Mercer International Inc.

v.

Government of Canada

ICSID CASE NO. ARB(AF)/12/(3)

Expert Opinion

Preface

This report sets forth our expert opinion and conclusions concerning the NAFTA Chapter 11 claim submitted by Mercer International Inc. against the Government of Canada.

In preparing this report, Pöyry has also used and has relied upon information provided by the Trade Law Bureau of the Department of Foreign Affairs, Trade and Development and the Department of Justice. We have reviewed this information and believe it is appropriate for the purposes of this report. This report and our opinions are based upon industry knowledge and assumptions we have made with respect to the information provided and reviewed.

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1 INTRODUCTION

1. Pöyry has been retained by Canada to provide our expert opinion on the factual allegations made by Mercer International Inc. ("Mercer") in the claim filed against Canada under NAFTA Chapter 11.

2. This report has been prepared by me, James Stockard, a Senior Consultant at Pöyry with support provided by other consultants and technical experts at this firm. I have over 15 years of experience in the pulp and paper industry. Since graduating from the first Paper Science and Engineering school in the United States to receive accreditation from the Accreditation Board for Engineering and Technology, I have worked with or visited over 50 pulp and paper facilities in North America and Europe. I have project experience at approximately 30 kraft mills. My *curriculum vitae* can be found at Appendix 8.1**.**

3. Pöyry is an international consulting and engineering company headquartered in Helsinki, Finland. The company was started as an engineering firm by Dr. Jaakko Pöyry with its earliest, major achievement being awarded the basic engineering design for the kraft pulp mill in Äänekoski, Finland, which is still in operation today. The company has grown from a pulp and paper focused engineering firm to the international consulting and engineering company it is today by expanding into other sectors, including other forest industries, energy, mining and metals, chemicals and biorefining, transportation, water, and real estate while continuing to grow and to provide services in the pulp and paper sector. Pöyry continues to be active in designing and supporting the startup of modern, greenfield kraft mills today. A selection of recent Pöyry project references for kraft mills can be found in Appendix 8.3.

4. This expert report first provides some general background on power generation at kraft pulp and paper mills and its interrelation to pulp production. I then turn to the facility review and analysis section where I provide our conclusions concerning BC Hydro's determination of Generator Baselines (GBLs) at the Celgar, Howe Sound, Skookumchuck and Canfor (Prince George) pulp mills.

1.1 Nature and Scope of Pöyry's Mandate

5. Pöyry has been requested to provide an expert report that reviews the process and economics of electricity generation at kraft pulp and paper mills. Further, Canada has requested that we assess the reasonableness of BC Hydro's determination of Generator Baselines (GBLs) for certain kraft pulp mills.

6. I have based my expert opinion on documents provided by counsel, my expertise and understanding of the pulp and paper industry, and Pöyry market and mill databases based on publicly available information.

7. Pöyry understands that this expert report will be filed with the NAFTA Chapter 11 tribunal and that we will be called upon to give expert testimony.

2 EXECUTIVE SUMMARY

8. Governmental policies have developed seeking more forms of "Green Energy" and a movement away from fossil fuels for electricity production. As kraft mills' primary feed stock is biomass and has a high potential to cogenerate steam and power, many projects have been proposed and been initiated at these types of facilities. As kraft mills' design and structure varies site to site, the opportunity for power generation is linked heavily to the performance of pulp production and the evolving infrastructure of the mill.

9. My opinion provided in the assessment of the Generator Baseline determinations is that they are reasonable for Mercer's Celgar mill, Howe Sound Pulp and Paper's Port Mellon operation, Tembec's Skookumchuck location, and Canfor's Prince George operation and incentivized incremental power generation based on information provided to BC Hydro by the generator and reviewed during commercial negotiations of the EPA.

10. While the specific considerations for the GBL determinations varied from one location to another due to technical, operational, or pre-existing contracts prior to BCUC order G-38-01, these determinations were made, in my opinion, in accordance with the principles outlined in Order G-38-01 and reflected in the terms of the Bioenergy Call for Power Phase 1, indicating "new self-generation, or incremental self-generation, in any event excess of the proponent's GBL at a proponent's facility to serve the proponent's industrial load at the facility (i.e. load displacement) and/or effect net energy export to the System (i.e. proponent Projects), but excluding generation projects, where the current output is under contract through a load displacement or demand side management agreement with BC Hydro."[1]

11. The GBL "represents the amount of electricity supplied by the generator that had historically been used to partially or fully meet the energy demand of the industrial load. Electricity supplied from the generator above that GBL is sold under the EPA, while electricity supplied from the generator below the GBL is not sold under the EPA, and is applied to partially or fully meet the industrial load's energy demand. The requirement for establishing a GBL avoids arbitrage, that is, to ensure energy currently generated by a proponent to serve its own load is not being sold to BC Hydro under the EPA while the same energy quantity is repurchased from BC Hydro at the lower electricity tariff rate."[2]

3 THE MECHANICS OF GENERATING ELECTRICITY AT A KRAFT MILL

12. The Kraft Pulping Process was originally designed to permit the recovery and reuse of chemicals while also providing a substantial amount of energy for process needs. Since its development over 125 years ago, the cost of electricity has risen such that opportunities have developed to produce steam for both the

[1] BC Hydro, Report on Bioenergy Call Phase I, Requests for Proposals, 17 February 2009 ("BCH Report on Bioenergy Call Phase I"), at bates 150641, **PÖYRY-1**. See generally Witness Statement of Les MacLaren, dated July 18, 2014, ¶ 87 ("Les MacLaren Statement") (After considering a number of options, Ministry staff recommended that new self-generated electricity should be eligible for acquisition by BC Hydro, to ensure incremental self-generated electricity is treated no differently than an IPP's electricity. In other words, new generation, whether from an IPP or an industrial self-generator, should be eligible for sale to BC Hydro. Incremental self-generated electricity would not need to be net of the industrial customer's load.")

[2] BCH Report on Bioenergy Call Phase I, at bates 150619, **PÖYRY-1**.

production process and for self-generation of electricity (sometimes referred to as cogeneration).

3.1 The Kraft Pulping Process

13. Kraft Pulping is a process in which wood chips are converted into pulp utilizing a chemical treatment to dissolve the organic matter (lignin) that keeps wood together. Pulp is a mixture of fibers and water. The fibers in pulp are comprised of several organic polymers which can be broken down into three main categories:

a. Cellulose;
b. Hemicellulose; and
c. Lignin

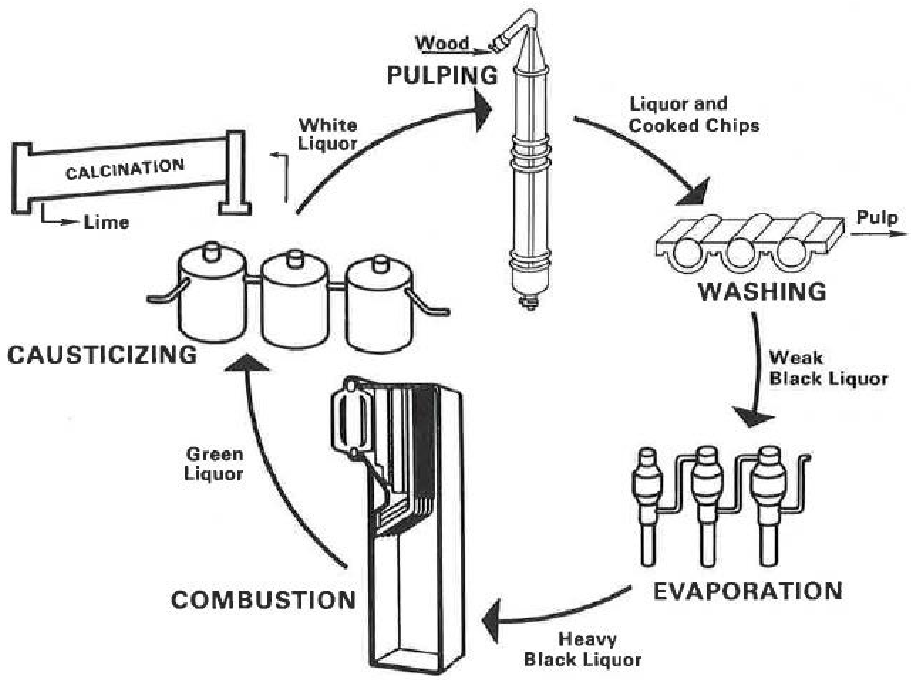
14. Depending on the intended end product, pulp is generally made up of a mixture of cellulose and hemicellulose. The lignin and smaller proportions of hemicellulose and cellulose are left in an important by-product, known as black liquor, generated from this process.

15. The benefit of kraft pulping is the fact that the majority of chemicals used can be regenerated in what is known as the Chemical Recovery Cycle. This cycle begins by mechanically separating the black liquor by-product from the pulp in a process known as 'Washing.' The separated black liquor undergoes a process to concentrate the organic material and residual inorganic chemicals, and is then burned in a Recovery Boiler (referred to as the Combustion phase of the Cycle in Figure 1). The Recovery Boiler is specially designed to burn black liquor to produce steam for the kraft process, as well as to initiate the chemical reactions required to regenerate the chemicals used in Pulping.[3]

16. The following figure demonstrates the interrelated aspects of Pulping with Chemical Recovery in the Kraft Process.

[3] The Recovery Boiler produces smelt, or molten salt. The smelt collected from the Recovery Boiler undergoes a series of additional processes (Causticizing / Calcination) to finish the regeneration of the Pulping chemicals.

Figure 1: Schematic diagram of Kraft Pulping and Chemical Recovery Cycle[4]



3.2 Steam and Power Generation

17. The Chemical Recovery Cycle is an inherent part of the Kraft Process and is one of the main reasons that the Kraft Process is the most prevalent chemical pulping process utilized today based on Pöyry's databases. The generation of energy in the Kraft Process employs several pieces of major equipment, including a Recovery Boiler and a Power Boiler. Today, it normally also includes electrical generating assets in the form of a backpressure turbine, an extraction condensing turbine, or some combination of the two.

18. As described above, the Recovery Boiler is used to combust black liquor to create high pressure steam. The primary fuel source for the Recovery Boiler is black liquor, which as a by-product, is dependent on pulp production. The Recovery Boiler should be the most stable operation at a kraft mill, consuming black liquor and

[4] Grace, Thomas, "Overview of Kraft Recovery," Pulp and Paper Manufacture, Volume 5: Alkaline Pulping. Third Edition. 1983, Fig 443 at 474, **PÖYRY-2**.

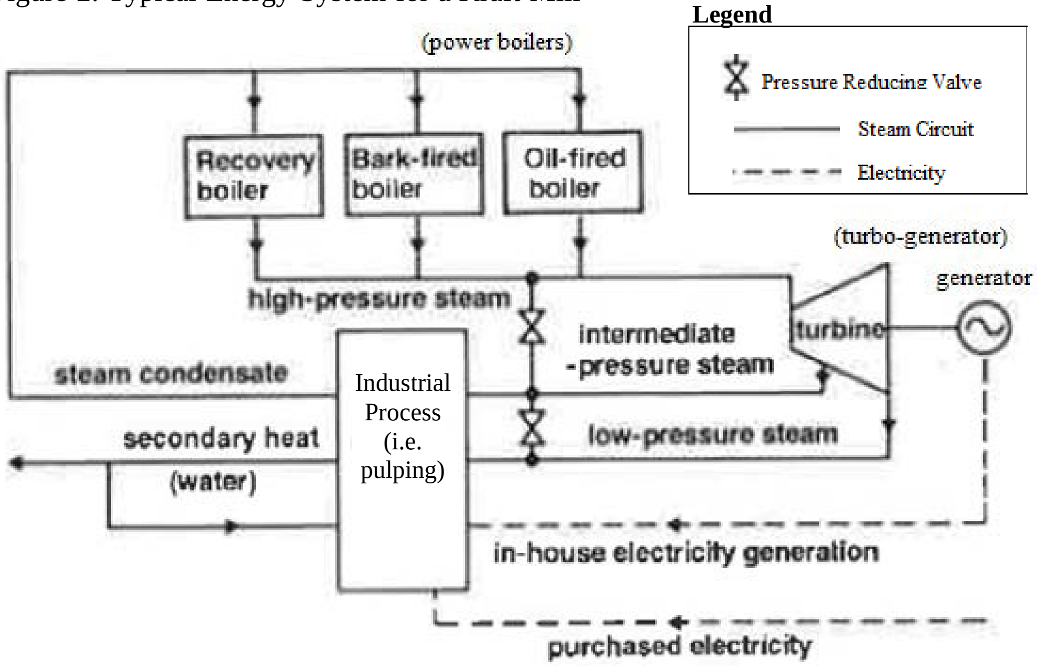
providing steam while other available process equipment will be used to address any changes in steam demand. The steam produced from the Recovery Boiler is the main source of steam generation for the kraft process.

19. As Kraft Process technology has improved, Recovery Boilers have been manufactured out of new materials and black liquor has been burned in a more efficient manner. These improvements have increased both the volume and pressure of steam generation available to mills. Although the Kraft Process does not require higher steam generation and pressure, kraft pulp mills have sought to use this excess steam efficiently through the installation of a backpressure turbine and generator. A backpressure turbine produces electricity while at the same time reducing the pressure of the steam so that it can be used in the Kraft Process. In this way, a backpressure turbine maintains the thermal balance of the pulp mill by allowing the steam produced by the boilers to be consumed in the Kraft Process.

20. The Power Boiler is also used to produce steam. However, power boilers are not ‘linked’ to the pulping process in the same manner as Recovery Boilers. Rather, Power Boilers are used to contribute to overall steam generation and to manage changing demands for steam for the production process. Power Boilers can be designed to use a variety of fuel sources (e.g., biomass (comprised of wood waste unsuitable for pulping which is also referred to as “hog”), natural gas, oil, coal, etc.), each with its own merits. Depending on the design of a mill’s boilers and steam system, a power boiler may provide steam to a backpressure turbine, but it will usually be operated to control steam generation to meet the production steam demand.

