RAILWAY LINE CAPACITY METRICS

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Introduction

The *Transportation Modernization Act* introduced amendments to the *Canada Transportation Act* that sought to increase the transparency of data pertaining to the performance of Canada's rail freight system, among a variety of other measures.[3] We assert that measures of performance that ignore capacity are easily manipulated and serve only to compare numerators over time, not actual performance compared to the capacity denominator. Further, measures of performance in a single year are not a very useful indicator. Even measures over time still only compare what is with what was, not what could be.

Canada's Recent History of Rail Service Failures

First, why are service failures relevant? There have been numerous rail service failures over the past 15 years or so that have caused significant concern to stakeholders and damage to shippers. When the Government of Canada tabled proposed amendments to the shipper protection provisions of the *Canada Transportation Act* in May of 2007, it also announced its commitment to initiate a review of the federal rail freight system in Canada in light of the significant concerns of railway shippers and other rail-based logistics stakeholders that had accumulated at that time.[4] The resulting final report of the panel appointed by the Government of Canada in the federal rail freight service review ("**FRFSR**") was released in January of 2011 and concluded, among other things, that

- "The rail-based logistics system, as documented in the Phase I results and reflected in stakeholder comments, has gone through a period during which rail service was less than adequate…
- While some of the service issues are attributable to non-railway stakeholders (these include poor forecasting and port and terminal congestion), most of the issues raised relate to railway behaviour."[5] [underlining added]

In late 2012 and in response to the FRFSR, the Government of Canada tabled Bill C-52, also known as the *Fair Rail Freight Service Act*, to amend the *Canada Transportation Act* to establish a statutory right to a service level agreement and create an arbitration process in the event of a dispute between a shipper and railway company regarding such an agreement. Bill C-52 received Royal Assent in June of 2013, thereby making service level arbitration ("**SLA**") available to shippers.[6] However, there have been very few SLA proceedings and, in any event, the existence of SLA has not been effective at deterring railway service failures.[7] For example, notwithstanding the FRFSR and Bill C-52, the national freight rail system experienced extensive service difficulties during the winter of 2013-2014, which spawned significant litigation in the grain industry.[8] And, it was not only grain shippers that suffered during that time and thereafter, as demonstrated by various parties' submissions in respect of the *Transportation Modernization Act*, which is now law.[9,10]

None of these developments have prevented railway service meltdowns, as evidenced by the systemic failure in the Vancouver area in the winter of 2018-2019, which prompted the Canadian Transportation Agency to conduct an investigation on its own motion, and ultimately determine that Canadian National Railway ("**CN**") had breached its service obligations.[11]

Capacity

In light of these service failures, a relevant consideration is often a comparison of rail service relative to railway capacity. Parties asserting a railway service failure often face the argument that a railway company is constrained by the capacity of its network and its obligations to other shippers. However, there is a paucity of neutral, third-party data that a shipper may use to measure the service it has received relative to the railway company's capacity.

Neither the transitional reporting requirements in the *Transportation Modernization Act* nor the Government of Canada's consultation paper in connection with the development of regulations that will round out and refine these requirements come to terms with the need for greater transparency in relation to network capacity. Past performance is not necessarily an appropriate standard against which to measure current or future performance, and such a comparison cannot provide a reliable basis for addressing future needs. In addition, metrics that conflate railway output decisions respecting the allocation of crews, locomotive power and railcars with infrastructure characteristics into a single overall concept of capacity do not address the need for data that can be used to assess the service that is being provided against the railway company's capacity or, for that matter, to inform government initiatives in relation to transportation infrastructure or investment decisions by rail-dependent firms.

Railway line capacity data for past periods is likely to be the best indicator of future capacity, at least in the near term. The availability of railcars, crew and motive power is not an appropriate consideration when assessing the capacity of a railway line because the extent and allocation of all such resources are well within the control of the carrier over the medium and long term, albeit possibly not in the short term. Finally, what constitutes profit maximizing capacity from a railway perspective is a wholly inappropriate consideration for assessing railway line capacity or service failures.

We submit that the measures of railway line capacity are already well-established and that rail carriers and the Government of Canada have access to the tools and data necessary to measure and report on railway line capacity.

