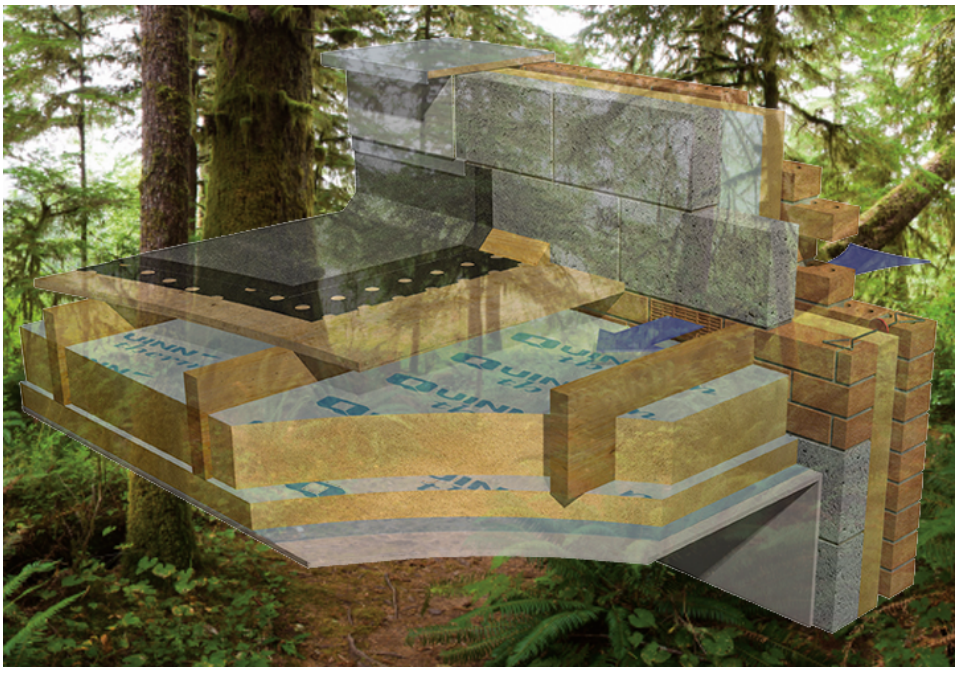

# Wood Industries Business Cases

**for Glulam/CLT, Pressure Treated Lumber and Wood Fibre Insulation.**

Prepared for: George Hanson, President, Vancouver Island Economic Alliance

Authors: Bill Collins and John Hankins

June 30, 2017

## Acknowledgements

The authors would like to acknowledge the following stakeholders and experts who offered their valuable time in supporting this work. We would like to specifically name Peter Moonen of the BC Wood Council as a wealth of information thank him for taking the time to join us on the Island. We would also like to thank Andrew Goodison of FP Innovations who set us on the right path in our investigation. Thanks must also go to Dick Jones of the Teal-Jones Group and Paul Sadler of Harmac for hosting us at their sites respective sites.

The authors would like to acknowledge George Hanson of VIEA and the members of the VIEA Wood Committee including Ron Cantelon, Gillian Trumper, Bret Torok-Both and Larry Rumming.

We would also like to thank the following people: John Gillis, Clint Parcher, Pat Deakin, Paul Beltgens, Amy Melmock, Don Demens, Cees De Jager, Michael Giroux and Jeff Mosher.

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## Executive Summary

This report took the recommendations that arose from the stakeholder roundtable discussions held in 2016 by the Vancouver Island Economic Alliance (VIEA) and the BC and Canadian Wood Councils in seven communities across Vancouver Island. Three priority value-added secondary wood manufacturing industries were identified through these roundtables as follows:

1. Pressure Treated Lumber
2. Glulam / CLT
3. Wood Fibre Insulation

To determine the viability of these opportunities on Vancouver Island (VI) the team completed a literature search on published information on these products and their respective markets, undertook telephone and face-to-face interviews with individuals from companies either directly involved or in the supply chain.

The analysis showed that, of the three opportunities, a facility to pressure treat lumber carries the lowest risk. However, the market size would most likely be limited to demand from the Island. It was deemed the lowest risk because the market on the Island for pressure treated lumber already exists and any new facility will face competition only from off-Island facilities.

Therefore, with an established market, and suppliers of the chemicals required willing to provide competitive prices for their product a VI based facility would have a potential price advantage as it would avoid the double shipping and handling costs for lumber on and off the Island. There would be the initial investment cost of acquiring and installing a retort to treat the lumber. A lumber company located in the mid-Island has already completed a thorough review of this opportunity and is assessing funding options to best cover the initial capital outlay.

The Glulam / CLT opportunity was seen as the next viable option because the market for this type of product in North America is growing.

Structurlam based in Penticton supplies product into this market and is able to successfully compete in the lower mainland and US markets with their mass timber building design offering. If a CLT / Glulam facility is established on Vancouver Island it was felt that, to be competitive, the mass timber produced would need to be designed to enable the product to be shipped in containers. A review of freight container and handling rates from Penticton to Metro-Vancouver and Vancouver Island to Metro-Vancouver calculate out to be very comparable.

Unlike Pressure Treated Lumber (PTL), the market demand for Mass Timber is still in its infancy with lots of growth potential. The capital cost to start an operation is significantly higher than PTL, the sales cycle is longer, and it requires a highly-educated sales team that can speak in technical terms with architects and engineers.

The CLT / Glulam opportunity should be thought of as an investment in advanced manufacturing. The potential for a return on investment will grow into the future as the adoption of CLT / Glulam increases in the market. However, patient capital is required because the return will likely take several years to materialize and will heavily depend on the capability of the sales team. The support of the provincial and municipal governments to buy local when undertaking construction projects will also assist to establish this industry on the island.