21. Figure 2 shows a typical energy system for a kraft mill with a high-pressure Recovery Boiler and two Power Boilers (Bark-fired boiler and Oil-fired boiler) supplying high-pressure steam to a backpressure turbine, which produces electricity for the kraft mill. The steam that is extracted from the turbine for the kraft process consists of both intermediate-pressure steam and low-pressure steam. The kraft mill will also purchase electricity to supplement the electricity produced by the turbine (assuming the turbine is not large enough to supply all of its electricity) and to provide energy when the turbine is not operating.

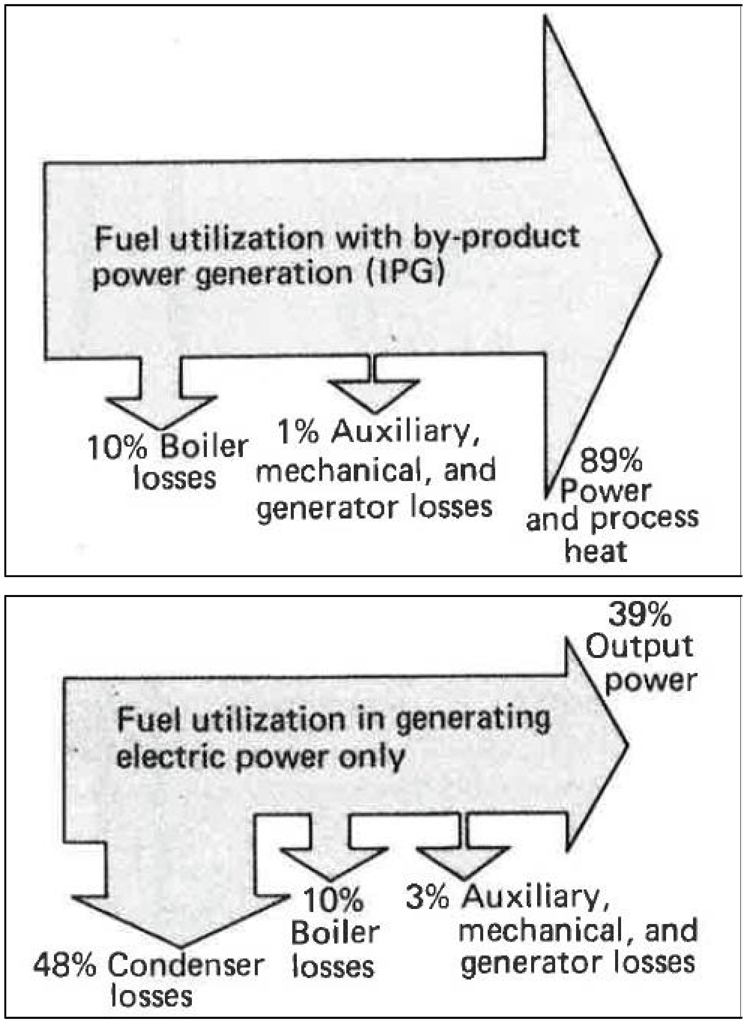
Figure 2: Typical Energy System for a Kraft Mill[5]



22. Some mills also use extraction condensing turbines to regulate steam and generate electricity. The key difference between backpressure and condensing turbines is that the steam exiting the end of a backpressure turbine is employed in the Kraft Process while the steam exiting a condensing turbine is not used for this process and is turned back into water to feed the boilers. Put another way, the use of a backpressure turbine in the Kraft Process will generally maintain the "thermal balance" of a mill between its energy production (i.e., the use of steam to generate electricity) and its energy consumption. In contrast, the use of condensing turbines will generally move a mill away from thermal balance between production and consumption. This difference can be seen in Figure 3.

[5] Smook, G.A., Handbook for Pulp and Paper Technologists, 2nd Edition. 1994, Fig. 25-13, at 373, **PÖYRY-3**. I have modified this diagram slightly by adding additional labels.

Figure 3: Generation Comparison of Backpressure (Top) and Condensing (Bottom) Power[6]



23. Recovery Boilers, Power Boilers, and backpressure or condensing turbines are capital intensive and are expected to operate for decades. As mill infrastructure evolves over time, different considerations develop where a combination of backpressure and extraction condensing turbine capabilities are justifiable with new equipment. Condensing turbines can be designed to take steam at various pressures to produce power and to handle changing demands for steam in the production process.

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[6] *Ibid.*, at 374, **PÖYRY-3**.

4 THE ECONOMICS OF GENERATING ELECTRICITY AT A KRAFT MILL

24. The primary principle that dictates whether, and in what quantities, a pulp mill will generate electricity is whether it is cheaper to generate than to purchase it. Where electricity can be sold, the selling price, be it based on a load displacement rate, market price, or incentivized rate, will also affect a mill's generation levels. Many factors that enter into this calculation are described in this section.

4.1 Cost of Generating Electricity

25. The cost of generating electricity at a pulp mill reflects a combination of fixed and variable costs, including the long-term capital cost of the investment, price and availability of fuel, and cost to operate and maintain the equipment.

4.1.1 Long Term Capital Costs

26. Kraft mills are inherently capable of cogenerating steam and electricity with the proper equipment (*i.e.*, a Recovery Boiler, a Power Boiler, and a Turbo-generator). As part of the pulping process, the internal rate of return for the cogeneration system is essentially the same as the rate of return for the overall mill. The weighted average cost of capital for Canadian pulp and paper facilities has typically been in the 12% - 13% range,[7] reflecting the expected return for the mill.

27. However, capital spending for incremental energy generation must compete with other mill improvement projects. Pulp and paper facilities have historically not been able to return their cost of capital. The average return on capital employed (ROCE) in Canada is in the 4% - 5% range.[8] From Pöyry's perspective, this means that to attract capital, investments of this nature must typically have a high

[7] CIBC World Markets, Presentation to the Canadian Council of Forest Ministers, *The Canadian Forest Products Sector: How Do We Adapt For* Survival, 4 October 2005 at 31, **PÖYRY-4**.

[8] *Ibid.*,at 5, **PÖYRY-4**.

payback of three years, or an internal rate of return of 30% to get onto a mill's discretionary capital short-list.

28. Mill margins must be adequate to justify capital for production and efficiency improvements. Mills with lower margins that cannot justify the capital expenditures eventually become less competitive and vulnerable to curtailments / closures during market downturns. The $C850 million invested in Celgar resulted in a modernized mill; however, inadequate margins to cover debt and operating costs resulted in huge losses for its shareholders when it entered bankruptcy.

29. It is interesting to note that, with such a high investment hurdle rate and relatively low power purchase prices in British Columbia, most incremental energy projects in this region require subsidies and incentives, such as load displacement agreements and energy purchase agreements, to justify capital expenditures.

4.1.2 Maintenance Costs

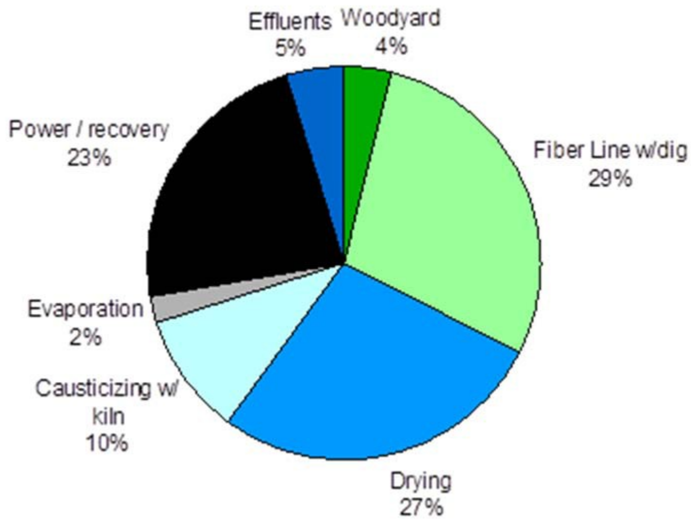
30. Maintenance costs generally include labor, materials and services, and maintenance of business capital (maintenance to replace broken or worn out equipment and parts to ensure long term viability of such equipment.).[9] Total maintenance costs for a pulp mill typically range from C$50/ADmt to C$100/ADmt, depending on the age and configuration of the site. Older mills, typical of those in British Columbia, would be expected to have higher maintenance costs relative to newer mills.

31. The following chart, Figure 4, has been developed by Pöyry to illustrate (sustained) allocation of maintenance costs across a mill. The power and recovery costs amount to almost a quarter of total mill maintenance spending in a normal year. Most of this cost is consumed for the maintenance and upkeep of the Recovery Boiler, a critical asset to the process as discussed previously. Due to the process demands

[9] Maintenance of business capital is often referred to as sustaining capital (e.g. capital required to sustain operations going forward).

placed on Recovery Boilers, their regular upkeep and maintenance is required for safety reasons through regular inspections and maintenance. Most of this occurs during the "annual shut" when the mill ceases all production-related activities that would be affected while the Recovery Boiler is down.

Figure 4: Example Kraft Mill Maintenance Allocation



32. Incremental power generation, beyond the requirements for the kraft process, will typically involve the installation of a condensing turbine with possible upgrades to existing Recovery and Power Boilers to maximize potential investment returns. For example, Mercer indicated that it anticipated maintenance costs of [redacted] per year[10] for its Green Energy Project, which would agree closely with our maintenance estimate of [redacted] per year based on the replacement value of the project and assumptions used in our cost models. Compared to total operating costs for the Green Energy Project (estimated at [redacted] per year,[11] of which over 85% is for hog fuel), maintenance costs are relatively minor.

4.1.3 Price and Availability of Fuel

[10] Mercer International Inc., Celgar Power Project, Confidential Information Package, February 2009, Appendix B at MER00026869, **PÖYRY-5** ("Celgar Confidential Info Package").

[11] *Ibid.*, Appendix B at MER00026869, **PÖYRY-5**.

Black Liquor and Reliable Pulp Production

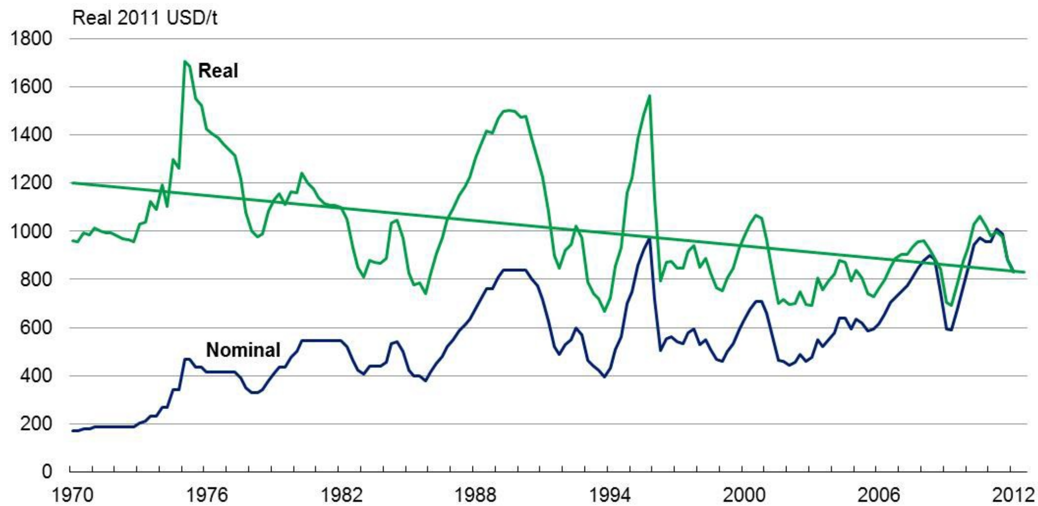
33. As described in section three, black liquor is co-produced as part of the Kraft Pulping Process and comprises most of the fuel for the Recovery Boiler. Inconsistent pulp production has a direct impact on power generation due to the reduced availability of black liquor. Key drivers of inconsistent pulp production include:

- Under-spending for maintenance and sustaining capital (poor maintenance practices leads to poor equipment and process reliability); and
- Volatile pulp demand affecting both product prices and a mill's business model for pulp production.

34. The following chart demonstrates the price history of Northern Bleached Softwood Kraft (NBSK) market pulp, the key market pulp grade produced by British Columbia pulp mills based on Pöyry's market research. It can be seen that nominal pulp pricing has been highly volatile over the past several decades while real pricing (deflated in constant dollars) is declining, putting pressure on higher cost pulp mills.[12]

[12] This price series does not reflect transaction prices, which include additional consumer discounts that have increasingly lowered the amount of cash returned to the manufacturer.

Figure 5: NBSK Historical Price Series in Northern Europe



Prices CIF North Atlantic/North Sea port.
Deflator used for real prices US WPI.

35. It can be expected that high cost producers will curtail production during market price troughs as cash returns from pulp sales drop below the costs of production. A number of British Columbia pulp mills curtailed production during the financial crisis of 2008 / 2009 as well as previously during the Asian financial crisis in the late 1990s.

Hog Fuel

36. The normal form of solid biomass fuel that pulp and paper mills consume is termed "hog fuel." Hog is composed primarily of bark and other tree residuals generated during logging and sawmilling. These residuals can be ground-up roadside logging residuals, sawdust, wood shavings, or small, undersized 'pin' chips.[13] The supply of hog fuel in Canada is largely driven by sawmill utilization rates.

37. Before processing a tree log, the bark is removed. As the tree log (sometimes referred to as roundwood) is processed in sawmill operations, bark is removed in a debarker, the exterior sides of the log are converted to wood chips for pulp mill use while the interior is reserved for cutting the log into square or rectangle

[13]'Pin' chips are undersized chips having undesirable width: thickness ratios. See Thesaurus of Pulp and Paper. Institute of Paper Science and Technology, 1991, at 343, **PÖYRY-6**.

pieces for dimensional lumber. As the log is turned into lumber, sawdust is created. Shavings are then created as this lumber is planed to provide a smooth finish. Typical yields from processing a log are: 47% lumber, 5% bark, 8% shavings, 7% sawdust, and 33% chips for pulp.[14]

38. Some pulp and paper mills are able to justify the investment and operating cost to build their own woodroom, including roundwood receiving stations and chipping operations to support their mills (often due to insufficient residual chip supply to feed their operation). This 'woodroom' supplies the mill with chips from available roundwood as well as generates hog fuel for steam production. Mills that have this capability inherently have less exposure to increased residual chip prices (i.e. when sawmills curtail their production), but also means owners must monitor when to curtail their woodroom (i.e. when residual chip supply increases and prices fall below the cost to manufacture chips from the woodroom).

