LAWSON LUNDELL LLP

Suite 1600 Cathedral Place
925 West Georgia Street
Vancouver, BC
Canada V6C 3L2

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Keith Bergner
D: 604.631.9119 | 403.218.7538
F: 604.694.2910
kbergner@lawsonlundell.com

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British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver BC V6Z 2N3

Attention: Mr. Patrick Wruck,
Commission Secretary

Dear Mr. Wruck:

Pacific Northern Gas Ltd (PNG) and Triton LNG Limited Partnership (Triton) Letter Agreement (the Letter Agreement) Application - Project No.1598957

Please find enclosed for filing:

1. Direct Evidence of Davis Thames on behalf of Western LNG LLC; and

2. Direct Evidence of Jeffrey Church.

Yours very truly,

LAWSON LUNDELL LLP

Keith Bergner*

KBB/beg

*Law Corporation

Direct Evidence of Davis Thames on behalf of Western LNG LLC

Q.	Please state your full name.
A.	Davis Thames
Q.	By whom are you employed and what is your position there?
A.	I am the President & CEO of Western LNG LLC, Suite 205, 4010 Blue Bonnet Blvd, Houston Texas USA 77005.
Q.	What is the purpose of this testimony?
	This testimony provides: • An introduction to Western LNG LLC ("Western") and its senior management; • An overview of Western's proposed Kitimat Project and its current status; • An overview of Western's discussions with Pacific Northern Gas, Ltd. ("PNG") and a description of the pipeline capacity requirements for the Kitimat Project; and • A discussion of potential the effect of the Triton agreement on Western's proposed project and rates generally for existing ratepayers on PNG's system.
Q.	Please briefly describe Western.
A.	Western is a Houston-based company engaged in the development of North American liquefied natural gas ("LNG") export facilities. Generally, Western is seeking to deploy innovative, low cost, small scale floating liquefaction technology at inland locations that have existing pipeline access to natural gas basins, which are becoming stranded behind burgeoning shale production in the United States. The business model is designed to enable Western to deliver LNG to end users in the East Asian markets on a favourable cost basis to most other liquefaction facilities being developed around the world, including those on the Gulf Coast of the United States. Western's initial development opportunity is located on the Douglas Channel near Kitimat, British Columbia (the "Kitimat Project").
Q.	Please briefly summarize your business and professional work experience.
A.	I was formerly a Senior Vice President of Cheniere Energy Inc. (NYSEMKT: LNG), and President of wholly-owned Cheniere Marketing, Inc., where I was responsible for the Cheniere's commercial activities and LNG trading business. With respect to Cheniere's first LNG export project, I was responsible for the development of the commercial model for Sabine Pass Liquefaction LLC, a wholly owned subsidiary of Cheniere Energy Partners LP (NYSEMKT: CQP), and led the team that negotiated and entered into sales and purchase agreements for over 16 million tonnes per annum of capacity at Sabine Pass at the end of 2010 and beginning of 2011. I also played a role in crafting the regulatory approach that resulted in the issuance of the Free Trade Agreement ("FTA") and non-FTA export licenses from the US Department of Energy during 2010. In 2013 I became the Chief Financial Officer for Cheniere Energy and its subsidiaries, and led the initial public offering of Cheniere Energy Partners Holdings LLC (NYSEMKT: CQH), the proceeds of which were used as equity capital to launch

	Cheniere's Corpus Christi LNG export project. I left Cheniere in 2014 to pursue other personal and business interests. Prior to joining Cheniere in 2005, I was Sr. Director of Finance and Risk Management at CrossCountry Energy, an interstate pipeline holding company that owned a number of pipelines including Northern Natural Gas, Transwestern Pipeline, an interest in Florida Gas Transmission, and in interest in Northern Border Partners prior to the bankruptcy of CrossCountry's parent in 2001. In 2004 as a result of sales of some of the pipelines and the purchase of the company by a joint venture of Southern Union and General Electric, the company owned and operated Transwestern, Florida Gas, Trunkline Gas, Panhandle Eastern, and several gas distribution utilities. From 1999 to 2001, I was an associate in Enron Corp.'s training program. Prior to joining Enron, I led an engineering department at Flowserve Corp's Los Angeles, California factory. I joined a predecessor company to Flowserve, BW/IP International, in 1990. I graduated with a B.S. degree in Mechanical Engineering from The University of Texas at Austin in 1989, and received a M.S. degree in Mechanical Engineering from Texas A&M University in 1992. I later received an M.B.A. from The Anderson School at UCLA in 1999.
Q.	Please briefly identify the other senior management personnel involved with Western.
A.	Western is managed by a seasoned team of executives experienced in the LNG and related energy infrastructure industries. Western's co-founder is Andrew Goldman, Chief Investment Officer of Hildred Capital Partners. He is a long-term investor in the liquefied natural gas sector. The other members of Western's management team include Michael Mellen and Brian Kerrigan. Mr. Mellen has been engaged in the US natural gas and power industries for over 24 years, and most recently worked for Methanex Corp., securing gas supply and transportation capacity for their methanol plants in several countries including Canada. Prior to that Mr. Mellen worked for Chesapeake Energy and Cheniere Energy securing markets for sales of natural gas, and prior to that worked for Calpine Corporation and Koch Industries. Mr. Mellen has a B.S. in Economics from the University of Houston. Mr. Kerrigan has more than 25 years in energy finance experience in banking, investment banking and private equity. His focus is primarily on the upstream, midstream and power industry. Prior to joining Western, Mr. Kerrigan served as Senior Vice President of Finance at Sunnova Energy Corporation. Prior to Sunnova, Mr. Kerrigan serves as Senior Vice President of Investment Banking at Pritchard Capital Partners, LLC. Prior to joining Pritchard Capital Partners LLC in October 2009, he was a Managing Director for CIT Energy focusing on providing junior and senior capital to upstream clients. Prior to that, he worked for a variety of energy companies and financial institutions focusing on structured finance. Mr. Kerrigan

	holds a Bachelor of Science Degree in Physics from The University of Texas at Austin and an MBA with a concentration in Finance from the Jesse H. Jones Graduate School of Management at Rice University. In addition Western has engaged Gerald Humphrey as an independent project management and execution consultant. Mr. Humphrey has over 45 years of engineering and construction experience, having served as the project director at Cameron LNG Export, and being responsible for pre-award activities and EPC project execution at the Cameron and Freeport export projects, and overseeing FEED execution for Mozambique LNG, Kitimat LNG, Elba Island, Golden Pass, Singapore, Peru LNG, and several US receiving terminal expansion projects. He has also been responsible for project execution at Northwest Shelf LNG in Australia, MLNG Dua in Malaysia, and various pre-project development activities at LNG facilities in Qatar, Australia, Oman, Nigeria, Malaysia, UAE, Indonesia and Alaska.
Q.	Please describe Western's Kitimat Project.
A.	Western has identified sites on Douglas Channel near Kitimat, British Columbia suitable for the location of a floating liquefaction facility which would produce 0.5 million tonnes per annum ("mtpa") of LNG, or approximately 27.3 pj per year, of LNG. The LNG produced at the facility would be loaded on standard LNG vessels, with approximately 10 deliveries per year leaving the facility. All sites being considered are within PNG's existing service area or could be served by a modest extension of the system from its existing terminus in Kitimat. Western's initial project will bring abundant, low-cost Canadian natural gas from the Montney, Horn River, and other Western Sedimentary Basins to rapidly growing markets in northeast Asia.
Q.	Please identify and briefly discuss of any significant commercial relationships related to Western's Kitimat Project.
A.	Western's development plan is supported by certain funds managed by affiliates of Apollo Global Management, LLC (NYSE: APO) ("Apollo"), a large, internationally recognized global alternative investment manager with over $245 billion in assets under management, that also holds an investment in a large natural gas producer that is active in the Western Canadian Sedimentary Basin. Subject to completion of certain milestones, Western will receive a capital commitment sufficient to fully fund construction of the project. Western has also entered into a Technical Service Agreement with Wison Offshore & Marine (USA) Inc., an affiliate of Wison Offshore & Marine Co. Ltd. ("Wison"), a Shanghai-based manufacturer of innovative infrastructure solutions and quality project delivery services to the global energy and marine industry. Wison, in connection with Black & Veatch, performed the engineering, procurement, construction, commissioning and startup of the highly successful Caribbean FLNG floating LNG platform at the beginning of 2017 - on time, on budget, and successfully meeting performance test criteria the first time. Pursuant to the TSA, Wison will develop the basis of design ("BOD") and carry out front-end engineering design ("FEED") for the Kitimat Project. Western has also agreed to the appointment of Wison as the EPC

	service provider for the floating liquefaction plant upon project FID. Under the terms of the TSA, Wison will provide a cost competitive FEED package utilizing its experienced in-house design team and execution methodology that has been optimized based on the successful delivery of the Caribbean FLNG. The FEED is expected to be completed in less than 40 weeks after the BOD is finalized.
Q.	Are you familiar with Exhibit E 1-1?
A.	Yes.
Q.	Is the description of the discussions between Western and PNG at pages 3 – 5 of Exhibit E-1-1 accurate?
A.	Yes. As described in Exhibit E 1-1: Western initiated discussions with PNG in October 2017 to obtain transportation service on the PNG pipeline from Summit Lake, BC to a site on Douglas Channel. During Western's enquiries regarding the terms of service for transportation on the system, Western found the Firm and Interruptible Gas Transportation Service Agreement, dated December 12, 2014 (the "EDFT TSA") that PNG had previously entered with EDF Trading Company ("EDFT") in the archived proceedings section of the BCUC website. PNG confirmed to Western that the EDFT TSA was a good model to use regarding the manner in which PNG would prefer to contract for the capacity. PNG indicated that for further discussions to proceed with Western, a Non-Disclosure Agreement ("NDA") between PNG and Western was required. Accordingly, a NDA was concluded on November 10, 2017. … Western had initially understood from other parties that there was available capacity on the pipeline to deliver enough feed gas to support a 1.0 mtpa project. However, PNG's representative told Western at the end of November 2017 that the pipeline only had 115 MMcf/d of throughput capacity in total, and that they believed that only 70 MMcf/d of capacity could be sold on a firm basis, leaving it enough capacity to satisfy its other obligations on the pipeline. PNG at that time indicated to Western that it had *"various potential load growth opportunities, most of which don't require 70,000 mcf but [that together] could eat up a significant portion of it."* The PNG representative concluded by stating that *"to keep things fair and civil we have a criteria and a reservation fee requirement/precedent which thins the vine for us."* Western's understanding was that PNG would both evaluate a proposed project to assess its feasibility and use the willingness of a project to pay option fees as criteria to identify the most likely potential customers for the capacity. During the month of December 2017, Western worked on reconfiguring its project plan to economically produce only 0.5 mtpa instead of the planned 1.0 mtpa, and developed its own hydraulic modelling analysis to attempt to understand the scope of any expansion that might be required to support the original 1.0 mtpa project scope. Western made several enquiries during this

time regarding PNG's existing commitments and its physical configuration. On December 15, 2017 Western advised PNG that it had completed reconfiguration of the project and was able to receive a reduced feed gas rate to support the 0.5 mtpa project, which would require contracting for the entire 70 MMcf/d of available capacity on the system. At that time the PNG representative stated that PNG might not be able to deliver the entire 70 MMcf/d, and enquired whether Western would be prepared to negotiate an option for the capacity, to which Western answered in the affirmative.

On January 8, 2018 Western delivered a proposal to PNG for contracting the entire 70 MMcf/d based largely upon the terms and conditions contained in the EDFT TSA. In addition, Western provided the results of its hydraulic modelling, which indicated that the scope required to increase the throughput on the system by an amount sufficient to support a 1.0 mtpa project would be very substantial. PNG acknowledged receipt of the proposal and stated that they would review it, and would respond in the next few days with comments. Western did not hear from PNG again until January 16th, when PNG stated to Western that they were committing 30 MMcf/d of the capacity to another project. Western later reached out to senior management at PNG to discuss the situation, and a meeting was arranged in Vancouver for January 25th.

During that meeting Western and PNG discussed how PNG could serve both Western's demand and the other party's demand for PNG's capacity. PNG indicated that the pipeline would have to be expanded in order to serve both parties. PNG's initial position appeared to Western to be that Western would bear the cost of the expansion (at that time Western did not know who the other party was or where their demand was located), but later PNG stated that it might be possible to arrive at a rolled-in rate applicable to both parties. Western indicated its willingness to share in the capital cost recovery to support an expansion, if it turned out that both parties ultimately decided to go forward with a project requiring PNG's capacity. The meeting ended with PNG agreeing to revise the term sheet Western had sent them and include a section on how to arrive at a regulatory formula for the rolled in rate, in a similar way to the manner in which the rate calculation methodology was spelled out in the EDFT TSA for the lateral between Kitimat and the project site. During that meeting the PNG representatives asked whether Western would be willing to enter into a transportation contract on similar terms to those negotiated with EDFT Trading, which Western confirmed in the affirmative.

