

# ***Railway Demand Forecasting and Service Planning Processes***

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Prepared for: Rail Freight Service  
Review

March 2010



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# 1. Purpose of the Project

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On May 30, 2007, the Government of Canada announced the introduction of a Bill, which contained improvements to the shipper protection provisions of the *Canada Transportation Act*. The announcement also indicated that the government would undertake a review of rail freight service.

The overall objectives of this review are to:

- Conduct a review of the rail-based logistics chain (including shippers, terminal operators, ports, and vessels), with a focus on service provided to Canadian shippers and customers by Canadian National Railways (CN) and Canadian Pacific Railway (CP) within Canada, including to and from ports and border crossings;
- Identify problems and issues with respect to railway service including those stemming from other elements of the logistics chain;
- For shippers located on shortlines and experiencing problems with rail service, examine the relationship between shortlines and the main line carriers to determine whether such problems are attributable to service, operating, or marketing practices of the main line carriers;
- Identify best practices and how these can be expanded to address service issues; and
- Make recommendations on how to address these problems and issues, including both commercial and, if necessary, regulatory solutions.

The review is being conducted in two stages. The first stage consists of quantitative and analytical work. In the second stage, draft recommendations are being developed by a Panel of three eminent persons based on the results of the analytical phase and any other relevant information that is available. The Panel will consult stakeholders on the draft recommendations and submit a final report to the Minister of Transport, Infrastructure and Communities.

On July 24, 2008 Transport Canada released the terms of reference for the quantitative and analytical stage of the rail freight service review. This report has been prepared in response to the requirements of the Request for Proposals (RFP) covering the description of railway demand forecasting and service planning processes. The objective of this report is to provide a comprehensive description of how railways forecast demand, how and to what extent railways interface with their customers in developing their demand projections, and how demand projections are transformed into railway service and asset plans. This report also describes the railways' ongoing short term planning and management activities as they manage the asset and service plans developed through these annual planning processes.

## 2. General Approach

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The railway planning processes described in this report are based on extensive interviews with CN and CP subject matter experts directly involved in and responsible for the development of the railways' demand forecasting and service planning processes. QGI has also relied on the experience and background of the team members that participated in the interviews and prepared this report.

Prior to conducting the interviews QGI provided CN and CP with a discussion document that identified the specific topics to be discussed for each element of the planning process. Key topics of discussion included the following:

### **Demand Forecasting**

1. Medium to Long term planning process (annual and 3-5 years out)
  - a. How customer demand information is collected and used in the broader planning process
    - i. Key challenges associated with collecting and inputting customer demand projections into overall process
    - ii. Differences in customer/market inputs across business lines and by shipper size
    - iii. Systems used to capture and analyze demand
    - iv. Demand forecasting units used – e.g. tons, cars, containers, etc.
  - b. Key “non-customer” factors accounted for in demand planning and process for balancing between customer stated demand and what ends up in the final plan
2. Short term demand forecasting and plan management (monthly and quarterly)
  - a. Periodic demand adjustments
    - i. Key factors that drive changes to internal demand forecast planning during the course of a year
    - ii. Frequency of adjustments
    - iii. Nature of ongoing customer dialogue with respect to shifts in demand due to: seasonal factors, changes in market conditions (demand surge or reduction), changes resulting from disruptions
    - iv. Process for communication of short term changes in demand to operating departments
  - b. Forecast Performance Measurement
    - i. Nature and frequency of existing measurements
    - ii. Mechanisms for providing customers with feedback on accuracy of their projected demand
  - c. Demand forecasting outputs
    - i. Structure of outputs (major flows (corridors), origin-destination demand forecasts, etc)
    - ii. Internal users of demand forecast information and for what purpose
  - d. Key railway challenges in development of short and long term demand forecasts

### **Network and Asset Planning Issues**

1. How Marketing demand forecast is used for asset planning for: train service, crews, locomotives, rail car fleets and track capacity
2. For each/all of the above asset planning processes:
  - a. Definition of planning cycle
  - b. Systems or models used
  - c. Processes for communicating gaps in supply/demand internally and externally
  - d. Significant challenges

## 3. Demand Forecasting

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Many railway planning processes including financial, asset, capital investment and service planning are predicated on the railways' estimate of the freight volumes (demand) to be handled within a given time period. For this information to be meaningful and support the railways' planning processes demand forecasts must not only provide an estimate of the total volumes but also identify the commodities, timing, and the origins and destinations of the traffic. The ability to view and analyze demand across each of these dimensions allows the railways to plan the type and frequency of train service, asset requirements including locomotives, freight cars and train crews and to understand the distribution of traffic across their networks. Each of these views will provide the necessary information to allow the railways to identify potential capacity constraints and develop strategies to address them. Depending on the nature of the capacity constraint the railways' strategies may include capital investment in track and or traffic management systems, locomotives or rail cars, short term leasing of freight cars and or locomotives, changes to train service or smoothing of demand peaks through capacity management. The appropriate strategies to be employed will be influenced by the type of constraint, its duration and where it is expected to occur in the network.

Each year CN and CP create demand forecasts using multiple planning horizons. While the development of the railways' annual plans is a principal focus of their planning activities they also develop multi-year demand outlooks - CN prepares a five year plan and CP prepares a four year plan. Furthermore railway planning activities do not begin and end with the annual planning process. The objective of the annual demand planning process is to establish the best view possible of traffic expectations and to define the appropriate service and asset plans necessary to handle these volumes. Throughout the course of the year both CN and CP continue to do short term tactical planning on a monthly and quarterly basis to respond to changes in demand by continually revisiting asset and operating plans.

This report describes how CN and CP develop their demand forecasts across the different planning horizons. This will include: how customer demand information is collected and used, the key "non-customer" factors considered, and the process for balancing between customers' stated demand and the final demand projections included in the railways' plans. Finally, the report will describe how the information is used by the railways for asset and service planning.

### ***3.1 Long Term Demand Planning***

Medium to long term planning activities at CN and CP provide the railways with a highly aggregated view of demand to allow them to identify potential future changes in key markets that may alter historical traffic patterns and volume expectations. These demand projections also provide important data for the development of multi-year forecasts of financial performance. The long lead times associated with capital investment in the rail industry require them to develop multi-year investment plans for asset renewal and expansion with respect to rail cars, locomotives, track infrastructure and train crews.

## *CN*

CN's five year plan is developed each year as part of its annual planning cycle. The plan is based on the detailed demand forecast and revenue plan for the coming year and is adjusted using a top down approach to account for medium to long term macroeconomic assumptions and known market issues of significance. Key macroeconomic assumptions included in the long range outlook will include international, national and regional economic and GDP outlooks, currency exchange rates and global commodity forecasts for those commodities handled by CN.

The plan is also adjusted to reflect significant market issues that are seen to have a reasonable probability of occurring within the 5 year planning horizon. This would include items such as new plant start ups, expansions or shutdowns and mine openings or closures. Finally from a financial planning perspective the railway will factor in its assumptions for annual pricing yield that is achievable through rate increases.