The Cambridge Study

In 2007, Cambridge Systems, Inc. published a study (the "**Cambridge Study**") at the direction of the Association of American Railroads as an assessment of the long-term capacity expansion needs of the continental United States freight railroads, including an approximation of the need for infrastructure improvements and investments to meet the U.S. Department of Transportation's projected demand for rail freight transportation in 2035.[12,13]

The Cambridge Study started by estimating the then current traffic volumes in each corridor on a trains per day basis. To do that, the Cambridge Study established current traffic volumes by corridor in trains per day based on the U.S. Surface Transportation Board's Carload Waybill Sample.[14] The study was careful to explain its methodology to address concerns over accuracy of various items.[15] For example, the Cambridge Study noted that the waybill sample does not collect information about empty, non-revenue producing railcar movements, and so the authors estimated those movements using information from the Uniform Rail Costing System on empty-return ratios by railroad, car type and car ownership.[16] In order to select representative daily traffic for each corridor, the Cambridge Study selected the 85th percentile day to account for weekly and seasonal variations.[17]

The Cambridge Study then assessed the current capacity of each corridor. It focused on three primary factors that contribute to a corridor's capacity:

1) Number of tracks;
2) Type of control system
    a. Automatic Block Signaling
    b. Centralized Traffic Control
    c. No Signal/Track Warrant Control
3) Mix of train types
    a. Train-Type Group 1 – Trains hauling heavier commodities, including coal and grain, and also merchandise / carload trains
    b. Train-Type Group 2 – Trains hauling lighter commodities, such as intermodal containers and automobiles
    c. Train-Type Group 3 - Passenger trains [18]

The Cambridge Study grouped the Train-Type Group 1 trains together because they all tend to operate at slower speeds, grouped the Train-Type Group 2 trains together because they tend to operate at higher speeds and run to more exacting schedules, and grouped the Train-Type Group 3 trains together because they tend to operate at high speeds, on fixed schedules, and often receive priority over freight trains. [19]

The image below from the Cambridge Study [20] summarizes the average capacity, expressed as a number of trains per day, based on the three inputs the Cambridge Study considered:

Table 4.2 Average Capacities of Typical Rail-Freight Corridors
Trains per Day

		Trains per Day	
Number of Tracks	Type of Control	Practical Maximum If Multiple Train Types Use Corridor*	Practical Maximum If Single Train Type Uses Corridor**
1	N/S or TWC	16	20
1	ABS	18	25
2	N/S or TWC	28	35
1	CTC or TCS	30	48
2	ABS	53	80
2	CTC or TCS	75	100
3	CTC or TCS	133	163
4	CTC or TCS	173	230
5	CTC or TCS	248	340
6	CTC or TCS	360	415

Key: N/S-TWC – No Signal/Track Warrant Control.
ABS – Automatic Block Signaling.
CTC-TCS – Centralized Traffic Control/Traffic Control System.

Notes: * For example, a mix of merchandise, intermodal, and passenger trains.
** For example, all intermodal trains.

The table presents average capacities for typical rail freight corridors. The actual capacities of the corridors were estimated using railroad-specific capacity tables. At the request of the railroads, these detailed capacity tables were not included in this report to protect confidential railroad business information.

Source: Class I railroad data aggregated by Cambridge Systematics, Inc.

The Cambridge Study noted that a corridor serving multiple train types will typically have a lower capacity than a corridor serving a single train type, due to the different operating speeds of the trains.[21]

Accordingly, it may be reasonable for a person attempting to assess railway line capacity to make some assumptions about the mix of train types to traverse a corridor. In the case of the Government of Canada, if it were not already in possession of train mix information (or it were to unsuccessfully seek it from CN or CP), the *Transportation Modernization Act* requires class I rail carriers to provide data from which the Government should be able to accurately estimate the train mix of major railway lines.[22]

The Cambridge Study acknowledged that other factors, such as the frequency and length of sidings, the capacity of yards and terminals, the terrain, the power of the locomotives, track speed, and individual railway operating practices, can influence corridor capacity, but did not have complete, consistent, and current information on these additional factors.[23] Accordingly, the Cambridge Study focused on the three factors listed above.

