Transport Canada

Higher Speed Passenger Rail Analysis: Environmental and Socio-Economic Impacts of VIA*FAST*

Report
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IBI GROUP

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1. EXECUTIVE SUMMARY

This report by IBI Group documents work carried out in conjunction with UMA Engineering Consultants and Deloitte & Touche LLP. Each of the consultants has a separate report, and a common Executive Summary covering all of the work will be a separate document.

The scope of the IBI Group project includes the following components of the VIA*FAST* proposal:

- assessment of the potential freight modal shift from road to rail;
- review of freight capacity issues; and,
- assessment of projected environmental and socio-economic benefits and costs for passengers and goods.

Gaps

Most of the work estimating impacts of VIA*FAST* was based on market studies 10 years old, or comparable research in other locations.

. More targeted market information is needed to identify the characteristics of potential customers, and their needs.

2. INTRODUCTION

Transport Canada engaged three consulting firms to assess the VIA*FAST* proposal to implement higher speed passenger rail in Québec City-Windsor Corridor. The proposal, as submitted in September 2002, featured optimization of rail infrastructure by improving capacity utilization of existing infrastructure. The initial concept was to separate passenger and freight train services as much as possible, thereby generating significant environmental, social and economic benefits from improvements to both passenger and freight services.

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The scope of the IBI Group project includes the following components of the VIA*FAST* proposal:

- assessment of the potential freight modal shift from road to rail;
- review of freight capacity issues; and,
- assessment of projected environmental and socio-economic benefits and costs for passengers and goods.

The common tasks assigned to each of the firms are to:

- validate projections in the VIA*FAST* proposal;
- identify gaps in the analysis supporting the proposal; and
- suggest remedies to close such gaps.

This work was carried out in a very compressed timeframe of approximately three weeks. The key participants from Transport Canada, VIA Rail Canada, CN and CPR were exceptionally accommodating and accessible as needed in the course of this work.

Specific documents in the VIA*FAST* proposal package that were reviewed in the course of this work are identified below:

1. The VIA*FAST* Summary Report submitted in September 2002.
2. CN/CP Benefits Quantification – Mercer Management Consulting May 24, 2002.
3. Environmental and Socio-Economic Impacts Increasing Use and Efficiency of Rail Infrastructure – AgriTrade and Transport – June 2002 (Draft Report).
4. 401 Model – CPR Discussion with Transport Canada, July 20, 2001.

The challenge of carrying out this work in a short period of time was magnified by the fact that the proposal itself for VIA*FAST* is transforming rapidly.

2.1 APPROACH

IBI Group's approach to this project was to divide the work into three streams. The first stream was to develop a market scenario for freight diversion potential to validate whether the identified "size of the prize" is reasonably achievable.

The second stream concentrated on evaluating the methodology used to determine the costs and benefits from externalities. The VIA*FAST* proposal included a number of consequences associated with reducing the number of cars and trucks on highways.

Additional benefits included in VIA's proposal, but which are not yet examined, include employment during construction, long-term employment and VIA's bottom-line benefit. The employment related benefits would best be determined once the project definition and scope is finalized. Evaluation of the financial implications for VIA is outside the scope of this work; it is related to the mandate of Deloitte & Touche.

The third stream is synthesis and reporting of conclusions. This report documents the synthesis of work in respect of the IBI Group study.

The methodology used draws heavily from current and recent studies carried out for Transport Canada and for other clients, and from direct experience of members of the project team. With respect to estimating freight market size, special analyses of the 1999 National Roadside Survey database were carried out for this project.

This report is organized along the lines of the work streams described above. Section 3, immediately following, documents the freight shift from road to rail. Section 4 documents the findings and observations in respect of externalities. Section 5 reports on the synthesis and conclusions of this work.