During the month of February and March, Western did not receive any feedback from PNG aside from periodic notes in response to enquiries from Western stating that they were working on the proposal and that it would be sent shortly. It was not until mid-April that PNG notified Western that it had completed the proposal, which would involve Western obtaining an option to contract for 30 MMcf/d of existing capacity, and the right, subject to engineering studies and Western' s acceptance, to contract for an additional 40

	MMcf/d of capacity created by constructing an expansion of the pipeline, to deliver the full 70 MMcf/d to a potential Douglas Channel project site. At that time Western learned that the agreement with the other party had been concluded and filed with the BCUC, and would become public shortly, though the identity of the other party was not revealed. The PNG proposal was finally received by Western on April 27, 2018. It was not until May 15, 2018 that Western gained access, through the Commission' s website, to the Letter Agreement for which approval is now sought. That is when Western first learned the "other party" that PNG had concluded an agreement with (on March 29, 2018) was Triton, an affiliate of PNG, and that the terms proposed to Western were largely similar to those concluded by Triton, save for delivery points and throughput volumes.
Q.	Please elaborate on the discussions that took place on December 15, 2017 as referenced above.
A.	On December 15, 2017, a PNG representative asked me "Perhaps I should ask whether you are prepared today to negotiate an option for our capacity? That would make some difference." I answered in the affirmative. On behalf of Western, I advised PNG that Western would be willing to negotiate an option agreement in connection with 70 MMcf/d of capacity on the pipeline. I note that this discussion (on December 15, 2017) was approximately three-and-a-half months before PNG concluded the option agreement with Triton (on March 29, 2018).
Q.	Please elaborate on the events that took place on January 8, 2018 as referenced above.
A.	On January 8, 2018 Western delivered a proposal to PNG for contracting the entire 70 MMcf/d based largely upon the terms and conditions contained in the EDFT TSA. PNG's representative replied: "Thanks for the term sheet, certainly unexpected. I will review with my team and come back to you in the next few days with comments." Western had a hard time understanding why PNG found this to be "unexpected" given the discussions that had occurred during the previous 2 months. In any event, I note that when Western's written proposal was tabled and this exchange took place (on January 8, 2018) it was slightly less than three months before PNG concluded the option agreement with Triton (on March 29, 2018).
Q.	In discussing the meeting that took place on January 25, 2018, you indicated that "the PNG representatives asked whether Western would be willing to enter into a transportation contract on similar terms to those negotiated with EDFT Trading, which Western confirmed in the affirmative." Is Western still willing to enter an agreement on similar terms?
A.	Yes, I made that statement to the marketing representative during that meeting. I repeated that statement later after PNG had submitted the letter agreement for approval. I note that this meeting and the re-confirmation of Western's willingness to enter an

agreement (on January 25, 2018) took place slightly more than two months before PNG concluded the option agreement with Triton (on March 29, 2018).

As indicated above, for the next two months during the month of February and March, Western did not receive any feedback from PNG aside from periodic notes in response to enquiries from Western stating that they were working on the proposal and that it would be sent shortly. We now know that the Triton agreement was signed March 29, 2018. It was not until mid-April that PNG responded substantively to the proposal that Western had signalled as early as November 2017 and tabled January 8, 2018.

To confirm, Western would still be willing to enter into an agreement that is substantially similar to the agreement that this Commission approved between PNG and EDFT.

Q. During all of the discussions that has taken place with PNG, what opportunity was Western given to demonstrate that its proposal could provide greater benefit to existing PNG ratepayers than the Triton proposal that was given priority by PNG?

A. Western was not asked to submit a proposal for transportation service. Throughout the discussions, it was Western that consistently provided the initiative in this regard. As described above, in order to keep the discussions moving forward Western provided the term sheet proposal to PNG on January 8, 2018. The terms were based substantially on the terms of the previously-approved EDFT TSA, but Western deliberately proposed favorable terms to itself in several areas since this was the first submission of what was expected to be a back and forth negotiation. Western never received a response to the term sheet, save for the response received in April, and this response bore little to no resemblance to the terms proposed by Western in January.

Q. Are you prepared to provide the Commission and/or PNG with full details of the status of Western's Kitimat Project in terms of:

a. land acquisition;
b. First Nation consultations;
c. financing; and
d. engineering.

A. Western is prepared to share a full status report on those issues with the Commission on a confidential basis. Western would only be prepared to share full information relating to these issues with PNG if more robust and specific arrangements were established to ensure commercially sensitive information could not be shared with PNG's affiliate AltaGas and/or with Triton.

Having indicated Western's willingness to provide this information, I observe that I do not believe that the information will assist the Commission. My respectful view is that neither the Commission nor PNG should be in the business of picking winners. That task should be left to the marketplace. In my view, PNG should be required to provide access to its capacity on a non-discriminatory and transparent basis so the marketplace can determine those projects that will proceed.

	Western notes PNG's response to Western IR 5.1 and 6.5 in this regard. PNG states that is unable to identify even the nature of the facility that Triton is contemplating and remarks that "PNG's primary interest is a successful delivery of feedstock to the customer meter." I agree that the "successful delivery of feedstock to the customer meter" should be PNG's primary concern and, with respect, the concern of the Commission. To the extent PNG needs assurances that a request for capacity is based on "a credible project that presents an acceptable risk profile to proceed on commercial terms", the form of assurance it is entitled to should be determined by the Commission based on objective financial criteria that can be applied equally to all proposals that PNG receives.
Q.	In response to Western IR 1.6.2, PNG provides this understanding that "Triton considers the acquisition of sufficient PNG capacity is a critical path item in its development process". Does Western similarly view the acquisition of capacity being on its critical path?
A.	Yes, the acquisition of sufficient gas transportation capacity is most certainly a critical path item for Western. Indeed, it is likely a critical path item for any LNG export project. It is certainly not unique to Triton.
Q.	If the option is granted, and Triton exercises the extension options mentioned in Western IR 12.2, to their full extent, what impact would that have on the Western project?
A.	Based on PNG's response to Western IR 8.2, Western understands that so long as Triton has an option on 50 MMcf/day, Western would have to pay for PNG to "undertake a significant upgrade to the trunk line part of the pipeline from Summit Lake." PNG goes on in that response to emphasize that an expansion project of that sort is materially distinct from the system upgrade associated with the 50 MMcf/day allocated to Triton. Because PNG has declined to provide Western with any information on the cost or timing associated with an expansion project, all that I can say at this time is that granting the option would at best materially delay the Western project and materially increase its cost.
Q.	Please elaborate how granting the option to Triton that PNG now seeks the Commission to approve would potentially affect the cost and timing of Western's project in Kitimat.
A.	Since Triton will have up to two and a half years to declare its intent with regard to the capacity, if Western continues to pursue the Kitimat Project, it will have to assume that Triton is going to exercise its option for the capacity. This will cause Western to have to negotiate an agreement whereby (i) PNG conducts engineering and obtains approval to build an expansion of the Summit Lake – Terrace mainline and (ii) Western successfully negotiates a transportation services agreement to utilize that capacity, and it is approved by the BCUC. Regardless of whether the Triton agreement is approved or not, Western will need to negotiate (i) an agreement for utilizing the existing mainline capacity from Summit Lake to Terrace (though the daily quantity is

	dependent on whether Triton exercises its option or not) (ii) an agreement to utilize the existing segment from Terrace to Kitimat (iii) an agreement to pay PNG to design and permit a new segment from Kitimat to the proposed project site and (iv) a transportation services agreement on that newly built segment from Kitimat to the proposed project site. Note that these latter agreements are in substance what is covered in the EDFT option agreement. Western respectfully observes that Triton's part-owner, Altagas, stands to benefit substantially from these arrangements, and that if Triton delays exercising its option on capacity for a long enough time, it would likely force Western's hand into contracting with PNG to construct a substantial and costly expansion. If Triton then decided not to proceed with their project, Western could be left with an expansion that was not needed, and the pipeline would likely continue to be underutilized.
Q.	On page 7 of Ex 1-1, there is a summary of the various option agreements previously entered into by PNG and now proposed with Triton. Please comment on what you consider to be the principle differences between these agreements.
A.	I think the principle difference is the term of the options. The prior agreements had relatively short option periods, generally 6 months, and the proponents had relatively advanced project plans. Triton by contrast, through both the option period and the time period allowed for negotiating and executing a transportation services agreement, has an exceedingly long period of time to make a decision, and that creates an opportunity cost that impacts PNG and Western that is not accurately conveyed by a simple "premium per quantity" formulation that PNG persists using to justify its arrangement. In addition, the volumes under the previous options (between 75 and 84.25 MMcf/d) were substantially larger than the initial volume (20 MMcfld) to Triton. These earlier options were for substantially all of the existing capacity on the pipeline. However, the Triton volume reserves only a fraction of the existing capacity on the mainline between Summit Lake and Terrace (and none of the capacity between Terrace and Kitimat); however, the Triton volume renders Western (which requires 70 MMcfld) unable to use the remaining existing capacity (for which Triton is not paying) in the absence of additional expansion capacity. Again, this is not accurately conveyed by a simple "premium per quantity" formulation that PNG persists using to justify its arrangement.
Q.	PNG has suggested in Ex B -5 that a bird in the hand (Triton) is preferable to a bird in the bush (Western). Do you agree that the Triton project is a bird in the hand in a way that Western's project is not?
A.	The timeline and discussion above makes it clear that from late 2017 or, at the latest, January 8, 2018, PNG had "two birds in the bush." Both Triton and Western were seeking an option on capacity (and Western was seeking substantially more capacity than Triton). With respect, Triton only became a "bird in the hand" after PNG chose to pursue and conclude an agreement with it first. PNG cannot unilaterally make this choice, and then invoke it as the reason the Commission should approve their option with Triton. PNG did not try to find out more about Western, the background of Western's management, or the financial capacity of Western's sponsor, prior to

deciding to move forward with Triton. Western respects the impressive histories of Triton's owners and notes the substantial asset bases of both companies involved. But neither apparently controls Triton, and neither has apparently made a capital commitment to the project. With a little more due diligence, PNG would have discovered that Western's financial sponsor (Apollo) is a substantially larger company than both of Triton's sponsors combined and has access to much greater financial liquidity than either of them. In addition, Apollo is a long time investor in operating companies in Canada in various industries including the upstream sector. Western's President & CEO is well known in the LNG industry and has extensive experience in bringing an innovative LNG project to market successfully, considering the unusual aspect of integrating it into the liberalized North American gas market as opposed to the conventional "upstream monetization play". Western also could have introduced PNG to our relationship with Wison Offshore & Marine, the company that will build the liquefaction equipment for the project, and its business plan, which we think will allow Western to successfully address the unique needs of buyers in today's LNG market.

Western understands the temptation of closing a "bird in the hand", but thinks that PNG could have successfully set up a transparent, fair and competitive process between Triton, Western, and the others that PNG indicates contacted it for capacity to enter into an option agreement on the best terms possible for the existing capacity. Further, if that many parties legitimately wanted to obtain capacity on the pipeline, an expansion could have been proposed that all parties participated in, as opposed to having an expansion supported by only one party as PNG currently proposes.

Q. PNG states that "starting in late October and November 2017 PNG has had a flurry of requests for meetings with various parties seeking potential capacity on PNG's pipeline." (Exhibit B-5 at 25.) Do you have any comments on the reason that interest in the PNG capacity would have increased recently?

A. Yes, there are several factors that may be responsible for this increase in interest. The existence of the PNG capacity is relatively well known in the LNG community. When Wison completed construction and testing of the Caribbean FLNG last year, the owner of the vessel was not ready to take delivery of it. This was widely reported in the trade press, and I am aware of several companies that sought to find a location for that vessel. It would not be surprising to learn that one or more of those people reached out to PNG in late 2017 to determine whether the pipeline capacity was available.

On a more macro level, the LNG market conditions have significantly changed in the last couple of years. With the addition of several new projects in Australia and the United States, and the significant drop in oil and LNG prices in 2015, all project development in the LNG industry effectively came to a halt. The cost of new capacity, and the existence of ample excess supply, reduced buyers' interest in contracting for new capacity on a long term basis. However with low prices comes increased demand, and in 2017 the forecast for the LNG market began to substantially improve. Now the market broadly agrees that demand will exceed supply from 2021 onwards unless new

	capacity is built for the market. There has been a substantial increase in the number of contractual commitments undertaken with new projects, and some final investment decisions taken on capacity, including in the US at the Cheniere Corpus Christi LNG facility. As a result, there is little surprise that PNG's capacity would be in greater demand today, as project proponents seek to capitalize on improving market conditions to develop a project.
Q.	On page 9 at point 5 of Exhibit E-1-1, it lists PNG's failure to disclose its discussions with Western as a reason the Commission should not now approve the application. Why do you suggest that PNG's discussions with Western were material facts that should have been disclosed to the Commission?
A.	Western's proposal represented, in my respectful view, a materially better outcome for PNG and its ratepayers if Western had been given a fair chance to compete for the capacity. This would have encouraged PNG to conduct due diligence and negotiate an agreement for a fair share of the remaining capacity. Western specifically focused on proposing to enter into an agreement on substantially similar terms to the EDFT agreement to emphasize that finalizing a contract would not be very hard since a fully negotiated and approved template could be used as the starting point. Western's proposal would benefit the existing shippers to a greater extent than Triton's proposal. Today, a significant portion of the existing capacity is "stranded", in the sense that it is unutilized by PNG and is not contracted to a third party transporter. While PNG has asserted confidentiality over the rate negotiated with PNG for the existing capacity, for the purposes of the discussion and calculations that follow I have assumed that it is equivalent to the rate negotiated by PNG and EDFT and approved by this Commission, \$0.50 per mcf. If Triton exercised its option to expand its daily quantity to 50 MMcf/d at \$0.50, it would add \$9.1 million in revenue to PNG's top line (ignoring the effect of the additional facilities that would be constructed between Terrace and Prince Rupert), allowing the Commission to reduce rates to existing customers by a commensurate amount. Assuming this rate reduction is allocated evenly among customer classes, an average residential customer's annual bill would be reduced by over \$250 per year, and an average commercial customer's bill would be reduced by over \$1,000 per year.[1] By comparison, Western proposes to contract for 70 MMcf/d. With the same assumed rate, and again excluding the effect of the construction of a lateral to the project site, this greater transport quantity would produce \$12.8 million per year in new revenue, allowing the Commission to reduce rates even further. Significantly, this would result in approximately 40% greater savings for both customer classes as compared to a potential contract with Triton, reducing the average residential customer's annual bill by over \$350 per year, and the average commercial customer's annual bill by over

[1] The annual average bill is based on 68.5 GJ of average annual residential consumption and 322.1 GJ of average annual commercial consumption, and rates set forth in PNG's published tariffs.

$1,400 per year.

The difference in proposed contracted volume makes a significant difference in terms of potential benefit to existing shippers, since the act of setting rates at PNG is essentially a zero sum game. PNG receives its cost of service regardless of how much of PNG's capacity is contracted, and existing rate payers cover any revenue gap that might exist due to an under-contracted pipeline. We all understand that it is not PNG's fault that Methanex closed its Kitimat facility and left PNG under-contracted; but in this setting it is incumbent on PNG to seek to maximize future revenue by contracting unutilized capacity at the highest revenue levels possible – which is a combination of both rate, volume, and term – in order to reduce rates to existing ratepayers.