The Cambridge Study indicated that it reviewed the calculated capacity of each corridor with the relevant railroad, which received an opportunity to make adjustments to update network information and better represent the actual corridor train volume and capacity.[24] The Cambridge Study continued on to compare then current volumes with these corridor capacities, and conducted a series of projections for future traffic volumes and necessary infrastructure expansions, and the projected cost thereof, all of which is beyond the scope of this paper.[25]

Importantly, the Cambridge Study did not make any attempt to account for the availability of crews, locomotives or railcars in estimating rail corridor capacity; those resources were simply assumed (implicitly) to be available and not a limiting factor. Clearly, crews, locomotives and railcars are all readily available, albeit perhaps not in the immediate term, depending on rail carrier operating practices. Nothing stops the carrier from maintaining adequate crew and rolling stock; that is simply an operating decision and forms part of the common carrier obligations enshrined in the level of service provisions of the *Canada Transportation Act*.[26] Further, to the extent decisions to withdraw or reallocate power, crews or equipment, whether alone or in combination, impact rail corridor capacity, those are solely rail carrier decisions. The objective of achieving a lower operating ratio is not a justification for reducing service. In any event, neither the decision nor the reason for the decision to withdraw or reallocate resources has anything to do with the actual capacity of a railway line. There is no need to depart from established measures of railway line capacity to attempt to account for the availability of crews, locomotives or railcars.

At the very least, a good place to start measuring rail service performance is with independent assessments of actual rail capacity using the Cambridge Study metrics.

As a backstop to the study of performance, there is a surrogate for capacity that rail carriers already employ. Both carriers have reams of data allowing them to calculate periodic gross ton miles ("**GTMs**") of traffic by traffic type on any given subdivision. That measure alone would help establish a rough baseline of what has been achieved, in terms of volumes transported on that subdivision, at any given time. To the extent a rail carrier improves efficiency, through longer trains as just one example, density increases as demonstrated by GTM per commodity per subdivision could establish a new "denominator" from which to judge performance in one period versus another.

Conclusion

Significant rail carrier service failures have continued despite several efforts to address their causes and provide for remedies when they occur. As part of its efforts to better understand the reasons for the service failures and enact useful remedies, the Government of Canada should use established baseline metrics to

measure the capacity of railway lines. To optimize service levels, there is no need to assess the profit maximizing capacity of a railway line, or account for the availability of crews, locomotives or railcars; indeed, attempting to do so would depart from established methods and would be inappropriate. At the very least, established measures are a useful starting point to distinguish between infrastructure capacity and rail carrier performance and to allow users to measure performance against capacity as part of the overall analysis in determining causes for rail carrier service failures.

Endnotes

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[3] For example, subsection 117(3) of the *Canada Transportation Act* was amended to require each railway company to make railway tariffs available on its internet site. Section 136.9 of the Act was implemented to require each railway company to publish an up to date list of the locations of the railway interchanges it operates on its internet site or on the internet site of an association or other entity representing railway companies. In addition, the *Transportation Modernization Act* requires class I rail carriers to report certain information to the Minister of Transport for the purposes of determining long-haul interswitching rates and communicating service and performance indicators to the public (*e.g.* see section 51.4(1) of the *Canada Transportation Act*).

[4] See the Final Report of the Federal Rail Freight Service Review dated January 2011, which is available at: https://www.tc.gc.ca/media/documents/policy/TP_15042_Final_Report_EN_WEB.pdf.

[5] *Supra*, note 4, page 47.

[6] The full text of the *Fair Rail Freight Service Act* is available at: https://www.parl.ca/DocumentViewer/en/41-1/bill/C-52/royal-assent/page-4

[7] The Canadian Transportation Agency's annual reports (available at: https://www.otc-cta.gc.ca/eng/corporate-reports) disclose that the Agency resolved the following number of rail disputes via level of service arbitration during the following fiscal years:
2018-2019: 0
2017-2018: 0
2016-2017: 0
2015-2016: 1
2014-2015: 5

[8] For example, see Canadian Transportation Agency Letter Decision No. 2014-10-03 (*Louis Dreyfus Commodities Canada Ltd. vs. CN*), Canadian Transportation Agency Letter Decision No. 2014-12-18 (*Viterra Inc. vs. CN*), Canadian Transportation Agency Letter Decision No. 2014-12-18 (*Richardson International Limited vs. CN*)., as well as subsequent appeals of each: See the Federal Court of Appeal's decision in *CN vs. Viterra Inc.*, *Richardson International Limited*, and the Canadian Transportation Agency (2017 FCA 6) and *CN v. Louis Dreyfus Commodities Canada Ltd. and the Canadian Transportation Agency* (2016 FCA 232).

