods not re-exported that are instead sold on the domestic market. This allows a manufacturer to avoid an upfront tax/duty while retaining the flexibility to sell some portion of the finished goods on the domestic market.

¹⁴ Canada Border Services Agency, Canada Revenue Agency, Western Economic Diversification, Transport Canada, Department of Foreign Affairs and International Trade, Industry Canada, and Export Development Canada.

5. Analysis Findings: Future Employment and Income Impact

movements, nor has it evaluated Air Canada policies regarding service at international air gateways.

Nevertheless, the findings of this study should be clearly interpreted as reinforcing the particularly high importance of international air cargo service to economic growth, and underscoring the major economic stakes associated with promoting and facilitating growth of international air cargo services at Vancouver International Airport -- Canada's Pacific Gateway airport. The study also highlights the future role of Abbotsford Airport as a secondary cargo facility.

Ultimately, it will be a combination of capital investment in air cargo facilities, and future air service regulations, tax and fee policies that will help determine the extent to which the industries in BC's Lower Mainland and elsewhere in Western Canada compete for future growth in the global economy. The study provided here certainly makes the case that the stakes in coming years will be large, representing tens of thousands of jobs and well over a billion dollars of wages per year.

A

APPENDIX: METHODOLOGY

A.1 Export and Import Trade Data

Data on foreign trade are based on Statistics Canada import/export trade data for British Columbia and Alberta, together with US Census Bureau, Foreign Trade Statistics and are assembled by WISER – the World Institute for Strategic Economic Research.¹⁵ Available US data include port and commodity statistics by mode. Truck traffic between Vancouver, the province of British Columbia, and the US West Coast to the south is documented by FTS data through the adjoining ports of Douglas BC and Blaine Washington. Statistics Canada data provided through WISER are aggregated by province and trading partner counties at commodity and mode detail, but does not specifically call out ports, such as Vancouver or YVR. We therefore assume that European and Asian air imports and exports to/from British Columbia pass through YVR or are trucked to/from the US.

The tables in Exhibits 8A and 8B show estimates of volumes and values of commodities exported or imported by air to Asia and Europe, including (A) Canadian (largely BC) products exported from YVR; (B) US produced commodities that are shipped by truck to YVR via the border crossing ports of Douglas and Blaine for export to Asia or Europe; (C) BC produced commodities that are shipped by ground from Canada via Douglas, BC and Blaine Washington for export from airports on the US West Coast; (D) Imports from Asia and Europe through YVR destined for Canadian destinations; (E) US imports to from Asia and Europe that are flown into YVR and trucked south; and (F) imports through airports on the United States West Coast that are trucked to Canadian destinations

Canadian commodities exported through YVR and imported through YVR that are destined for Canadian markets (parts “A” and “D”) reflect Statistics Canada data of domestic air exports (“A”) and air imports (“D”) between the province of British Columbia and Asia and Europe.

Canadian goods destined for Asia and Europe that are exported through airports on the US West Coast (part “C”), and Asian and European imports to Canada that

¹⁵ World Institute for Strategic Economic Research. WISER maintains an extensive international trade database including four U.S. State level export series, U.S. exports and imports by Customs District and by individual Port, and most recently, EU, Canadian, and Japanese trade statistics. WISER and its predecessor, MISER-Trade, have been providing international trade data since 1988.

are flown into US airports (part “F”) are estimated from FTS data. Commodity-specific Canadian exports trucked into the US and destined to Asia and Europe (part “C”) are documented as Statistics Canada data for Canadian exports that are transported via road. This implies that these commodities are trucked to the US, and then exported to Asia and Europe through US airports. FTS also provides modal splits of commodities exported from the West Coast to Asia and Europe. Air exports of Canadian produced goods through US West Coast airports are estimated by applying FTS commodity-specific proportion of air exports to the commodity flows of British Columbia exports via road to Europe and Asia. Similarly, Asian and European imports to Canada that arrive at West Coast airports and then trucked north (part “F”) are estimated by applying FTS commodity-specific modal split of Asian and European imports to the US West Coast to the flow of imports into British Columbia by truck from Europe and Asia.

Estimates of US exports trucked to YVR and shipped to Asia or Europe (part “B”) and US imports from Europe and Asia that are flown into YVR and then trucked to US West Coast (part “E”) are estimated by joining the Canadian and US trade data. US exports trucked to YVR and shipped to Asia or Europe (part “B”) are estimated from FTS documentation of the volume and value of goods shipped north through the Port of Blaine and destined for Asia and Europe. These commodities are matched to Statistics Canada data that provides modal splits of commodity exported from British Columbia to Asia and Europe. Imports of Asian and European goods to YVR that are destined for the US (part “E”) are estimated by applying the air mode proportion by commodity of imports coming into British Columbia documented by Statistics Canada data to the commodity flows of Asian and European imports that transported through Blaine (from Canada) as documented by FTS data.