The city of Vancouver has gained a reputation as a global leader in wood construction, which is evidenced by the recent construction of the UBC Brock Commons 18-story building. At the time of writing this report, it was the tallest mass timber building in the world. Vancouver Island has an opportunity to leverage off the global reputation that Vancouver has established.

The Wood Fibre insulation opportunity is seen at this time as the least potential because the capital outlay would be significant with no established market in North America. The small amount of market demand is currently being satisfied from existing suppliers. If the market for wood fibre insulation does start to grow, attracting an existing Eastern Canadian or European manufacturer to establish a facility on Vancouver Island could be the best approach.

This report is advocating the following:

**For Pressure Treated Lumber (PLT)**

Work with current VI wood manufacturer to find innovative funding options to cover the capital outlay for expanding into PTL.

**For Glulam and CLT**

To create a working committee made up of end to end supply chain to support the adoption of Glulam / CLT as a favoured material for public and private commercial projects and residential developments.

**For Wood Fiber Insulation**

Maintain a watching brief on the market and make connections to established European manufacturers to consider VI as and when they consider investing in a plant to service Western Canada and USA.

# Introduction

## Background

The Vancouver Island Economic Alliance (VIEA) has been exploring ways to promote the growth of the secondary wood processing sector on Vancouver Island since 2014. VIEA is a non-government, non-profit organization whose mandate is to promote economic interests and exploit opportunities for growth in business and community throughout Vancouver Island.

The work leading up to this report began through a series of community conversations in the fall of 2016 when VIEA partnered with BC Wood and the Canadian Wood Council to conduct town hall style meetings in seven communities on Vancouver Island. Discussions were held with more than 100 people including those involved with secondary manufacturing, representing local government and First Nations along with representatives of provincial and federal agencies. The expected outcome was to identify short term actions that could be employed to promote economic growth in value-added wood processing while addressing the underutilization of natural and human resources available on the Island.

The VIEA process delivered three actionable activities and set the objectives for three tasks:

a. Conduct industry research to locate and identify value-added wood manufacturers on Vancouver Island,
b. Use established economic modeling to analyze available data to calculate the economic impact of value-added wood manufacturing at the community and regional levels, and
c. Conduct Island-wide industry and market research for three investment opportunities identified as Glulam, Pressure Treated Lumber and Wood Thermal Insulation.

This report is focused on exploring the feasibility of item “c” on the above list.

## Approach

A team approach was used to complete the research reported here (Appendix 1 – The Team). Using results from the town hall meeting as a starting point, twenty-five interviews were conducted over a three-month period. Interviews were either by phone or in person. The team took advantage of any initiations for site visits to secondary wood processing plants on the Island and the Lower Mainland. In one case, multiple parties were brought together when a more vertically integrated discussion with potential entrepreneurs was advantageous.

In addition to interviews, the team took advantage of existing research available from leading authorities in wood products manufacturing. It became evident that British Columbia is a major centre of research excellence in wood products in North America.

The results are presented so as to give the reader a sense of the opportunity and potential next steps. Before discussion of each opportunity however, it was necessary to provide a discussion of conditions

that will influence investment decisions in any secondary wood processing enterprise on Vancouver Island. The business cases for Glulam/CLT, Pressure Treated Lumber and Wood Thermal Insulation are presented individually. From the information given here, it is possible to construct a one-page "teaser" that could be used to initiate discussion with any potential investor.

## Overview of Secondary Wood Processing on Vancouver Island

### Market Landscape

There are more than 140 wood processing enterprises on Vancouver Island. Enterprises within the market landscape are quite interdependent largely because of geography and transportation costs. The value chain is shown in Figure 1. The major players in the value chain include the primary producer, log processors, secondary or value-added wood processors and their customers. These enterprises employ more than 4,000 workers on the Island and generate annual revenues in excess of $1.7 billion dollars.