39. The following table shows indicative delivered prices for the respective residuals and residues mentioned above, based on a 2013 study done for BC Hydro's Integrated Resource Plan.[15]

Table 1: Indicative Biomass Delivered Cost by Fuel Type (C$/tonne, oven dried)

	FUEL TYPE			
	Hog Fuel (Bark)	**Roadside Residue**	**Dry Shavings**	**Sawdust**
Regional Fiber Cost (C$/tonne)	2	25	35	20
Average Delivery Cost (C$/tonne)	10	50	10	10
Total delivered Fiber Cost (C$/tonne)	12	75	45	30

40. Costs shown in the above table are averages and the actual price will vary based on location within the province. With sawmill curtailments and closures, it can be expected that much of the low-cost hog fuel would become unavailable,

[14] Integrated Resource Plan Appendix 3A-25, 2013 Resource Options Report Update, Appendix 6 at 16, **PÖYRY-7**.

[15] *Ibid.*, Appendix 6 at 81, **PÖYRY-7**.

requiring end-users to rely on more expensive biomass sources, such as roadside residuals.

41. In 2008, the collapse of the United States housing market resulted in a substantial drop in lumber demand and selling prices. For all but the lower cost mills, lumber prices fell below the cost of production. To respond to this situation, North American sawmills curtailed production by reducing the number of operating shifts, increasing downtime to maintain production equipment, or implementing indefinite or permanent mill closure. These curtailments affected the residual chip supply, as well as available hog fuel for pulp and paper mills across North America. Since not all pulp and paper mills have woodrooms, varying levels of exposure to this situation occurred. [redacted].[16] Some pulp mills, like Celgar, have woodrooms on site that enable them to process small roundwood (e.g. pulp logs), thereby reducing their exposure to sawmill curtailments.

Natural Gas

42. As delivered hog fuel has moisture content of 40% - 50%,[17] natural gas is normally used as an auxiliary fuel for biomass power boilers. The following chart shows historical natural gas pricing per MMBtu from 1995 to 2008 delivered to the Henry Hub, a large natural gas distribution and trading hub in the United States.[18] Due to its importance, it lends its name to the pricing point for natural gas futures contracts traded on the New York Mercantile Exchange, which serves as a benchmark for North American natural gas prices.

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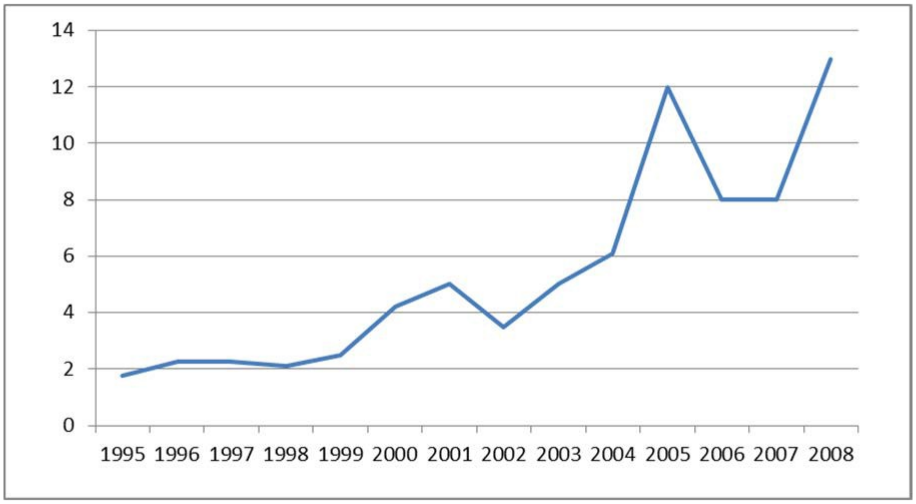
[16] BC Hydro Inter-Office Memo, Tembec Skookumchuck Pulp Operations - CBL/GBL/EPA Analysis, 8 April 2009, at 037397, **PÖYRY-8**.

[17] U.S. Department of Agriculture Forest Service, "How To Estimate Recoverable Heat Energy in Wood or Bark Fuels", General Technical Report FPL 29, 1979, at 4, **PÖYRY-9**.

[18] Natural Gas (1990-2014), Trading Economics, online: <http://www.tradingeconomics.com/commodity/natural gas>, **PÖYRY-10**

Figure 6: Natural Gas Prices, Delivered, Henry Hub (US$/MMBtu)



43. Based on the pricing levels demonstrated in Table 1, for much of the 1990's, the cost of natural gas was approximately equivalent to hog fuel on an energy basis of about 11 MMBtu per tonne of hog,[19] with hog fuel costs ranging from C$1.1/MMBtu to C$6.8/MMBtu depending on source. If the cost to use natural gas or hog fuel is similar, and there are no environmental policies dictating otherwise,[20] natural gas would normally be preferred for incremental energy production from an operational perspective as a power boiler would produce incremental steam faster using natural gas (due to the moisture content of the hog fuel).

44. However, starting in 1999, natural gas prices started rising sharply and continued climbing on a general upward trend through to 2009. High natural gas prices, relative to hog fuel, would have led mills to minimize their natural gas usage and to increase their capital justification for burning hog fuel going forward. In situations where there were technical limitations to utilizing hog fuel due to its quality, [redacted], high natural gas prices led to [redacted]

[19] U.S. Department of Agriculture Forest Service, "How To Estimate Recoverable Heat Energy in Wood or Bark Fuels", General Technical Report FPL 29, 1979, at 4, **PÖYRY-9.**

[20] Note that, in order for incremental generation projects to be eligible in BC Hydro's Bioenergy Call for Power Phase I, and subsequent Integrated Power Offer, the fuel to power the projects had to be "clean", which meant that natural gas could not be used. See Witness Statement of Lester Dyck, dated August 21, 2014 ("Dyck Witness Statement"), ¶ 52; and BCH Report on Bioenergy Call Phase I, at bates 150850, **PÖYRY-1.**

[redacted].

5 BC HYDRO'S ACQUISITION OF GENERATION RESOURCES

5.1 Principles Underlying BC Hydro's Conclusion of Electricity Purchase Agreements ("EPAs")

45. The 2007 Energy Plan was released by the Province of British Columbia ("the Province") on February 27, 2007. This plan directed that:

- BC Hydro become energy self-sufficient by 2016;
- Clean or renewable electricity generation, which was defined to include bioenergy, continue to account for at least 90% of total generation;
- The Province introduce a Bioenergy Strategy.[21]

46. The requirement that BC Hydro become self-sufficient by 2016 was of particular importance as this required BC Hydro to identify new sources of clean or renewable electricity. The 2007 Energy Plan also provided direction on the source of some of this energy by requiring BC Hydro to issue an expression of interest, followed by a request for proposals (RFP) for electricity generation from sawmill residues, logging debris, and beetle-killed timber (*i.e.,* a bioenergy call for power).[22]

47. On January 31, 2008, the B.C. Government released its Bioenergy Strategy that provided additional direction to BC Hydro on the bioenergy call for

[21] Ministry of Energy Mines and Petroleum Resources, The BC Energy Plan, A Vision for Clean Energy Leadership, 27 February 2007, at 10, 12-13, 18 and 39, **PÖYRY-11**. See also MacLaren Witness Statement, ¶ 79 ("The self-sufficiency requirement opened up opportunities for the private sector to sell clean and renewable energy to BC Hydro through a variety of competitive processes, including two Bioenergy Calls for Power. While in practice BC Hydro (through its trading arm, Powerex) continued both to import and to export electricity, it also conducted a series of acquisition processes to purchase the rights to electricity in BC to meet the self-sufficiency requirement because it could no longer rely on the spot market to meet electricity demand (as it had under previous planning assumptions that allowed for a "market allowance" during low water years).")

[22] *Ibid*., at 18 and 39 , **PÖYRY-11**.

power referred to in the 2007 Energy Plan.[23] BC Hydro subsequently issued the first of a two-phase Bioenergy Call for Power referenced in the Bioenergy Strategy, which focused on existing forest products facilities that utilized biomass.

48. BC Hydro's RFP for the Bioenergy Call for Power Phase I stated that "facilities intending to submit a Proposal involving incremental self-generation servicing their industrial load must have their existing generation baseline ("GBL") determined by BC Hydro to confirm eligibility. Proponents must provide data required by BC Hydro to determine the GBL for the applicable industrial facility or facilities."[24] Proposals could include, "new self-generation,[25] or incremental self-generation, in any event excess of the Customer's[26] GBL at a Customer's facility to serve the Customer's industrial load at the facility (i.e. load displacement) and / or effect net energy export to the System (i.e. Customer Projects), but excluding generation projects, where the current output is under contract through a load displacement or demand side management agreement with BC Hydro."[27]

5.2 BC Hydro's Generator Baseline Methodology

49. Pöyry understands that BC Hydro's GBL determinations are intended to determine the annual amount of self-generated energy that is used for self-supply, in a normal operating year, at the time the EPA is negotiated with the self-generator.[28] Normal operations are assessed in the absence of the prospect of the currently

[23] Ministry of Energy Mines and Petroleum Resources, BC Bioenergy Strategy, Growing our Natural Energy Advantage, 31 January 2008, at 8, **PÖYRY-12**.

[24] BCH Report on Bioenergy Call Phase I, at bates 150641, **PÖYRY-1**.

[25] MacLaren Witness Statement, ¶ 87.

[26] "Customer" was defined for the purposes of the RFP as "a customer of BC Hydro, or of any other public electric utility, taking industrial or commercial electricity service". *See* BCH Report on Bioenergy Call Phase I, at bates 150648, **PÖYRY-1**.

[27] *Ibid.*, at bates 150641, **PÖYRY-1**.

[28] BC Hydro, Transmission Service Rate (TSR) Customer Generator Baselines (GBLs), Information Report, dated June 2012, Appendix G at bates 048178, **PÖYRY-13** ("BCH GBL Information Report"); and Dyck Witness Statement, ¶44.

negotiated EPA, and account for pre-existing agreements.[29] The purpose of a GBL is to define what qualifies as energy eligible for sale under the EPA.[30]

50. BC Hydro considers a number of economic, technical, and operational factors when setting GBLs for its EPAs with self-generating customers. The foundational information is the customer's historical self-generation output, energy consumption data, and information related to its manufacturing operations.[31] The generation and consumption data and information is then typically adjusted to account for the specific circumstances of each customer, including its operational requirements and constraints (*e.g.* thermal requirements), the specific industry, economic conditions, and any abnormalities during the data reference period that may impact the assessment of a customer's normal conditions.

51. In Pöyry's experience with pulp and paper mills, operational and commercial information of this nature is considered highly sensitive. When sharing this type of information in the context of contract negotiations, the mills would expect that it be kept confidential.

6 FACILITY ANALYSES

52. The following facility reviews examine the configuration of the sites as they are today, provides a short history and background for how each operation has changed over the years with implications focused on power generation, and evaluates BC Hydro's application of its GBL methodology for each mill on the basis of the mill's operations.

[29] Dyck Witness Statement, ¶¶ 44-46.

[30] Only energy generated above the GBL can be sold under the EPA See BCH Report on Bioenergy Call Phase I, Appendix A at bates 150641, **PÖYRY-1**.

[31] Dyck Witness Statement, ¶ 44.

6.1 Zellstoff Celgar (Mercer), Castlegar, BC

Figure 7: Satellite View of Castlegar Mill

6.1.1 Mill Introduction

53. The Celgar mill is one of the oldest pulp operations in British Columbia. As seen in Figure 8, the mill is quite large. Built along the Columbia River, the red box highlights the water treatment facility to the pulping operation and finishing line further downstream (moving west to east).[32] As a result of a rebuild in 1993, the mill is considered to be one of the most modern facilities in the region from Pöyry's perspective. A summary of the facility from Pöyry's database can be found in Table 2.

[32] Letter from Carl Johnson, BC Ministry of Water, Land, and Air Protection to Zellstoff Celgar Limited, 21 February 2005, re: Amendment of Permits PE-01272(07), PA-0308(11), PR-01768(6), **PÖYRY-14**.

Table 2: Celgar Mill Summary
Mill Built: 1960
Estimated Technical Age: 20 years
Product Focus: Northern Bleached Softwood Kraft Pulp (NBSK)
Estimated Capacity: 520,000 ADmt/year NBSK

Major Equipment:

Process Area	**General Equipment**
Raw Material Handling	2 Debarkers; 2 Chippers; Purchased Chips
Cooking	1 Continuous Digester
Chemical Recovery	1 Recovery Boiler; 1 Evaporator; 1 Lime Kiln; 1 Recausticizing System
Bleach Plant	1 O; 1 D Eop D Ep D ECF pulp capability
Chemical Plant	Chlorine Dioxide, SVP-Hooker process
Energy Island	2 Power Boilers; 2 Turbines
Major Fuels	Wood Based, Natural Gas
Pulp and Papermaking	2 Pulp Dryers

6.1.2 Mill Background

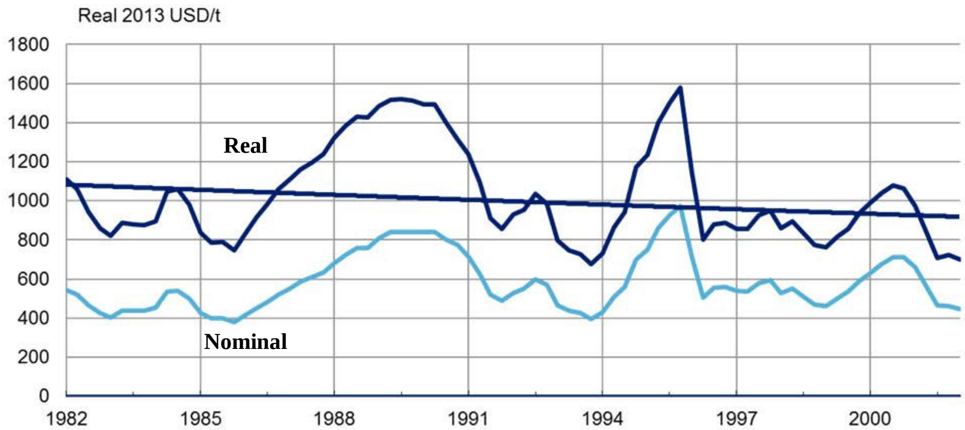
54. The Celgar pulp mill was originally constructed by the Celanese Corporation of America in 1960 and was one of the first mills built in the interior of British Columbia. The mill subsequently changed hands several times until, in 1986, it was acquired by Celgar Pulp Co as a joint venture between the China International Trust and Investment Corp, (CITIC B.C. Inc.), and Power Consolidated (China) Pulp Inc.. In 1989, Stone Consolidated Inc., a subsidiary of U.S. Stone Container Corp., purchased a 50 percent interest in Power Consolidated (China) Pulp.[33] By that time, British Columbia was considering more stringent environmental regulations and the

[33] B.C. Ministry of Environment and Ministry of Regional and Economic Development, Review of Prospectus for Celgar Pulp Mill Expansion, July 1990, s. I.1, at 1-2, **PÖYRY-15**.