## *CP*

As part of its annual planning cycle CP develops a four year plan. This planning exercise is focused on eighty (80) key markets – e.g. Canadian grain exports via Vancouver. Much like CN, CP begins with its base year forecast then calibrates its plan to factor in macroeconomic assumptions such as GDP projections as well as industry specific forecasts from independent sources. Macroeconomic data and forecasts are drawn from independent sources including the major banks and economic and forecasting organizations such as IHS Global Insight.

Key industry inputs include volume forecasts produced by Canada's major ports for import-export traffic and industry specific production and sales forecasts such as for the automobile industry. In addition the railway will factor in significant market events such as plant closures or expansions.

## **3.2 Annual Demand Planning**

The railways' annual planning processes include the development of detailed plans for revenues and expenses, freight car and locomotive fleet sizing, crews, train services and capital investment planning. The foundation for each of these planning processes is the development of the annual demand or volume forecast for each calendar year.

### **3.2.1 CN – Annual Planning Process**

CN's annual planning process begins in mid summer with a target of mid fall for completion. While the final demand forecast results from the combination of bottom up and top down planning it begins with the development of a detailed bottom up demand plan.

The objective of the bottom up planning process is to develop a detailed and quantified view of the traffic volumes that are expected to be handled by the railway in the coming year. For planning purposes demand will be expressed differently depending on the line of business. At CN, with the exception of Intermodal, the principal unit of demand

forecast is carloads. For the railway's domestic Intermodal business demand is expressed in container units and for import-export traffic as twenty foot equivalent container units (TEUs).

There are three principal types of inputs to the demand forecasting process. The initial or base plan is generated using a combination of the most recent historical and forecast information available. Specifically the starting point is the current year's experience which reflects some six months of actual performance and the most current forecast for the remaining months of the year. The second principal input consists of demand information gathered from the railway's customers including any significant issues such as permanent or temporary plant closures, expansions, shifts in destination markets and seasonal fluctuations in volumes. Finally the railway will apply its own market intelligence including market share assumptions for individual customers, market forecasts for selected commodities and industry sectors and macroeconomic forecasts.

### *Base Year Forecast*

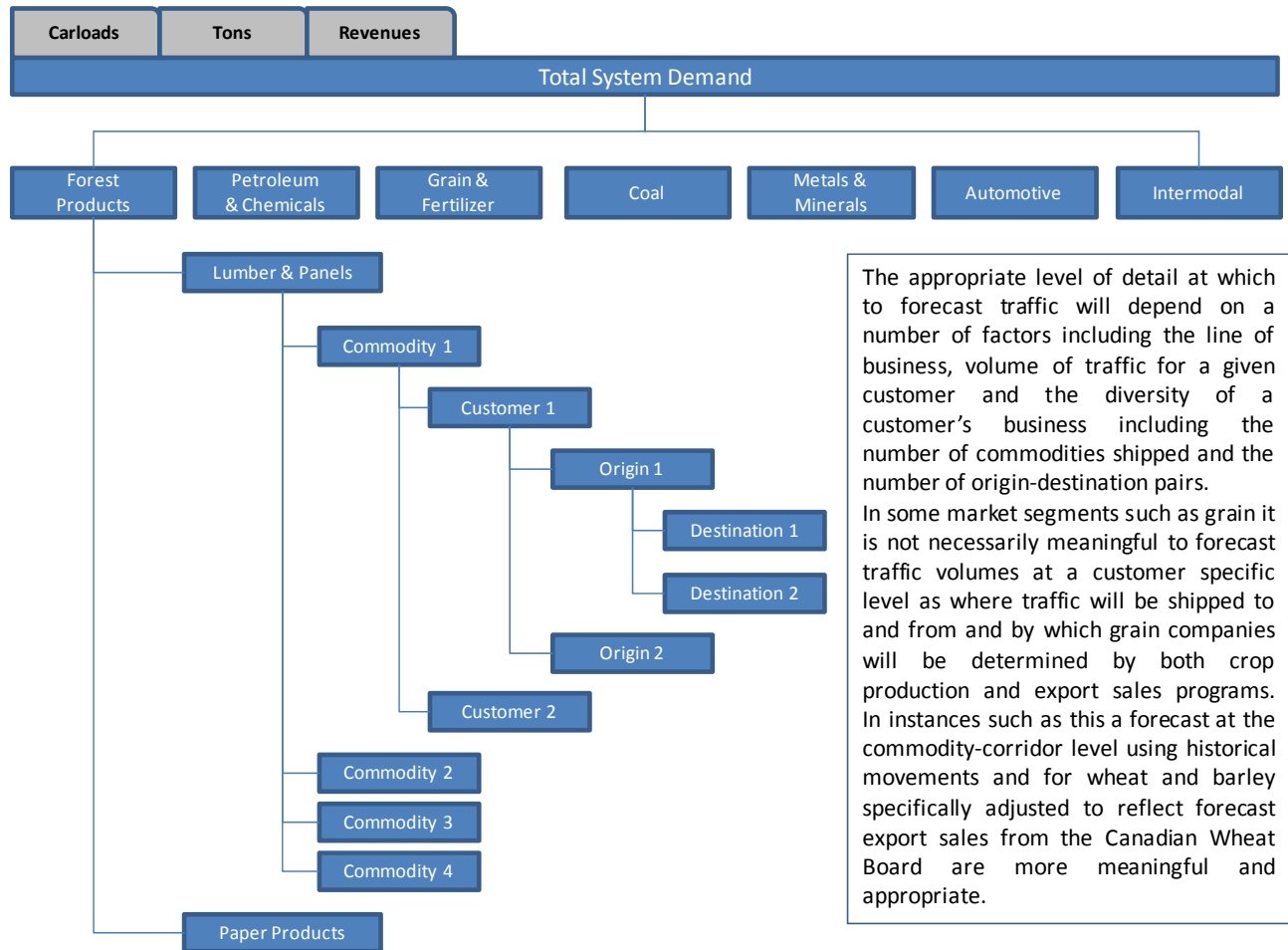
The railway's demand forecasting process should be thought of as an exception based planning process. Given the breadth and complexity of CN's market it is not practical to attempt to develop detailed demand forecasts for each of its more than 2500 shippers, roughly 150 commodities and 13,000 origin-destination pairs.<sup>1</sup> At an aggregate level a significant portion of the railway's traffic base remains relatively stable from year to year. It is therefore more practical for these planning activities to focus on how volumes are expected to differ from prior experience rather than trying to construct a new forecast each year from the ground up. The beginning point is therefore a detailed base forecast constructed from recent history that is subsequently validated through direct customer discussions and the analysis of commodity market and macroeconomic forecasts.

CN uses a centralized demand forecasting system that is detailed and hierarchical in structure. At the highest level of aggregation it provides a view of total system demand by month for the planning period. It also provides integrated views of the revenue projections associated with projected demand. Underlying this aggregated view are increasingly detailed views that segment monthly demand across a number of dimensions including line of business, commodity and commodity subgroup within each business unit, network corridor and ultimately by customer.

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<sup>1</sup> Canadian originated traffic for calendar year 2007 as provided by CN for the development of a representative sample for transit time performance measurement.