While I expect that PNG may argue with the specific numbers set forth above (and I acknowledge that they have access to better information about their pipeline and the current rate negotiated with Triton), the directional result is sound – i.e. Western's proposal, based on a higher volume, represented a potential significantly greater reduction for existing ratepayers than does the Triton proposal. Given this, the existence of another shipper interested in the capacity is clearly a relevant fact that PNG should have disclosed to the Commission.

Q. If the Commission rejects this application, does Western ask that the excess capacity on PNG's system be exclusively offered to it instead of Triton?

A. No, we would be happy to participate in a process that made the existing capacity, and any expansion capacity (if necessary) available on a non-discriminatory basis. Existing capacity (and options on existing capacity) should be equitably shared. If an expansion is required because there is more demand for capacity than currently exists, all new users of the segment requiring expansion should equitably participate in paying for the cost of the expansion and should only receive service for the expansion quantity once the expansion is complete, instead of the current situation in which an affiliated party is allocated the existing capacity, and any other (non-affiliated) party must be a shipper in the more expensive expansion capacity where the timing is more uncertain.

Q. Would Western be willing to participate in an open season for an option to determine the extent of interest in both the existing capacity on the PNG system and the potential demand for expanded capacity?

A. Yes. Western believes that an open season process should be held that (i) enables PNG to gather greater market information and (ii) provides all market participants with an equal opportunity to vie for an option on PNG existing and/or expansion capacity.

Q. Have you had an opportunity to review PNG's response to Western IR 11 and, if so do you believe that response tells the Commission?

A. It appears that in order to accommodate both Western and Triton, PNG would have to add approximately 35 MMcf/d of mainline capacity between Summit Lake and Terrace, along with the facilities required by Triton on the Terrace-Prince Rupert leg, and an extension of PNG's system from its terminus in Kitimat to Western's proposed project site.

In Western's view, it would be a reasonable outcome, assuming that no other party desired capacity on PNG at this time, to propose an arrangement whereby (i) Triton and Western proportionally contract for the existing capacity on the system; (ii) Triton and Western proportionally contract for the expansion on the mainline between Summit Lake and Terrace; (iii) Triton contracts for expansion capacity from Terrace to Prince Rupert; and (iv) Western contracts for the expansion lateral from Kitimat to its proposed project site. In the event that either Triton or Western decide not to proceed with their project, then part (ii) would no longer be necessary and the daily quantity in (i) could be adjusted accordingly.

Pacific Northern Gas Ltd and Triton LNG Limited Partnership

Letter Agreement Application

Project No. 1598957

British Columbia Utilities Commission

Direct Evidence of Jeffrey Church

July 31, 2018

Direct Evidence of Dr. Jeffrey Church

1. Please state your full name and business address.

Jeffrey Robert Church
Department of Economics
University of Calgary
2500 University Drive NW
Calgary, Alberta
T2N 1N4

2. What position do you currently hold at the University of Calgary?

I am a full professor in the Department of Economics and the Undergraduate Director for the Department of Economics.

3. Please briefly summarize your academic experience and focus.

My field of specialty is industrial organization. I define Industrial Organization, or industrial economics, in my textbook as the study of the operation and performance of imperfectly competitive markets and behaviour of firms in these markets. The study of industrial organization is a scientific inquiry intended to answer three questions. These are (i) why are markets structured as they are—where structure means the extent of vertical integration, the number and size distribution of firms, the extent of product differentiation, and the conditions of entry; (ii) how does market structure affect firm behaviour, outcomes in the market, and market performance, i.e., an assessment of the desirability of those outcomes; and (iii) how can firms, by their conduct, affect market structure. Modern industrial organization involves developing and testing explanations of firm behaviour and market outcomes.

In my industrial organization courses at the University of Calgary, I organize the material around market power which is the ability of firms to profitably raise prices above competitive levels. Key areas of focus are on the sources of market power, its exercise and effects, and how firms can create, enhance, or maintain their market power. Understanding the effects of market power and potential policy responses is the foundation of regulatory economics. Understanding how firms can create, enhance, or maintain their market power is the intellectual foundation for competition law and policy.

My academic research has focused on network externalities, competition law, and regulatory economics. My contributions in regulatory economics include a monograph on regulation of natural gas pipelines in Canada, the three chapters in my industrial organization textbook, a recent commentary for the C.D. Howe Institute on the objectives of regulation, three reports on government policy and regulation of electricity and wireless communications for the School of Public Policy at the University of Calgary, approximately 25 presentations on the regulation of pipelines, telecommunications, and electricity, and I have supervised over 10 Master's theses whose focus was regulation. A complete list of my publications and other academic activities is included in my curriculum vitae which is attached as Appendix A.

I teach courses in industrial organization, competition policy, and regulatory economics at the University of Calgary on a regular basis. I have also instructed courses in regulatory economics for the Van Horne Institute at the University of Calgary. Since 2000 I have organized the Summer Internship in Regulatory Economics at the University of Calgary, placing approximately five students a year in regulatory departments of pipelines; electricity generators, distributors, and transmission companies; telecommunication firms; government departments; and regulatory agencies.

I have acted as an expert on a wide range of regulatory and competition policy matters. I have been accepted as an expert in proceedings before the Copyright Board of Canada, the Competition Tribunal, the National Energy Board, the Alberta Energy Utilities Board and the Alberta Utilities Commission, the Canadian Radio-Television and Telecommunications Commission, the Federal Court of Canada, the Federal Court of Australia, and the Supreme Court of British Columbia. A list of my testifying experience is attached as Appendix B.

4. What experience have you had in considering the policies of natural gas pipelines in Canada?

As mentioned, I am the coauthor of a monograph on the regulation of natural gas pipelines in Canada. Since that time I have published a book review on a recent text on the political economy of pipelines, a focus of my recent commentary on the objectives of regulation was the National Energy Board, through the years I have been a featured speaker twice on regulation of pipelines in Canada, and I prepared evidence for the Mackenzie Explorer Group in the Mackenzie Gas Project Hearing before the National Energy Board.

5. Have you prepared a Curriculum Vitae and if so, where can it be found?

I have, and as indicated, it is attached as Appendix A, while Appendix B documents the record of my testifying experience.

6. At whose request have you prepared this testimony?

Lawson Lundell LLP, on behalf of Western LNG LLC ("Western").

7. What topics will your testimony focus on?

My testimony addresses the following three issues:

(i) It identifies the appropriate objectives for allocating excess capacity and expanded capacity on a natural gas pipeline.

(ii) It establishes the importance of an open season process in generating the information required to promote the allocation of both existing excess capacity and expanded capacity to shippers that meets the appropriate regulatory objectives, in particular economic efficiency.

(iii) It provides an assessment of the procedures followed by Pacific Northern Gas Ltd. ("PNG") to allocate its existing excess capacity to Triton LNG Limited Partnership ("Triton"). The assessment is that the queuing process followed by PNG is not likely to meet the appropriate regulatory objectives.

8. What material have you reviewed prior to preparing this testimony?

I have reviewed the record of this proceeding. That record includes the following documents:

Application for Approval of Letter Agreement between Pacific Northern Gas Ltd. and Triton LNG Limited Partnership, March 29, 2018, including the Letter Agreement and the Backstop Agreement (Exhibit B-1 to B-1-3)

Applicant's Reply to Letter of Comment, June 21, 2018 (Exhibit B-5)

Applicant's Responses to BCUC Information Request 1 (Exhibit B-2)

Applicant's Responses to BCUC Information Request 2 (Exhibit B-7)

Applicant's Responses to BCOAPO Information Request 1 (Exhibit B-8)

Applicant's Responses to Western LNG Information Request 1 (Exhibit B-9)

Letter of Comment of Western LNG LLC (Exhibit E-1-1)

In addition I reviewed all, or parts of, the following documents:

Application by Trans Mountain for Approval of the Transportation Service and Toll Methodology for the Expanded Trans Mountain Pipeline System, Updated January 10, 2013.

National Energy Board, Reasons for Decision In the Matter of Trans Mountain Pipeline ULC, RH-001-2012, May 2013.

Pacific Northern Gas Ltd, Amended Application to the British Columbia Utilities Commission for Approval of 2016 and 2017 Revenue Requirements, February 29, 2016.

Pacific Northern Gas Ltd (PNG-West Division), Application to the British Columbia Utilities Commission for Approval of 2018 and 2019 Revenue Requirements, November 30, 2017

Pacific Northern Gas Ltd and Pacific Northern Gas (N.E.) Ltd, Gas Sales Tariff

Pacific Northern Gas Ltd. (PNG-West), 2016 Annual Report to the British Columbia Utilities Commission for the period January 1, 2016 to December 31, 2016.

TransCanada Pipelines Limited, Transportation Access Procedure, January 1, 2015.

Trans Mountain Pipeline Proposed Expansion: Notice of Open Season Procedure for Firm Service Capacity, October 20, 2011.

Utilities Commission Act [RSBC 1996] Chapter 473.

9. What are the facts upon which your opinion is based?

(i) Triton and PNG have entered into an option agreement under which PNG has reserved rights to capacity of 20 MMcf/day from Summit Lake to Prince Rupert to Triton.[1]

(ii) Under the letter agreement Triton has the right to exercise a further option for an additional 30 MMcf/day, for a total firm capacity of potentially 50 MMcf/day.[2]

(iii) Western's project is designed to utilize 70 MMcf/day of capacity on PNG from Summit Lake to Kitimat.[3]

(iv) The total capacity required to support both the Triton and Western projects is between 90 and 120 MMcf/day.

(v) Total capacity after reactivation and recommissioning on PNG from Summit Lake to Terrace is approximately, and on average, 110 MMcf/day.[4]

(vi) Total excess capacity, after reactivation and recommissioning, on PNG from Summit Lake to Terrace is approximately, and on average, 100 MMcf/day.[5]

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[1] Application Letter Agreement at p. 3, Letter Agreement at ¶¶3 and 5(e).

[2] Application Letter Agreement at p. 3, Letter Agreement at ¶¶3 and 5(e).

[3] Letter of Comment of Western at pp. 3-4.

[4] PNG Response to Western LNG IR 1.11.1(a). This is 40,515 MMcf/year divided by 365 days in a year.

[5] PNG Response to Western LNG IR 1.11.1(a). This is 36,129 MMcf/year divided by 365 days in a year.

(vii) Expanding capacity on PNG from Summit Lake to Terrace above 100 MMcf/day will involve both looping and new compression, and may require an environmental assessment.[6]

(viii) The capital cost of providing the 20 MMcf/day by PNG to Triton is estimated to be $5.9 million (excluding AFUDC).[7]

(ix) The cost of reactivating and recommissioning the other 80 MMcf /day from Summit Lake to Terrace has not been determined, though it is not thought to involve additional looping or an environmental assessment.[8]

(x) Triton has agreed to a demand charge for the 20 MMcf/day that is confidential.[9]

(xi) Western would accept substantially similar tolls and other terms of service as PNG reached with EDFT (approved by the BCUC January 20, 2015).[10]

(xii) PNG had parallel negotiations with Triton, Western, and, perhaps, others.[11]

10. Please describe your understanding of the nature of the PNG pipeline and the manner in which it is regulated.

PNG is currently regulated by the British Columbia Utilities Commission (BCUC) under the *Utilities Commission Act* (*"UCA")*. The *UCA* requires public utilities, including PNG,[12] to obtain a certificate of public convenience and necessity from the BCUC, which requires the BCUC to find that the public utility is "necessary for the public convenience" and "conserves the public interest".[13] Moreover, its rates and service offerings are subject to approval by the BCUC. In particular, its rates must be

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[6] PNG Response to Western LNG IR 1.8.2, 1.10.3 and 1.11.2.

[7] PNG Response to BCUC IR 1. 2.

[8] PNG Response to Western LNG IR 1.8.2, 1.10.3, 11.1, and 1.11.2.

[9] Application Letter Agreement at p. 4

[10] Letter of Comment of Western at pp. 3-4 and p. 5.

[11] Letter of Comment of Western at pp. 3-5, Applicant's Response (Exhibit B-5) at ¶25, PNG Response to Western IR 1.8.2, and PNG Response to Western IR 1.8.2.

[12] *UCA* at ¶1.

[13] *UCA* at ¶45(8).

approved by the BCUC and approved rates must not be unjust, unduly discriminatory, or unduly preferential.[14]

PNG offers some services as a common carrier, i.e., subject to the toll and terms of service, all customers of that class of service must be served.[15] PNG also appears to offer other services or seeks to offer other services as a contract carrier, including the proposed service offering to Triton.[16] Services provided as a contract carrier differ from those provided by a common carrier in at least two important ways that are reflected in the difference in contracting practice. A contract carrier enters into long term contracts with its customers under which specific levels of capacity are reserved for its use and the customer agrees to pay the costs of capacity (demand charges) whether it uses the capacity or not.

11. In your experience, how is existing capacity allocated on other contract carrier pipelines in Canada?

That depends on the timeframe. In the very short term pipelines allocate available capacity by offering interruptible service. Shippers can access existing capacity at the interruptible rate. The amount of interruptible capacity available is variable and uncertain. It varies from day to day based on a number of factors, including aggregate firm nominations, aggregate firm demand, weather, and availability of capacity.

In the longer run, pipelines typically have open seasons for existing excess capacity that is reliable, i.e., it is essentially always available. Under an open season the pipeline takes its available excess capacity to the market. In doing so it attempts to match the available excess capacity with demand for firm service. This involves finding a toll and terms of service which are sufficiently attractive to shippers that they will enter into long term contracts, in aggregate, for some or all of the capacity made available by the pipeline. The means by which "bids" for the available excess capacity are ranked by the pipeline vary between pipelines and the characteristics of the

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[14] *UCA* at ¶¶59, 60, 61, 63, and 64.

[15] PNG Gas Sales Tariff at ¶4.1.

[16] PNG Gas Sales Tariff at ¶4.2.

capacity that are available. Bids can be ranked not just by the toll bid, but also by the net present value ("NPV") of the toll commitment,[17] the financial commitment (toll multiplied by capacity),[18] the length of the commitment,[19] etc. Indeed to the extent that existing tolls are efficient, i.e., are a correct signal of the value of capacity, it is appropriate to allocate the capacity in the open season based on term, the NPV of the commitment, or the total financial commitment.