3. FREIGHT SHIFT FROM ROAD TO RAIL

3.1 VALIDATION

It is therefore evident that to validate the market potential for freight modal shift, an independent market assessment is required. A special analysis of the 1999 National Roadside Survey Database was carried out, and current work for the Ontario Michigan Border Partnership Study was also reviewed. An estimate of the total number of tractor-trailer trips susceptible to conversion to rail was developed for the years 2000, 2012 and 2020; tractor-trailer trips covering distances less than 250 km were excluded from the data subset. Origins and destinations west of Windsor/Sarnia and Quebec and East were selected from the NRS data for trips through Ontario; also, trips between Michigan to Eastern Ontario, and between Quebec/Atlantic and South Western Ontario were selected. Trips using the Corridor and occurring totally within Ontario are excluded from the estimate shown in Exhibit 1

Estimates for the Michigan-GTA segment are based on "Existing and Future Travel Demand Working Paper", December 2002, prepared for the Michigan Ontario Border Partnership Study by URS Cole Sherman and IBI Group. These projections were developed following extensive review of border Customs data from Canada and the USA, trade projections from both countries, origin-destination trip analysis using the Commercial Vehicle Survey (an Ontario version of the National Roadside Survey,

undertaken jointly) and interviews with carriers and shippers. The projections were developed on the basis of origins and destinations, and commodity sectors for all modes of transportation.

Growth rates were developed separately for six major commodity groupings that dominated border traffic. The composite result is applied to the other two road segments, as shown in Exhibit 1.

3.1.1 Market Requirements

Competition between highways and railways for a share of the shipper's wallet has been fierce for many decades, and especially evident with expansion of the highway network in the 1960s and 1970s. Generally, this has been good news for shippers because freight transportation overall has consistently declined in price throughout this period.

Efficiency and advancement continue to dominate the agenda of the logistics industry. In the highway mode, the average cargo weight and productivity of drivers, tractors and trailers has increased steadily on average. Fuel efficiency has also improved with new technology, reducing emissions per unit of highway output.

The rail mode has rationalized its networks into higher and lower density routes, with the emergence of Short Lines to serve the latter. New technology to reduce operating costs and improve transparency with customers has also been introduced in this mode. The rail mode appears to be taking up the challenge to develop innovative intermodal technology. New intermodal terminals are being built throughout North America with modern computers efficiently controlling inventory, and handling systems to operate quicker, reduce costs, and schedule appointments so that motor carriers can get in and out quickly.

With respect to shippers, various studies have shown that there are five principal factors governing selection of mode and carriers for transportation services. The relative ranking and weights of factors may vary from customers to customer.

1. time in transit (speed and frequency – how fast can it be delivered?)
2. reliability of time in transit
3. equipment supply (the right vehicle, in good condition, when needed, where needed)
4. low risk of loss and damage
5. price

Generally, the motor carrier industry has the advantage over rail in all categories for distances below 800 km, where most freight demand actually occurs. The rail mode is naturally more effective over longer distances. Line haul cost on a railway is generally less than $1 per kilometre for the equivalent of a highway trailer (compared to line haul tractor-trailer costs in the $1.50 to $3.00 range). However, terminal charges for marshalling cargo and rolling stock, and delays, add to the cost of the rail mode making it less competitive for shorter distances. Motor carriers have a great advantage in being more flexible to meet customer needs, and much less costly for the origination and termination of shipments.

Innovations by the railway industry to address "terminal" disadvantages include bi-modal services such as the "RoadRailer" by Norfolk Southern Triple Crown and CN; this permits trailers to run directly over railway tracks behind a locomotive with removable, or hydraulic-lift bogies. CPR introduced "Expressway" in the 1990s as a service directly offered to private and for-hire motor carriers. This service is designed to accept conventional highway trailers without any special attachments or strengthening of the structure of the trailer. It features simple and quick loading and unloading using a portable ramp that travels with the train. Loading and unloading operations can take place at the equivalent of a level crossing, for example from a rail lead into a motor carrier terminal (not yet in practice). This service has been introduced successfully in the Montréal-Toronto market, and it has been expanded to Windsor and Detroit.

Discussions with fleet managers in private and for-hire companies confirm that there is a positive acceptance of modal integration. However very few customers are ready to make major commitments to such a service over a long period of time. It remains very much" wait-and-see" in terms of attitude from

both users and providers of the service. Current volume levels have been achieved by handling surge-volumes for the most part.