Figure 1 Illustrative Schematic of CN Demand Forecasting System



Forecast information can be input at any level of detail and the planning system will automatically aggregate up or disaggregate down. Disaggregation of forecast data to the lowest level of detail is done on the basis of historical traffic movements. Detailed traffic forecasts, including those at the individual customer level, can subsequently be adjusted manually to introduce more current customer or market information.

**Customer Involvement**

The principal responsibility for customer interaction at CN, including the collection of demand data, rests with CN's account managers that report through its Sales and Marketing organization. CN estimates that customers that generate approximately 90% of its annual revenues have an account manager assigned to them and that 85% of demand inputs, excluding regulated grain and Intermodal traffic, can be done at an individual customer level.<sup>2</sup>

<sup>2</sup> If regulated grain and intermodal traffic are included the company estimates that 70% of demand inputs are able to be done at the individual customer level.

During the planning period CN account managers will meet with their customers to discuss demand projections for the coming year. This customer interface process is best characterized as informal with the nature of these discussions varying from customer to customer. Some shippers will provide detailed forecast data on a monthly basis at a commodity, origin-destination level that can be directly input to CN's planning process. In other cases discussions with customers are less formal with volume outlooks for the coming year discussed in general terms with no specific data necessarily provided by the customer. The information gathered from customers can then be input to CN's centralized forecasting system on an individual customer basis at the appropriate level of detail. In many cases the information gathered from customers will be used to validate the base plan developed from history with adjustments made to reflect changes in the timing of shipments, specific commodities to be shipped, and origin-destination pairs as appropriate.

Although CN's planning system provides the capability to enter demand forecast data at the customer-commodity-origin-destination level for many customers entering data at this level will not be meaningful. This is because forecasts at this level are now predicting both the behaviour of commodity markets and the market share of individual customers. It has been the railway's experience that the level of precision of such forecasts diminishes with each increasing level of detail and that downstream asset and service planning processes do not require this level of precision.

There is no formal process for CN to communicate the results of its demand planning process back to individual customers. Individual account managers may discuss "budgeted" demand with their customers although this process is informal at best.

### *Market Reconciliation*

While account managers are responsible for gathering most customer information and inputting and validating customer specific forecasts in CN's planning system, the development of system wide commodity and commodity subgroup forecasts is the responsibility of market managers within each of CN's business units. Individual customer forecasts are aggregated to the commodity level where they are reconciled by market managers against broader market views for those commodities. This reconciliation process introduces market share assumptions for individual customers – in some cases the sum of individual customer market share assumptions can exceed total anticipated market volumes – given the expected performance of the market as a whole. For instance in developing demand forecasts for lumber and panel products a market manager would look at market forecasts for Canadian lumber and panel exports to the United States (US) and projections for US housing starts using independent industry and economic forecasting data. Once CN establishes the forecast for total Canadian exports of these commodities it would then weigh individual customer forecasts, historical traffic volumes and competitive factors to arrive at the expected volumes from each major shipper.

The relative weight given to individual customer forecasts as compared to broader market forecasts will differ across individual railway business units. Intermodal and grain forecasts for instance will typically place a greater emphasis

on the expected performance of the total market as opposed to the specific volumes that might be shipped by any one customer. Projected railway volumes of containerized import traffic that consist principally of consumer products will be heavily influenced by the expected performance of the Canadian economy as a whole and in some instances perhaps the expected performance of individual provincial economies. For domestic Intermodal traffic where 85% of volumes move between CN's seven largest intermodal terminals but traffic is generated by more than 1,000 individual shippers understanding forecast demand at a terminal level is more important and practical than trying to predict shipment volumes and patterns for individual customers when planning asset and service capacity levels. As noted earlier, for grain shipments it is not necessarily meaningful to forecast traffic volumes at a customer-origin specific level because volumes shipped by any individual grain company or processor from any given location will be determined by regional crop yields and in the case of wheat and barley the export sales programs controlled by the Canadian Wheat Board.

### *Top Down Planning*

The top down forecasting process done by CN's Financial Planning group is designed to validate and challenge the detailed planning assumptions used by Marketing. The top down process uses the preliminary demand forecasts developed by Marketing and examines at an aggregate level the year over year growth projections as well as developing trends or significant changes to historical shipment patterns. The plan is then validated against independent economic and commodity market forecasts to test for reasonableness. The final volume forecast to be used for corporate budgeting purposes reflects a reconciliation of the bottom up and top down processes arrived at through discussion between the Financial Planning and Marketing departments.

### 3.2.2 CP – Annual Planning Process

CP, much like CN, does its annual business planning between August and October each year. CP’s integrated planning process is known as the Sales and Operations Planning Process. The first step in the annual planning process is the development of the company’s demand forecast for each calendar year. This forecast is the foundation for all other components of operational planning through to ongoing plan management. Figure 2 below provides a high level summary of each step of the planning process.

Figure 2 CP Sales and Operations Planning Process



#### Sales Forecast

CP’s marketplace is similar to CN’s with more than 2500 shippers moving more than 100 commodities between approximately 14,000 origin–destination pairs.<sup>3</sup> For practical reasons CP, like CN, also uses historical volumes and shipment patterns to create its base forecast prior to incorporating customer and market specific information for the current planning horizon.

The demand forecasting process looks at CP’s three principal lines of business – Intermodal, bulk and merchandise. For planning purposes the company will forecast its business using different units of demand, such as carloads or tons, depending on the specific business unit or market segment. The principal inputs to the Sales Forecasting process

<sup>3</sup> Canadian originated traffic for calendar year 2007 as provided by CP for the development of a representative sample for transit time performance measurement.

include customer specific demand information and independent market and economic forecasts. Once the preliminary detailed forecast has been developed demand values are entered into CP's centralized revenue planning system (RPS) at the commodity-corridor level. Corridors define the origin-destination combinations for the forecast traffic although they may be defined at varying levels of detail – e.g. station to station, region to region, etc. The data entered into the RPS system subsequently drives downstream operational and financial planning processes.

### *Customer Involvement*

As noted earlier, with more than 2500 shippers across its Canadian network that ship anywhere from one car to 250,000 cars each, it is not practical for CP to try and engage all customers in demand planning discussions. However, the company does look to have explicit planning discussions with its largest customers in each of its market segments. CP has established a threshold of \$1 million in annual revenues to identify the customers with whom explicit planning discussions are to be held annually as part of its sales forecasting process. It is estimated that this represents approximately 100 customers across all lines of business. These 100 customers would be responsible for well over 80% of CP's total annual freight volumes. Customer discussions are managed by CP's Marketing and Sales department.

There is no formal process for CP to communicate the results of its demand planning process back to individual customers. Individual marketing representatives may choose to discuss "budgeted" demand with their customers although this process is informal at best.

### *Market Reconciliation*

The initial view of forecast demand that is created using history and subsequently adjusted for specific customer input is then validated by CP's individual market and commodity segment groups. This validation exercise relies on the knowledge and experience of CP's marketing personnel and the use of independent industry, market and economic forecasts. The objective of this process is to determine what the company expects to handle for a given commodity or market segment and then reflect this in individual customer forecasts. In making assumptions regarding individual customer volumes CP assesses the probability that an individual customer will achieve the level of traffic they anticipate given the expected performance of the market as a whole. The validated plan becomes the preliminary view of demand that is used as the principal input to downstream operating and financial planning processes.