12. How is expansion capacity allocated on contract carrier pipelines in Canada?

When there appears to be sufficient demand to consider expansion, contract carrier pipelines in Canada typically also hold an open season. An open season typically arises after the pipeline has received inquires from shippers interested in acquiring rights to more transportation capacity and it has canvased existing and prospective shippers regarding their interest in additional capacity. The details of the interaction between shippers and the pipeline prior to, and during the open season, can be pipeline specific. But the objective of the open season is not pipeline specific. The objective of an open season is a convergence on tolls, term, and other terms of service such that at those tolls and terms of service the aggregate demand for capacity across all shippers equals the capacity that the pipeline company is willing to invest in and provide.

In a successful open season, the pipeline is able to create a market for capacity and the market reveals information regarding demand, i.e., the willingness to pay for additional capacity by shippers. The pipeline can then compare that to the costs of additional capacity and identify if there are mutually advantageous gains from trade. Those gains from trade exist and can be realized by expansion if there is additional capacity for which the value to the shipper, as reflected by their willingness to pay, exceeds the cost of supplying that additional capacity. The difference between the value of capacity to a shipper and the costs of that capacity is a measure of how much more valuable the resources used to provide the capacity are in providing transportation services than in their next best alternative use.

[17] PNG Response to Western LNG IR 1.9.3 (Maritimes & Northeast Pipeline).

[18] TransCanada Pipelines Limited, Transportation Access Procedure, January 1, 2015 at ¶4.4.

[19] PNG Response to Western LNG IR 1.9.1 (Foothills).

13. From a policy perspective, what are the objectives of the allocation methodologies used by contract carrier pipelines?

The objective of regulation can be summarized as providing for revenue adequacy to sustain investment and service, while at the same time minimizing the costs of production, the costs associated with allocative inefficiency, and rates paid by consumers. These objectives are reflected in the *UCA* with its emphasis on revenue adequacy, cost reduction, just and reasonable rates, and no undue discrimination or preference.[20]

These regulatory objectives reflect the underlying economic rationale for regulation. The overarching objectives of regulation are two-fold: (i) allocative efficiency and (ii) cost efficiency.

Competition typically requires competitors and is advantageous because it forces the prices of firms to track costs. In the ideal situation of perfect competition, firms produce where their marginal cost equals the market price. The result is allocative efficiency.

Allocative efficiency involves producing the optimal quantity of a product, in this case transportation services. The correct level of production, the efficient level of production, is where the value of an additional unit of service to a buyer exactly equals the cost of the resources required to provide that additional unit of service. This is the outcome in competitive markets: suppliers produce where the price equals marginal cost and consumers purchase until their willingness to pay equals the price. As a result on the marginal unit, the willingness to pay by buyers, the maximum they are willing to give up for another unit of a good, exactly equals what they have to give up to get another unit of the good, its marginal cost. Allocative efficiency is maximized when the opportunity cost of the resources used, the value in their next best alternative use, exactly equals their value in the current use. If this is not the case, then both suppliers

[20] *UCA* at ¶¶59-60.

and buyers can be made better off by using resources currently allocated to the production of the next best alternative. For instance if marginal cost is \$X, but willingness to pay is \$Y, with \$Y> \$X, then by acquiring the resources at cost of \$X and offering to sell another unit of the good at a price less than \$Y, gains from trade can be split between the buyer and the supplier in total equal to \$Y-\$X.

Cost efficiency is more intuitive. It occurs when the value of resources used to provide some level of services is minimized. It requires each firm to minimize costs and to have the cost minimizing number of firms. When markets are competitive, costs are minimized. Under competitive markets there is not a trade off between allocative efficiency and cost efficiency.

Underlying regulation of pipelines is the fact that they are typically natural monopolies. A natural monopoly exists when the costs of production to meet demand are minimized when there is a single provider. In the simplest case of a single product firm, a sufficient condition for a natural monopoly is that production is characterized by economies of scale: long-run average cost (unit cost) is smaller the larger output. Natural monopoly creates a trade off between cost efficiency and allocative efficiency that is not the case when markets are competitive. Cost efficiency suggests minimizing the number of firms, but that reduces competition, resulting in market power where prices are raised above marginal cost.

Regulation solves this trade off by restricting supply to a single carrier to achieve cost efficiency, but also implementing controls on that carrier's market power by regulating its rates.

Natural monopoly also has implications for how rates are set. When there is a natural monopoly, there will be a trade off between revenue adequacy and incentives for investment and allocative efficiency. Allocative efficiency involves setting price equal to long-run marginal cost. But in the case of a natural monopoly, long-run unit cost is declining: the more that is produced, the lower the long-run average cost (hence a natural monopoly). But if long-run average cost is declining, this means that long-run marginal cost must be less than long-run average cost. As a result if price is set to attain allocative efficiency, by setting it equal to long-run marginal cost, the economic profits of the firm will be negative since price will be less than long-run average cost.

In the absence of a subsidy, the rate will have to be raised above long-run marginal cost to allow the firm to break even and earn a competitive rate of return or zero economic profits.

More generally, when a firm offers multiple services or products, pricing each at long run marginal cost when it is a natural monopoly will result in negative profits in the absence of subsidization. Thus the burden of recovering the revenue deficit of the firm will have to be assigned to different service classes. This requires raising the rates above long-run marginal cost for each service. Raising rates above long-run marginal cost creates allocative inefficiency. As rates rise, consumers reduce their consumption and resources are used instead in their next best (i.e., second best) alternative. The loss in value from this reduction in consumption is called the deadweight loss. When raising rates above long-run marginal cost to cover the firm's revenue deficiency, the effect on allocative efficiency should be minimized to the extent possible. It should be recognized that imposing the burden of revenue adequacy on consumers with demand very sensitive to price can result in considerable deadweight loss and reallocating the burden would reduce the destruction of value.

14. Are you aware of the manner in which PNG proposes to allocate existing and expansion capacity on the PNG pipeline?

Yes. I have reviewed the Letter Agreement between Triton and PNG, as well as PNG's responses to interrogatories in this proceeding. PNG's approach in this case is analogous to queuing, i.e., first come, first served. Triton is the first of at least one other shipper (Western) and there are indications of more. PNG's allocation process involves not just a queue, but a two stage contractual process. In the first stage the shipper enters into an option agreement under which for a certain period of time PNG agrees to reserve the capacity for the shipper and during which the shipper assesses the viability of their project. In the second stage the shipper exercises their option and the shipper and PNG then enter into a firm transportation agreement. In the case of Triton, the option agreement also contains backstop provisions under which Triton pays for preliminary design work for capacity above 20 MMcf/day.

15. In your opinion, does PNG's mechanism for allocating capacity serve the objectives of cost and allocative efficiency?

No it does not. Rather than create a market for its excess capacity or for expansion, where there is interaction between shippers and the pipeline that reveals information about the value and costs of capacity provision, leading to the potential for economic efficiency, the PNG mechanism involves negotiating with shippers sequentially. Hence information regarding demand for capacity, in particular information regarding to whom capacity is most valuable, the aggregate demand for capacity, and the costs of different size expansions are not generated. As a result it is very unlikely that the existing capacity will be allocated to those who value it the most (because they can create the most value by having access), that expansions will occur when the benefits exceed the costs, that expansions will be the optimal size, and that the rents associated with less expensive capacity will be used to address PNG's revenue deficiencies and reduce the extent to which tolls for other shippers are above long-run marginal cost.

16. Can you explain why the methodology PNG has employed likely to allocate capacity in an economically efficient manner?

The reason is that the PNG approach does not create a market. In a market, shippers would have the opportunity to compete with each other for both existing capacity and capacity expansions. It is this competition that insures that the capacity is allocated to its most efficient use, i.e., that it creates the most value added.

The possibility that PNG's process will not lead to an efficient outcome is shown through three simple examples. Two of those examples are discussed in the response to this question, the third in the response to the next question. The first example focuses only on the difference in willingness to pay by two shippers, assuming term and volume is the same. The second example focuses on competition between two shippers when their willingness to pay and volume commitment are different, but term is assumed to be the same. The first two examples assume capacity is fixed, while the third example assumes capacity can be expanded.

In a queuing process it might be the case that the willingness to pay for the 20 MMcf/day of existing capacity by the first in line is $F MMcf/day, because the difference between the revenues it expects per MMcf/day less all other costs except the cost of transportation on PNG is $F MMcf/day. The second in line shipper might be willing to pay $S MMcf/day because that is the difference between its revenues and all other costs except the tolls on PNG. The value created by the pipeline, the ability to transport 20 MMcf/day, is greater for the second project in the queue when $S>$F, but the PNG process would choose the first. The loss to the Canadian economy would be $S-$F per MMcf/day in lost profits.

In this simple example, an open season that involved a bidding process would see the 20 MMcf/day of capacity allocated to the highest bidder, the second firm in PNG's queue. It would pay $F per MMcf/day of capacity and capture its incremental value of $S-$F. The pipeline would capture $F less the incremental costs of the 20 MMcf/day. These incremental profits would be then used to lower the rates of all other shippers until PNG only recovers its revenue requirement (i.e., the cost of service provision).

The example has implicitly assumed that only 20 MMcf/day of capacity is available and that all shippers in the queue would commit to the same term. In these circumstances, focusing just on the toll is sufficient. The ranking of the total revenue commitment by each shipper is the same as the ranking by willingness to pay, i.e., toll bid.

More generally the decision criteria for efficiency requires that for any service or increment of service, its incremental benefit from accessing transportation (IB) exceed the incremental cost (IC) of supplying it with transportation. The incremental benefit in this case is the revenues from processing the natural gas less all other costs except the costs of transportation on PNG. If the IB is greater then the IC, it is efficient for PNG to provide the incremental firm service. The value added from providing the service is greater than the cost of providing the transportation service.

The IB and IC of a shipper will depend on the nature of the service demanded by the shipper. In particular, the IB and IC will depend upon the volume and term of service provided.

In the case of mutually exclusive projects, the project with the greatest net incremental benefit NIB=(IB-IC) should be chosen. This is the decision criteria for efficiency where it is assumed that the IB and IC based on private benefits/costs also reflect social benefits and costs. If that is the case, then the IB is simply the profits of a shipper's project excluding the cost of transportation.

For example, suppose the Triton project requires a commitment of 50 MMcf/day, but the Western project requires a commitment of 70 MMcf/day. Suppose further that the costs of expanding PNG from Summit Lake to Terrace above 100 MMcf/day are prohibitive, then the two projects will be mutually exclusive, and if scale considerations are sufficiently important, any other project will also be precluded. In these circumstances the IB of Western will be its profits gross of transportation costs on PNG from processing 70 MMcf/day, while the IB of Triton will be its profits gross of transportation costs on PNG from processing 50 MMcf/day. Without significant differences in term, netback to the two LNG facilities, and incremental costs, the volume advantage of Western suggest that its project could easily be the efficient project, but PNG's queuing process has selected Triton's.

The access procedures of a pipeline should elicit the information that reveals the IB of shippers and IC of providing service, and then use that information to allocate existing capacity efficiently and size expansions efficiently. An open season facilitates identification of efficient projects, both allocation of existing excess capacity to the shippers that maximize its use value and expansion of new capacity. Just as the PNG queuing process does not necessarily result in the efficient allocation of existing capacity, it also does not likely result in expansions of the efficient size. Expansions may be too small and result in a discriminatory allocation of capacity.

17. Is the approach of PNG likely to allocate capacity in a non-discriminatory manner?

The danger is that the PNG process does not create the information that allows for the efficient allocation of existing capacity and investment in expansion. As a result there are at least two types of discriminatory outcomes that can arise:

(a) Without canvasing the market to find out the maximum value of existing capacity, PNG might contract existing capacity at a toll that is much lower than market value. The fortunate shipper captures the benefits of the low-cost capacity instead of existing shippers. This is particularly problematic when the shipper and PNG are affiliated: PNG will find it difficult to establish that the toll negotiated is the market price that a third party would pay since it does not know what a third party would have paid. It is insufficient for PNG to assert that existing shippers will gain, since they might have gained even more with a third-party shipper. The concern is that PNG will discriminate against third-party shippers with a higher willingness to pay since its affiliate will gain the rents, not existing shippers.

(b) Moreover, because contracts will be signed sequentially with shippers, different shippers could easily end up paying different tolls, even though it is the aggregate demand of all that results in capacity expansion. Suppose there are three projects in the queue, with demands of 20 MMcf/day, 80 MMcf/day, and 100 MMcf/day. For all three projects to proceed would require PNG to loop the Summit Lake to Terrace leg. Suppose further that the aggregate incremental profits from the three projects would exceed the aggregate incremental costs from reactivating and recommissioning the first 20 MMcf/day, reactivating and recommissioning the next 80 MMcf/day, and the costs of looping/expansion the next 100 MMcf/day. Indeed assume that incremental aggregate net benefits are maximized if all three projects proceed. Finally suppose further that the three projects would all be privately profitable if the toll charged each was average incremental cost (this is the sum of the incremental costs across the three tranches of capacity divided by 200 MMcf/day) and the term of the commitment for each was the same.[21] An open

[21] Note this is not the efficient price, since it likely allocates too much of the revenue deficiency to existing shippers. Instead the efficient price would be average incremental cost adjusted for a markup to recover common costs.

season with this tolling methodology would result in efficiency: all three shippers would commit to capacity, all three projects would proceed as they should, and PNG would expand.

But if each capacity expansion is tolled at its average incremental cost and allocated on a first come first serve basis, then each shipper in the queue will be charged a different toll, with the tolls rising with the position of the shipper in the queue. In these circumstances it could easily be the case that some of the projects, though socially desirable, are not privately profitable. In this case the tolls would be discriminatory, send the wrong signal regarding the value of capacity, and result in inefficient allocation of the existing capacity and insufficient expansion.

18. Are you aware of any impediment to employing an open season process on the PNG pipeline to produce an efficient and non-discriminatory allocation of pipeline capacity?

PNG has concluded that an open season to allocate its capacity is not appropriate, either for existing or expansion capacity.[22]

It would appear, however, that for expansion capacity, something that allows for more participation by potential shippers such as an open season, is recognized as being required, based on the increase in interest due to changes in the market for LNG. PNG's own evidence suggests that there is renewed interest in accessing transportation services on PNG. PNG, in anticipation of increased interest and more favourable economics of large industrial projects, initiated preliminary studies to enhance its ability to respond to inquiries from shippers.[23] In the fall of 2017, besides Western and Triton, PNG acknowledges a "flurry of requests for meetings with various parties seeking potential capacity on PNG's pipeline";[24] since the filing of its application "PNG has had numerous discussions with other third parties who have expressed interest in PNG's existing and expansion capacity";[25] and in fact that the increase in

[22] PNG Response to Western IR 1.9.9. and 1.9.11.