It would take a major commitment of rolling stock, motive power and track capacity to ensure a frequent and reliable service in the long-term before fleet managers make major commitments. Such major commitments would include long-term resource allocation decisions to optimize investments in tractors and new drivers, assuming significant use of the rail mode for line haul movements.

3.1.2 Trends

The direction of government policies is toward promotion and encouragement of sustainable transportation. Canada has made public its commitment to reduce emissions, with commensurate targets for fuel efficiency in the transportation sector. This policy direction would be consistent with more long distance transportation by rail, greater development of intermodal terminals, and attempts to divert traffic from highly congested areas such as large urban centres and border crossings.

Both the railways and the trucking industry will be under pressure to conserve fuel. The long-term policy direction towards sustainability is one factor, and cost uncertainty owing to volatile energy markets is another source of pressure.

Driver shortage for line haul transportation is becoming more prominent, and could influence modal shift away from road. The motor carrier industry may be forced to collaborate with railways simply to accommodate growth.

All of these factors encourage modal shift from highway to rail, particularly where road congestion delays are consistently present. The Expressway train mentioned above could be indicative that the process of shifting is occurring already.

There is unlikely to be a middle ground. Rail services will either remain marginal in this particular market, much as today; or they will grow to critical mass beyond which positive feedback market mechanisms will encourage substantial growth, to the upper level of potential identified.

Traffic at these levels would require significant investment in infrastructure and technology along with changes in movement trends and patterns to which shippers are accustomed. Unless the service can be offered on a basis that is "as and when required" (high frequency, quick turnaround), then there will be a modest limit to growth. Success will be driven by large carriers and shippers (with private fleets) that buy-in to establish a critical mass level of service. Certain commodities are less susceptible to such a shift (e.g. pharmaceuticals, some perishables). Resistance to change will be another impeding factor.

The keys to success will be reliability, consistency, availability and speed at competitive prices, just as it is today with conventional trucking.

3.2 GAPS

The market analysis carried out in the course of this project is preliminary in nature, equivalent to a "scoping" estimate.

It would be prudent to obtain a better understanding of the freight markets size and potential to shift. Proponents of the projected benefits should carry out further probing into:

- the characteristics of potential core customers (e.g. commodities shipped, value of goods; service locations, public versus private, etc.);
- cost-driving factors (e.g. length of haul, shipment weights, loads versus empties etc.); and,
- product attributes (e.g. frequency, speed, reliability, safety, ease of doing business, etc.).

3.3 NEXT STEPS

4. EXTERNALITIES

4.1 VALIDATION

The environmental and socio-economic benefits and costs (i.e. the externalities) associated with VIA*FAST* were initially developed in a report submitted to VIA in June 2002.

The types of benefits that VIA includes are:

- Reduction in cars on highways;
-
- Reduced congestion;
- Reduction in fuel consumption;
- Improved safety;
- Reduction in GHG (Greenhouse Gases)
- Reduced highway maintenance;
- Jobs during Construction;
- VIA's bottom-line benefit (ex scope in this report, covered by Deloitte & Touche);

The findings are developed in the draft report " Environmental and Socio-Economic Impacts Increasing Use and Efficiency of Rail Infrastructure" by AgriTrade and Transport (ATT). This work was never completed beyond the draft report stage. 1961

The methodology developed by ATT continues to be used, and working spreadsheets have been updated with new information. At the outset of this project the actual determination of costs and benefits was based on the electronic spreadsheet calculations of ATT, with some modification of parameters to reflect more recent changes to the rail passenger service plans. The freight costs and benefits are stated as being identical to those considered by ATT at the time of its work.

Considering the conclusion of Section 3 of this report, the first step to validate environmental and socio-economic impacts of VIA*FAST* is to restate all of the calculations

However, other changes were made affecting some key assumptions in the intervening months since the report was drafted. Some of these changes are significant and they are discussed below under each of the main subcategories of benefit/cost. Such comments are focused on three main topics, as follows:

- assumptions regarding average occupancy of automobiles in the Corridor
- estimates of the benefits from avoided collisions (fatalities and injuries)
- assumptions regarding the value of time for auto, rail and air passengers (congestion).

These are discussed under the appropriate headings below.