## **3.3.3 Revenue and Capital Expenditure Planning**

### *Revenue Planning*

The demand forecast establishes the basis for the development of the railways' revenue projections. Revenue budgets for both railways are essentially developed by applying freight rates per unit of demand (carloads, intermodal units, tons) against forecast demand. Estimated rates will, depending on the level at which they are applied against demand, consist of either rates for a specific customer-commodity-origin-destination forecast or weighted average

rates in cases where revenues are estimated against a more aggregated demand forecast. Revenue projections will also incorporate the companies' yield strategies and targets for revenue growth established by their respective executive teams. These yield, or pricing, strategies must take into account the railways' competitive strategies versus their direct rail and indirect modal competitors. Railway pricing strategies will also need to reflect the expected financial performance of their key customers and the effect of freight rates on their customers' competitiveness in the customers' final markets – particularly in markets where market and product competition are important factors.<sup>4</sup>

### *Capital Expenditure Planning*

Principal areas of railway capital investment include track infrastructure, rail cars, locomotives, facilities and information systems. These investments are made to achieve a range of corporate objectives including safety of operations, market growth and operational efficiency or productivity.

The railway marketing organizations' principal involvement with capital investment planning relates to investment in freight cars, containers and customer facilities such as commodity trans-load facilities, to support revenue growth. For investments such as these the volume of traffic and related risks as well as the associated revenues and profitability are key inputs to the internal business cases developed when seeking capital expenditure authority. For Operations departments, capital expenditure planning activities focus primarily on investments in basic plant renewal and expansion including track infrastructure and traffic control systems, locomotives, railway facilities including yards and repair shops. These investments will be made to maintain and enhance safety of operations, improve productivity of operations and thus reduce operating costs or to expand network capacity. All these investments tend to be multi-year programs although forecasted demand can influence the timing of these investments based on shifting traffic patterns that may result in capacity constraints or capacity surplus in specific parts of the network. Where surplus capacity is forecast in the network, the railway can pursue strategies to salvage track or track materials from sidings or main track and in the most extreme examples of surplus capacity they can pursue rail line sale or abandonment strategies.

### **3.2.4 Challenges**

As was noted in QGI's report on stakeholder operating practices<sup>5</sup> supply chain planning requires stakeholder collaboration with respect to demand forecasting and capacity planning. While shippers have expressed the view that they believe railway demand forecasts do not always reflect the true demand they communicate to the railways the railways argue that they must weigh the input of shippers against the expected performance of broader markets and consider potential volatility in demand when planning capacity and assets in order to manage the financial risks

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<sup>4</sup> For more discussion of the dynamics of railway competition see: *Description of Canada's Rail Based Freight Logistics System*, QGI Consulting, November 2009. pp 56-63

<sup>5</sup> *Analysis of Operating Practices: Key Issues from Stakeholder Interviews Potential System-wide Solutions*, QGI Consulting October 2009.

associated with these investments and ensure a commercial return will be achieved over the life of the investments being considered.

QGI's interviews with railway representatives revealed that many believe that some of their customers have difficulty providing accurate medium to longer term demand forecasts. Railway staff identified many reasons for this including:

- inefficiencies in customers' logistics management processes;
- unrealistic or inaccurate market forecasts and market share projections; and
- an unwillingness of customers to reveal their own marketing projections.

In particular railway representatives indicated that they believed that shippers often had more accurate forecasts available within their own organizations but that railway representatives simply were not able to access this information through their regular contacts in the shippers' organizations. Some railway representatives also believe that customers may have an incentive in certain situations to inflate their traffic volume forecasts in order to ensure that railway investment will be made at levels exceeding demand, in order to ensure shipper access to capacity during times of constraint due to high demand for customers' products or due to operating disruption that limits available transportation capacity.

In addition, the timing of annual railway planning activities is, in many cases, not aligned with the timing of their customers' internal planning activities. Whereas CN and CP look to begin planning for the coming year early in Q3 many of their customers' planning activities do not begin until early or mid fall, about the time the railways are targeting to complete their planning.

At an aggregate level railway forecasts of demand are accurate within approximately 10% over the course of a year.<sup>6</sup> An additional challenge for railways is to effectively manage day to day variability in demand that results from the individual decisions of shippers regarding the timing of their shipments. The railways' core service design<sup>7</sup> does assume a day of week distribution for demand across its network based on historical movements and uses this to plan its daily train service. While history is a reasonably good predictor of traffic flows shipper behaviour can change during the course of year for any number of reasons that the railway cannot anticipate when it establishes its base service plan.

Shippers in all business segments do not dispute the significant challenges they face in developing reliable forecasts of transportation demand. However, they point out the special difficulties they face in predicting not only their own, but also their competitors' and their customers' expected behaviour, capacity and requirements in developing such forecasts.

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<sup>6</sup> *Analysis of Railway Fulfillment of Shipper Demand and Transit Times*, QGI Consulting March 2010.

<sup>7</sup> Excludes bulk traffic moving in unit trains that while included in annual planning for capacity purposes are not included in the railways' basic service design as unit trains are proposed and activated based on monthly and weekly planning activities.

Forecasting accuracy can be further complicated when issues of competition and market concentration are considered. While great effort may be expended by both railways and shippers in the development of detailed demand forecasts the volume of traffic ultimately handled by the railways will be impacted by modal and intra modal competition as well as competitive forces in their customers' markets. Generally speaking the more concentrated a market segment is, coal or sulphur for instance where there are only a handful of shippers, the easier it is to develop demand forecasts at the customer origin level. However, in some business segments such as Intermodal, where there are a very large number of small and infrequent shippers it is difficult and in many cases not practical to attempt to forecast traffic volumes for individual customers. The accuracy of demand forecasts will also be impacted by broader market forces – such as occurred during the global financial market upheaval of 2008-2009. Customer demand for rail freight transportation fell precipitously during late 2008 however; it would be unreasonable to criticize railway customers (or railways) for failing to properly forecast the severity of the reduction in freight demand that resulted from these extraordinary market forces.

Finally, unplanned disruptions in railway operations can lead to changes in the level or timing of rail freight demand. Examples include weather related disruptions such as occurred during the winter of 2007-2008 when railway service was severely disrupted numerous times between December and March. When railway operations are disrupted some unfilled transportation demand will be shifted to the future creating a higher demand for transportation in future periods. Determining the degree to which unfilled demand can be shifted to the future and the degree to which the economic opportunities are lost is difficult to predict and a source of contention between railways and their customers. However, such disruptions can occur off the railway network as well, particularly when unplanned production shutdowns due to strikes, plant operations problems, or ocean transportation disruptions result in changes to freight logistics demand levels and timing.

## 4. Service and Asset Planning

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Identifying and forecasting the volume of traffic that is expected to be handled during a year is the initial step in the railways' planning processes. An important output of demand forecasting activities is a series of different views of forecast traffic volumes that are used in railway asset and service planning processes. The following section of the report describes how market demand forecast information is transformed and used for railway operational planning.