[23] PNG Response to BCOAPA IR 1.1.2.

[24] Exhibit B-5 at ¶25.

[25] PNG Response to Western IR 1.8.2.

interest means that if a firm transportation agreement with Triton is realized for 50 MMcf/day, that PNG will have to "consider other customer requests for future project expansion, not just the request of Western alone."[26] Indeed going forward, it appears that PNG would initiate a process that would be similar to an open season: "PNG would work with potential customers to determine if an expansion to its existing facilities is feasible to provide additional capacity *to all interested parties* at a rate that is just and reasonable and not unduly discriminatory, while applying the Utility System Extension Test Guidelines and adhering to the regulations under the *Utilities Commission Act*."[27] It appears that the market for B.C. LNG is much more developed and liquid than it has been, resulting in an increase in demand for transportation capacity.[28] As a result, PNG appears to have recognized that increased demand undercuts its existing allocation mechanism and it will have to move to something that looks like an open season going forward.

The issue then is whether PNG should use an open season to allocate its relatively low cost existing capacity of approximately 100 MMcf/day between Summit Lake and Terrace. PNG's concern with open seasons is that no one will develop projects and participate in the open season because project development requires the ability to reserve capacity without contractual commitment. This requirement arises because of concerns over the tolls and availability of capacity when transportation is required and the financial liability of committing to demand charges for the term of the transportation agreement. Project development, under this hypothesis requires that transport capacity be reserved at known tolls relatively cheaply while all other aspects of the project are developed. This gives rise to the option approach of PNG to reduce the risk to potential shippers. The resulting Letter Agreement with Triton is appropriate because a bird in the hand is better than two in the bush and, given the

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[26] PNG Response to Western IR 1.8.2.

[27] PNG Response to Western IR 1.8.3, emphasis added.

[28] PNG Response to Western IR 1.9.9.

failure of projects in the past, reserving capacity to Triton though an option is appropriate.[29]

The danger, as indicated above, is that an affiliate of PNG captures the rent associated with this low cost capacity, not existing shippers, and this relatively cheap capacity is not allocated to the projects that generate the most value under the PNG first come first served approach.

There are two possibilities. First, maybe the twin risks of (i) not having available capacity and toll uncertainty and (ii) the financial liability of being on the hook for demand charges for a significant period of time can be reduced by the design of the open season in light of the changing economics of LNG. That is, it might be possible to design the open season in a way that provides sufficient flexibility that shippers can assess tolls and the availability of capacity with a sufficient degree of precision that the risks and uncertainty of not having uncontracted reserved capacity are reduced, all within the context of the changing favourable economics of LNG. The improving economics of LNG exports may be sufficient to assess that market demand for PNG's capacity will be sufficient going forward, that its capacity will be tradable and the downside risks of long term contracting mitigated.

Second, it may be that the twin risks are still too significant, even with the changing market conditions for LNG. The issue then becomes how to keep the attractive feature of the PNG process, access to reserved uncontracted capacity, but make it more likely that this right of access is allocated efficiently, something that is not assured with the other feature of the PNG process, i.e., first come, first served. That is, how can the option be maintained, but it is allocated to the right set of shippers?

PNG could be encouraged to explore flexible iterative processes that reveal the value of the option. For instance, a market indication of the value and risk of accessing the existing capacity could be created by having an auction for the option. If it is the case that project development is too costly and risky without access to transportation, as PNG claims, then allocation of the rights to "reserve uncontracted capacity" through

[29] PNG Response to Western IR 1.9.10-1.9.12; Exhibit B-5 at ¶¶3, 5, 7; PNG Response to Western IR 1.12.2.

an auction process would contribute to ensuring that the shippers with the highest value are identified and the value of both the option rights and some of the value of the capacity captured for existing shippers.

It does not seem inconceivable or unworkable that PNG have an auction for the option of entering into a firm service transportation agreement where the auction involves establishing the price for an option on, for instance, 10 MMcf/day tranches of capacity, with 10 such tranches available. The length of the options and other conditions for each of the tranches would be standardized. This would allow for the existing 100 MMcf/day or so of capacity to be allocated efficiently across shippers: PNG would choose the allocation of the 100 MMcf/day that maximized its option revenues.

For instance, suppose that there are only two bidders, Western and Triton, with demand for 70 MMcf/day and 50 MMcf/day. Then Western would need to acquire 7 tranches, Triton 5 tranches. Since there are only 10 tranches, the two demands cannot both be satisfied. The winner would be the shipper whose aggregate bid was the largest. Triton would win if its aggregate bids for 5 tranches exceeded the aggregate value of Western's bids for 7 tranches.

It is worth emphasizing that the auction for the option is presented only as an example of an alternative mechanism to PNG's queue and option agreement approach to allocate its existing low cost capacity, the capacity that is available after recommissioning and reactivation. A flexible iterative process is valuable because it identifies the projects that create the most economic value, resulting in economic efficiency and lower tolls for existing shippers.

19. Please provide a summary of your conclusions.

My analysis of PNG's process for allocating its existing excess capacity and expansion capacity is that it is unlikely to result in an efficient utilization of existing excess capacity or an efficient expansion. Queuing is well known not to be an efficient mechanism to allocate scarce resources: only by accident is the allocation that results from queuing (first come, first served) likely to result in those with the highest value, in this case those shippers with the projects that are most profitable, from receiving capacity. The result is a reduction in aggregate income (profits) and a reduction in revenues to PNG. These reduced revenues imply that tolls for other shippers cannot be reduced as much as they might be if capacity was allocated efficiently. Instead some of the value of the low cost existing capacity is more likely to be captured by the shipper that is first in line. Moreover, the process used by PNG may forestall expansions when they are in fact beneficial and reduces the likelihood that they will be optimally sized.

Jeffrey Church

July 31, 2018

Appendix A
Jeffrey Robert Church

July 2018

Contact Information

Department of Economics
University of Calgary
2500 University Drive, N.W.
Calgary, Alberta
T2N 1N4
Phone: (403) 220 6106
Fax: (403) 282 5262
e-mail: jrchurch@ucalgary.ca

Citizenship

Canadian

Education and Professional Qualifications

- Ph.D., Economics, University of California, Berkeley 1989, specialization in Industrial Organization and International Trade. Supervisory Committee Richard Gilbert, Michael Katz, and Jeffrey Perloff.
- B.A. First Class Honours (Economics), University of Calgary 1984.
- Qualified as an expert witness before the Copyright Board of Canada, Competition Tribunal, the National Energy Board, the Alberta Energy Utilities Board and the Alberta Utilities Commission, the Canadian Radio-Television and Telecommunications Commission, the Federal Court of Canada, the Federal Court of Australia, and the Supreme Court of British Columbia.

Positions Held

Academic Appointments

- Undergraduate Director, Department of Economics, University of Calgary (since July 1, 2017).
- Professor, Department of Economics, University of Calgary (since July 1, 2001).
- Program Director, Digital Economy Program, School of Public Policy, University of Calgary (May 1, 2013-June 30, 2015).
- IAPR Professor, Institute for Advanced Policy Research, University of Calgary, *Coordinator of the Markets, Institutions, and Regulation* Working Group (July 1, 2006 to June 30, 2009).
- Associate Professor, Department of Economics, University of Calgary (1994-2001).
- Assistant Professor, Department of Economics, University of Calgary (1989-1994).

Other Appointments

- Chairperson, Terra Nova Reference Price Committee, Newfoundland (2007 and 2010-2014).
- Founding Academic Director, Centre for Regulatory Affairs in the Van Horne Institute for International Transportation and Regulatory Affairs, University of Calgary (1998-2001).
- T.D. MacDonald Chair in Industrial Economics, Competition Bureau, Industry Canada, Hull, Quebec (1995-1996).
- President, Church Economic Consultants Ltd. (1992-).
- Managing Director, Berkeley Research Group (2010-)
- Member, C.D. Howe Institute Competition Policy Council (2011-).

Academic Awards and Distinctions

Teaching Awards

- Faculty of Social Science Distinguished Teacher Award, University of Calgary 1994 and 2004.
- Superior Teaching Award, Department of Economics, University of Calgary, 1997, 1999, 2000, 2002, 2003, 2004, 2011, 2013, 2015.
- Students' Union Teaching Excellence Award, University of Calgary 1994-95.

Major Distinctions

- Faculty of Social Sciences Gold Medal, University of Calgary 1984.
- *Who's Who Legal Canada*, 2015-2018. London: Global Competition Review.
- *The International Who's Who of Competition Lawyers and Economists*. London: Global Competition Review annually from 1998-2018.
- Behavioural Matter of the Year – Americas Team Award, Global Competition Review 2014 for *The Commissioner of Competition v. Visa Canada Corporation and MasterCard International Incorporated* (Winner).
- Behavioural Matter of the Year – Americas Team Award, Global Competition Review 2014 for *The Commissioner of Competition v. The Toronto Real Estate Board* (Nominated).

Research Interests

- Industrial Organization
- Economics of Regulation
- Competition Policy

Publications

Google Scholar Page: https://scholar.google.ca/citations?user=8EbOoNEAAAAJ&hl=en

Refereed Journal Articles

- “Direct and Indirect Network Effects are Equivalent: A Comment on “Direct and Indirect Network Effects: Are They Equivalent?” (with N. Gandal), *International Journal of Industrial Organization* 30: 708-712, 2012.
- “Indirect Network Effects and Adoption Externalities.” (with N. Gandal and D. Krause) *Review of Network Economics* 7: 325-346, 2008.
- “The Church Report’s Analysis of Vertical and Conglomerate Mergers: A Reply to Cooper, Froeb, O’Brien and Vita.” *Journal of Competition Law & Economics* 1: 797-802, 2005.
- "Specification Issues and Confidence Intervals in Unilateral Price Effects Analysis." (with O.Capps, Jr. and H.A. Love) *Journal of Econometrics* 113, 3-31, 2003.
- "Systems Competition, Vertical Merger, and Foreclosure." (with Neil Gandal) *Journal of Economics and Management Strategy* 9, 25-52, 2000.
- "Abuse of Dominance under the 1986 Canadian *Competition Act*." (with Roger Ware) *Review of Industrial Organization* 13, 85-129, 1998.
- “Strategic Entry Deterrence: Complementary Products as Installed Base.” (with Neil Gandal) *European Journal of Political Economy* 12, 331-354, 1996.
- "Delegation, Market Share and the Limit Price in Sequential Entry Models." (with Roger Ware) *International Journal of Industrial Organization* 14, 575-609, 1996.
- "Complementary Network Externalities and Technological Adoption." (with Neil Gandal) *International Journal of Industrial Organization* 11, 239-260, 1993.
- "Bilingualism and Network Externalities." (with Ian King) *Canadian Journal of Economics* XXVI, 337-345, 1993. Reprinted in *Economics of Language*. ed. D. Lamberton. International Series of Critical Writing in Economics, Vol. 150, Northampton, MA.: Edward Elgar Publishing, 2002.
- "Comment on ‘Energy Politics in Canada, 1980-81: Threat Power in a Sequential Game’." *Canadian Journal of Political Science* XXVI, 61-64, 1993.
- "Integration, Complementary Products and Variety." (with Neil Gandal) *Journal of Economics and Management Strategy* 1, 651-675, 1992.
- "Network Effects, Software Provision and Standardization." (with Neil Gandal) *Journal of Industrial Economics* XL, 85-104, 1992.

Invited Papers

- “The Lamentable Rise of an Expanded Essential Facilities Doctrine in Canada: the Troubling Economic Foundations and Implications of the Toronto Real Estate Board Decision,” *Canadian Competition Law Review forthcoming* 2018.

- “Too Many Tweets: Internet Billing Practices in Canada,” *Policy Options* May 2011: 54-59.
- "Trade-Dress and Pharmaceuticals in Canada: Efficiency, Competition and Intellectual Property Rights," (with Roger Ware) *Policy Options* 18: 9-12, 1997.

Books and Monographs

- *The Impact of Vertical and Conglomerate Mergers on Competition* Brussels: European Commission, 2004 at http://bookshop.europa.eu/en/the-impact-of-vertical-and-conglomerate-mergers-on-competition-pbKD7105158/. Published as European Commission, 2006, *The Impact of Vertical and Conglomerate Mergers on Competition* Luxembourg: Office for Official Publications of the European Communities.
- *Industrial Organization: A Strategic Approach* (with Roger Ware) San Francisco: IRWIN/McGraw-Hill, 2000.
- *Traditional and Incentive Regulation: Applications to Natural Gas Pipelines in Canada* (with Robert Mansell) Calgary: Van Horne Institute, 1995.
- *Econometric Models and Economic Forecasts: A Computer Handbook Using MicroTsp* New York: McGraw-Hill, 1990.

Chapters in Books

- "Conglomerate Mergers." in W.D. Collins ed., *Issues in Competition Law and Policy* Volume 2 Chicago: American Bar Association, pp. 1503-1552, 2008.
- "Vertical Mergers." in W.D. Collins ed., *Issues in Competition Law and Policy* Volume 2 Chicago: American Bar Association, pp. 1455-1502, 2008.
- "Platform Competition in Telecommunications." (with N. Gandal) in M. Cave, S. Majumdar, and I. Vogelsang eds., *Handbook of Telecommunications* Vol. 2 Amsterdam: North-Holland, pp. 119-155, 2005.
- "Mergers and Market Power: Estimating the Effect on Market Power of the Proposed Acquisition by The Coca-Cola Company of Cadbury-Schweppes’ Carbonated Soft Drinks in Canada." (with A. Abere, O. Capps, Jr. and H.A. Love) in D. Slottje ed., *Economic Issues in Measuring Market Power*, Contributions to Economic Analysis, Vol. 255, Amsterdam: North-Holland, pp. 233-294, 2002.
- "The Economics of Coordinated Effects and Merger Analysis." in D. Houston ed., *CBA Competition Law Conference 2000* Juris Publisher: Yonkers, N.Y., pp. 561-575, 2001.
- "Network Industries, Intellectual Property Rights, and Competition Policy." (with Roger Ware) in N. Gallini and R. Anderson eds., *Competition Policy, Intellectual Property Rights and International Economic Integration* Calgary: University of Calgary Press, pp. 227-285, 1998.