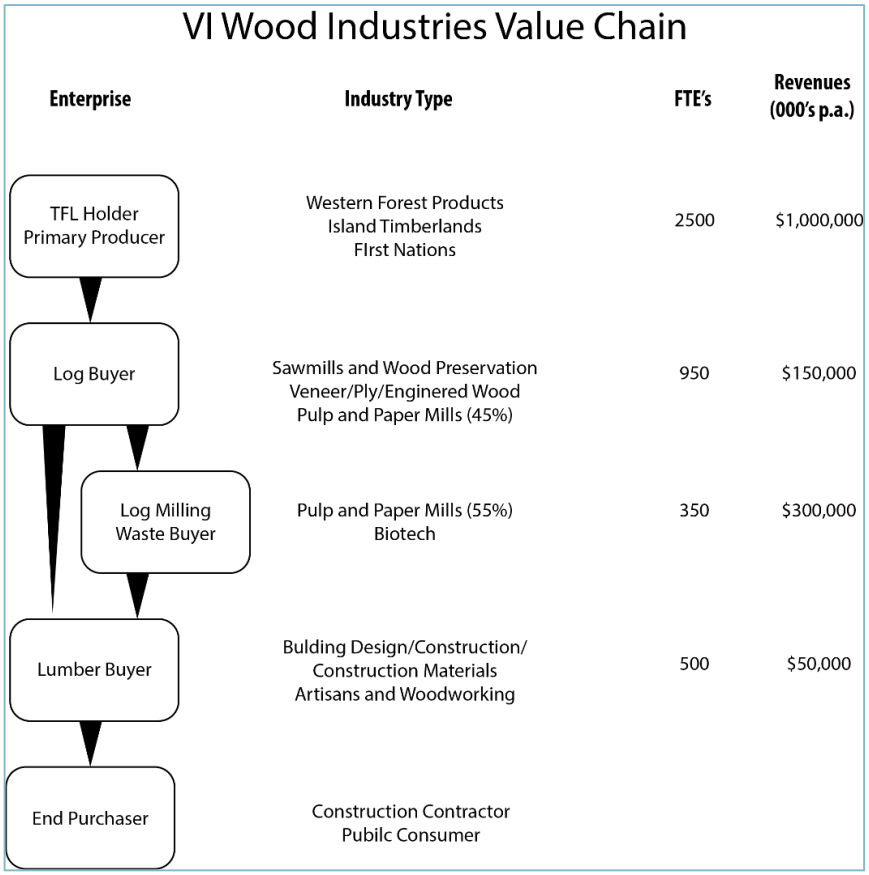


*Figure 1 Value Chain for the Wood Industry on Vancouver Island.*

Data collected by the Vancouver Island Economic Alliance indicate that primary producers are the biggest employers on the Island and generate the majority of revenue. Western Forest Products is licensed to cut over 80% of the Island's timber. A 2011 study of major industries in British Columbia

noted that the Coastal Forest Sector has faced significant economic challenges over the last 15 years due to the decreasing availability of old-growth timber, high fibre and manufacturing costs, and shifts in market demand[1]. Lumber production in the Coastal Sector declined almost 50% from 2004 to 2008. The turmoil has resulted in a substantial restructuring of the industry. A single firm, Western Forest Products, now dominates the lumber sector on the Island. Western Forest Products now accounts for over 80% of total lumber capacity and almost 90% of mills with capacity greater than 10 million board feet.

Excepting the primary producers and their sawmill operations, secondary wood processors generate over $700,000,000 per annum revenue and employ close to 2700 workers. Included in this value chain are the sawmills who produce dimensional lumber and other veneer, plywood or engineered wood products. Those who utilize the lumber for further processing or directly for construction take up the next level in the chain. Companies who process the lumber residual also slot in here. Traditionally, these are pulp and paper enterprise who get 70% of their feed stock in the form of chips from sawmill operations. Most recently due to the drastic reduction of sawmills on Vancouver Island the pulp industry is either going off Island for chips or buying logs and chipping them. In one VI pulp operation, this represents upwards of 50% of feed stock comes from chipping raw logs.

Benchmarking financial data across similar companies in Canada can provide a context for Vancouver Island based enterprise. Table 1 shows selected key performance indicators for representative enterprise in the value chain identified above.

*Table 1 Canadian benchmarks for companies in the Wood Industry Value Chain*

| Business | Revenue per Employee | Profit per Employee | Labour Productivity** | Capital Productivity*** | Survey Base |
|---|---|---|---|---|---|
| Lessors of Other Real Estate* | 190,960 | 36,880 | 73,120 | 5 | 737 |
| Sawmills | 286,770 | 19,880 | 66,100 | 4 | 558 |
| Structural Wood Manufacturers | 249,500 | 18,090 | 64,110 | 28 | 208 |
| Millwork | 176,690 | 8,680 | 53,740 | 17 | 997 |

** Probably not applicable specifically to TFL holders but provides context for investment.*
*** Dollars of added value per employee*
**** Dollars of added value per dollar of tangible asset*

Vancouver Island primary and secondary producers' revenue per employee are shown in Table 2. A comparison with other Canadian companies shows the secondary producers in line or slightly lower than their counterparts whereas the primary producer's revenue per employee is significantly higher. The average revenue per employee is gleaned from data collected as part of an earlier phase of this VIEA

[1] *source: http://www.cscd.gov.bc.ca/lgd/infra/library/Major_Industrial_Property_Taxation_Impacts_Report.pdf*

initiative and does not include the pulp industry on the Island. With the pulp data included the revenue jumps to $250,000.

*Table 2 Revenue per Employee for wood producers on Vancouver Island.*

| Enterprise | Revenue per Employee |
|---|---|
| Primary Producer | $400,000 |
| Secondary Producer | $150,000 |

Forest products workforce and revenue distribution are shown in Figure 2. Circles represent the relative size of the workforce and the text is the annual revenues generated from that workforce. The vast majority of forest products revenue is generated in the central part of Vancouver Island.