### 4.1 *CN Annual Service and Asset Planning*

As described earlier, CN's principal unit of demand is the number of rail cars the railway plans to move during the course of a year. However, this unit of demand alone is not sufficient to meet the needs of CN's downstream asset and service planning activities. As such the carload forecast is translated into other units of demand including tons and revenue ton miles (RTM).<sup>8</sup> Tonnage forecasts are derived from the carload forecast by applying historical ton per car ratios at the individual commodity-car type level.<sup>9</sup> These forecasts are then used to calculate revenue ton miles. RTMs are a measure of revenue workload calculated by applying the average length of haul against forecast tons for all movements at a commodity-origin-destination level. At the most granular level this calculation is done for an individual shipper-commodity-origin-destination combination. Where traffic is forecast at a higher level of aggregation such as commodity-origin-destination CN's planning system will calculate RTMs using the average weighted historical length of haul for all of the forecast traffic included at a particular level of aggregation.

#### 4.1.1 Rail Car Fleet Planning

Forecast carloads are used to plan CN's rail car fleets. This unit of demand is seen to be effective and appropriate for this planning activity because it is accurate at an aggregate level. It is not however sufficiently accurate at a detail level such as the origin-destination flow level to be effective for train service design planning as this requires more accurate estimates of the tonnages to be moved.

In developing its rail car fleet plan CN's objective is to define the total number of cars by individual car type that it believes will be required to handle the forecast traffic. The number of cars required to handle a defined volume of traffic is dependent on a number of variables including: the absolute volume of traffic to be moved and the planned car cycles<sup>10</sup> for each individual car fleet. In situations where rail cars are used in single point to point dedicated

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<sup>8</sup> Revenue ton miles are also referred to as net ton miles.

<sup>9</sup> CN's planning system associates a specific car type against all forecast commodities.

<sup>10</sup> A freight car cycle is a measure of the elapsed time for the movement of a car including the time for each segment of a car trip. The segments include time in loading, loaded transit, unloading and empty transit to its point of next loading. Car cycles for individual fleets are generally computed by summing the time spent by all cars for all car trips in each cycle segment and dividing by the total number of car movements in that segment. The weighted average times for all segments are then added together to produce an average car cycle number.

service the sizing of a rail car fleet is relatively straightforward. However, with the exception of specialized equipment operating in customer assigned pools this is rarely the case. Rather the railway's car fleets are largely used in general freight service and are shared by many shippers for movements between many origins and destinations with varying lengths of haul with highly variable cycle times. As such the railway uses average cycle times for a given fleet based on historical traffic distribution patterns.

The principal steps in sizing each rail car fleet can be summarized as follows:

1. Develop demand forecast expressed in carloads
2. Identify specific commodity movements within the forecast for which the railway will supply the cars
3. Calculate average car cycles by car type based on historical traffic movements
4. Adjust historical car cycles to reflect asset utilization targets (car cycle improvements) by car type
5. Apply car cycle data by car type against forecast demand to determine the number of rail cars required to handle the traffic through the course of the year accounting for seasonal fluctuations in traffic
6. Compare calculated car requirements against existing fleet positions including planned car retirements, expiring leases during the planning period, target bad order ratios<sup>11</sup>, planned rail car maintenance or modification programs and assumptions regarding substitution<sup>12</sup> of cars between fleets
7. Identify forecast fleet shortages and or surpluses by car fleet

In cases where the fleet planning process yields a projected car shortage for a given car fleet CN will assess the strategies available for eliminating the shortage considering the size and duration of the projected shortage. Options generally include the lease or purchase of additional cars. Because of the long lead times associated with new car construction, typically one year or more, this option will not be considered unless the shortage is projected to be long term and a business case can be developed to support the investment. Leasing options will be limited by the availability of cars in the North American freight car market and the applicable lease costs. Given the homogeneous nature of most rail car fleets in North America if a car shortage is being driven by a general increase in market volumes, in grain for instance, the lease market may also present limited options as other railways may also be pursuing the same car types at the same time.

Where the rail car planning process identifies a projected surplus position the railway will seek to minimize the costs associated with the surplus asset through leasing or sales opportunities with other railways or rail car leasing companies, storage of cars or returning leased cars to lessors if it is financially advantageous.

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<sup>11</sup> The term bad order is used to describe a rail car or locomotive that is removed from service due to mechanical failure. In fleet planning for both rail cars and locomotives railways assume a certain level of ongoing bad orders or the average percent of a fleet that is unavailable for service on a daily basis. (Bad order ratio = cars unavailable / total cars in fleet) The bad order ratio applied for a given fleet of cars or locomotives will typically reflect the average age of the fleet, its mechanical history and targets for asset utilization established by the company.

<sup>12</sup> While some freight movements require very specific car types to handle the traffic, other traffic can be moved with a variety of car types. For example, while some woodpulp shippers may request cars of a specific weight capacity with a specific door type, they may accept substitute cars with lower weight capacity and different door configurations. Similarly, users of covered hopper cars may prefer cars with specific types of top hatches and unloading gates however railways may substitute cars that do not have the preferred loading, unloading and capacity configurations.

### 4.1.2 Service Design Planning

The objective of the service design or train service planning process is to develop the detailed base train service plan required to handle the forecast traffic volume and to accommodate where required scheduled passenger train operations. The output of this planning process is a system wide base train service design that identifies the schedules and frequency of trains that the railway plans to operate during the planning period. At a detail level the train service plan will identify the operating parameters for each scheduled train service including:

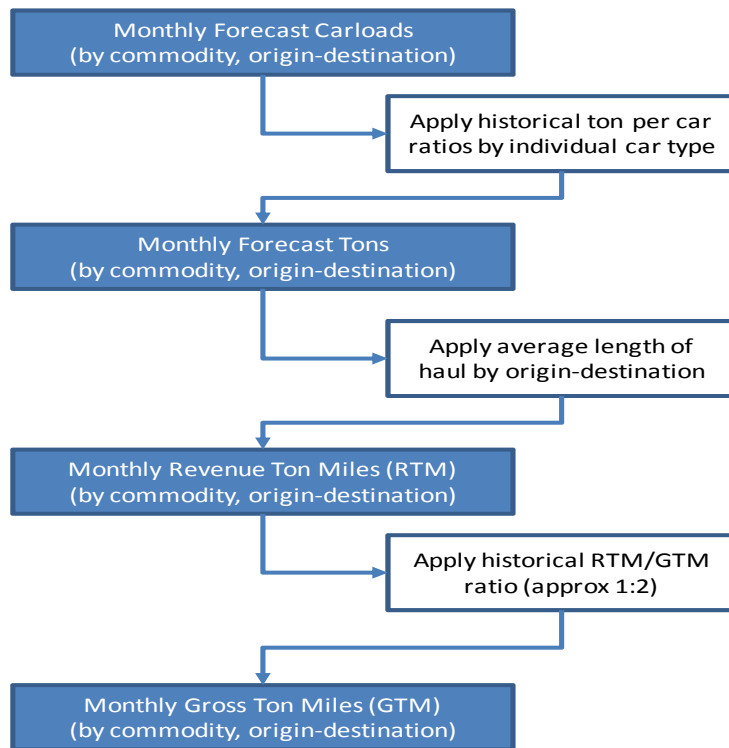
- the days of the week it will operate and scheduled departure and arrival times;
- the origin and destination terminal for each train;
- the type of traffic planned to be moved including how traffic will be blocked (grouped on the train) to facilitate the setting off and picking up of traffic at intermediate terminals for delivery to customers and to make planned train connections;
- established priorities for traffic in cases where available traffic exceeds available train capacity;
- on line work (switching) to be performed by each train; and
- maximum train lengths and weights based on routing to account for grades, curvatures, maximum gross weight on rail restrictions and siding lengths to allow for train operations in both directions on single track territories.