Celgar pulp mill was already experiencing difficulties meeting the existing effluent emissions requirements.[34] To avoid a forced shutdown due to impermissible emissions, Celgar Pulp Co. announced that it would spend C$630 million on an environmental modernization and expansion of the mill.[35]

55. Leading up to this investment decision, international pulp markets were experiencing one the longest price run-ups and highest peaks in modern history. Northern bleached softwood kraft pulp (NBSK) is predominantly produced by B.C. kraft pulp mills. This is a pulp product from a broader family of bleached softwood kraft pulp (BSKP) products available in the market. The NBSK market price during this period can be seen in the following chart based on Pöyry's market research.

Figure 8: NBSK Historical Pricing in Northern Europe



Source: Pöyry Database

56. During this period of increasing pulp prices, several pulp mills made many investments to modernize their facilities and expand production to capitalize on the opportunity while others decided to build new pulp mills (i.e. rebuild at Hinton, AB pulp mill, Howe Sound Pulp, and Paper, Celgar; and a greenfield pulp mill in Northern Alberta by Alberta-Pacific according to Pöyry databases).

[34] BC Ministry of Environment. Environmental Performance Review of Celgar Pulp Corp. 363.73922/C392/1995, **PÖYRY-16**. Celgar Expansion Review Panel, Final Report, dated February 1991, Section 3, Key Considerations, at VIII, **PÖYRY-17**.

[35] New York Times Company Briefs, 6 October 1989, **PÖYRY-18**. Indicates that Celgar Pulp Co., a venture that includes Stone Container Corp. and Power Corp. of Canada, said it would spend $630 million (Canadian) on an environmental modernization project.

57. The Celgar pulp mill modernization and expansion project was primarily intended to increase production from an estimated 185,000 to 425,000 air dry metric tonnes per year (ADmt/year).[36] Other objectives at the time by the then owners sought to construct a facility:

- Design a mill that is state-of-the-art by 1990's standards.
- Incorporate the best available technology.
- Ensure that the final design has the flexibility to allow Celgar to make future changes to utilize improved environmental control developments.
- Ensure that the mill design meets all environmental requirements.[37]

58. Moreover, this project would replace the existing 3.5 MW turbine with a 52 MW extraction, back pressure turbine utilizing steam only from the mill's recovery boiler. Celgar Pulp Co. in its Application for a provincial Energy Project Certificate committed to generating energy from the increased turbine capacity to become essentially self-sufficient. As Celgar indicated, "The heat generated in burning black liquor will be used to produce steam. This steam, when passed through a turbo-generator, will under normal conditions supply 100% of the modernized mill's electrical power requirements."[38] The project was approved by the Province with a condition that it "be designed, located, constructed and operated in accordance with the Application."[39]

59. Pulp markets started to soften in 1990 and then collapsed over the next several years as seen in the price series of Figure 8. By the time the modernization and expansion project was complete, NBSK prices in China had dropped from a high

[36] According to Pöyry databases, the scope of the modernization and expansion project included a new lime kiln and recausticizing plant; new chlorine dioxide plant and effluent treatment facilities; new chip screens, fiberline, pulp machine, evaporators and recovery boiler and refurbishment of the old pulp machine; new turbo-generator, 4-stage elemental chlorine free diffusion bleach plant.

[37] Application for an Energy Project Certificate (E.P.C.A.) Under Section 18 of the Utilities Commission Act, 12 October 1990, at 3, **PÖYRY-19**.

[38] *Ibid.*, **PÖYRY-19**

[39] *In The Matter Of The Utilities Commission Act S.B.C, 1980, c. 60 (The Act) And In the Matter of An Application by Celgar Pulp Company For An Energy Project Certificate For The Celgar Pulp Mill Expansion*, Ministers' Order, 12 October 1990, s. 1(a), **PÖYRY-20;** Witness Statement of Peter Ostergaard, dated August 21, 2014, ¶¶ 14-22.

of approximately US$800/tonne in 1990 to less than US$400/tonne by 1993 based on Pöyry market price research. The price decline through to 1995 was fuelled partly by increasing overcapacity in the market. This new business environment was significantly different from when the modernization and expansion project started and immediately caused problems for the pulp mill.

60. When the mill restarted in 1993, project costs had escalated from the estimated C$630 million to approximately C$850 million due, in part, to construction delays and high levels of debt financing, financed through a C$750 million loan from the Royal Bank of Canada and National Westminster.[40] Overall, this investment cost level was high despite several capital investments versus operating cost tradeoffs leading to higher manufacturing costs.[41] In general, pulp manufacturing is capital intensive in nature, requiring high EBITDA margins over the long-term to support operations.

61. After restart, the mill experienced difficulties increasing production and with pulp quality. In particular, the Celgar mill needed almost seven years to achieve its new production capacity of 425,000 ADmt/year. During this period, the mill produced an unusually high level of pulp not meeting mill standards for brightness and dirt count. This 'off-grade' pulp was sold at a discount to customers where brightness and dirt count were not as critical for the targeted end use.[42] The combination of start-up challenges, persistently poor market conditions, and significant financial burden to pay for interest and principal of its high debt caused it to incur continued operating losses.

62. The restart of the pulp mill in June 1993 also saw a change of ownership when Stone Container Corp. and Venepal acquired Power Consolidated (China) Pulp

[40] Witness Statement of David Gandossi, dated March 28, 2014, ¶ 24("Gandossi Witness Statement").

[41] Retaining the original pulp dryer and installing a smaller, new pulp dryer would have reduced capital investment; however, operating costs would have increased compared to a single dryer operation due to duplication of personnel, maintenance materials, and other operating materials to support both units. Also, the existing power boiler is not designed to generate steam at adequate pressure for the 52 MW turbine.

[42] Jaakko Pöyry NLK Inc., Project Next Step – Technical Due Diligence Report, Section 7; Quality and Production Bottlenecks at MER00283087, **PÖYRY-21** ("Pöyry Due Diligence Report").

and changed its name to Stone Venepal (Celgar) Inc. ("Stone Venepal").[43] Celgar would continue to operate for the next few years with the involvement of both Stone Venepal and CITIC BC. .[44] However, in 1996, with Celgar's financial situation continuing to worsen, CITIC BC decided not to invest any further funds in the pulp mill. Stone Container Corp. subsequently purchased CITIC BC's interest in the pulp mill and assuming responsibility for further debt of C$273 million. It ultimately invested a further C$180 million into the pulp mill in an attempt to keep it operating; however, this strategy failed.[45]

63. The effects from the investment cost overrun, mill restart difficulties, and market conditions ultimately led to the bankruptcy of the mill. The two senior secured lenders subsequently appointed KPMG Inc. as receiver and trustee for the mill's assets. KPMG Inc. operated the Celgar mill from 1998 until it was purchased by Mercer in 2005.[46]

64. Due to the recent investments, it was difficult to find a new owner for the mill. The expectations of lenders on the value of the investment typically exceed the economic value of distressed assets. This was the case for Celgar. Despite being on the market for quite some time, an acceptable offer for the assets was not made for seven years.

65. Receivership is a difficult situation for a pulp mill to operate under. The objectives of a trustee are to minimize further losses while focusing on short term cash generation and not longer-term returns as manufacturers typically do due to the

[43] B.C. Registry Services, Extraprovincial Company Summary, Stone Venepal (Celgar) Inc., 20 May 2014, **PÖYRY-22**

[44] Stone Container Corp. increased its interest in Stone Venepal from a 50 percent to 90 percent in late 1994. *See* Securities and Exchange Commission, Stone Container Corp., Form 8-K, 16 February 1995, **PÖYRY-23**

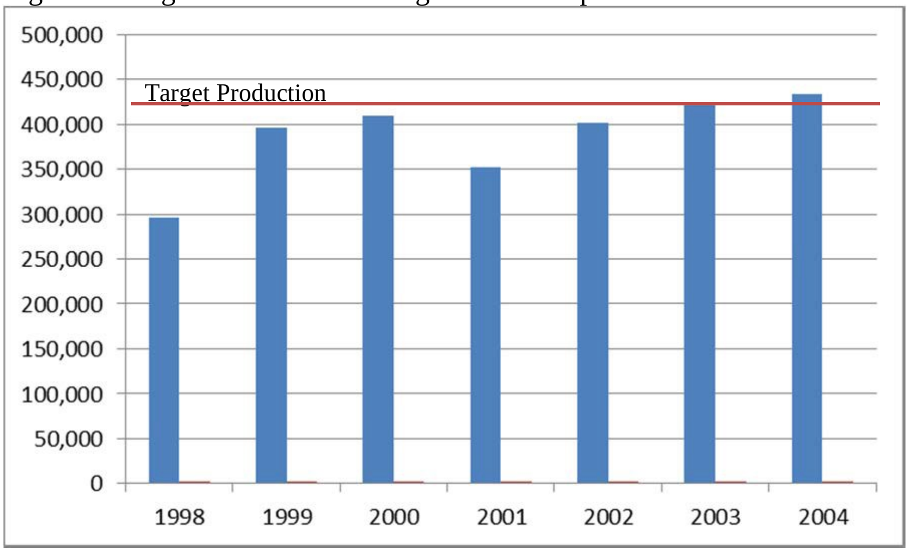
[45] "Celgar Mill in Receivership", Pulp and Paper Magazine, September 1998, **PÖYRY-24**.

[46] Gandossi Witness Statement ¶ 25; Witness Statement of Brian Merwin, dated March 28, 2014, ¶ 34. ("Merwin Witness Statement") Mr. Merwin states that, "Though a drop in pulp revenue due to weak markets was definitely a factor; the Celgar Mill's bankruptcy likely was due to the fact that its pulp production was not creating enough black liquor to meet the energy needs of the mill. This, together with the under realization of electricity revenue, created high costs. Those high energy costs, coupled with several hundred million dollars of capital expenditures on the energy system which was not seeing returns, made it impossible for pulp production alone to ensure the economic viability of the mill." However, these *ad hoc* energy purchases and sales from Fortis amounted to approximately 5-10% of mill load. Given that energy purchases were somewhat offset by energy sales, these would likely not have been material to the bankruptcy. See Mercer Memorial, Annex A.

cyclical nature of the industry. In practice, this means a trustee is unlikely to commit to long term supply or purchase agreements or to make new investments other than those required by law or necessary to maintain operations.

66. Figure 9 shows Celgar's production while in receivership. Pulp production was erratic and generally fell below the Celgar pulp mill's design capacity of 425,000 ADmt during this period. In general, typical practices after start-up of investments of this nature seek to identify that the investment is achieved and to identify bottlenecks within the process to increase mill production levels further.[47]

Figure 9: Celgar Production During Receivership



67. Investments, including those with short pay-back time, are not typically initiated under receivership. This is not a major issue in the short term; however, this behavior over the longer term will decline the mill's competitive position, as other manufacturers will seek these opportunities. In terms of Celgar, the long period in receivership meant that financially viable investments were not made.[48]

Mercer's Acquisition of the Celgar Mill and the Blue Goose Project

[47] Pöyry Due Diligence Report, at Section 2; Mill Overview, **PÖYRY-21**.

[48] *Ibid.*, Section 8; Major Maintenance and Capex Forecasts at MER00283090-MER00283094, **PÖYRY-21.**

68. In our experience in modernization or expansion projects, owners will identify bottlenecks and typically employ funds reserved for removing them to realize opportunity on possible over-dimensioning (excess capacity due to factors utilized to ensure design criteria is met) in process areas and departments following the project start-up period. As owners learn and understand the capabilities of their assets, they can make use of targeted investments to capitalize on possible over-dimensioning. This is one reason why pulp mills end up producing higher volumes than their design capacity a few years after start-up.

69. However, targeted investments may not be possible with significant project cost overruns beyond the original budget and minimal operations cash flow. In Celgar's case, revenues proved insufficient to cover the substantial debt taken on for the rebuild.[49] Hence, I believe it is unlikely that many investments would have been made to debottleneck or optimize operations prior to the bankruptcy.

70. Based on our experience, an owner of a pulp mill that intends to develop the mill in the long term typically injects back a portion of the free cash flow from its operations for investments that aim to increase either productivity or offer cost reduction. The threshold to justify these investments usually varies between one and three years' pay-back time, but this threshold is at the discretion of the owner as well as the focus of the projects, depending upon the market conditions at the time.

71. Mercer learned of the opportunity to acquire the Celgar Mill in July 2003, [redacted].[50] [redacted] was engaged by Mercer in August 2004 to prepare a due diligence report on the mill providing, among other things, views on:

- Production Process Upgrades – [redacted] recommended capital upgrades to the production process to improve the reliability and quality of production and to

[49] Gandossi Witness Statement, ¶ 25.

[50] *Ibid.*, ¶ 26.