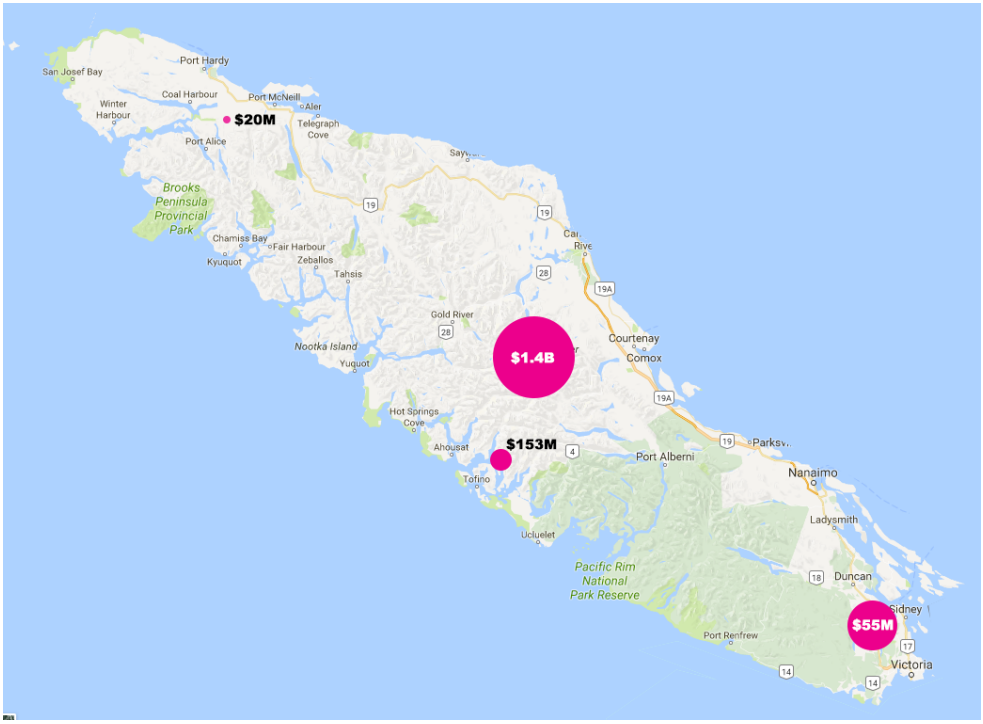


*Figure 2 Distribution of Labour and Revenue Across Vancouver Island.*

## Fibre Supply

### Availability

Access to a reliable fiber supply and knowing the forward cost were highlighted as an important factor when determining the viability of any long-term investment in a secondary manufacturing facility. When interviewing the VI Tree Farm Licensees (TFL), they did not see any challenge with the availability of fiber on the Island. The challenge is the cost of the fiber in the local market compared to the premium export market.

The holders of the TFL's are looking to maximize the financial return for their respective shareholders. Therefore, as long as they continue to receive a premium for harvested trees sold into the export market, they will remain focused on exports.

During interviews with some of the TFL license holders the idea of the TFL companies, moving down the value chain and setting up their own CLT / Glulam manufacturing facility supplied by their own fiber was discussed. The companies interviewed felt this was not their area of expertise and would require a different market mindset. They said that they were best set up to stick to their core competence and were focused more on lumber markets and where appropriate, investing in increasing the efficiencies of their sawmills.

More than 95% of standing timber on the Island is owned by the Crown. That means harvesting rights are controlled by the Provincial Government. The majority of timber is available to be harvested either by holders of Tree Farm Licenses (TFL's) or through First Nations treaty lands. Industries that depend on logs for feed stock on the Island are at a competitive disadvantage in accessing the raw materials compared to their mainland counterparts because there significantly less lumber sellers on the Island. It has been said that labour deregulation or decreasing the influence of trade unions has opened the market to more competition yet the value chain is very restricted because lack of diversity in licenses to cut timber. The market dynamic of the forest industry on Vancouver Island is dramatically different from that of mainland British Columbia. While more than 90% of the Island's trees grow on Crown land, tree farm licenses are held by very few players. The distribution of species and the qualities of those species are unique. Table 3 is the breakdown of Annual Allowable Cut for those companies operating on the Island. Figure 3 shows the geographic distribution of TLF's on the Island.

*Table 3 Annual Allowable Cut for Tree Farm Licenses on Vancouver Island*

| **TFL Holder** | **AAC ($m^3$)** | **Percentage** |
|---|---|---|
| Western Forest Products Inc. | 5,424,452 | 82 |
| TimberWest Forest Corp. | 630,000 | 10 |
| Teal Cedar Products Ltd. | 460,009 | 7 |
| Pacheedaht Anderson Trading Holding L.P. | 108,500 | 2 |
| Ma-Mook Natural Resources Ltd | 537 | <1 |
| **Total** | 6,623,498 | |

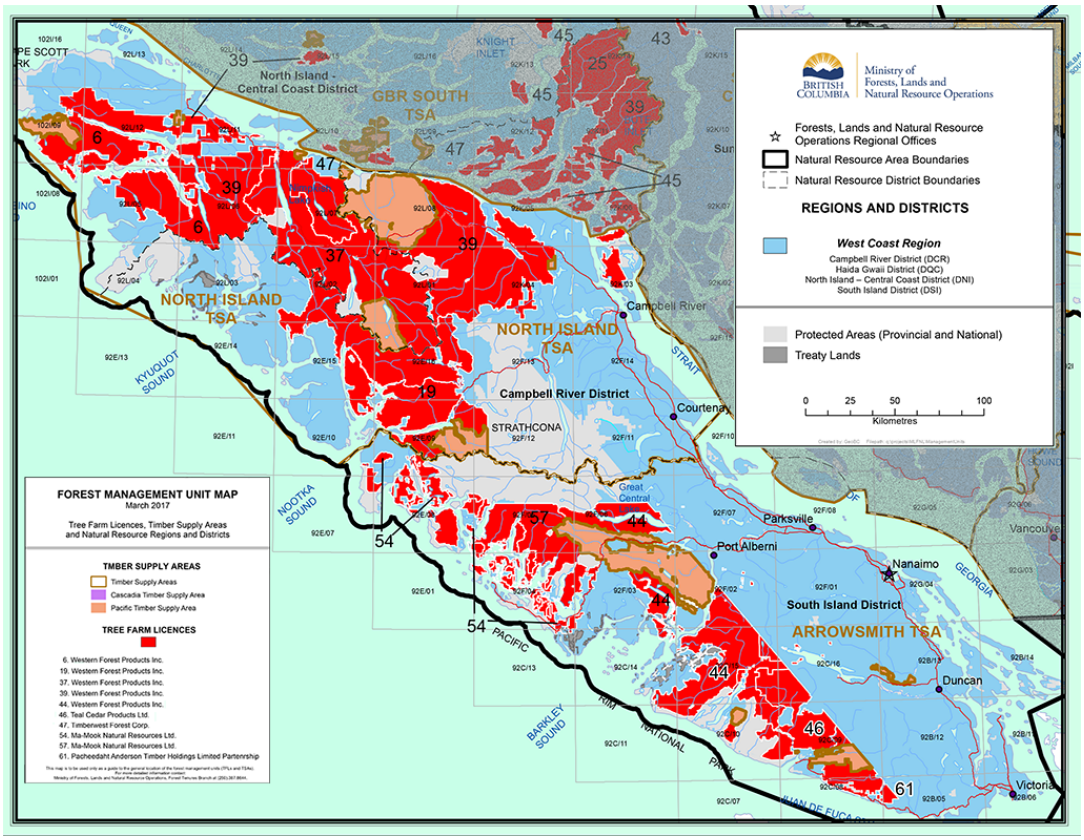


*Figure 3 Tree Farm Licenses on Vancouver Island as of March 2017*

## Transportation

A concern expressed by many interviewed was whether the VI demand for value-added secondary wood products would be sufficient to justify the capital costs and provide a positive return on investment. If VI demand was deemed not to be sufficient, could product manufactured on VI compete with the same product produced on the mainland?