In addition to scheduled train operations, the railway needs to plan for the movement of trains that operate on demand, in response primarily to bulk shippers' requirements. Most unit train movements operate in response to the production and marketing requirements of bulk shippers. The demand for this type of traffic is usually defined in terms of the number, tonnage and weight and length of unit train movements that will need to operate in specific corridors on a monthly and weekly basis. The demand for these train movements may not be scheduled in advance for particular days and thus may need to take advantage of capacity "windows" on the railways' networks in the corridors where they will operate. Thus the service design plan will need to provide for these capacity windows and anticipate how the expected volumes of unit train traffic will be accommodated taking into account the needs of regularly scheduled train service.

Finally, the railways' service design teams will need to forecast and plan for time periods when tracks may be removed from service or have restricted operations to allow for scheduled maintenance operations to take place on track, track materials, right of way or traffic control systems.

The principal demand input to the service design planning process is forecast gross ton miles (GTM). Gross ton miles are a measure of railway workload calculated as the number of gross tons including freight cars and their contents, company service equipment, and cabooses multiplied by the distance moved – e.g. 10,000 gross tons x 1 mile = 10,000 gross ton miles. For planning purposes GTMs are calculated based on the revenue ton mile forecast using historical GTM/RTM ratios of approximately 2:1. For train service design GTMs rather than RTMs are used as GTM calculations will include the weight of the rail cars and empty car movements that must be accounted for when calculating train capacity, locomotive requirements and track maintenance. Figure 3 below provides a schematic view of how the GTM forecast is created.

Figure 3 GTM Forecast Development Process



The forecast GTMs are then applied against the base service design at a detailed level using historical traffic routing patterns.

This allows CN's service design team to determine if the existing service design has sufficient capacity to handle the forecast workload. Planners will also assess options for changes to the base design to address potential capacity issues or to identify opportunities for changes in train configuration or service frequency to achieve operating efficiencies.

### 4.1.3 Locomotive Planning

With its core service design in place CN then plans the locomotive requirements associated with the anticipated train operations. Locomotive planning at CN is done in three incremental phases that define the locomotive requirements for each line of business and service type. The three planning phases are:

- the base service plan including all manifest and intermodal train service
- bulk train service including coal and sulphur moving in unit trains
- grain train service including unit train and country spotting operations

CN uses train service simulation models to identify the demand for locomotives associated with operating its core service design. These simulations identify the locomotive requirements for each train run and allow CN planning personnel to identify the time locomotives spend hauling trains versus the time spent in yards. By looking at inbound to outbound train connections CN can identify the most efficient way to cycle locomotives between trains in order to minimize terminal dwell time and obtain the most efficient utilization from its fleet. As with rail car planning CN will factor into its locomotive demand projections a planned bad order ratio. This yields the planned locomotive supply for the base service plan.

Locomotive demand for forecast coal and sulphur traffic unit train service is based directly on the commodity demand forecast. The forecast demand is converted into planned train runs based on an expected number of cars per train. Each train has a planned train cycle time that will include loading at origin, loaded transit, unloading at destination and

empty transit back to origin. CN plans for this traffic to move in unit train service with dedicated locomotives for each train operated. The number of locomotives required therefore will be based on the number of locomotives assigned to each train multiplied by the number of trains divided by the planned train cycle.

For grain traffic locomotive demand planning takes into consideration grain service type – grain traffic moving on manifest trains, in unit train service and for country spotting and pick up operations. Grain traffic moving in manifest service will have been included in the base service plan and is therefore excluded here.

#### **4.1.4 Train Crew Planning**

In planning its train crews CN needs to account for two different wage structures – hourly and mileage based crews. Train crews in Quebec, on the former BC Rail territory, and in the United States operate under hourly wage agreements with all other train crews in Canada under mileage agreements. The total number of train crews required is determined by calculating the number of train miles (mileage based crews) and train hours (hourly based crews) required to execute the operating plan including scheduled train services and unit train service. Once the base requirement is established the plan is adjusted to factor in expected sick days, vacation time and planned retirements.

### **4.2 CP Annual Service and Asset Planning**

As discussed earlier CP employs an integrated annual planning process called the Sales and Operations Planning Process. This process encompasses all planning activities from the development of the initial demand (sales) forecast through to the execution of the integrated operating plan. The demand, supply and production planning modules of this integrated planning structure are where asset and service planning activities happen. In interviews with QGI, CP indicated that the purpose of its operational planning process is to create a balanced network plan while maximizing train length in order to ensure effective asset utilization and optimize the capacity of its network.

#### **4.2.1 Operational Demand Planning**

The operational demand planning phase uses the sales forecast as its key input and translates market demand expressed in tons into units of workload demand that can be used for train service and asset planning. There are three key methods employed in this phase of planning – forecasting of train miles, train start modeling, and product design and analysis. The planning process uses all three methods to estimate the operating workload and rationalizes and brings them together into the Integrated Operating Plan.

##### ***Train Mile Forecast***

CP, like CN, translates its market demand forecast expressed in tons into revenue ton miles by applying the average length of haul for movements at the commodity-corridor level. GTMs are subsequently calculated from the RTM forecast using historical ratios. Lastly train miles are calculated from the GTM forecast by applying historical

GTM/train mile ratios. Underlying these calculations is the core train design. The key output from this process is the total estimated workload for CP's network stated in train miles by service area and type of train service. Because this view of workload assumes the historical train service it is subject to adjustment if changes are made to past train design.

### *Train Start Modeling*

In parallel with the train mile forecast process is the development of planned train starts. Train start modeling is done for approximately 80 corridors and 15 major terminals in CP's network. Train starts are calculated from forecast carloads from the sales forecasting process. Total carloads to be handled, both loaded and empty, are calculated by applying historical empty-load ratios to the forecast for loaded cars. The number of trains required is then calculated by applying historical average car lengths and train length/weight ratios against the total number of cars. The principal output of this process is an estimate of the total number of trains required to meet the demand in the forecast expressed in terms of total monthly train demand by network corridor. Estimated train starts at an individual corridor level are then compared to corridor capacities to identify potential constraints.