68. In our experience in modernization or expansion projects, owners will

drying capacity and improvements to chip handling; and

- Cost Saving Measures – These measures included operational streamlining and some high-return capital projects to reduce costs. Key among the cost savings projects were improved pulp washing reducing chemical costs and allowing more organic material to be burned in the recovery boiler.[51]

72. The report concluded that the mill could be upgraded to produce at a rate of [redacted].[52] Increased pulp production would also increase steam output resulting in higher levels of power generation, which would be somewhat offset by an increase in mill electrical load.[53]

73. Mercer subsequently launched project Blue Goose in August 2005. Project Blue Goose planned investing C$27.9 million on several upgrades to improve the productivity and efficiency of the mill recommended in [redacted] due diligence report.[54] The critical elements of the project justification included:

- [redacted];
- [redacted];
- [redacted];
- [redacted];
- [redacted];
- [redacted];
- [redacted].[55]

[51] [redacted] Due Diligence Report, at MER00283037, **PÖYRY-21.**

[52] *Ibid.*,Section 8; Significant Potential Capex Projects at MER00283092-MER00283094, **PÖYRY-21**.

[53] Merwin Wittness Statememt, ¶ 38: Merwin states that, "increased and more stable pulp production improves electricity generation and reliability at the mill. Every additional tonne of pulp the Mill produces increases the production of black liquor, which then allows for greater electricity production and decreased electricity purchases." We acknowledge these statements as true, however we note that reduced electricity purchases and increased electricity sales were not material to the justification of Blue Goose.

[54] Zellstoff Celgar Limited Partnership, Project Performance Analysis, 24 January 2012, at MER00148430 and MER00148431, **PÖYRY-25** ("Celgar Project Performance Analysis").

[55] *Ibid.*, Table 12 - Blue Goose Project Benefits Summary at MER00148447, **PÖYRY-25.**

74. The largest portions of the EBITDA increase were due to the projected incremental production of [redacted] ADmt/year of pulp and the chemical savings. Energy savings and revenue were minor in comparison for project justification.[56] If energy savings and revenue had been excluded, the project payback would have been in [redacted] rather than [redacted].[57]

75. In my experience, the investments made under the Blue Goose Project are, by scope and payback, similar to typical investments a strategically oriented owner would normally implement over time. If project implementation of the Celgar rebuild had not failed in terms of delays and cost overruns, the mill may have been able to meet its financial obligations and provide owners with a positive cash flow. I believe that under these normal circumstances, the types of projects implemented under Project Blue Goose would have been most likely executed during a similar timeframe as other expansion projects by other owners. Since they were not, the Blue Goose Project should be largely considered as normalization of Celgar operations after being investment constrained financially and by obligations and objectives of bankruptcy trustees.

Celgar's Green Energy Project and the Pulp and Paper Green Transformation Program

76. In March 2007, as required by the Province's 2007 Energy Plan, BC Hydro issued its Request for Expressions of Interest (RFEOI) to supply biomass-based electricity, under what it would later term the Bioenergy Call for Power Phase I ("Bio Phase I"). Celgar responded to the RFEOI and sought approval from its board in

[56] Based on analysis from Celgar Project Performance Analysis, Table 12, at MER00148447, **PÖYRY-25**, energy savings and revenue at [redacted] were the smallest of the identified project benefits. In my view, identified benefits from incremental production and chemical savings of over [redacted], would on their own merits, have justified the Blue Goose project.

[57] The Celgar Project Performance Analysis, Table 12, at MER00148447, **PÖYRY-25**, indicates that if energy savings and revenue [redacted] were removed from the equation, remaining benefits would have totaled; [redacted]. Payout for the project would have been, [redacted] benefits), [redacted], which is a very nominal increase over the [redacted] payout. In my experience, projects with a [redacted] payout would be readily approved. Actual EBITDA improvement was about [redacted] due to higher than projected incremental production.

November 2007 to proceed with critical path requirements for an energy project.[58] This is referenced as Celgar's Green Energy Project, a plan to add an additional condensing turbine to the pulp mill.

77. Mercer's board was provided with an initial proposal for the Green Energy Project in May 2008. This proposal envisaged the addition of a condensing turbine with the following economic benefits:

- [redacted]
- [redacted]
- [redacted]
- [redacted]

78. The Mercer board made the decision to approve the entire project and to proceed.[59]

79. Although there were no power sales agreements in place at the time of the board's approval, given BC Hydro's impending Bio Phase 1 Call for Power and robust market power pricing at the time, I believe the estimated power sales price of C$101/MWh would be considered reasonable in the short term provided that Celgar was able to secure the necessary regulatory approvals, sufficient U.S. transmission capacity, and locate a U.S. purchaser that was willing to pay a premium for Canadian green energy. As mentioned previously, mills typically require about a three year payback for significant improvement / return projects to make it on the capital short list. However, given the benefit afforded by a power contract mitigating risk for the project, a 3.3 year payback should be considered acceptable for a major project with an established industry player.

2008 Financial Crisis and Impact on Pulp Pricing

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[58] *See* Celgar Energy Project, Final Analysis, 29 October 2007, at MER00073442, **PÖYRY-26**. The board approved the order for a turbine conditional on the cancellation costs not exceeding [redacted].

[59] Celgar Project Performance Analysis, Capital Project Review, 24 January 2012, at MER00148461, **PÖYRY-25.**

80. By November of 2008, BC Hydro had accepted Celgar's EPA and would finalize the contract for execution. In December of 2008, Celgar won the competition to be funded by Natural Resources Canada under the ecoEnergy for Renewable Power program. The contribution agreement would pay C$10/MWh and improve EBITDA by about C$3 million per year, worth close to $30 million over the 10 year term.

81. However, the financial crisis had a huge impact on commodity pricing as conditions worsened rapidly by the third quarter of 2008. The price of NBSK in China, according to Pöyry's price series in Table 3, went from US$780/ADmt in the first quarter of 2008 to US$640/ADmt by the fourth quarter. The price continued to drop further to US$530 by the second quarter of 2009.

Table 3: NBSK Prices in China: 2008-2010

Year	Quarter	Price, USD/admt
2008	I	780
	II	785
	III	765
	IV	640
2009	I	525
	II	530
	III	615
	IV	695

82. As product pricing declined, the US housing market collapsed, resulting in sawmill closures and curtailments, thereby significantly increasing the fiber costs for pulp production and fuel costs for energy generation.[60]

83. Celgar mill earnings went from [redacted] for the first nine months of 2007 to [redacted] for the same period in 2008, which was the worst financial result since the mill was purchased by Mercer in 2005.[61] In February 2009, Mercer issued a Confidential Information Memorandum seeking [redacted] in debt financing for Celgar's Green Energy Project. In it they offered

[60] The highest volume, lowest cost fiber and hog fuel is derived from sawmill chipping and debarking operations. The housing downturn and subsequent financial crisis ultimately reduced the supply of low cost chips and hog fuel.

[61] Celgar Confidential Info Package, Appendix D, Celgar Statement of Cash Flows For the Nine Months Ended 30 September 2008 at MER00026886, **PÖYRY-5**.

[redacted].[62]

84. Mercer presented a robust forecast of about [redacted] annual EBITDA for the Green Energy Project,[63] which was more than adequate to service the financing. [redacted].

85. From January to April 2009, [redacted] continuing deterioration of the pulp market affecting Celgar's financial situation, spending on the project was slowed to a minimum. By May 2009, with [redacted] Mercer decided to suspend all spending on the project until it could obtain financing and disbanded the project teams.[64]

Natural Resources Canada (NRCan) Pulp and Paper Green Transformation Program (PPGTP)

86. In June, 2009, NRCan's Pulp and Paper Green Transformation Program was announced. Celgar qualified for C$57.7 million of funding through this program.[65] However, to be able to utilize as much as possible of the PPGTP funds for the Green Energy Project, Mercer had to cancel its ecoEnergy contribution agreement, which had the impact of reducing annual project EBITDA by about [redacted].

87. A contribution agreement with NRCan was executed in late November 2009, which enabled Celgar's Green Energy Project to be restarted without any requirements for external financing. The total project cost for the Green Energy

[62] *Ibid.*, Introduction at MER00026843, **PÖYRY-5.**

[63] *Ibid.*, Appendix B, Celgar Power Project Forecast Summary at MER00026868, **PÖYRY-5.**

[64] Gandossi Witness Statement, ¶ 48.

[65] Mercer International Inc., Mercer International Inc. Announces CDN$57.7 Million in Green Transformation Government Funding for Celgar Mill, Globe Newswire, 13 October 2009, **PÖYRY-27.**

Project was C$64 million, toward which Mercer invested [redacted], with the balance provided by PPGTP funding.[66]

88. My view is that the PPGTP funding was a very fortunate opportunity for Celgar to complete the project in the near term. Despite the increased project cost, largely due to the six month delay and the [redacted] with cancellation of the ecoEnergy contribution, the return to Mercer's [redacted] investment in the project saw payout in less than a year.

89. In my opinion, it is open to conjecture whether subsequent recovery in pulp and financial markets in 2010 and 2011 would have eventually enabled the debt financing of the project without the PPGTP or how mill strategy, decisions, and performance may have changed without the condensing turbine installed in the near term. However, extended delays would have had severe repercussions to the project organization and total costs. The benefits to the business are not insignificant from the Green Energy Project. Most importantly is the acknowledgement that, even with the delay and modifications to the opportunity, the project's projected, annual EBITDA contribution to the business is still [redacted].[67]

6.1.3 Review and Assessment

Celgar's January 2009 EPA

90. As described in Section 5, BC Hydro issued a Request for Expressions of Interest (RFEOI) in March 2007 to assess and identify potential bioenergy projects and proponents for its Bioenergy Call for Power. The RFEOI increased Celgar's interest in self-generation and ultimately led to BC Hydro's negotiation of an EPA

[66] Celgar Project Performance Analysis, Table 22 - GEP Expected Performance development at MER00148486, **PÖYRY-25**; Gandossi Witness Statement, ¶ 48; By May 2009, Mercer had invested some [redacted] in the Green Energy Project.

[67] Celgar Confidential Info Package, Appendix B, Celgar Power Project Forecast Summary at MER00026868, **PÖYRY-5**. The C$3 million Federal Government green power incentive had to be canceled, resulting in a [redacted] EBITDA annual forecast.

with the facility.[68] Celgar was one of four successful proponents to win a contract under the terms of Bio Phase I.[69]

BC Hydro's Determination of Celgar's GBL

91. In March, 2008, Mercer forwarded its RFP Registration form to BC Hydro, outlining two projects it was submitting to the RFP process: the Green Energy Project involving the installation of a new condensing turbogenerator; and the Biomass Realization Project involving the output from the existing turbogenerator.[70] Power from the Green Energy Project was considered eligible since it was incremental to Celgar's existing generation. However, power from the Biomass Realization Project was not eligible since it came from existing supply.[71] Celgar subsequently worked with BC Hydro to set a GBL similar to those that had been set with BC Hydro's customers under the RFP process, and submitted historical generation data from the mill.[72]

92. BC Hydro officials determined the GBL following a review of Celgar's data [redacted], including:

- the mill electricity usage,
- self-generation output, and
- plant production data.[73]

[68] Celgar Project Performance Analysis, GEP at MER00148459, **PÖYRY-25.**

[69] BCUC, Order E-08-09, "An Application by British Columbia Hydro and Power Authority For Acceptance of Electricity Purchase Agreements", 31 July 2009, **PÖYRY-28.**

[70] Zellstoff Celgar Limited Partnership, Bioenergy Call for Power (Phase 1) Registration Form, 6 March 2008, MER00278895, **PÖYRY-29**.

[71] Lester Dyck Witness Statement, ¶ 70-75; With respect to the Biomass Realization Project, however, BC Hydro explained that the intent of the Bio Phase I call was to acquire incremental generation, and not existing generation being used to self-supply a proponent's load. See BC Hydro, Bioenergy RFP – Phase 1, Briefing Note on Celgar, 9 April 2008, at bates 061630, **PÖYRY-30** ("BCH Briefing Note on Celgar"),.

[72] Dyck Witness Statement, ¶ 67-91; Letter from Brian Merwin to BC Hydro, Re: Zellstoff Celgar Limited Partnership ("Celgar") – Biomass Realization Project and Celgar Green Energy Project, 7 May 2008, at bates 019771-019780, **PÖYRY- 31**.

[73] Dyck Witness Statement, ¶ 80-83; Letter from Brian Merwin to BC Hydro, Re: Zellstoff Celgar Limited Partnership ("Celgar") – Biomass Realization Project and Celgar Green Energy Project, 7 May 2008, at bates 019774, **PÖYRY-31.**

93. Celgar also put forward recommendations that the GBL should be set at around [redacted][74] However, Celgar also submitted data that indicated that it self-generated sufficient energy in 2007 to meet its mill load and that in this year, under normal operating conditions, its load was [redacted] for a 8760-hour year.[75] The information provided also confirmed that the existing 52 MW self-generation facilities were being used to meet Celgar's entire mill load. On occasion, Celgar sold electricity in excess of its mill load, and purchased electricity from FortisBC only when Celgar's generation facilities were not operating.[76] In prior years, [redacted], generator output was less than mill load, with the balance provided from electricity purchases. Celgar also claimed that: [redacted][77]

94. Finally, Mercer's internal documents suggest that it believed that BC Hydro could set its GBL as high as [redacted].[78]

95. As a result of the data provided by Celgar, and after discussion with Celgar, BC Hydro was made aware of the following:

- Mercer had made significant investments in Celgar through Project Blue Goose from 2005-2007. These investments improved productivity, reduced costs, increased pulp production, reduced natural gas consumption and reduced energy purchases from FortisBC.

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[74] Dyck Witness Statement, ¶ 79; Letter from Brian Merwin to BC Hydro, Re: Zellstoff Celgar Limited Partnership ("Celgar") – Biomass Realization Project and Celgar Green Energy Project, 7 May 2008, at bates 019775, **PÖYRY-31**.

[75] Letters between BC Hydro and Brian Merwin re: Biomass Realization Project, May 2008, Appendix 1 at MER00278917, **PÖYRY-32.** Celgar actually provided contradictory data to BC Hydro concerning the load of the pulp mill. Although the written description indicates that the pulp mill load was 43 MW, the data provided in tabular form actually indicates that the pulp mill's load was 40 MW. BC Hydro discussed these discrepancies with Celgar and determined that the tabular data was accurate.