One of the most cost effective means of transporting product off the Island is by container and therefore, through our research, it was felt that for VI to be competitive in CLT / Glulam, for example, the product should be designed to be shipped by container.

A comparison was made between container shipping costs from the Okanagan to the lower mainland versus the cost of shipping product from Vancouver Island to the lower mainland.

The Okanagan freight rates were quoted in the range of $750 for Tridems and $850 for B-Trains plus Fuel Surcharges in the 15% range which are in line with Nanaimo to the lower mainland shipping costs.

The quote from the shipping agent was as follows.

> *"I think it's safe to conclude that neither location has a transportation advantage over the other going to the Delta area."*

## Impact of the Softwood Lumber Agreement with the United States

Canada and the United States are currently renegotiating an agreement that has seen four previous iterations. The dispute centers on the US Forest Industries assertion that the Canadian land tenure system constitutes a subsidy to the lumber industry thus giving them an unfair advantage when selling product into the United States. Recently tariffs have been imposed on companies exporting prescribed products to the US. Also, countervailing duties have also been applied based on US anti-dumping laws. However, negotiations in this dispute over the past thirty years have ended in agreements being reached and there is nothing to suggest this round of discussion will not be successful.

The softwood lumber disagreement between Canada and the United States has a direct impact on the forest products industry in British Columbia. The products forthcoming from the businesses described herein have not been included in previous agreements. While it is difficult to predict what types of softwood lumber products will be included in any new agreement, there is nothing to suggest that Pressure Treated Lumber, Mass Timber or Wood Thermal Insulation will be included. As one interviewee noted, "If the markets for these products suddenly take off in the US, there is no telling what US industry might claim as unfair competition."

## Regulatory and Environmental Oversight

It has been said that British Columbia is one of the most business friendly provinces in which to do business. Currently it enjoys one of the lowest corporate tax rates in Canada (Table 3). In addition, the Provincial Government has committed to reducing so-called "red tape" to stream line the intersection of business practice and government oversight2.

However, an entrepreneur active in the wood processing business on Vancouver Island said there has been an increase in government regulation. More inspections and reporting requirements are being added including environmental (dust control), lift equipment calibration (pull tests), electrical inspections and other boiler equipment inspections. It has been said that small to medium sized wood processing enterprise is approaching the point where the overhead cost of an engineer must be added to operational expenses to keep up with the reporting requirements.

[2] *http://www2.gov.bc.ca/gov/content/governments/about-the-bc-government/regulatory-reform/red-tape-reduction*

*Table 4 Schedule of 2017 Provincial Corporate Tax Rates*[3]

| Province | Corporate Tax Rates (%) |
|---|---|
| British Columbia | 11.0 |
| Alberta | 12.0 |
| Saskatchewan | 12.0 |
| Manitoba | 12.0 |
| Ontario | 11.5 |
| Quebec | 11.8 |
| New Brunswick | 14.0 |
| Nova Scotia | 16.0 |
| Prince Edward Island | 16.0 |
| Newfoundland & Labrador | 15.0 |

Municipal taxation has come under scrutiny in the recent past. In the earlier referenced 2011 study of the impacts of taxation on major industrial property, points specific to the wood processing industry on Vancouver Island were made:

> *In British Columbia annual property tax costs are the product of the taxable assessed value multiplied by the applicable tax rates. The taxable assessed value and property classification are determined by BC Assessment, an independent crown agency, legislatively mandated to assess all property throughout British Columbia at its actual value and on a fair and equitable basis. Tax rates are set by the province, municipalities and a number of other taxing jurisdictions.*
>
> *The BC system is distinctive in that assessment of major industrial improvements (buildings & other components) is based not on market value, but rather through utilization of a costing manual, commonly referred to as the Major Industrial Property (MIP) manual. The costs estimated from the MIP manual are depreciated at legislated annual depreciation rates that range from 4% to 6.5%. In the instance of an operating major industrial plant the annual depreciation is capped at a maximum of 80%. Assessment values are adjusted each year by a cost factor based on trends in changes in reproduction costs of the assessable assets. It is noteworthy that the current major industrial system assessment does not reflect increases or decreases in value as a result of commodity price changes.*

[3] *https://home.kpmg.com/content/dam/kpmg/ca/pdf/2017/03/substantively-enacted-tax-rates-for-general-corporations-for-2016-and-beyond.pdf*

*Class 4 tax rates are set by individual municipalities. Properties outside of municipal areas are taxed at standardized provincial rates except in Peace River, and these properties are also taxed by the regional districts at rates that differ according to the services provided.*

The 2011 study concluded that municipal taxation did not contribute significantly to overall costs, are not a significant factor in decisions on capital purchase and do not affect decisions on reinvestment in existing infrastructure. When interviewed for this report, one owner of an operating sawmill on the Island indicated taxation was not commensurate with the municipal services received. Table 4 is the schedule of selected Vancouver Island municipalities combined tax rates for light and major industries[4]. It shows tax rates from 2010 and 2016 to provide a trend in rate change. The green and red circles represent trends favourable and unfavourable to business.