[9] See the submission of Teck Resources Limited (available at: https://www.ourcommons.ca/Content/Committee/421/TRAN/Brief/BR9076752/br-external/TeckResourcesLimited-e.pdf) dated September 12, 2017, which indicates, among other things: "Perennial rail service challenges have impacted our competitiveness, our national supply chain's long term economic sustainability and Canada's global reputation as a trading nation. To put this in perspective, the direct costs attributable to rail service failures incurred by Teck have amounted to as much as $50 million to $200 million over 18 month periods in the past decade."

[10] See also the testimony of Mr. Brendan Marshall, Vice-President, Economic and Northern Affairs, Mining Association of Canada before the Standing Senate Committee on Transport and Communications on February 7, 2018 (https://sencanada.ca/en/Content/SEN/Committee/421/trcm/53786-e): "…we are continually facing an unlevel playing field in the rail freight market which manifests as significant and perennial service failures. The reason is that the Canada Transportation Act is an imperfect surrogate for competition in a monopoly marketplace. Many shippers are captive to one railway and beholden to railway market power as a result." Mr. Brad Johnston, General Manager, Logistics, Teck Resources Limited testified on the same panel: "Throughout the consultation process for developing this bill, Teck has advanced balanced solutions to address the significant rail service issues that our sector continues to experience. To put this in perspective, Teck's experience is that direct costs attributable to rail service failures have been as high as $200 million over various periods in the past decade. These are added failures and costs that our global competitors simply do not face."

[11] Canadian Transportation Agency Letter Decision No. CONF-9-2019 dated April 15, 2019, which is available at: https://otc-cta.gc.ca/eng/ruling/conf-9-2019.

[12] See the report of Cambridge Systematics, Inc. dated September 2007 entitled "National Rail Freight Infrastructure Capacity and Investment Study", available as of February 28, 2020 at: http://www.coaltrainfacts.org/docs/natl_freight_capacity_study.pdf.

[13] Also, see Cambridge Systematics, Inc.'s presentation in respect of the Cambridge Study, available as of February 28, 2020 at: https://prod.stb.gov/wp-content/uploads/files/docs/railEnergyTransportationAdvisoryCommittee/Cambridge%20Systematics%20briefing.pdf.
[14] *Supra*, note 12, page 4-2.
[15] *Supra*, note 12, Appendix A.
[16] *Supra*, note 12, page 4-2 and Appendix A.
[17] *Supra*, note 12, page 4-3.
[18] *Supra*, note 12, page 4-5 and 4-6.
[19] *Supra*, note 12, page 4-6.
[20] *Supra*, note 12, Table 4-2 on page 4-7.
[21] *Supra*, note 12, page 4-6 and 4-7.
[22] See section 76(1) of the Act, which currently requires class 1 rail carriers to provide to the Minister of Transport, in the form and manner that the Minister may specify, a report containing a variety of shipment-specific information, including the standard transportation commodity code, and the origin and destination of the shipment.
[23] *Supra*, note 12, page 4-5, footnote 15.
[24] *Supra*, note 12, page 4-7.
[25] *Supra*, note 12, page 4-8 through page 7-6.
[26] In Canadian Transportation Agency Letter Decision No. 2014-10-03 (*Louis Dreyfus Commodities Canada Ltd. vs. CN*), the Agency was clear at paragraph 14 that crews and railcars are components of a railway company's level of service obligations (also commonly referred to as the common carrier obligations): "As a shipper remedy, one of the purposes of section 113 of the CTA is to counterbalance the monopoly or near monopoly power that a railway company may exert with respect to certain shippers in some circumstances. To the extent that monopoly power can be exerted, the railway company's preferences will overwhelm shippers' preferences in terms of the overall car supply, supply of motive power, delays, deployment of crews and other level of service issues." Also, see Agency Decision No. 344-R-2007 (*Great Northern Grain Terminals Ltd. vs. CN*), in which the complainant shipper successfully argued that CN's failure to supply a sufficient number of grain railcars to the shipper constituted a breach of CN's service obligations.