[76] Dyck Witness Statement; ¶ 70.

[77] Letters between BC Hydro and Brian Merwin re: Biomass Realization Project, May 2008, Appendix 1 at MER00278918, **PÖYRY-32**; Mr. Merwin states in this document that the [redacted] capital upgrades were operational for all of 2007.

[78] Draft Memorandum from Brian Merwin, Untitled, at MER00049113, **PÖYRY-33**.

93. Celgar also put forward recommendations that the GBL should be set at an "ad hoc/next day" basis, and only under "net of load" circumstances.[79]

- Celgar had been buying from FortisBC only on an ad hoc basis (i.e., generally during maintenance periods when the generator was down).[80]
- Generator production for years [redacted].[81]
- Annual mill load for years [redacted].[82]

96. Based on information provided by Celgar, BC Hydro correctly concluded that Project Blue Goose capital projects were operational in 2007.[83] The diagrams and information provided indicated the effect of increased pulp production on the operation (*i.e.* increased Recovery Boiler steam generation for use in either the existing or proposed new turbo-generator). Further, the additional pulp produced would have had a direct effect on the amount of self-generation.[84] The process data supplied by Celgar to BC Hydro was reviewed as part of the process and demonstrated

[79] Dyck Witness Statement, ¶ 70; ("In fact, Celgar confirmed that it was currently using the 52 MW generator to serve the mill's entire load, and had even on an *ad hoc* basis sold surplus electricity (*i.e.* electricity above its load) to either FortisBC or NorthPoint Energy Solutions Inc. ("NorthPoint").") Northpoint Energy Solutions is the power marketing subsidiary of SaskPower, a public utility owned by the Province of Saskatchewan.

[80] *Ibid.*, ¶ 80; ("Celgar purchased electricity from FortisBC only when Celgar's generation facilities were not operating normally; … Celgar had upgraded its pulp production and steam efficiencies [redacted].

[81] Letter from Brian Merwin to BC Hydro, Re: Zellstoff Celgar Limited Partnership ("Celgar") – Biomass Realization Project and Celgar Green Energy Project, 7 May 2008, at bates 019774, **PÖYRY-31.**

[82] *Ibid.*, **PÖYRY-31.**

[83] Letters between BC Hydro and Brian Merwin re: Biomass Realization Project, May 2008, Appendix 1 at at MER00278918, **PÖYRY-32.** Mr. Switlishoff contends that BC Hydro did not make "any adjustment for incremental generation arising from investments immediately prior to 2007…" However, he provides no explanation as to why BC Hydro should do so other than asserting that this energy is "incremental." Mercer made a strategic business decision to invest in Celgar through Project Blue Goose to normalize pulp production. This in turn increased energy production with available assets. BC Hydro did not have to incentivize Mercer to increase Celgar's self-generation through an EPA as Mercer had already decided that it was economic for it to normalize pulp production, which would lead to an increase in self-generation.

[84] Dyck Witness Statement, ¶ 81. ("As such, the 2005 and 2006 generating data did not reflect current normal operations at the time of negotiating the GBL under Bio Phase I. The upgrade and efficiency improvement projects were not completed until 2007, and thus self-generation production from years prior to 2007 could not be considered current normal self-generation.")

the variability in power generation and pulp production.[85] As many of the investments within Project Blue Goose were deferred likely due to the site operating in receivership, the projects Mercer considered before and employed after acquiring the mill were predominantly targeted at increasing pulp production, which had a direct impact on power generation from the existing turbo-generator.[86] Increased power generation was a secondary benefit.

97. BC Hydro also indicated in its briefing notes concerning Celgar that self-generation from the existing turbine was not going to be permissible as BC Hydro concluded: "If BC Hydro were to agree to the purchase of energy from the existing generator at the Celgar mill, then BC Hydro would essentially be paying Celgar for using energy it generates to serve its own load."[87] Further, the briefing note also explained that BC Hydro had adopted an approach consistent with BCUC Order G-38-01, which prohibited arbitrage.

98. After Project Blue Goose, Mercer improved the site's pulp production and power generating capabilities, enabling some export of power in 2007 and enabling a new normal[88] for the site and submitted this information to BC Hydro.[89] Based on the information provided by Celgar and guidelines from G-38-01, BC Hydro

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[85] Celgar Historic [*sic*] Data, 1990-2007, at bates 020470, **PÖYRY-34**

[86] Mercer's Memorial, ¶ 273. ("Mercer also appreciated that the Celgar Mill had been in receivership for over five years, placing the Mill in a hibernation of sorts. The Mill's receivership status did not lend itself to an aggressive pursuit of investment opportunities or improvements in the Mill's pulp and electricity operations.' As David Gandossi, Mercer's Executive Vice-President, Chief Financial Officer and Secretary explains, "We did not separately evaluate the Mill's potential to generate revenue from electricity sales — principally because we did not think that selling the mill's self-generated electricity would be necessary to earn a reasonable rate of return on our investment.")

[87] BCH Briefing Note on Celgar, at bates 061630, **PÖYRY-30.** ("If BC Hydro were to agree to the purchase of energy from the existing generator at the Celgar mill, then BC Hydro would essentially be paying Celgar for using energy it generates to serve its own load. Assuming Celgar's average annual mill load is 300 GWh, BC Hydro's tariff rate is $36/MWh and a contract firm energy price of $85/MWh for the Celgar's generation output, the net cost to BC Hydro for this arrangement which results in no new energy supply, would be $15 million per year.")

[88] Switlishoff Witness Statement, ¶ 183. Mercer indicates that Celgar never received what it refers to as a "multi-year baseline" and compares its situation to [redacted]. Mr. Switlishoff provides no rationale for such a baseline other than it would be more "favourable" to Celgar. [redacted] is discussed in more detail below. However, Celgar faced none of the serious challenges that [redacted]. Nor does Mr. Switlishoff provide evidence that Mercer requested such a baseline when BC Hydro made its GBL determination.

[89] Letter from Brian Merwin to BC Hydro, Re: Zellstoff Celgar Limited Partnership ("Celgar") – Biomass Realization Project and Celgar Green Energy Project, 7 May 2008, **PÖYRY-31.**

then determined that Celgar's annual GBL was equivalent to its 2007 plant load,[90] 349,275 MWh, or approximately 40 MW.

99. In our view, BC Hydro's determination of a 349,275 MWh GBL is reasonable based on the aforementioned circumstances and information provided to BC Hydro.

[90] Post Blue Goose, from 2007 until the start of the Green Energy Project condensing turbine in 2010, was a 'new normal' for Celgar. From 2007 through 2009, generator output exceeded mill load. From 1994-2006, with the exception of 1999, mill load was greater than generator output requiring net electricity purchases. Therefore mill load for 2007 was appropriate as a baseline from my perspective.

6.2 Howe Sound Pulp and Paper, Port Mellon, BC

Figure 10: Satellite View of Port Mellon Mill

6.2.1 Mill Introduction

100. Howe Sound Pulp and Paper (Howe Sound) has one of the broadest configurations concerning pulp and paper manufacturing in comparison to the other facilities being reviewed. Along with NBSK production, the facility has the capability to generate thermo-mechanical pulp (TMP) for supporting the single newsprint machine operating at the site. These additional operations result in much more significant power demands to support all of the operations.

Table 4: Howe Sound Pulp and Paper Mill Summary
Mill Built: 1908
Estimated Technical Age: 24 years
Product Focus: Northern Bleached Softwood Kraft Pulp (NBSK)
Estimated Capacity: 425,000 ADmt/year of NBSK, 230,000 ADmt/year of Newsprint

Major Equipment:

Process Area	**General Equipment**
Raw Material Handling	Purchased Chips
Mechanical Pulping	3 TMP Lines with Heat Recovery; 1 Rejects Refiner Line
Cooking	1 Continuous Digester
Chemical Recovery	1 Lime Kiln; 1 Recausticizing System; 1 Evaporator; 1 Recovery Boiler
Bleach Plant	1 OO; 2 D Eop D E D; 1, PY for TMP ECF pulp capability
Chemical Plant	Chlorine Dioxide, Erco R8 process
Energy Island	1 Bubbling Fluidized Bed Boiler, 2 Turbines
Major Fuels	Wood Based, Natural Gas, Sludge
Pulp and Papermaking	1 Pulp Dryer; 1 Newsprint Machine

6.2.2 Mill Background

101. The Howe Sound pulp mill is one of the oldest mills in British Columbia, originally constructed in 1908. The mill started manufacturing paper and only slowly moved into kraft pulp production.

102. In 1988, the partnership between Canfor Corporation and Oji Paper Company was finalized, and the mill began an extensive, four-year modernization and expansion program. [redacted] was invested into modernizing and expanding

the pulp mill, as well as installing a new TMP plant and newsprint machine. As a result, most of the equipment that Howe Sound utilizes today is relatively modern.[91]

103. In 1989, Howe Sound signed a [redacted] generation agreement with BC Hydro. The agreement was for Howe Sound to supply [redacted] GWh/year. The 112 MW of installed capacity planned for the mill was anticipated to be sufficient for the agreement. To supply the power, BC Hydro provided Howe Sound a [redacted] to enable the construction of the power boiler and the two generators.[92]

104. [redacted].[93] Declines in newsprint demand, and relatively soft pulp markets, led to financial restructuring by the owners, and the facility placed in receivership. This also led to the sale of Howe Sound to Paper Excellence, a subsidiary of Asia Pulp and Paper, in 2010.

105. [redacted].[94] [redacted].

[91] Correspondence from B Morgan (HSPP) to L. Gray (Canfor) re: Electrical Power Demand and Cogeneration Capability, 3 April 1989, **PÖYRY-35**

[92] Generation Agreement between BC Hydro and Howe Sound Pulp and Paper Limited, 1 October 1989, at bates 016601-016639, **PÖYRY-36**; Witness Statement of Pierre Lamarche, dated August 20, 2014, ¶ 17-18. ("Lamarche Witness Statement").

[93] Lamarche Witness Statement, ¶¶ 18-22. Witness Statement of Fred Fominoff, dated August 19, 2014 ("Fominoff Witness Statement"); ¶¶ 17-19.

[94] *See* Fred Fominoff Witness Statement, dated August 19, 2014, ¶¶ 15-19 ("Fominoff Witness Statement").

106. When logs or wood chips are exposed to sea water, they will absorb salt, creating the general effect of 'salty hog.' Although sea transportation is the only practical method of log transportation along the coast of British Columbia, the salt absorbed by the bark (*i.e.* hog) is carried into the boiler, leading to a much higher corrosion rate, as well as environmental problems due to air emissions. Commonly available control technologies can address the air emissions, but the corrosion salty hog causes can render a boiler unsuitable and possibly unsafe to handle higher steam pressures. Ultimately, this reduces operational efficiency with a backpressure turbine for power generation (*i.e.*, the boiler will need to be de-rated and only operated at lower pressures).[95]

107. Generally the best approach to reducing corrosion is to limit the amount of salt entering the boiler. Treating the hog to remove the salt is cost prohibitive. As the structure of the boiler is impacted by corrosion, significant repair of the biomass boiler would be necessary to increase steam generation and reliability for the long term. [redacted].[96]

108. In addition, the moisture content of hog fuel affects its energy value. The dryer the hog, the higher its energy value, leading to higher steaming rates. [redacted].[97] [redacted].[98]

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[95] Lamarche Witness Statement, ¶ 21. [redacted]

[96] Fominoff Witness Statement, ¶ 18.

[97] *Ibid.*, ¶¶ 18-19; Lamarche Witness Statement, ¶ 20.

[98] Fominoff Witness Statement, ¶ 19. [redacted]

109. In accordance with BCUC Order G-38-01, Howe Sound and BC Hydro negotiated the conditions under which Howe Sound could sell "idle generation." Howe Sound and BC Hydro signed an [redacted].[99] In 2006, Howe Sound requested that [redacted]. BC Hydro did not object to Howe Sound's request [redacted].[100]

110. In August of 2009, BC Hydro announced the Integrated Power Offer ("IPO") in order to "leverage PPGTP funding to British Columbia for investment in electricity generation and conservation," providing an opportunity for HSPP to take advantage of both the PPGTP funding as well as an EPA from BC Hydro.[101] With the assistance of C$37.6 million of PPGTP funds,[102] [redacted].[103]

6.2.3 Review and Assessment

Howe Sound's 2010 EPA and BC Hydro's Determination of Howe Sound's GBL

[redacted]

[99] Consent and Electricity Purchase and Sale Agreement between BC Hydro and HSPP, 28 February 2002, at bates 021714, **PÖYRY-37.** [redacted].

[100] Letter of Understanding between BC Hydro and HSPP, Re: Cogeneration Plan Surplus Electricity, 31 October 2006, **PÖYRY-38**; Pierre Lamarche Witness Statement, ¶ 41-42.

[101] Fominoff Witness Statement, ¶ 23.

[102] BC Hydro News Release, BC Hydro supports Howe Sound Pulp and Paper's energy efficiency and clean power plans, 8 September 2010, **PÖYRY-39**.

[103] Dyck Witness Statement, ¶ 125. [redacted]

111. Howe Sound and BC Hydro entered into an Electricity Purchase Agreement (EPA) in October 2010.[104] The IPO negotiation team determined that [redacted].[105]

112. The negotiation team also realized that [redacted].[106] Howe Sound had [redacted]. This meant that [redacted]. To make matters more complex, [redacted].[107]

113. [redacted], the negotiation team decided to set the GBL by [redacted].[108] This timeframe was selected for the following reasons:

- [redacted];
- [redacted]; and

[104] BC Hydro and Howe Sounds Pulp and Paper Limited Partnership, Electricity Purchase Agreement, Integrated Power Offer, 7 September 2010, **PÖYRY-40**.

[105] [redacted]. Fominoff Witness Statement, ¶¶ 15-20.

[106] Fominoff Witness Statement, ¶ 32.

[107] Email from Fred Fominoff to Scott Janzen, HSPP Downtime Oct 1st 2005 – May 22nd 2009 Period, 28 May 2009, at bates 140732-140733, **PÖYRY-41**.

[108] [redacted] *See* Dyck Witness Statement, fn 137.