*Table 5 Selected municipal tax rates on Vancouver Island*

| | | 2010 | | 2016 | | Differential | |
|---|---|---|---|---|---|---|---|
| Name | Type | Major | Light | Major | Light | Major | Light |
| Campbell River | City | 55.24 | 23.64 | 48.72 | 24.39 | -6.52 | 0.74 |
| Central Saanich | District | 8.18 | 15.08 | 7.11 | 14.60 | -1.07 | -0.48 |
| Colwood | City | 8.18 | 31.28 | 7.11 | 52.48 | -1.07 | 21.20 |
| Comox | Town | 27.94 | 27.63 | 29.51 | 29.17 | 1.57 | 1.54 |
| Cumberland | Village | 20.51 | 20.20 | 21.59 | 21.25 | 1.08 | 1.04 |
| Duncan | City | 7.31 | 7.00 | 7.06 | 26.59 | -0.25 | 19.59 |
| Esquimalt | Township | 41.95 | 26.21 | 44.90 | 27.97 | 2.95 | 1.76 |
| Gold River | Village | 8.48 | 49.11 | 7.42 | 57.39 | -1.06 | 8.27 |
| Highlands | District | 8.86 | 14.78 | 7.94 | 19.78 | -0.92 | 5.00 |
| Ladysmith | Town | 96.98 | 24.84 | 115.62 | 29.04 | 18.64 | 4.19 |
| Lake Cowichan | Town | 92.53 | 27.84 | 105.21 | 32.98 | 12.68 | 5.13 |
| Langford | City | 18.46 | 18.15 | 19.20 | 18.86 | 0.75 | 0.71 |
| Nanaimo | City | N/A | N/A | 24.06 | 23.72 | | |
| Nanaimo | District | 38.34 | 25.89 | N/A | N/A | | |
| North Cowichan | District | 51.86 | 25.27 | 41.33 | 29.30 | -10.53 | 4.02 |
| Port Alberni | City | 64.49 | 42.46 | 62.44 | 68.41 | -2.05 | 25.96 |
| Port Hardy | District | 8.51 | 31.90 | 7.38 | 39.99 | -1.13 | 8.08 |
| Port McNeill | Town | 31.66 | 31.35 | 18.42 | 34.41 | -13.24 | 3.06 |
| Tofino | District | 17.38 | 17.08 | 11.02 | 10.68 | -6.36 | -6.39 |
| Ucluelet | District | 7.99 | 32.19 | 6.77 | 6.43 | -1.22 | -25.76 |
| Victoria | City | 23.43 | 23.13 | 22.08 | 21.74 | -1.35 | -1.39 |

[4] *http://www.civicinfo.bc.ca/surveys.asp*

## The Business Cases

### Introduction

Based on the numerous stakeholder roundtable discussions described earlier, a picture of exciting business opportunities arose. The businesses are Glulam Beams, Pressure Treated Lumber and Wood Thermal Insulation. Following preliminary investigation as part of this business case development exercise, it was decided to expand the scope of Glulam to include Cross Laminated Timber (CLT).

As an introduction to the details of each business case, Table 6 is a high-level summary of each opportunity.

*Table 6 High level summary of the business opportunities described in this report*

| Opportunity | Raw Material | Capital | Land | Environment | Building Code Availability |
|---|---|---|---|---|---|
| CLT and Glulam | Dimensional Lumber, Hemlock Balsam SPF | $10M – 25M CLT<br>$1M - $5M Glulam | CLT 5 ,000 $m^2$ lot<br>5,000 $m^2$ covered<br>Glulam<br>2,000 $m^2$ lot<br>2,000 $m^2$ covered | Wood chips and dust control | In Canadian Code, pending in BC code. |
| Wood Fibre Insulation | White Wood | $80 to $100M | 15,000 $m^2$ lot<br>5,000 $m^2$ covered | Handling of binding agents | 3-5 years |
| Pressure Treated Lumber | Hemlock Balsam | $3 - $10M (depending on land costs) | 3,000 $m^2$ lot<br>2,000 $m^2$ covered | Water Discharge Chemical recapture | existing |

## The Case for Pressure Treated Lumber Production

### Product Overview

Preservative-treated lumber is wood which has been surface coated (non-pressure treated wood), where the application of preservative is by brushing, spraying or dipping the piece. Pressure treatment is a process that forces chemical preservatives into the wood. The lumber is placed inside a closed cylinder, then vacuum and pressure are applied to force the preservatives into the wood. The preservatives help protect the wood from attack by termites, other insects, and fungal decay.

Preservative-treatment processes do not alter the basic characteristics of wood but provides much improved service life for wood building materials in severe service conditions[5].