Papers and Proceedings

- "The Interface Between Competition Law and Intellectual Property in Canada: An Uneasy Alliance or Holy War?" on CD-ROM, *2005 Annual Fall Conference on Competition Law*. Ottawa: Canadian Bar Association, 2005.
- "The Economics of Exclusionary Contracts and Abuse of Dominance in Canada." on CD-ROM, *2003 Annual Fall Conference on Competition Law*. Ottawa: Canadian Bar Association, 2003.
- "Competition Policy and the Intercity Passenger Transportation System in Canada." in M. Duncan, ed. *Directions: A New Framework for Transportation* Calgary: Van Horne Institute, pp. 21-25, 1993.
- "Commodity Price Regulation in Canada: A Survey of the Main Issues." (with Robert Mansell) *Papers and Proceedings of the Fifth Annual Regulatory Educational Conference,* Canadian Association of Members of Public Utility Tribunals, 1991.

Public Reports

- *Defining the Public Interest in Regulatory Decisions; The Case for Economic Efficiency*. C.D. Howe Institute Commentary No. 478, May 2017. Available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2965707.
- *Wireless Competition in Canada: Damn the Torpedoes! The Triumph of Politics over Economics* (with A. Wilkins). School of Public Policy, University of Calgary Research Paper, 7(20), 2014. Available at http://policyschool.ucalgary.ca/sites/default/files/research/church-wirelessupd2014-v6.pdf.
- *Wireless Competition in Canada: An Assessment* (with A. Wilkins). School of Public Policy, University of Calgary Research Paper, 6(27), 2013. Available at http://www.policyschool.ucalgary.ca/sites/default/files/research/j-church-wireles-online.pdf.
- *Transmission Policy in Alberta and Bill 50* (with William Rosehart and John MacCormack). School of Public Policy, University of Calgary Research Paper, 2009.
- *Buyer Power: Background Note*. Competition Committee, Directorate for Financial and Enterprise Affairs, OECD, Paris, 2009, Available at http://www.oecd.org/dataoecd/38/63/44445750.pdf.
- *Vertical Mergers: Background Note*. Competition Committee, Directorate for Financial and Enterprise Affairs, OECD, Paris, 2007. Available at http://www.oecd.org/dataoecd/25/49/39891031.pdf.
- *An Evaluation of Traditional and Incentive Regulation for Canadian Natural Gas Pipelines*. (with Robert Mansell) Study submitted to, and available from, the National Energy Board of Canada, 1992.

- *Methodology for Evaluating Natural Gas Transmission System Reliability Levels and Alternatives*. (with Robert Mansell) Study prepared for, and available from, the Canadian Petroleum Association, 1991.

Public Regulatory Interventions

- Submission of The Director of Investigation and Research to Industry Canada re: Canada Gazette Notice No. DGTP-008-95 Review of Canadian Overseas Telecommunications and Specifically Teleglobe Canada's Role October 27, 1995 (with David Smith).
- Reply Comments of The Director of Investigation and Research to Industry Canada re: Canada Gazette Notice No. DGTP-008-95 Review of Canadian Overseas Telecommunications and Specifically Teleglobe Canada's Role December 11, 1995 (with David Smith).
- Submission of The Director of Investigation and Research to The Canadian Radio-Television and Telecommunications Commissions re: Telecom Notice CRTC 95-36 Implementation of Regulatory Framework, Local Interconnection and Network Component Unbundling January 26, 1996 (with Cal Gundy and Patrick Hughes).
- Final Argument of The Director of Investigation and Research to The Canadian Radio-Television and Telecommunications Commissions re: Telecom Notice CRTC 95-36 Implementation of Regulatory Framework, Local Interconnection and Network Component Unbundling October, 1996 (with Cal Gundy and Patrick Hughes).
- Final Oral Argument of The Director of Investigation and Research to The National Energy Board in PanCanadian Petroleum Limited application dated 26 July 1996 for an order requiring Interprovincial Pipe Line Inc. to transport natural gas liquids for PanCanadian Petroleum Limited from Kerrobert, Saskatchewan (MH-4-96) November 1996 (co-author).
- Opening Statement to the Alberta Utilities and Energy Board in Federated Pipe Lines Ltd. Application to Construct and Operate a Crude Oil Pipeline from Valhalla to Doe Creek, Alberta Energy and Utilities Board March (Decision 98-12) March 1998.
- Final Argument of The Director of Investigation and Research to The Canadian Radio-Television and Telecommunications Commissions re: Telecom Notice CRTC 98-10 Local Competition Start-Up Proceeding November, 1998 (with Cal Gundy).
- *Commissioner of Competition Intellectual Property Enforcement Guidelines,* Hull, Quebec: Competition Bureau. External member Commissioner of Competition's Drafting Team, first draft released in June 1999, second draft released April 2000, final version released September 2000.
- Final Argument of The Commissioner of Competition to The Canadian Radio-Television and Telecommunications Commissions re: Telecom Notice Public Notice 2001-37 - Price

Cap Review and Related Issues October 2001 (with Cal Gundy).

- Comments of The Commissioner of Competition to The Canadian Radio-Television and Telecommunications Commissions re: Telecom Notice Public Notice 2001-47 Framework for the expansion of local calling areas and related issues November 2001 (with Cal Gundy and Masood Qureshi).
- Written Comments of the Competition Bureau to the Alberta Electricity Industry Structure Review February 2002 (with David Krause and Mark Ronayne).
- Final Submission of the Commissioner of Competition to the Ontario Energy Board’s Natural Gas Forum Consultation on the Ontario Natural Gas Market November 2004 (with Mark Ronayne).
- The Commissioner of Competition Evidence, Final, and Reply Argument, The Canadian Radio-Television and Telecommunications Commissions re: Telecom Notice Public Notice 2005-2, Forbearance from Regulation of Local Exchange Services June, September, and October 2005 (part of the Competition Bureau’s drafting team).
- *Market Power and the Mackenzie Gas Project,* Evidence filed before the National Energy Board, Mackenzie Gas Project, GH-1-2004, June 2005.
- The Commissioner of Competition Evidence, Supplementary Material, Final Argument, and Reply Argument, The Canadian Radio-Television and Telecommunications Commissions re: Telecom Notice Public Notice 2006-14, Review of Regulatory Framework for Wholesale Services and Definition of Essential Service 2007 (part of the Competition Bureau’s drafting team).
- Commissioner of Competition, *Abuse of Dominance Provisions as applied to the Telecommunications Industry,* Hull, Quebec: Competition Bureau. External member Commissioner of Competition's Drafting Team, first draft released September 2006, final version released June 2008.
- *Foreign Ownership Restrictions of Canadian Telecoms: An Analysis of Industry Canada’s Proposals* (with assistance of BRG), re Industry Canada Consultation on Opening Canada's Doors to Foreign Investment in Telecommunications: Options for Reform, July 2010. Available online at http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/Rogers.pdf/$file/Rogers.pdf.
- *Spectrum Policy as Competition Policy: A Good Choice for Canada?* (with assistance of BRG) re Industry Canada Consultation on a Policy and Technical Framework for the 700 MHz Band and Aspects Related to Commercial Mobile Spectrum Gazette Notice SMSE-018-10, February 2011. Available online at http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/smse-018-10-jeffreychurch-rogers.pdf/$FILE/smse-018-10-jeffreychurch-rogers.pdf.

- *Economic Principles and Usage Based Billing,* The Canadian Radio-Television and Telecommunications Commissions re: Telecom Notice of Consultation CRTC 2011-77 Review of billing practices for wholesale residential high-speed access services March 2011. Available online at https://services.crtc.gc.ca/pub/ListeInterventionList/Documents.aspx?ID=156065&Lang=e.
- *The Competitive Effects of Vertical Integration: Content and New Distribution Platforms in Canada* (with assistance of BRG), The Canadian Radio-Television and Telecommunications Commissions re: Broadcasting Notice of Consultation CRTC 2010-783 Review of the regulatory framework relating to vertical integration, April 2011. Available online at https://services.crtc.gc.ca/pub/ListeInterventionList/Documents.aspx?ID=156953&Lang=e Documents.aspx?ID=156065&Lang=e.
- *In the Matter of a Complaint by Imperial Oil with Respect to Enbridge Southern Lights GP (ESL) Tariffs No. 1 and 2 Expert Evidence* (with assistance of BRG), The National Energy Board, Hearing Order RH-1-2011, July 2011 and *Reply Evidence* September 2011. Available online at https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=704264&objAction=browse and https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=718914&objAction=browse.
- *Western Alberta Transmission Line Application Evidence of Dr. Jeffrey Church and Mr. John MacCormack,* Application No. 1607067, Proceeding ID 1045, Alberta Utilities Commission, September 2011.
- *Market Definition and Competitive Effects in Air Freight,* December 22, 2011 and *Reply* August 16, 2012 *Australian Competition & Consumer Commission v. Air New Zealand Limited, Federal* Court of Australia, NSD534/2010.
- *Critical Transmission Review Committee Request for Information*, Submission of Dr. Jeffrey Church and Mr. John MacCormack, January 2012.
- *In the Matter of The Ontario Energy Board Act, and in the Matter of an Application By Toronto Hydro- Electric System Limited for an Order Pursuant to Section 29 of The Ontario Energy Board Act, Expert Report of Jeffrey Church*, June 2013. Available online at http://www.rds.ontarioenergyboard.ca/webdrawer/webdrawer.dll/webdrawer/search/rec?sm_udf10=EB-2013-0234&sortd1=rs_dateregistered&rows=200.
- *Review of Wholesale Services and Policies Expert Report,* The Canadian Radio-Television and Telecommunications Commissions Review of Wholesale Services and Policies Telecom Notice of Consultation 2013-551, January 2014. Attachment 1 to the Intervention of Bell Canada. Available online at

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- *The Competitive Effects of TransAlta's Timing of Discretionary Outages, Expert Report and Reply Report,* Application of the Market Surveillance Administrator File No. 0630, March 2014. Available online at https://www.auc.ab.ca/eub/dds/eps_Query/ProceedingSubmissionSearch.aspx?ProceedingId=3110.
- *Competitive Royalties for Retransmitted Distant Signals in Canada Expert Report and Reply Expert Report,* Copyright Board of Canada, Television Retransmission (2014-2018), 2015.
- *The Competitive Effects of the Historical Trading Report: A Response to the MSA's Application* and *Update,* Market Surveillance Administrator Section 51(1)(b) Notice and Application, Alberta Utilities Commission Proceeding 21115, 2016.

Public Expert Competition Filings

- *Expert Report of Jeffrey Church* in *The Commissioner of Competition v. Visa Canada Corporation and MasterCard International Incorporated*, The Competition Tribunal CT-2010-010, April 2012. Available online at http://www.ct-tc.gc.ca/CMFiles/CT-2010-010_Expert%20Report%20of%20Jeffrey%20Church_239_45_4-10-2012_4211.pdf
- *Expert Report of Jeffrey Church* in *The Commissioner of Competition v. The Toronto Real Estate Board,* The Competition Tribunal CT-2011-003, July 2012. Available online at http://www.ct-tc.gc.ca/CMFiles/CT-2011-003_Expert%20Report%20of%20Jeffrey%20Church_202_53_7-27-2012_7764.pdf
- *Expert Report of Jeffrey Church* in *The Commissioner of Competition v. The Toronto Real Estate Board,* The Competition Tribunal CT-2011-003, May 2015. Available online at http://www.ct-tc.gc.ca/CMFiles/CT-2011-003_Expert%20Report%20of%20Jeffrey%20Church_332_38_6-15-2015_4965.pdf
- *Report of the Technical Advisor, In Re: Domestic Drywall Antitrust Litigation,* MDL No. 2437, for the United States District Court for the Eastern District of Pennsylvania, 2017.

Book Reviews

- *The Political Economy of Pipelines* (by Jeff Makholm) for *The Energy Journal,* 36, 355-357, 2015.
- *Competition Policy: A Game -Theoretic Perspective* (by Louis Phlips) for *The Economic Journal,* 107, 1590-1592, 1997.

Websites

- *Industrial Organization: A Strategic Approach*. URL: http://www.econ.ucalgary.ca/iosa/
- *Industrial Organization: A Strategic Approach Instructor's Manual*. URL: http://www.econ.ucalgary.ca/iosa/IM/

Research In Progress

- "Network Externalities, Technological Progress, and Competitive Upgrades." (with Michael Turner) Mimeo, Department of Economics, University of Calgary 2002.
- "Direct and Indirect Strategic Effects: A Taxonomy of Investment Strategies." (with L. Moldovan) Mimeo, Department of Economics, University of Calgary 2006.
- "Exclusive Provision and Standardization in a Two-Sided Market." (with J. Mathewson) Mimeo, Department of Economics, University of Calgary 2009.
- "Asymmetries, Simulation and the Assessment of Input Foreclosure in Vertical Mergers." (with A. Majumdar and M. Baldauf) Mimeo, Department of Economics, University of Calgary 2010.
- "Capacity Constraints in Durable Goods Monopoly: Coase and Hotelling." (with John Boyce and Lucia Vojtassak) Working Paper 2012-07, Department of Economics, University of Calgary 2012.
- "The Market Consequences of 'Mad Cows'." (with Dan Gordon) Mimeo, Department of Economics, University of Calgary 2014.
- "Market Power in the Alberta Electric Industry." (with Richard Kendall-Smith) Mimeo, Department of Economics, University of Calgary 2014.
- "Residential Wireline Telecommunications Services in Canada: Primary Exchange Services and Broadband." (with Andrew Wilkins) Working Paper, Department of Economics, University of Calgary, 2014-34, January 2014. Available on line at http://econ.ucalgary.ca/sites/econ.ucalgary.ca/files/unitis/publications/1-4876092/Wireline_Database_January_2014.pdf.
- "Residential Wireline Telecommunications Services in Canada: Primary Exchange Services and Broadband 2015." (with Andrew Wilkins) Working Paper, Department of Economics, University of Calgary, 2015-07, March 2015. Available on line at http://econ.ucalgary.ca/sites/econ.ucalgary.ca.manageprofile/files/unitis/publications/1-6291150/DEP_Wireline_Database_2015_March_25_2015.pdf.
- "The Alberta Utilities Commission Fails Principles: A Review of the Alberta Utilities Commission Decision 21115-D01-2017 Application by the Market Surveillance Administrator Regarding the Publication of the Historical Trading Report," Mimeo, Department of Economics, University of Calgary 2018.