- [redacted].[109]

114. [redacted].[110] [redacted][111] [redacted].[112] The GBL determination based on this period was equivalent to an average of [redacted].[113]

115. During negotiations, Howe Sound also raised concerns about [redacted]. BC Hydro agreed to [redacted].[114] [redacted]

[109] Email from Scott Janzen to Lester Dyck, HSPP GBL, dated November 3, 2010, at bates 157667, **PÖYRY-42**.

[110] [redacted]. Draft CBL Review Committee Notes, 3 August, 2011, at bates 130855-130859, **POYRY-43**; Email from Fred Fominoff to Scott Janzen, HSPP Downtime 1 Oct 2005 –22 May 2009 Period, dated May 28, 2009, at bates 140732-140733, **PÖYRY-41**; Email from Scott Janzen to Lester Dyck and David Keir, Howe Sound GBL, dated August 10, 2011, at bates 022268-022271, **PÖYRY-44**.

[111] Fominoff Witness Statement, ¶ 34. [redacted]

[112] Dyck Witness Statement, ¶ 130. "In order to arrive at a GBL that reflects normal operations, we made an adjustment [redacted] to account for [redacted]

[113] Draft CBL Review Committee Notes, 3 August, 2011, at bates 130855-130859, **PÖYRY-43.**

[114] Lester Dyck Witness Statement, ¶ 131. [redacted]

[redacted].[115]

116. The following chart shows Howe Sound's total generation, outages, power sales and average daily generation over the time period in which the GBL was calculated.[116]

[115] Email from Scott Janzen to Fred Fominoff re: GBL, dated June 24, 2010, at bates 143058, **PÖYRY-45.** [redacted]

[116] Howe Sound Pulp and Paper LP, Generation Baseline Calculations, 28 October 2009, at bates 157669, **PÖYRY-46**.

Figure 11: Summary of Howe Sound's Energy Statistics

[redacted]

117. The chart above shows a [redacted]. BC Hydro determined that [redacted]. It was believed by the negotiation team that [redacted].[117]

[117] Fred Fominoff Witness Statement, ¶¶ 20-22. [redacted]

118. While the process for determining the GBL calls for using the 12 month period immediately preceding the EPA negotiations, it also requests that the self-generator provide supporting documentation on operations and indicate if data is not reflective of "normal" operations. HSPP and BC Hydro agreed [redacted].[118]

119. My review of the 2009 data for the 12 month period prior to the EPA indicated that a GBL of [redacted] would have been established[119] if the aforementioned modifications to the data analysis were not done by the negotiation team. This would have been a lower GBL to the advantage of Howe Sound while also not reflective of Howe Sound operations.

120. My view is that the use of the [redacted], in this instance, was warranted and was a reasonable response to the problems the negotiation team faced in identifying an appropriate time period for GBL determination [redacted].[120]

121. The overarching objectives for BC Hydro of applying contracted GBLs are to protect ratepayers from detrimental arbitrage and to incentivize incremental generation to meet power needs for the service area. I believe BC Hydro's negotiations with Howe Sound in establishing a contracted GBL of [redacted] achieved both objectives and were representative of commercial negotiations.

[redacted]

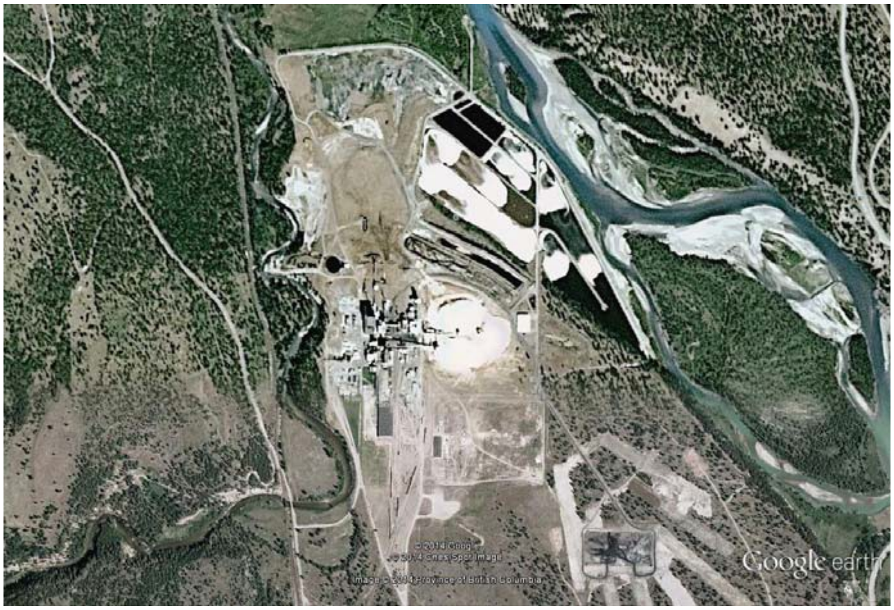
118 *Ibid.*, ¶ 32.

119 Howe Sound Pulp and Paper LP, Generation Baseline Calculations, 28 October 2009, at bates 157669, **PÖYRY-46**.

120 Mr. Switlishoff in ¶ 129 of his witness statement, raises the [redacted] period for the GBL without a clear understanding of the reasons for the use of this period.

6.3 Skookumchuck Pulp Mill, BC

Figure 12: Satellite View of Skookumchuck Mill



6.3.1 Mill Introduction

122. The Skookumchuck pulp mill is one of the smallest facilities under review but could be considered the simplest and most straightforwardly designed operation.

6.3 Skookumchuck Pulp Mill, BC

Mill Built: 1968
Estimated Technical Age: 25 years
Product Focus: Northern Bleached Softwood Kraft Pulp (NBSK)
Capacity: 270,000 ADmt/year NBSK

Major Equipment:

Process Area	General Equipment
Raw Material Handling	Purchased Chips
Cooking	1 Continuous Digester
Chemical Recovery	1 Recovery Boiler; 1 Evaporator; 1 Lime Kiln; 1 Recausticizing System
Bleach Plant	1 O; 1 D Eop D Ep D ECF pulp capability
Chemical Plant	Chlorine Dioxide, Mathieson-process
Energy Island	2 Power Boilers; 2 Turbines
Major Fuel Consumption	Wood Based, Natural Gas
Pulp and Papermaking	1 Pulp Dryer

6.3.2 Mill Background

123. Crestbrook Forest Industries ("Crestbrook") built the Skookumchuck mill in 1968 as a single line kraft operation. Crestbrook continued to operate the mill until Tembec acquired the company in 1999.[121] After the acquisition, Tembec continued to operate the plant until 2013 when the site was sold to Paper Excellence, a subsidiary of Asia Pulp and Paper.[122]

[121] Tembec Press Release, *Tembec to sell its NBSK pulp mill in Skookumchuck British Columbia*, 26 March 2013, online: http://tembec.com/en/Media/Press-Releases/tembec-sell-its-nbsk-pulp-mill-skookumchuck-british-columbia, **PÖYRY-47**.

[122] *Ibid.*, **PÖYRY-47**.

124. Similar to other mills within the region, the Skookumchuck mill received a series of major investments from 1985 to 1993 to replace and to upgrade equipment. The cooking area received a new digester in 1985 and was further upgraded in 1993. A new chemical recovery area was also installed in 1993, along with modernizations to the bleach plant, chemical plant, and pulp dryer, much of which dated back to the original startup of the mill based on Pöyry databases. The investment into the biomass cogeneration plant following the conclusion of an EPA in 1997 is perhaps the most recent significant investment for the site.[123]

Skookumchuck's 1997 EPA

125. Skookumchuck's situation was different than Celgar's in that it had a pre-existing 1997 EPA with BC Hydro relating to new generation capacity (43.5 MW) that was installed to replace the existing, aging 15 MW steam turbine.[124] Skookumchuck's EPA was unique because it was the first pulp mill in British Columbia to enter into a long-term sales agreement with BC Hydro, four years before G-38-01 was issued. Unlike more recent EPAs, which had adopted a GBL approach, the 1997 EPA did not require the self-generator to serve part of its mill load with self-generation before it could sell electricity to BC Hydro.[125]

126. The original 20 year contract was signed in 1997 between Purcell Power, a subsidiary of Crestbrook Forests, and BC Hydro. In 1999, Tembec acquired Crestbrook Forests and assumed the Assignor's responsibilities within the contract with BC Hydro.[126] Construction had not yet begun on the project, and Tembec invested [redacted] to install the 43.5 MW turbine generator, which achieved its Commercial Operation Date under the 1997 EPA in September 2001. In 2001, BC

[123] Tembec, 2000 Annual Report, at 15 and 21, **PÖYRY-48**.

[124] Justification Report Tembec EPA Replacement for Incremental Energy Sales from Purcell Power Plant, 24 September 2009, at bates 139553, **PÖYRY-49**; Prior to Tembec's acquisition of the mill, Purcell Power's plan was to install a smaller turbine generator (14 MW) to operate alongside the existing 15 MW turbine. When Tembec acquired the mill, construction had not yet begun, and it invested C$55 million to install a larger turbine generator (43.5 MW) and use the existing generator for emergency purposes.

[125] Dyck Witness Statement, ¶ 96.

[126] Assignment and Assumption Agreement of Purcell Power (Skookumchuck) Project, 5 December 2007, **PÖYRY-50**.

Hydro and Tembec also signed an Electricity Supply Agreement, which worked in conjunction with the 1997 EPA.[127] [redacted].[128] [redacted]. The EPA had a provision allowing the [redacted].[129]

127. In 2009, [redacted].[130] [redacted].[131] Accordingly, all parties escalated efforts to reach mutual agreement on a GBL in preparation for an EPA discussion.

6.3.3 Review and Assessment

Tembec's 2009 EPA and BC Hydro's Determination of Tembec's GBL

128. At the time of negotiating the 2009 EPA, [redacted].[132] As indicated previously, the value of hog fuel escalated from an effective price to generate power of

[127] Electricity Supply Agreement between British Columbia Hydro and Power Authority and Tembec Industries Inc., 14 September 2001, Appendix 8, at 30-31, **PÖYRY-51**. Witness Statement of Lester Dyck, ¶ 98.

[128] Purcell Power Corp. and BC Hydro, Electricity Purchase Agreement, 5 September 1997, **PÖYRY-52** ("Purcell EPA"); Electricity Supply Agreement between British Columbia Hydro and Power Authority and Tembec Industries Inc., 14 September 2001, at 30-31, **PÖYRY-51**; and Dyck Witness Statement, ¶ 98.

[129] BC Hydro Inter-Office Memo, Tembec Skookumchuck Pulp Operations - CBL/GBL/EPA Analysis, 8 April 2009, at bates 037396, **PÖYRY-8**. Purcell EPA, ss. 2.1 and 20.6, at bates 016971 and 016991, **PÖYRY-52**.

[130] Tembec Press Release, Tembec takes lumber, pulp, newsprint downtime to adjust to market conditions, 3 February 2009, **PÖYRY-53**.

[131] [redacted]. See Dyck Witness Statement, fn 123; and Justification Report Tembec EPA Replacement for Incremental Energy Sales from Purcell Power Plant, 24 September 2009, at bates 139553, **PÖYRY-49**.

[132] BC Hydro Inter-Office Memo, Tembec Skookumchuck Pulp Operations - CBL/GBL/EPA Analysis, 8 April 2009, at bates 037397, **PÖYRY-8.**

[redacted].[133] As the EPA value for produced power was not supportive of the level of increased cost of biomass due to supply situations, Tembec had the rationale to [redacted] close the power plant in 2009.[134]

129. Upon the pulp mill restart later that year, and no end in sight to the housing crisis / sawmill curtailments, [redacted]. Further, as was also indicated in the price increases Tembec faced, hog fuel had changed from being a residual sought by generators to be disposed of to a commodity supporting policy initiatives for biomass based power. This was indicated in the observation that biomass costs to the plant increased by a [redacted].[135]

130. Without Tembec producing power from purchased hog, BC Hydro would have needed to increase power supply from [redacted].[136] Therefore, to incentivize utilization of existing capacity, a new EPA was negotiated to replace the existing one, with power pricing appropriate to the current cost of biomass. The new EPA was negotiated on the basis of the terms of Bio Phase I, which included a GBL.[137]

131. In the absence of a contract with high prices for hog fuel, Tembec indicated [redacted]

133 *Ibid.*, **PÖYRY-8**

134 Purcell EPA, s. 15.1 at bates 016986, **PÖYRY-52**; [redacted]

135 BC Hydro Inter-Office Memo, Tembec Skookumchuck Pulp Operations - CBL/GBL/EPA Analysis, 8 April 2009, at bates 037397, **PÖYRY-8.** [redacted]

136 *Ibid.*, at bates 037396-037397, **PÖYRY-8**.

137 Dyck Witness Statement, ¶¶ 104-5.

[redacted].[138] The parties agreed to use this assumption as the basis for the GBL, and agreed that [redacted].[139] Power generation was therefore calculated using [redacted].

132. Tembec submitted that, in the absence of the obligations in the 1997 EPA, TG2 would not have been installed. Therefore, [redacted]. BC Hydro indicated that [redacted].[140] BC Hydro's calculations gave an average hourly GBL of 14 MW. Tembec eventually agreed to

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[138] Letter from C. Lague, Tembec to Matt Steele, BC Hydro, Re: Tembec Skookumchuck site GBL, dated March 10, 2009, at bates 020966, **PÖYRY-54**.

[139] Dyck Witness Statement, ¶ 107.

[140] Letter from C. Lague, Tembec to Matt Steele, BC Hydro, Re: Tembec Skookumchuck site GBL, dated March 10, 2009, at bates 020995-020966, **PÖYRY-54**. [redacted]. As Mr. Lague noted:

[redacted].

this figure, and the annual GBL was set at 122,640 MWh/year (the annual equivalent of 14 MW).[141]

133. During negotiations, Tembec [redacted].

134. Examining the Steam Consumption Diagram[142] supplied to BC Hydro in 2009 by Tembec as supporting documentation for determining the site's GBL and using the historical operational data (following tables)[143] also supplied, [redacted] MW would be indicated as the generator performance utilizing purchased hog fuel volumes.