A.2 Economic Impact Model

Model Process. The economic impact analysis used in this study uses a framework known as TREDIS -- the Transportation Economic Development Impact System. This model includes four elements:

- 1) **Forecasting.** Economic activity associated with BC manufacturing (\$ of GDP and value of output) and import/ export activity (\$ value of goods) are projected to grow in future years. In addition, the level of airport activity (passenger volume and cargo tonnage) is also projected to grow under baseline and alternative (“Achievable Growth”) scenarios.
- 2) **Impact of Airport Activity Expansion.** The airport capacity and activity expansion scenarios are each translated into estimates of additional direct

economic activity (jobs, income, spending) projected to occur at the airport in future years. This projection is calculated by distinguishing growth in passenger-serving activity, cargo-serving activity and general airport operation activity. That information is used to develop estimates of future airport job growth by industry. Only cargo-serving and general airport activities are counted as drivers of future job impact for this study (since this study focuses on cargo activity growth). The share associated with overseas (as opposed to domestic and cross-border) cargo shipment is also distinguished for this study.

- 3) **Impact on Export Products.** The airport capacity and activity expansion scenarios are each translated into direct transportation impacts, portrayed in terms of changes in tonnage and value of overseas shipments traveling through YVR. These shipments are distinguished by commodity and associated industry sending exports or receiving imports, using economic forecasts from step 1 and inter-industry purchasing patterns in the economic model described later in step 4. The difference between these scenarios is identified as the “at-risk” share of shipments, and the economic model calculates the economic stakes in terms of additional transportation costs to be incurred and value of Canadian import and export products to be lost (if future Vancouver airport cargo capacity and overseas service levels are not in place to serve that future growth).
- 4) **Economic Impact Calculation.** Detailed industry-by-industry economic multipliers are derived from an input-output model of BC (which is described later). The multipliers are applied to calculate the extent to which direct changes in airport-related jobs and associated wages (from step 2) will lead to further indirect effects (on jobs at suppliers of materials and services) and induced effects (on jobs at businesses gaining revenue from worker income re-spending). Detailed industry cost response factors are also applied to calculate the extent to which changes in import/export capacity and import/export shipment costs (from step 3) will directly lead to changes in the level of production of affected industries and commodities. And the economic multipliers are applied again to calculate the extent to which those direct changes will also lead to broader indirect and induced impacts.

Use of Model Elsewhere. This same form of economic impact analysis framework has been used widely for economic impact studies across Canada. In BC, it was used for the Greater Vancouver Gateway Council’s earlier study of the *Economic Impact Analysis of Investment in a Major Commercial Transportation System* (2003) and *The Economic Role of the Gateway Transportation System in the Greater Vancouver Region* (2008). It has been used in Ontario for economic impact studies of rail transportation alternatives for GO Transit and Durham Region Transit, as well as several ground transportation corridors for the Ministry of Transportation Ontario (MTO). It has also been used in Quebec and Atlantic

Provinces for the Northeast CanAm Connections study. Its consistency with other studies of the economic impact of Vancouver International Airport is explained below.

Data Sources. This TREDIS model used for this study was calibrated with the most recent available information on national, provincial and sub-provincial economic profiles provided by Statistics Canada, together with additional information on economic trade from OECD (for national and international information). It draws on import/export patterns from Statistics Canada and Foreign Trade Statistics of the US Census Bureau.

Definition of Multipliers. It is important to note that any direct changes in airport jobs in Vancouver occur (by definition) within British Columbia. However, some suppliers of products used in airport development and operation may come from outside of BC, and some consumer spending of airport workers may ultimately flow to producers located outside of BC. For that reason, the size of indirect and induced effects, and the associated multipliers used to calculate total economic impacts, will be larger as the selected impact area is defined to cover a broader region.

The economic multiplier model used to assess future scenarios in this study includes indirect and induced impacts for the BC economy. The multipliers were calculated using detailed data on inter-industry purchase and sales patterns from Statistics Canada's 2007 National Input-Output model, which were updated to 2009 and regionalized based on provincial economic profiles. (The updating and regionalization calculations were done by staff of Minnesota Implan Group, Inc.)

Comparison with Prior Studies of Vancouver Airport. In general, the economic multipliers used in this model are fully consistent with earlier studies assessing the current economic impact of Vancouver International Airport in 2006 and 2010.¹⁶ Specifically, the multipliers used here are similar to those used in the 2006 economic impact study but differ slightly because of changes in the economy and wage/worker ratios since that time. However, impacts covered in this report span a smaller impact area than the 2010 economic impact study (which included impacts occurring anywhere in Canada). As a result, the multiplier impacts shown here are smaller than those used in that 2010 report.

For further information about TREDIS, see www.tredis.com.

¹⁶ *Vancouver International Airport Economic Impact*, by Intervistas Consulting, Inc., 2006; and *Economic Impact Assessment of the Vancouver International Airport*, by Ference Weicker & Company, 2010.