Presentations

- "Competition Issues in Markets Involving Platforms." Economist Roundtable with the Competition Bureau, Toronto, May 2018.
- "Essential Facilities in Canada: the Lamentable Rise of an EF Doctrine in Canada."

Canadian Bar Association National Competition Law Section 2017 Annual Competition Law Fall Conference, Ottawa, October 2017.

- "Economic Foundations of Abuse of Dominance." The Forum on Competition Law, Toronto, November 2016.
- "Scholars Panel: Loyalty Programs—Risks & Rewards," Moderator, Canadian Bar Association National Competition Law Section 2016 Annual Competition Law Fall Conference, Ottawa, September 2016.
- "Timing of Discretionary Outages and Market Power in the Alberta Electricity Industry." Australian Competition and Consumer Commission, Melbourne, August 2016.
- "Implications of OTT Services for the Regulation of Telecommunication Services." ACCC/AER Regulatory Conference 2016, Brisbane, August 2016.
- "Managing Competition in Local Telecommunications: Regulatory Failure at the CRTC." Association Canadian General Counsel Conference, Vancouver, May 2016.
- "Economic Analysis for Merger Review." CBA Economics and Law Committee, TeleSeminar, March 2016.
- "Where Did My Monopoly Go?" Canadian Association of Managers of Public Utilities Tribunals Annual Conference, Calgary, May 2015.
- "Defining the Public Interest." Energy and Resources Council, C.D. Howe Institute, Calgary, March 2015.
- "Economic Fundamentals of Abuse of Dominance." Canadian Bar Association National Competition Law Section Economics & Law and Young Lawyers Committee, TeleSeminar, March 2015.
- "Top 10 Changes That Should be Made to Canadian Competition Law and Institutions," Canadian Bar Association National Competition Law Section 2014 Annual Competition Law Fall Conference Ottawa, September 2014.
- "Market Power in the Alberta Electric Industry." Annual Meeting of the Canadian Economics Association, Vancouver, May 2014.
- "To Regulate or Not to Regulate—Is that the Question?" Canadian Bar Association National Competition Law Section Spring Forum, Toronto, May 2014.
- "Vertical Mergers under Canadian Competition Law." Panel Discussion, Canadian Bar Association National Competition Law Section Mergers Committee, TeleSeminar, March 2014.
- "How Competitive is Canada's Wireless Sector?" Panel Discussion, International Institute of Communications (Canadian Chapter), Ottawa, November 2013.
- "Presentation to the Critical Transmission Review Committee." Critical Transmission Review Committee, Calgary, January 2012.

- "Spectrum Policy as Competition Policy." Workshop on Auction Design and Competition in Canadian Wireless Markets, Centre for Digital Economy, University of Calgary, Ottawa, September 2011.
- "Issues in the Economic Regulation of Pipelines in Canada." Canada's Pipeline and Energy Transportation Infrastructure, C.D. Howe Institute, Banff, June 2011.
- "Competition Issues in Network Industries." Canadian Bar Association National Competition Law Section, Competition Law Spring Forum 2011: Focus on Civil, Toronto, May 2011.
- "Regulatory Governance and the Alberta Integrated Electric System." 11th Annual Alberta Power Summit, Calgary, November 2010.
- "Asymmetries, Simulation and the Assessment of Input Foreclosure in Vertical Mergers." Bates White Seventh Annual Antitrust Conference, Washington, D.C., June 2010 and Annual Meeting of the Canadian Economics Association, Ottawa, June 2011.
- "The Competition Act and the Fair Efficient and Open Competition Regulation." Workshop for the Alberta Utilities Commission, Calgary, April 2010 (with Barry Zalmanowitz).
- "Transmission Policy in Alberta and Bill 50." School of Public Policy Workshop, Electricity Transmission Policies: Issues and Alternatives, Calgary, October 2009 and the National Energy Board, Calgary, February 2010.
- "Economics of Vertical Mergers." British Institute for International and Comparative Law, 7th Annual Merger Conference, London, November 2008.
- "Telecommunications in Canada: Market Structure and the State of the Industry." 2008 Telecommunications Invitational Forum, Landgon Hall, Ontario, April 2008.
- "Cartel Cases Under Section 45: Is Proof of Market Definition the Achilles Heel?" Panelist, Competition, Crime and Punishment, Canadian Bar Association National Competition Law Section Spring Conference, Toronto, April 2008.
- "Forbearance of Local Telecommunications in Canada: One Back, Two Forward?" Telecommunications and Broadcasting Current Regulatory Issues and Policy Insight Communications Conference, Ottawa, April 2007.
- "The Economics of Non-Horizontal Merger Guidelines." ENCORE Workshop on the Assessment of Non-Horizontal Mergers, The Hague, April 2007.
- "Stumbling Around in No Man's Land is Dangerous: Competition Policy, the CRTC, and Deregulation of Local Telecom in Canada." Competition Policy in Regulated Industries: Principles and Exceptions, C.D. Howe Institute Policy Conference, Toronto, November 2006.
- " Competition in Local Telecommunications in Canada: Grading the CRTC." Delta Marsh

Annual Conference, Department of Economics, University of Manitoba, Winnipeg, October 2006.

- “Grading the CRTC: Forbearance from the Regulation of Retail Local Exchange Services Telecom Decision 2006-15.” part of the Panel on Local Competition at the Annual Meetings of the Canadian Economics Association, Montreal, May 2006.
- “The Interface Between Competition Law and Intellectual Property in Canada: An Uneasy Alliance or Holy War?” Presented at the Canadian Bar Association Annual Fall Conference on Competition Law, Gatineau, November 2005.
- “Game Theory and Industrial Organization: An Introduction.” Competition Tribunal, Knowlton, Quebec, October 2005.
- “The Impact of Vertical and Conglomerate Mergers on Competition: An Overview of the Survey And Implications for Competition Policy.” DG IV European Commission, Brussels, July 2004, UK Competition Commission, London, September 2005, British Institute of International and Comparative Law/Competition Law Forum, Brussels, September 2005 and Conference on Economics in Competition Policy, Ottawa, April 2006.
- “The Economics and Competition Policy of Exclusionary Agreements.” Competition Bureau, Gatineau, April 24-25, 2005.
- “Intellectual Property Issues and Abuse: The IP/Competition Policy Interface in Canada.” 2004 Competition Law and Policy Forum, Langdon Hall, Cambridge, Ontario, April 2004.
- “Efficiencies Gained and Paradise Lost? Or the Inverse? Comments on the Propane Case.” Economics Society of Calgary Seminar Regulation vs. Competition: Different Shades of Grey, Calgary, October 2003.
- “The Economics of Exclusionary Contracts and Abuse of Dominance in Canada” Presented at the Canadian Bar Association Annual Fall Conference on Competition Law, Hull, October 2003.
- “Network Externalities, Technological Progress, and Competitive Upgrades” Presented at PIMS-ASRA Alberta Industrial Organization Conference, Calgary, November 2002.
- Panelist, The Changing Competition Law Landscape, Osler, Hoskin & Harcourt, Calgary, June 2002.
- Panelist, Efficiencies in Mergers Under the Competition Act, Annual Meeting of the Canadian Economics Association, Calgary, June 2002.
- "Specification Issues and Confidence Intervals in Unilateral Price Effects Analysis" Presented at the Annual Meeting of the Canadian Economics Association, Calgary, June 2002.
- “The Economics and Econometrics of Unilateral Effects Analysis.” Competition Bureau,

Gatineau, January 7th and 8th, 2002 (with Oral Capps, Jr. and H. Alan Love).

- "Economics and Antitrust of Network Industries." Competition Bureau, Gatineau, January 2001.
- "The Economics of Coordinated Effects and Merger Analysis." Presented at the Canadian Bar Association Annual Fall Conference on Competition Law, Ottawa, September 2000.
- "Network Externalities, Technological Progress, and Competitive Upgrades." Presented at the Annual Meeting of the Canadian Economics Association, Vancouver, June 2000.
- "Competition Policy for Network Industries." Presented at Centre for the Study of Government and Business New Challenges for Competition Policy Panel, Annual Meeting of the Canadian Economics Association, Vancouver, June 2000.
- "Applying Antitrust Concepts in IT Industries." Presented at Roundtable on Reassessing the Role of Antitrust in Mega-Mergers and IT Industries Faculty of Law, University of Toronto, June 2000.
- "The Economics of Electricity Restructuring: The Case of Alberta." Canadian Law and Economics Conference, Toronto, September 1999.
- "Refusals to License and the IP Guidelines: Abuse of Dominance and Section 32." McMillan Binch Symposium on Intellectual Property Rights and Competition Policy, Toronto, June 1999.
- "The Economics of Electricity Restructuring: The Alberta Case." presented at Economic Society of Calgary conference Alberta's Electricity Market—Moving Towards Deregulation, Calgary, May 1999.
- "Competition in Natural Gas Transmission: Implications for Capacity and Entry." presented at Van Horne Institute conference The New World in Gas Transmission: Regulatory Reform and Excess Capacity, Calgary, April 1999.
- "Bill 27: The Regulatory Framework." presented at Canadian Institute of Resources Law conference on Restructuring Alberta's Electricity System: How will It Work?, Calgary, June 1998.
- Panelist, Antitrust and Telecommunications, Global Networking '97 Conference, Calgary, June 1997.
- "Network Industries, Intellectual Property Rights, and Competition Policy." presented at Author's Symposium on Competition Policy, Intellectual Property Rights and International Economic Integration, Ottawa, May 1996.
- Panelist, Symposium on Barriers to Entry, Bureau of Competition Policy, Ottawa, March 1995.
- "Branded Ingredient Strategies," presented at the Summer Conference on Industrial Organization, University of British Columbia, Vancouver, August 1994.

- "Equilibrium Foreclosure and Complementary Products," the Annual Meetings of the European Association for Research in Industrial Economics, Tel-Aviv, September 1993, the Annual Meeting of the Canadian Economics Association, Ottawa, June 1993 and the Mini-Conference on Network Economics at Tel Aviv University, July 1992.
- "Competition Policy and the Intercity Passenger Transportation System in Canada," presented at the Van Horne Institute for International Transportation and Regulatory Affairs symposium on *The Final Report of the Royal Commission on National Passenger Transportation,* The University of Calgary, February 1993.
- "Integration, Complementary Products and Variety," presented at the Annual Meeting of the Canadian Economics Association, Prince Edward Island, June 1992 and Telecommunications Research Policy Conference, Solomons Island, MA, September 1991.
- "The Role of Limit Pricing in Sequential Entry Models," presented at the Twenty-Fifth Annual Meeting of the Canadian Economics Association, Kingston, June 1991.
- "Commodity Price Regulation in Canada: A Survey of the Main Issues," presented at the Fifth Annual Regulatory Educational Conference, Canadian Association of Members of Public Utility Tribunals, May 1991.
- "Complementary Network Externalities and Technological Adoption," at the Twenty-Fourth Annual Meeting of the Canadian Economics Association, Victoria, June 1990 and at the Fifteenth Canadian Economic Theory Conference, Vancouver, June 1990.

Invited Seminars

- Department of Economics, University of Montreal, June 2011
- Faculty of Commerce and Business Administration, University of British Columbia, April 2002
- Department of Economics, University of Toronto, March 2002
- School of Business & Economics, Wilfred Laurier University March 2002
- Competition Bureau, January 2002
- Department of Economics, University of Laval, April 1996
- Department of Economics, Carleton University, Ottawa, January 1996
- Stern School of Business, New York University, December 1995
- Bureau of Competition Policy, Industry Canada, Ottawa, March 1994
- Department of Economics, Simon Fraser University, November 1992
- Department of Economics, University of Victoria, November 1992
- Department of Economics, University of Toronto, October 1991
- Department of Economics, Queen's University, Kingston, October 1991
- Department of Economics, University of Alberta, February 1990

Refereeing

American Economic Journal: Microeconomics, American Economic Review, Canadian Competition Law Review, Canadian Journal of Agricultural Economics, Canadian Journal of Economics, Canadian Journal of Political Science, Canadian Public Policy, Canada Research Chairs, C.D. Howe Institute, Econometrica, Energy Journal, European Economic Review, FCAR, Information Economics and Policy, International Economics and Economic Policy, International Economic Review, International Journal of the Economics of Business, International Journal of Industrial Organization, Israel Science Foundation, Journal of Econometrics, Journal of Economic Behavior and Organization, Journal of Economic Education, Journal of Economic Psychology, Journal of Economics, Journal of Economics and Business, Journal of Economics and Management Strategy, Journal of Industrial Economics, Journal of International Economics, Journal of Law, Economics, & Organization, Management Science, Marketing Science, National Science Foundation, RAND Journal of Economics, Journal of Economic Surveys, Review of Industrial Organization, Review of Network Economics, Routledge, SSHRC, University of Calgary School of Public Policy, University of Cambridge Press.

Professional Service

- Chair, Canadian Bar Association National Competition Law Section Economics and Law Committee, 2005-2007.
- Vice-Chair Canadian Bar Association National Competition Law Section Economics and Law Committee, 2004-2005.
- Juror, James M. Bocking Memorial Award, Canadian Bar Association National Competition Law Section, 2006-2017.
- Co-Editor, *Journal of Economics & Management Strategy,* 2001-2007.
- Editorial Board, *Canadian Journal of Economics*, 1993-1996.
- Theme Head Economics Sessions and Programme Committee, International Telecommunications Society and the International Council for Computer Education Global Networking '97 Conference, Calgary, June 1997.
- Organizer, Roundtable on Vertical Mergers, Competition Committee, Directorate for Financial and Enterprise Affairs, OECD, Paris, 2007. See http://www.oecd.org/dataoecd/25/49/39891031.pdf
- Organizer, Roundtable on Buyer Power, Competition Committee, Directorate for Financial and Enterprise Affairs, OECD, Paris, 2008. See http://www.oecd.org/dataoecd/38/63/44445750.pdf
- External Examiner for E. Croft Ph.D., Policy Programme, Faculty of Commerce and

Business Administration, University of British Columbia, April 1999, B. Isaacs Ph.D., Department of Economics, Simon Fraser University, May 2000, J. Landa Ph.D., Department of Economics Carleton University, May 2001, J. Latulippe Ph.D, Department of Economics, University of Montreal, June 2011.