### *Product Design and Analysis*

Train service design planning is done using CP's internally developed Product Design and Analysis Visibility Tool (PDAE) in conjunction with the MultiRail<sup>13</sup> train service planning application. The objective of this planning exercise is to assess the capability of the existing service design to adequately handle the forecast traffic volumes. The current demand forecast is translated into a detailed traffic file by applying the forecast volumes against a historical traffic file thus providing a view of forecast demand by origin-destination station by day of week. This traffic file becomes the input to the MultiRail system that CP uses for service design planning. The detailed "forecast" traffic file is loaded to the MultiRail system which enables CP planning personnel to assess the ability of the existing train service design to accommodate the forecast demand. The system identifies opportunities for changes to the existing design to optimize handling of the forecast volumes.

## **4.2.2 Supply Planning**

The supply planning phase looks to size the assets required to execute the service plan. This includes rail car and locomotive fleet planning and train crew planning. All asset planning builds in defined productivity initiatives. Locomotive fleet sizing uses the MultiRail Locomotive planning module. This module identifies the locomotive demand associated with the operation of the service design.

Rail car fleet planning is done by CP's car management team. Car management uses the monthly demand forecast from the sales and revenue forecast to plan fleet requirements for seven major car fleets consisting of twenty sub fleets. Car requirements are calculated by applying average monthly car cycles adjusted for productivity initiatives and

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<sup>13</sup> MultiRail is a third party train service planning software developed by MultiModal Applied Systems of Princeton, New Jersey.

for seasonality against the forecast demand. CP also factors in an average 4-6% bad order factor based on the mechanical history of individual car fleets. Some fleets will have higher maintenance requirements and thus corresponding bad order ratios based on the types of commodities they handle and the loading and unloading practices of shippers and receivers.

Crew planning is done by CP's crew management team. Crew demand projections are based on projected train demand by corridor. The number of crews required is calculated by determining the crewing requirements for each forecast train run within each individual corridor. Train crew requirements are adjusted for planned absentee rates, sick leave and vacation time.

### ***4.3 Annual Service and Asset Planning Challenges***

The biggest challenge to service planning for CN and CP is the volatility of demand on a day to day basis. While planning activities are detailed and use the best available information regarding expected traffic volumes they cannot realistically account for the inevitable ebb and flow of daily traffic volumes resulting from the decisions of individual shippers, the actions of other supply chain participants or unanticipated events in either the railway network or customers' markets. Railways recognize that perfection in this environment is unachievable as there are too many factors that are not within the railways' control. The objective of these planning processes is to establish a core service plan, supported by sufficient assets to meet expected demand with sufficient flexibility to respond to day to day occurrences at an acceptable level of financial risk to the railways.

### ***4.4 Short Term Planning and Asset Management***

The annual planning processes at CN and CP establish the volume and revenue expectations for the coming year and contribute to the development of operating plans that drive expense forecasts and projections for corporate financial performance. Once finalized these individual plans are translated into financial budgets and workload projections for the year and become the basis against which actual performance is measured. While the annual planning process comes to a close at this point both CN and CP continue to do short term planning on a monthly and quarterly basis to measure performance to budget and adjust the outlook for the remainder of the year regularly revisiting asset and operational plans.

Although significant time and effort is expended in creating the annual plan a forecast created 3-4 months prior to the beginning of the year cannot perfectly anticipate evolving market conditions and customer behaviour particularly in times of market volatility. As such both railways revise projections for revenues and volumes using monthly and quarterly outlooks. These outlooks seek to incorporate the most current customer and market information to confirm expectations for the balance of the year and then translate revisions into refreshed views of asset and train service requirements going forward.

The question the railways are continually attempting to answer is whether or not performance to date, whether above or below plan, is a leading indicator of volume and financial performance to follow. In cases where demand has fallen short of expectations should the railway expect to see a “snowplow” effect whereby deferred demand will materialize later in the year? Other possibilities are that the demand expired as it was either time sensitive or was satisfied by other suppliers or via another transportation provider and is effectively lost to either the shipper, the railway or both? Similarly, in situations where demand has exceeded planned volumes to date - is this an indication of a sustainable increase in demand that will carry through to the end of the year; has demand projected for later in the year simply moved forward; or will volumes return to planned levels? These are important issues for the railways to manage as they can have a significant impact on rail car, locomotive and train service plans that have been put in place using the original plan assumptions.

Monthly and quarterly planning processes, including discussions with their customers, attempt to provide the best possible short term outlooks that can be used to make decisions regarding changes to rail car and locomotive fleets and whether or not the existing train service plan is suitable going forward. In addition to trying to maintain service levels to customers and ensure sufficient capacity is in place the railways are looking to maintain control of their short term operating costs.

Both CN and CP have implemented formalized processes for reviewing current year performance and translating changes in demand outlooks into operational workload projections that allow for the ongoing review of asset and service plans.

#### **4.4.1 CN Short Term Planning Processes**

CN’s Equipment Requirements Team (ERT) is responsible for conducting ongoing reviews of the company’s asset requirements and plans throughout the year. The team is comprised of executives from the Marketing, Financial Planning and Operations Planning groups and is chaired by the vice president of Financial Planning. The ERT meets monthly to review asset plans for both marketing and operations based on performance to date and revised outlooks going forward.

For rail car fleet planning the monthly ERT process is supported by a weekly process that tracks forecast changes in short term customer demand as identified by Marketing and actual realized demand as measured through the company’s car ordering processes. With a view of projected demand and current actual demand on rail car fleets as well as fleet performance (car cycles) the process projects potential surpluses or shortfalls for rail cars by individual car type. Also included in this analysis are measures of recent and short term fleet attrition including retirements, cars destroyed, and expiring leases. Using all of these factors the ERT process determines actions to be taken to meet expected demand within expected performance levels in consideration of established expense targets. Decisions of the ERT are required to be unanimous and require sign off at the VP level in each function.

### *Locomotive Planning*

CN continually assesses the performance of its locomotive fleet to identify situations where short term locomotive capacity is becoming constrained or surplus. CN uses its internally developed Locomotive Planning System (LPS) to measure both the daily performance of its locomotive fleet and the near term demands on planned train operations. This is done by loading the current core service design and planned bulk train demand into the LPS which provides CN's management team with a dynamic view of forecast daily supply and demand for locomotives at the individual terminal and train level.

As part of the locomotive management and planning process CN monitors the performance of a number of key drivers including: rail car dwell times, train length, and car velocity (average car miles per day per car). The performance of each of these operational elements is used to identify emerging trends that may signal the need for additional locomotives or alternatively a surplus fleet. For terminal dwell times the focus is on identifying cars that have dwell times greater than 24 hours. An increase in the number of such cars may signal the need to either operate additional trains or longer trains in order to avoid a build up of cars in terminals. Operating additional or longer trains can increase demand for locomotives. Similarly average car velocity is used as an indicator of network efficiency and fluidity. If performance falls consistently below established thresholds it may signal the need to activate additional trains. The railway's train service design assumes a planned train length and weight and a locomotive horsepower to train weight ratio. Short term fluctuations in demand can result in less or more traffic being available for a designed train service that may result in longer or shorter train lengths than originally planned. By tracking this performance CN is able to identify developing trends and make tactical adjustments to its locomotive distribution strategies. When train length is decreasing it may present the railway with opportunities to combine trains thus operating fewer total trains and reducing the demand for locomotives. When train length is increasing it may signal the need to run additional trains thus placing greater demand on the locomotive fleet.