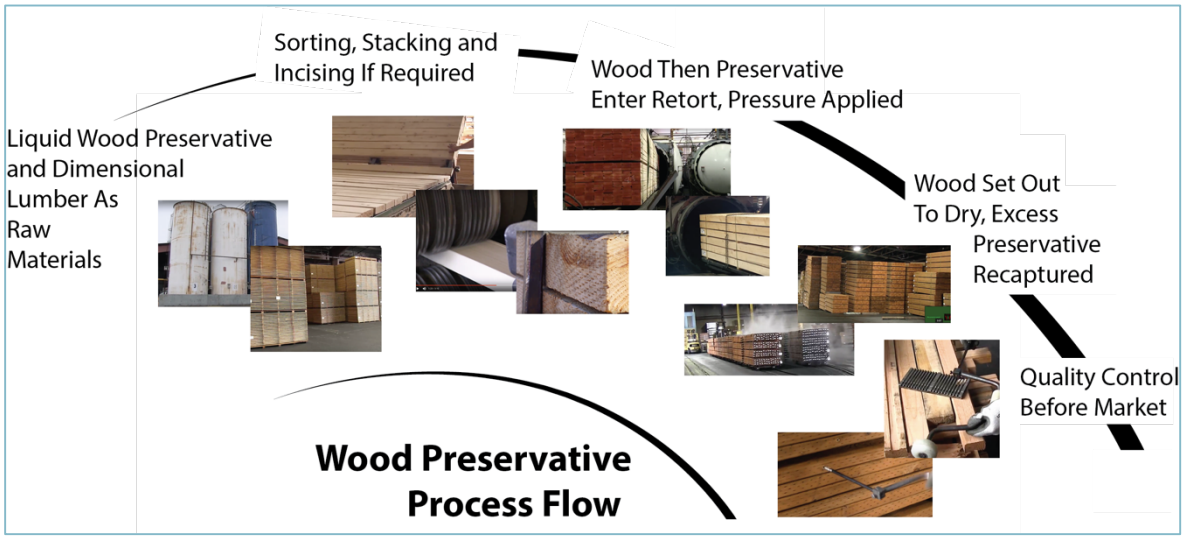


*Figure 4 Wood Preservation Process Flow*

### Business Overview

There are no pressure treated lumber (PTL) facilities on Vancouver Island. Thus, all pressure treated wood used on the Island is shipped from the mainland. Feed stock for mainland pressure treating comes from Vancouver Island, Northern BC and Alberta. One source said that 60% of feed stock for lower mainland pressure treatment comes from the Island. Another Island-based fence post manufacturer ships their product to California for pressure treatment.

5 http://preservedwood.org/TheStory/HowPreservedWoodisMade.aspx

The establishment of the pressure treated lumber facility on Vancouver Island would reduce the transportation cost of shipping to the treatment facility from Northern BC and Alberta and then onto Vancouver Island, which in turn would have a lower carbon (GHG) footprint and create jobs (Approx. 8 to 10) on the Island.

There are 5 pressure treated wood facilities in the lower mainland Table 10. There are also distribution centres on the Island for pressure treated facilities south of the border. Princeton Wood Preservers Ltd., who make products such as fence posts, have a distribution yard on Vancouver Island through Fenceline Products in Parksville.

*Table 7 Pressure Treated Lumber Plants in the Lower Mainland of British Columbia*

| | |
|---|---|
| Stella Jones in New Westminster | http://stella-jones.com |
| Taiga Building Products in Langley | http://www.taigaforest.com/ |
| Canasia Forest Industries Surrey | http://www.canasiaforest.com/ |
| Canwel, Langley | http://www.canwel.com/index.html |
| Westminster Industries Ltd in White Rock | http://www.westmin.ca/index.html |

## Business Development

Treated wood is sourced for retail, residential or industrial construction including land and marine applications, and for agriculture use. Industrial uses include railway ties and telephone/hydro poles. Pressure treated lumber for retail is delivered from lumber yards either by box stores such as Rona or Home Depot or through local businesses with one local lumber retailer purchasing pressure treated lumber from Alberta.

Business growth would be largely a function of awareness building and price competitiveness. There will be a certain amount of cache for purchasing locally or for companies who can represent themselves as "green". However, the value of "green" is still limited because price remains the main factor in purchasing decisions. With the anticipated higher margins from reduced shipping costs, a Vancouver Island manufacturer of PTL would have room to be price competitive, although initial capital outlay may reduce cost flexibility.

## Industry

The estimated annual market for above ground pressure treated lumber on Vancouver Island is ~15 million board foot above ground. The volume for underground pressure treated lumber is not included. Due to the unique nature of each market, the product is treated for local consumption as opposed to shipping out of country as each jurisdiction has their own environmental rules. Therefore, the market geography would be mainly Vancouver Island with some potential to compete on the lower mainland.

## Operations

The wood used in the pressure treated process comes from a saw mill. Therefore, direct supply of wood fiber is not a concern to the manufacturer of the PTL facility apart from the normal lumber price fluctuations.

In early conversations, a concern was raised that the chemical suppliers could be reluctant to supply a new entrant as it would take business away from their existing customers. Based on a discussion with the VI wood company that has been actively engaged in exploring this opportunity, they confirmed this would not be the case as the volume of PTL that is currently destined for VI can easily be shipped to meet demand in other parts of BC and Canada. Therefore, the supply of chemicals for treatment is not anticipated to be a challenge as the suppliers of the chemicals are keen to see more processing facilities to increase the volume for their product.

The two main suppliers of chemicals to treat wood are Lonza and Viance. Lonza has branded products for pressure treating of wood and for fire retardation. Brands such as Wolmazined are used by BC companies for pressure treating wood. Viance brands such as Ecolife and Preserve are commonly used as the chemical agent to treat wood. Their fire retardant D-Blaze is used by BC wood industries to as a chemical to mitigate fire hazard.

There are numerous active chemicals used to treat wood. The list of approved chemicals for preserving residential lumber in the United States includes: ACQ, borates, copper azole, copper aphthenate, copper-HDO and colymeric betaine. Of these chemicals, ACQ currently is the most widely used wood preservative for residential applications. ACQ (alkaline copper quaternary) is a water-based wood preservative that prevents decay from fungi and insects (i.e., it is a fungicide and insecticide). It also has relatively low risks, based on its components of copper oxide and quaternary ammonium compounds.

## Financial Overview

Based on discussions with a VI wood manufacturer, the volume of above ground pressure treated lumber would justify investment in a one cylinder manufacturing facility. The estimated investment cost to convert a facility zoned for industrial with no land acquisition cost would be $3 - $5million. The facility would employ up to 8 full time employees.