- House of Commons Standing Committee on Industry, Science and Technology Roundtable Participant on Competition Policy, December 2001.
- House of Commons Standing Committee on Industry, Science and Technology, Deregulation of Telecommunications, February 2007.

Teaching Experience

Graduate

- Ph.D. Micro Theory
- Industrial Organization
- Regulatory Economics
- Markets and Public Policy (School of Public Policy)

Undergraduate

- Regulatory Economics
- Competition Policy
- Honours Micro Theory
- Industrial Organization
- Intermediate Microeconomics

Professional

- Regulatory economics through the Centre for Regulatory Affairs.
- Principles of Microeconomics, Industrial Organization and Competition Policy for the Competition Bureau.

Graduate Student Supervision/Examination

Completed

- Supervisor, M. Ec. Programme, Mark Larsen, "Calgary Crossfield Sour Gas: A Case Study in the Costs of Regulation," Department of Economics, University of Calgary, 1993.
- Supervisor, M. A. Programme, George Given, "The Dynamics of Industries Characterized by Complementary Network Externalities," Department of Economics, University of Calgary, 1994.
- Supervisor, M. Ec. Programme, R. Allan Wood, "Subsidies to Municipal Golfers in Calgary, AB.," Department of Economics, University of Calgary, 1995.
- Supervisor, M. A. Programme, Marcy Cochlan, "Branded Ingredient Strategies," Department of Economics, University of Calgary, 1995.

- Supervisor, M. Ec. Programme, Shaun Hatch, "Optimal Pricing and the Allocation of Water Under Uncertainty: A Stochastic Nonlinear Programming Approach," Department of Economics, University of Calgary, 1995.
- Supervisor, M. A. Programme, Denelle Peacey, "Priority Pricing," Department of Economics, University of Calgary, 1995.
- Supervisor, M.A. Programme, Michael Turner, "Analysis of Product Upgrades in Computer Software," Department of Economics, University of Calgary, 1999.
- Supervisor, M.A. Programme, Kurtis Hildebrandt, "Market Dominance and Innovation in Computer Software Markets," Department of Economics, University of Calgary, 1999.
- Supervisor, M.A. Programme, Alex Harris, "Optimal Multiproduct Tolling on an Oil Pipeline," Department of Economics, University of Calgary, 2000.
- Supervisor, M.A. Programme, Noelle Bacalso, "Conceptual Hazards Associated with Power Purchase Arrangements," Department of Economics, University of Calgary, 2000.
- Supervisor, M.A. Programme, Laura Jolles, “Antitrust Logit Model,” Department of Economics, University of Calgary, 2005.
- Supervisor, M.A. Programme, Mohamed Amery, “The Procurement of Ancillary Services in Alberta,” Department of Economics, University of Calgary, 2007.
- Supervisor, M.A. Programme, Graham Thomson, “Optimal Price Cap Regulation,” Department of Economics, University of Calgary, 2008
- Supervisor, M. A. Programme, Kevin Wipond, “Market Power in the Alberta Electrical Industry,” Department of Economics, University of Calgary, 2008.
- Supervisor, M.A. Programme, Nicholas Janota, “Introducing Competition into Regulated Network Industries: From Hierarchies to Markets in Canada’s Railroad Industry,” Department of Economics, University of Calgary, 2009.
- Supervisor, M.A. Programme, Cory Temple, “A Beggars’ Banquet? Copyright, Compensation Alternatives, and Music in the Digital Economy,” Department of Economics, University of Calgary, 2010.
- Supervisor, M.A. Programme, Susan Baker, “Loyalty Programs: A Review of the Competition Commissioner versus Canada Pipe Case,” Department of Economics, University of Calgary, 2011.
- Supervisor, M.A. Programme, Michael Ata, “A Bayesian Approach to Antitrust Liability: Exclusive Dealing and Predation,” Department of Economics, University of Calgary, 2011.
- Supervisor, M.A. Programme, Richard Kendall-Smith, “An Analysis of Market Power in the Alberta Electricity Market,” Department of Economics, University of Calgary, 2013.
- Supervisor, M.A. Programme, Grant Freudenthaler, “The Implications of Uniform Pricing

in Restructured Electricity Wholesale Markets: Evidence from Alberta," Department of Economics, University of Calgary, 2016.

- Supervisor, M.A. Programme, Lars Renborg, "Implications of Implementing an Efficient Residential Transmission and Distribution Tariff and an Efficient Reimbursement Price for Excess Rooftop Solar Production in Alberta ," Department of Economics, University of Calgary, 2018.
- Supervisor, Master of Public Policy Programme, Jennifer Rumas, "Economic Evaluation of Wind Power in Alberta," School of Public Policy, University of Calgary, 2012.
- Supervisor, Master of Public Policy Programme, Nicolaas Jansen, "A Review of Alberta's Default Rate for Electricity," School of Public Policy, University of Calgary, 2016.
- Supervisor, Master of Public Policy Programme, Marko Daljevic, "The Regulatory Compact and the Treatment of Stranded Assets." School of Public Policy, University of Calgary, 2016.
- Supervisor, Ph.D. Programme, David Krause, "Internalizing Network Externalities," Department of Economics, University of Calgary, 2002.
- Supervisor, Ph.D. Programme, Hongru Tan, "The welfare implication of lifting the no surcharge rule in credit card markets," Department of Economics, University of Calgary, 2016.
- Supervisory Committee, Ph.D. Programme, Lucia Vojtassak, "Equilibrium Concepts in Exhaustible Resource Economics." Department of Economics, University of Calgary, 2006.
- Supervisory Committee, Ph.D. Programme, G. Kent Fellows, "Select Issues in Applied Regulatory Theory," Department of Economics, University of Calgary, 2015.
- Examination Committee Member, M. Ec. Programme, Murray Sondergard, "An Examination of the Efficient Markets Hypothesis for the Toronto Stock Exchange," Department of Economics, University of Calgary, 1992.
- Examination Committee Member, M.A. Programme, Denise Froese, "Auctioning Private Use of Public Land," Department of Economics, University of Calgary, 1993.
- Examination Committee Member, M.Ec. Programme, Merrill Whitney, "Economic Espionage as a Form of Strategic Trade Policy" Department of Economics, University of Calgary, 1994.
- Examination Committee Member, M.Ec. Programme, Robert Richardson, "North-South Disputes Over IPRs" Department of Economics, University of Calgary, 1994.
- Examination Committee Member, M. Ec. Programme, Eva Cudmore, "The Viability of New Entry into the Alberta Electrical Generation Industry," Department of Economics, University of Calgary, 1997.

- Examination Committee Member, M. A.. Programme, Geok (Suzy) Tan, Course Based M.A, Department of Economics, University of Calgary, 1997.
- Examination Committee Member, M.A. Programme, Kris Aksomitis, "Strategic Behaviour in the Alberta Electricity Market," Department of Economics, University of Calgary, 2002.

Current

- Supervisor, Ph.D. Programme, Michael Ata, Department of Economics, University of Calgary.
- Supervisor, M.A. Programme, Ahmadreza Javanmardi, Department of Economics, University of Calgary.

University Service

- University Research Grants Committee 1994/95
- Dean's Academic Appointment Committee, Department of Mathematics and Statistics 2001
- ISEEE Tier II Chair in Energy and Climate Change Search Committee 2005/06
- Faculty of Social Sciences Academic Program Review Committee 2000/01
- Faculty of Social Sciences Executive Council 2002/03
- Department of Economics, Ad Hoc Outreach Committee 2001/02
- Curriculum Fellow, Department of Economics, 2001
- Department of Economics Representative on Van Horne Institute Sub-Committee on Centre for Regulatory Affairs 1997/98
- Department of Economics Advisory Committee 1997/98, 2013/14, 2017/2018, 2018/2019
- Department of Economics Undergraduate Curriculum Committee 1993/94, 1994/95, 1996/97, 1997/98, 1999/00, 2000/01, 2001/02, 2010/11
- Department of Economics Honours Advisor 1992/93, 1993/94, 1994/95, 2006/07
- Department of Economics Hiring Committee 1990/91, 1991/92, 1994/95, 1998/99, 1999/00, 2002/03, 2003/04, 2004/05, 2005/06, 2015/2016
- Department of Economics Computer Committee 1992/93, 1993/94, 1996/97, and 1997/98
- Department of Economics Ph.D. Ad Hoc Committee 1990/91 and 1992/93
- Department of Economics Ad Hoc Committee on the Status of Women 1991/92
- Department of Economics Striking Committee 1991/92
- Department of Economics Guest Lecturers Committee 1990/91 and 1991/92
- Department of Economics Graduate Curriculum Committee 1989/90
- Department of Economics Library Coordinator 2006/07
- Department of Economics Graduate Studies Committee 2007/08 and 2008/09
- Department of Economics Graduate Admissions Committee 2016/17

- Department of Economics Fund Raising Coordinator 2006/07, 2007/08, 2008/09, 2012/13 and 2013/14
- Department of Economics Microeconomics Coordinator 2013/14, 2014/2015, 2015/2016
- Department of Economics Policy and Planning Committee, Future Directions External Review 2016/17, 2017/2018
- University of Calgary Appointment Appeals Committees 2008
- Haskayne School of Business, Academic Appointment Review Committee 2007/08, 2008/09
- Haskayne School of Business, Advisory Decanal Selection Committee for the Dean, 2012/2013
- Haskayne School of Business, Senior Recruiting for Finance, 2013/14
- Haskayne School of Business, Recruiting for Accounting, 2014/15, 2015/2016
- General Promotions Committee, University of Calgary 2008/2009, 2010/2011
- Selection Advisory Committee, Headship Department of Economics, 2017

Consulting Experience

President of Church Economic Consultants Ltd., for whom I have written consulting reports and provided advice on issues in regulatory and antitrust economics for a number of companies and agencies, including the Alberta Beef Producers, Apotex, Australian Competition and Consumer Commission, Bell Canada Enterprises, Bayer CropScience, BC Ferries, BP Canada Energy Company, the Canadian Association of Petroleum Producers, the Canadian Cattlemen's Association, the Canadian Competition Bureau, The Coca-Cola Company, The Conference Board of Canada, Enbridge Pipelines, ENMAX, EPCOR, European Commission, Foothills Pipelines, Google Inc., James Richardson International Limited, Mackenzie Explorers Group, Maple Leaf Foods, Marine Atlantic, Market Surveillance Administrator Alberta, MasterCard, Microcell, Nokia, Nova Gas Transmission, OECD Competition Division, Pacific Gas & Electric, Pan Alberta Gas, PanCanadian Petroleum, Peace Pipe Line, Perimeter Transportation, Rogers Communications, Superior Propane, Toronto Hydro-Electric System, Toronto Real Estate Board, TransAlta, TransCanada Pipelines, Williams Energy, Visa, and eight major motion picture film studios.

Other

- 3M National Coaching Certification Program Level 1 Softball January 2002
- 3M National Coaching Certification Program Coach Level Hockey November 2002
- 3M National Coaching Certification Program Level 1 Baseball September 2003

Appendix B

Testifying Experience

Jeffrey Church

July 2018

1. *Federated Pipe Lines Ltd. Application to Construct and Operate A Crude Oil Pipeline from Valhalla to Doe Creek,* Alberta Energy and Utilities Board Decision 98-12, Appearance February 1998.

2. *Merck v. Apotex* (Enalapril) Federal Court of Canada T-2408-91 Appearance November 1998.

3. The Canadian Radio-Television and Telecommunications Commissions re: Telecom Notice Public Notice 2006-14, *Review of Regulatory Framework for Wholesale Services and Definition of Essential Service*. October 2007. As part of the Competition Bureau's drafting team, participated as part of a three member panel.

4. *Perimeter Transportation Ltd. v. Vancouver International Airport Authority*, 2008 BCSC 1515. Direct and Rebuttal Evidence. Appearance Supreme Court of British Columbia, February (Direct) and May 2008 (Rebuttal).

5. *Apotex Inc. v. Eli Lilly and Company, Eli Lilly Canada Inc., and Shionogi & Co. Ltd.* Federal Court of Canada, Court File No. T-1321-97. Direct and Rebuttal Evidence, September and October 2008.

6. *In the Matter of a Complaint by Imperial Oil with Respect to Enbridge Southern Lights GP (ESL) Tariffs No. 1 and 2,* National Energy Board. Appearance November 2011. Participated as member of BP Canada Energy Trading Company's panel.

7. *In the Commissioner of Competition v. Visa Canada Corporation and MasterCard International Incorporated*, The Competition Tribunal CT-2010-010, 2012.

8. *In the Commissioner of Competition v. The Toronto Real Estate Board,* The Competition Tribunal CT-2011-003, 2012.

9. *Australian Competition & Consumer Commission v. Air New Zealand Limited,* Federal Court of Australia, NSD534/2010, 2013.

10. The Canadian Radio-Television and Telecommunications Commissions, *Review of Wholesale Services and Policies* Telecom Notice of Consultation 2013-551. November 2014. Part of Bell Canada's panel.

11. *Market Surveillance Administrator application pursuant to Section 51 of the Alberta Utilities Commission Act against TransAlta Corporation et al., Nathan Kaiser and Scott Connelly* File No. 0630, Alberta Utilities Commission, December 2014. Member of the MSA's panel.

12. *In the Commissioner of Competition v. The Toronto Real Estate Board,* The Competition Tribunal CT-2011-003, 2015.

13. *Television Retransmission (2014-2018)*, Copyright Board of Canada, 2015.

14. *Historical Trading Report,* Market Surveillance Administrator Section 51(1)(b) Notice and Application, Alberta Utilities Commission Proceeding 21115, 2016. Member of the ENMAX panel.

15. *Oceanex Inc. v. Canada (Minister of Transport) and Marine Atlantic Inc.,* Federal Court of Canada, File No. T-348-16, June 2017. [Deposition, not in front of the judge.]