Where short term locomotive shortages or surpluses are identified they are typically addressed using locomotives made available from or to other railways or locomotive leasing companies through either short term leasing or trading of horsepower hours. This latter approach is relatively common in the North American railway industry. Individual railways establish bilateral agreements to use one another's locomotives for short periods of time. In lieu of traditional commercial lease arrangements the railways track the use of their respective locomotives using a debit/credit system. Horsepower hours are assigned a dollar value and agreements may provide for reconciliation of imbalances between railways at prescribed times.

#### 4.4.2 CP Short Term Planning Processes

CP's ongoing planning activities and performance oversight are managed through its internal "Butterfly Team" structure. This group, which exists in parallel at the senior management and executive levels within the company, has direct responsibility for measuring performance to plan and conducting ongoing assessments of railway capacity issues throughout the course of the year. At the working level the Butterfly Team consists of representatives from all key Marketing and Operations functions within the company including product design, fleet planning, locomotive planning, crew planning, engineering, yield management and revenue planning. The Butterfly Team approach was adopted by CP Rail in recent years in direct response to capacity issues encountered in its critical western corridor.

The team conducts a monthly review of updated demand forecasts that incorporate the most recent market and customer intelligence and the company's performance and experience to date. Using analytical and planning techniques similar to those used in the development of the annual operating plans the team looks to identify potential near term capacity constraints in all aspects of network operations by asset class and location. Where potential capacity issues are identified the team assesses the range of alternatives available and makes recommendations to CP's executive team.

A key management tool used by the team is a network status model that describes the capacity condition of the network based on defined thresholds. Network condition is classified at a high level using color coded descriptions (blue, green, yellow, red) that describe the state of network capacity from surplus to constrained. The designation of a network corridor or asset class (crews, locomotives, freight cars) as yellow or red indicates the potential for near term capacity constraints and leads to the assessment of tactical options available to alleviate the projected capacity issue based on the specific nature and location of the constraint. Capacity constraints in a railway network can be the direct result of operational or market issues.

From an operating perspective short term capacity constraints can result from network disruptions including weather based disruptions and operational disruptions such as train derailments or problems experienced by one of the railway's customers at a major bulk or container terminal. The severity of the constraint, and therefore the solutions to be considered, will be determined by the location and duration of the disruption. A disruption on a low density branch line may impact local service to some customers but is unlikely to have a broad impact on the network as a whole. By comparison a main line disruption in a high density corridor such as CP's western corridor can have significant impact not only in the immediate area but if of sufficient duration will have ripple effects in other parts of the network. In addition to disrupting corridor train operations this kind of disruption can impact the flow of empty cars to meet future orders, reduce rail car fleet capacity by lengthening car cycles, impact crew and locomotive balancing and create congestion in railway terminals throughout the system as the predicted flow of traffic is disrupted.

Short term market shifts can also create capacity issues in the railway network. While most often thought of in terms of capacity constraints significant shifts in market volumes can also result in a short term capacity surplus. In one case

the railway will look at solutions to try and increase short term capacity and in the other ways to reduce capacity in order to control operating costs and maintain efficient operations. Bulk commodity markets such as coal and grain are good examples of where changing market demand can result in both of these situations.

Some examples of tactical responses that would be considered by CP's Butterfly Team in these situations are illustrated in the following table.

<b>Asset Class</b>	<b>Capacity Constraint</b>	<b>Capacity Surplus</b>
Train Capacity	<ul style="list-style-type: none"> <li>• Operate additional trains</li> <li>• Extend train lengths</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce train operations by combining trains in selected corridors</li> </ul>
Freight Cars	<ul style="list-style-type: none"> <li>• Add to existing fleets by activating cars in storage or through short term leasing</li> <li>• Allocate or ration cars to customers</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce car fleets through short term storage of surplus cars</li> </ul>
Crews	<ul style="list-style-type: none"> <li>• Increase train crew pools through recall of laid off employees if capable</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce train crew pools through short term lay offs</li> </ul>
Locomotives	<ul style="list-style-type: none"> <li>• Increase locomotive fleet through short term leasing or "borrowing" of locomotives from other railways</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce locomotive fleet through short term storage</li> </ul>

## 5. Summary

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The processes for demand and service planning at CN and CP, while somewhat different at a technical level are very similar with respect to the specific areas of planning, the key inputs used and the planning horizons employed.

Each year both railways plan their expected volumes of traffic and the assets and train services needed to support them using a number of different planning horizons. The focus of most planning activity is centered on the development of the railways' annual plans. These plans form the basis for longer term planning activities – for CN a five year plan and for CP a four year plan – that look to identify significant expected changes in railway volumes, traffic patterns and financial performance by introducing medium term macroeconomic assumptions and industry specific forecasts using a top down approach. These longer term views of demand are important to the railways as they are critical inputs to each company's multi-year capital investment strategies for asset renewal and capacity management.

The annual demand planning process is the initial planning activity and produces the forecast traffic volumes that become an important input to the downstream financial and operational planning activities for both railways. These demand forecasts are created using a combination of historical traffic performance, direct customer input and market intelligence. The railways differ somewhat with respect to the how they engage their customers and how many customers they look to involve in planning discussions. However, for both railways there is tremendous concentration of traffic volume within a small percentage of their shippers. In general, on both railways, over 80% of rail volumes are moved by approximately 5% of shippers. Thus, railways can reliably plan their asset requirements at a high level using the input of a relatively few shippers.

Key operational planning activities for both carriers are focused on sizing of rail car and locomotive fleets and the development of train service plans at levels necessary to meet demand projections including the anticipated timing of demand. In planning these assets both carriers explicitly factor in assumptions regarding the mechanical reliability of their fleets and productivity initiatives.

The railways share similar challenges in developing accurate demand forecasts related to customer and market factors beyond their control. With respect to customers the railways sometimes find it difficult to engage customers in planning discussions because their respective planning timelines are not necessarily aligned. In some instances the accuracy of demand forecasts provided by customers is suspect because of the individual market share assumptions used – a key reason why the railways explicitly validate individual customer forecasts against broader market forecasts.

Unforeseeable short term volatility in global commodity markets also present challenges for railway demand forecasting as they do for the railways' customers. In addition the volatility of day to day demand driven by the decisions of individual shippers and the actions of other supply chain participants can be problematic for the railways. The railways necessarily design their core train service using assumptions, based on history, of how volumes will flow

on a daily and week to week basis. While history is a reasonably good predictor of traffic flows, shipper and other stakeholder behaviour can change during the course of year for any number of reasons that the railway cannot anticipate when it establishes its base service plan.

CN and CP recognize, as do many shippers, that annual demand and service planning is not perfect and should not be expected to be. The challenge facing the railways is to establish operating plans that provide sufficient flexibility to reasonably adjust to short term market fluctuations and unanticipated disruptions within the logistics network at an acceptable level of financial risk. It is for this reason that both CN and CP expend significant effort in monthly and quarterly planning activities. The railways attempt to compensate for these types of events by continually measuring their performance to plan and assessing and adjusting their operations to maintain service consistency for customers and fluidity within their own networks.