[141] Electricity Purchase Agreement between BC Hydro and Tembec Industries Inc., 13 August 2009, at Appendix 1, s. 3, at bates 017071, **PÖYRY-55**; and Witness Statement of Lester Dyck, ¶¶ 111.

[142] Letter from C. Lague, Tembec to Matt Steele, BC Hydro, Re: Tembec Skookumchuck site GBL, 10 March 2009, at bates 021002, **PÖYRY-54**.

[143] Email from Chris Lague to Norman Wild, Re: Skookumchuck Steam Balances and expanded Exhibit 4 of GBL document, at bates 157660, **PÖYRY-56**.

Table 6: Average Steam and Power Generation

[redacted]

Table 7: Average Production and Steam Flows

[redacted]

135. Adjusting the aforementioned operational data[144] for no condensing power and using the Steam Consumption Diagram,[145] the conclusion of BC Hydro's analysis indicates a GBL of 14 MW. [redacted],[146] but Tembec agreed to the 14 MW GBL in subsequent negotiations.

136. In summary, [redacted].[147] While the 14 MW GBL negotiated was marginally higher than the turbine design criteria would indicate, Tembec did not submit additional documentation to justify the events mentioned happened in such frequency to change BC Hydro's GBL determination. Overall, BC Hydro reasonably

[144] *Ibid.*, bates 157660, **PÖYRY-56.**

[145] Letter from C. Lague, Tembec to Matt Steele, BC Hydro, Re: Tembec Skookumchuck site GBL, dated March 10, 2009, at bates 021002, **PÖYRY-54**.

[146] *Ibid.*, **PÖYRY-54**; Paraphrasing Tembec's point, [redacted]

[147] BC Hydro Inter-Office Memo, Tembec Skookumchuck Pulp Operations - CBL/GBL/EPA Analysis, dated April 8, 2009, at bates 037397, **PÖYRY-8.**

incentivized idled capacity to the advantage of BC ratepayers, [redacted].[148]

6.4 Canfor, Prince George, BC (Intercontinental and PGPP)

Figure 13: Satellite View of Prince George Mills

[148] *Ibid.*, bates 037396-037397, **PÖYRY-8.**

6.4.1 Mill Introduction

137. Canfor's Prince George location under review is actually two kraft mills, as can be seen above, but is treated as a single location from BC Hydro's perspective. The following review will provide a similar perspective.

Table 8: Canfor Mill Summary
Mill Built: 1966 - 1968
Estimated Technical Age: 28 years
Product Focus: Northern Bleached Softwood Kraft Pulp (NBSK), Unbleached Softwood Kraft Pulp (UBSK), Sack paper
Estimated Capacity: 315,000 ADmt/year NBSK, 190,000 ADmt/year UBSK, 140,000 ADmt/year Sack paper

Major Equipment:

Process Area	General Equipment
Raw Material Handling	3 Barkers, 3 Chippers, Purchased chips
Cooking	3 Continuous digesters
Chemical Recovery	3 Evaporators; 2 Lime Kilns; 2 Recausticizing Systems; 2 Recovery Boilers
Bleach Plant	1 O; 1 D Eop D Ep D; 1 D Eop D;
Chemical Plant	Oxygen; 1 SVP-MeOH process and 1 Mathieson process for Chlorine Dioxide
Energy Island	4 Power Boilers; 3 Turbines
Major Fuels	Wood Based, Oil, Gas
Pulp and Papermaking	2 Pulp Dryers, 1 Paper machine

6.4.2 Mill Background

138. The Prince George Pulp ("Prince George") mill began operating in 1966 as a joint venture of Canfor and Reed Paper (UK). The second mill began operations in 1968 in cooperation by Canfor, Reed and Feldmuhle (Germany). Canfor purchased Reed's stake in both operations in 1978 as well as bought out Feldmuhle's share by 1985.

139. Canfor's Prince George facility has undergone numerous investments to improve operations and increase capacity. Between 1998 and 2001, Prince George invested in numerous projects to upgrade the quality and capacity of sack paper production. In 2005, Prince George invested in a cogeneration plant. One year later, the Prince George mill underwent operational improvements, modernizing the bleach plant and screen room. In 2011, Pöyry's database indicates numerous investments were made to upgrade the energy island and to comply with environmental regulations.

Prince George Bioenergy Project

140. On March 15, 2004, BC Hydro and Canadian Forest Products Ltd. entered into a Load Displacement Agreement (LDA) under which BC Hydro committed to provide up to C$49 million in incentive funding towards an estimated C$81.4 million cost of procuring and installing a new turbo-generating facility at Prince George.[149] In exchange, Prince George was required to self-generate 390 GWh per year for a term of 15 years.

141. The project consisted of installing and commissioning a turbo-generator unit, and ancillary equipment, having an estimated net electrical output of [redacted] MW.[150] As part of the project, Canfor installed wood residue handling and conditioning systems, modified mill boilers and processes to optimize steam production for electrical generation, and upgraded the mill's electrical system to handle the new generator load and to displace mill electricity consumption.

Generation Shortfall

142. After the generator's commercial operation date, Canfor [redacted]

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[149] Power Smart Incentive Program Agreement between BC Hydro and Canfor, 15 March 2004, at bates 017407 **PÖYRY-57**; Letter Agreement between BC Hydro and Canfor, dated November 6, 2003 at bates 070472, **PÖYRY-58**.

[150] *Ibid*., at bates 070472, **PÖYRY-58.**

[redacted]merous investments to [redacted].[152]

143. Canfor initially developed this project in 2002 and 2003 when the mountain pine beetle infestation was in its early stages. The mountain pine beetle is endemic to British Columbia, which has seen several infestations. The insect infests lodge pole pine, a species prevalent in the B.C. interior. The beetle gets under the bark of a tree where it infects the wood with a blue stain fungus. This fungus interferes with the tree's ability to transport water and nutrients through the trunk that slowly starves and eventually kills it. After death, the remains of the tree are dry and brittle. Because the dead tree poses a serious fire hazard, this dead standing timber needs to be removed to proactively protect forest land.

144. Previous beetle infestations had been curtailed naturally by a cold winter; however, winters were not as cold for as long compared to previous seasons, which allowed the beetle to continue to infect more trees with the fungus. This situation resulted in one of the more serious infestations British Columbia has ever experienced.[153]

145. As the mountain pine beetle infestation had never been as serious before, the effects on the wood and to wood consumers in the region are continuing to be understood. In general, this dry, dead wood can affect how pulp mills operate in the region and source wood for their operations. Historically, wood chips procured in the region would be about 45% moisture content (i.e. the mass of a wood chip would be

[151] Draft Letter Agreement Between BC Hydro and Canfor, dated October 16, 2008, at bates 070124, **PÖYRY-59**: [redacted].

[152] Letter from B. Robinson (Canfor) to D. Calabrigo (CPLP) re: Reset of 2004 PG Cogen Project Baseline, dated August 12, 2008, at bates 070176, **PÖYRY-60**.

[153] *The United States of America v. Canada*, LCIA 111790, Final Award, 18 July 2012, at 47, **PÖYRY-61**.

45%, by weight, of water with the balance being compounds from a tree). As time passed and access to beetle killed tree stands became available, it has been noticed by mills in the region that incoming chip dryness has increased, an indicator that more beetle killed wood has entered the mills.

146. The dryer chips entering mills from beetle killed wood can still result in acceptable finished product pulp quality; however at the expense of decreasing yield (i.e. requiring more mass of wood per mass of pulp at constant pulp production). The additional wood mass required to maintain pulp production would also increase the amount of black liquor / byproduct needing to be processed in the recovery boiler. To further compound the situation, it has been seen from experience that the black liquor generated from beetle killed wood also has lower energy content / fuel value relative to healthy wood. These factors resulted in lowering the amount of steam production from the recovery boiler.

147. As mentioned previously, the recovery boiler operation is critical to kraft pulp manufacturing, oftentimes being the primary area preventing incremental pulp production. [redacted].

Impact on No. 2 Boiler

148. Similar to the wood chips entering the mill, the dryness of the hog fuel produced from mountain pine beetle killed wood also increased. Although dryer fuel would normally relate to higher steam production, the lower heating value of the dry,

dead wood more than offset the benefit of lower moisture content. The net result was that more hog fuel was required to produce the same amount of steam in Prince George's power boiler. [redacted].[154]

LDA Amendment

149. Canfor prepared a case for [redacted].[155] The facility would [redacted].

150. The LDA was subsequently amended in early 2009 to reflect a reduction in load displacement requirements to [redacted] GWh. In consideration for the agreement with BC Hydro to the amendments, Canfor agreed [redacted].[156]

6.4.3 Review and Assessment

[154] Letter from Sotirios Korogonas to Allan Leonard Re: Documentation for CPLP CBL Statement of Account, dated August 24, 2007, **PÖYRY-62**.

[155] BC Hydro, Briefing Note, Canfor Load Displacement Agreement Amendment, 12 September 2008, at bates 070129, **PÖYRY-63**; Letter from B. Robinson (Canfor) to D. Calabrigo (CPLP) re: Reset of 2004 PG Cogen Project Baseline, 12 August 2008, at bates 070176, **PÖYRY-60**.

[156] Power Smart Incentive Program Agreement – Amending Agreement No. 2, 4 February, 2009, at bates 017436, **PÖYRY-64**.

Prince George's 2009 EPA and BC Hydro's Determination of the Prince George GBL

151. Prince George submitted a proposal to sell incremental generation to BC Hydro in Bio Phase I. As discussed above, a GBL was required for the EPA under the terms of the call for power. Like Celgar, Prince George was one of four successful proponents to be awarded an EPA in Bio Phase I.[157]

152. Prince George's GBL was based on historical generator output in the period prior to the Bio Phase I EPA negotiations in 2008. Canfor indicated that it believed that Prince George's current annual generation level of [redacted] GWh would be sustainable over the term of the Power Smart Incentive Agreement.[158]

153. The mill's GBL was therefore set by BC Hydro at 338 GWh per year. The baseline [redacted].[159] Under normal operating circumstances, [redacted].

154. In my view, Prince George's GBL is consistent with the principles of protecting ratepayers from detrimental arbitrage and incentivizing incremental generation. The GBL was based on [redacted].[160] This generation is [redacted]

[157] Electricity Purchase Agreement between BC Hydro and Canfor Pulp Limited Partnership, February 2009, at bates 065025, **PÖYRY-65**; BCUC, Order E-8-09, "An Application by British Columbia Hydro and Power Authority For Acceptance of Electricity Purchase Agreements", at Appendix A, **PÖYRY-66**.

[158] BC Hydro, Briefing Note, Canfor Load Displacement Agreement Amendment, 12 September 2008, at bates 070129, **PÖYRY-63**.

[159] Email exchanges between L. Dyck and B Moghadam re: Canfor RECs info, dated July 29, 2009, at bates 069996, **PÖYRY-67**.

[160] Letter from S. Korogonas to M. Steele re: Declaration of Electrical Power Generation, dated July 12, 2011, at bates 073937, **PÖYRY-68**.

[redacted]. The incremental power generation [redacted].

155. These upgrades were completed prior to the EPA and related to power boiler and recovery boiler upgrades, [redacted].[161] In all cases, [redacted].[162] BC Hydro also maintained [redacted].[163]

156. Canfor acknowledges [redacted].[164] As Canfor summarizes [redacted].

1) [redacted].

[161] Letter from Sotirios Korogonas to Allan Leonard Re: Documentation for CPLP CBL Statement of Account, dated August 24, 2007, **PÖYRY-62**.

[162] RFP Appendix #4, Project Description Requirements, Canfor Analysis – Response to BCH questions, at bates 024956, **PÖYRY-69**; [redacted].

[163] Power Smart Incentive Program Agreement between BC Hydro and Canfor, 15 March 2004, s. 4.5 at bates 017411, **PÖYRY-57**.

[164] Letter from B. Robinson (Canfor) to D. Calabrigo (CPLP) re: Reset of 2004 PG Cogen Project Baseline, dated August 12, 2008, at bates 070176, **PÖYRY-60**; Canfor correspondence to CPLP General Counsel; [redacted]

2) [redacted].

3) [redacted].

4) [redacted]

157. With these considerations, BC Hydro correctly incentivized Canfor with an EPA to procure additional fuel volumes that would otherwise have left idle generating capacity at their facility constructed under the prior Power Smart LDA.

7 CONCLUSIONS

158. In conclusion, the GBLs assigned to the different facilities appear to be reasonable based on the information reviewed.

159. The purpose of BC Hydro's GBLs is to define what qualifies as incremental energy that is eligible for sale in an EPA. To arrive at each GBL, BC Hydro looked at the annual amount of self-generated energy that is used by the mill for self-supply, in a normal operating year, at the time the EPA is negotiated. Based on the information reviewed, the GBL set for each facility analyzed in this report reasonably represents its unique normal operations at the time of its negotiations with BC Hydro and considers information provided by the self-generators indicating when their facility operation is not normal.

160. Celgar's GBL acknowledges the improvements to the site (*i.e.* Project Blue Goose) that were made prior to the EPA, and without the prospect of an EPA. The facility was improving its operation after Mercer's acquisition and was operating better after Blue Goose than during the mill's receivership years, and this improved

situation was considered a "new normal" for purposes of setting the GBL prior to the EPA agreement. In my opinion, this approach is consistent with the process outlined by BC Hydro and undertaken with the other facilities under review for an agreed view by both parties on what is considered "normal" for the site.

161. The considerations taken into account for Howe Sound Pulp and Paper, Canfor, and Tembec indicated [redacted].

162. Howe Sound's determination correctly prevents a lower GBL [redacted]. Further, the awarded EPA enables [redacted].

163. Canfor's obligation [redacted] under the Power Smart LDA program [redacted]. After Canfor invested in projects [redacted]. Based on the plant's performance, BC Hydro agreed to amend the LDA [redacted].

164. Skookumchuck's historical power production is [redacted]. After considering the operation without the obligation to support the pre-existing EPA, BC Hydro reasonably incentivized power generation with a new EPA [redacted].

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8 APPENDICES

1. Curriculum Vitae of James Stockard
2. Curriculum Vitae Summary of Pöyry Team Members
3. Selected References of Kraft Mill Projects
4. Restrictions and Reservations