4.1.1 Trips and Emissions

Assessing the validity of benefits and costs from environmental emissions is highly dependent upon the confidence one can place in the market forecasts, and the granularity of those forecasts in terms of the attributes of voyages that would shift from other modes of transportation to rail. The market forecasts are the subject of a separate report by Deloitte & Touche, which is being prepared concurrently. Comments in this report are based on the forecasts as presented to the consultants on May 30, 2003.

The work in this project was based on those forecasts, as given; to assess the method by which the environmental impacts associated with modal diversion were calculated. This section deals primarily with the passenger implications,

General observations and conclusions regarding validation of environmental emissions are shown in Exhibit 3.

VIA*FAST* refers to estimates included in the document of September 2002. Present refers to a presentation document dated May 21, 2003 by VIA Rail Canada entitled "Financial Projections And Enviro/Socio-Economic Benefits of VIA*FAST*". Additional analysis was performed using the electronic spreadsheets provided by VIA as supporting material.

Exhibit 3: Validation of Emissions Factors

Automobile is the dominant mode now and in base case projections for the future. Assumptions regarding automobile use provide substantial leverage in the determination of total benefits because this occupancy is used to determine how many cars will be removed from the roads by a given shift to rail.

Unfortunately, there is no uniform acceptable standard fall back upon.

A sensitivity test was carried out to test the effect of average auto occupancy of trips shifting to VIA*FAST,*

Fuel consumption estimates are also affected by this calculation

4.1.2 Socio-Economic Impacts

Exhibit 4: Socio-Economic Impacts

The projected benefits of VIA*FAST* are summarized in Exhibit 4.

The remaining text in this section concentrates on the estimation costs and benefits attributable to changes in passenger transportation.

Congestion

extract the benefit on account of fewer vehicles on the road, similarly air travellers and rail and bus travellers are assumed to benefit from less congestion. The benefit estimate is based on a number of observations:

4. Automobile occupancy rates would reflect changes to benefits from this mode in direct proportion to the number of vehicle-trips affected.

The appropriate time to revise all of these factors is after proponents agree on acceptable market projections of ridership and mode diversion. The benefits from time saved are sensitive to the type of trips, trip purposes and modal preferences of the travellers shifting patterns.

Safety (Collisions)

Accident rates, including mortality and serious injuries were based on national historical data. Exposure to risk is translated to rates per passenger kilometre for each mode.

Projected deaths and injuries were then compared using VIA*FAST* and Base Case Scenarios. Up to this point, the results and the methodology are conventional. Establishing the value for avoided casualties departs from Transport Canada practice

Other

Other socio-economic benefits included in VIA*FAST* justification are either no longer applicable, or were not quantified in monetary terms.

- Employment creation during construction, and later during operation of new services, is cited as a benefit. There is little doubt that temporary and permanent employment generation would result from implementation. The information available at this time is inadequate to assess the quantities and the net new employment generated, mainly because the project itself is not yet sufficiently defined

- Noise pollution is also mentioned, although no conclusions are developed.

4.2 GAPS

The methodology to determine environmental and socio-economic benefits was completed (or revised) only recently. It appears that they general assumptions are broad in nature and useful only as general estimates

Key assumptions upon which the derivation of social benefits is based could be firmed up considerably with improved market research and market forecasts based on stated preference or revealed preference

research to understand the characteristics of travellers who would be choosing rail and their reasons for switching from previous means.

4.3 NEXT STEPS

Detailed review of costs and benefits would require further market research and demand forecasting of intercity passenger transportation.

It would be prudent to reassess existing and projected vehicle occupancy levels and load factors in all modes of transportation. This would be to ensure consistency in the application of factors that are appropriate for urban setting and those are appropriate for an intercity setting, and to ensure that projected load factors are realistically attainable in light of seasonal, weekly and daily patterns of travel demand.

5. SYNTHESIS AND CONCLUSIONS

The overall summary of this work is straightforward.

Considering the time and money dedicated to the determination of costs and benefits, the overall approach is considered reasonable, although systematically tending toward optimistic and aggressive assumptions concerning potential future benefits.

VIA*FAST* is now a passenger train project in a multi-purpose right-of-way. It should be evaluated as such.