## The Case for Mass Timber Production

Structurelam is an example of a British Columbia company that has been in business for many years producing glulam products. In 2012 they took advantage of the introduction of CLT panels for industrial building shell construction in Canada. Structurelam then expanded to meet the demand. A manufacturer of CLT can produce glulam at an incremental cost because the equipment and the expertise is in-house. To move from a manufacturer of Glulam (with its lower initial capital requirement) is a significantly bigger challenge. Glulam and CLT will be presented as separate business cases below but it will be concluded that strong consideration should be given to integrating the two under the one business proposition.

### Business Overview

Glulam

Glulam (glued-laminated timber) is a structural timber product manufactured by gluing together individual pieces of dimension lumber under controlled conditions. The attributes of this wood product account for its frequent use as an attractive architectural and structural building material. Companies have been manufacturing glulam since the 1960's. One interviewee commented, "Anyone with a saw, big hydraulic press and some glue can produce glulam." While simplistic, the comment is evidence of the relatively lower barriers to entry for this type of enterprise. It should be said that modern building codes are quite specific on the details of the quality of these structures and thus investment in engineering capability would be expected.

Modest capital investment is required for a stand-alone Glulam facility. For less than $2 M the equipment and infrastructure can be acquired. A facility must have at least 500 $m^2$ of shop floor and outside lot of about 0.5 hectares. There are no special environmental regulations apart from WorksafeBC requirements for dust control and materials handling.

CLT

CLT (cross laminated timber) products hit the market in Canada in 2010. It has been in use in Europe for more than forty years. CLT is a panelized wood product made from dimensional lumber. There are competing models for the CLT business. One model, embodied by Structurelam in Penticton BC, is that of a totally integrated building system provider. Essentially, this is an enterprise that manufactures prefabricated buildings. In this model sales engineers work with owners of the new structure and their architects and engineers to design the building shell in alignment with the CLT manufacturer. Another model, with examples south of the border, is that of a commodity provider where some of the offer is build-to-print but also included in the offer are ready-made CLT building blocks for various applications[6].

*6 www.smartlam.com*

CLT capital costs are typically in excess of $10 M with equipment including a finger jointing machine, presses and a CNC capable of cutting in excess of 10 metres in length. There are some entrepreneurs that suggest a smaller scale operation can be put in place for $ 5 M but it is not clear the target maximum panel size. CLT requires similar sized shop and lot size. In North America, CLT producers can be profitable with 5000 $m^2$ shop and 5000 $m^2$ outdoor lot. In Europe, the facilities could easily double that size or more. If the feed stock for the CLT enterprise is dimensional lumber, meaning whole log processing is not done on site, both CLT and Glulam are considered Class 5 property (light industrial).

## Product Overview

Glulam

In the manufacture of glulam, the wood pieces are end jointed and arranged in horizontal layers or laminations. The lumber used for the manufacture of glulam is a special grade (lamstock) which is purchased directly from lumber mills. It is dried to a maximum moisture content of 15 percent and it is planed to a closer tolerance than that required for dimension lumber. Canadian glulam is manufactured in three species combinations: Douglas Fir-Larch, Hem-Fir and Spruce-Pine[7] .

Glulam beams can be glued into multiple lamella at lengths in excess of 70 metres and processed by CNC machine into incredible architectural sculptures. Most of the time the beams are meant to be exposed and thus lam stock is known for its superior dimensional tolerances and esthetics. It is also desired for its strength to weight ratio being two-thirds the weight of steel and only one sixth of the weight of concrete.

*Figure 5 Pictures of various glulam beams[8].*

*7 http://cwc.ca/wood-products/glulam*

*8 http://www.krusi.com/LignamaticCNC.html, http://www.westernwoodstructures.com/wp-content/uploads/2012/12/_disney-ice-hockey-arena.jpg,*

Cross Laminated Timber (CLT)

Originally invented in the 1970s, the first industrial sized Cross-Laminated Timber (CLT) manufacturing facilities were established in Europe in the late 1980s and are increasingly gaining recognition as a high-performance material for structural systems[9]. For the purposes of this report, we use the term CLT to describe laminated panelized engineered wood products. In the strictest sense, CLT panels are fastened with glue only. Other panel products are fastened, for example with nails (nail-lam) or dowels, (dowel-lam). The authors recognize there are very specific differences in these products from the building code requirements to the production methodology. While we attempt to be specific to CLT, the conversation applies to the other panel products.

Cross-Laminated Timbers (CLT) are large engineered wood panels manufactured by cross laminating lumber with adhesives or fasteners. CLT is produced with three to seven layers of lumber or planks stacked on one another at right angles and are either glued together in a hydraulic or vacuum press over their entire surface area or nailed together. Each layer is composed of softwood boards. Panel thickness is usually in the range of 50 mm to 300 mm but panels as thick as 500 mm can be produced.

Panel size ranges from 1.2 to 3 m in width and 5 to 15 m in length. Openings within panels can be pre-cut in the factory to any dimension and shape, including openings for doors, windows, stairs, service channels and ducts. The resulting product is loadbearing, stable and can act as a diaphragm or shear wall.

Because of CLT's structural properties and dimensional stability, the product is well suited to floors, walls and roofs used in mid-rise construction. The walls and floor panels may be left exposed in the interior which provides additional aesthetic attributes. The panels are used as prefabricated building components which can speed up construction practices or allow for off-site construction in remote locations.

CLT has gained traction since 2000 in the emerging green building movement. While cost will continue to be the main driver in CLT market uptake, the environmental advantages of mass timber over steel or concrete are significant. It has been suggested that the carbon footprint offered by mass timber is smaller than that of building materials of equal strength/weight characteristics. This occurs in both the energy used to produce the material (wood manufacturing using less energy) and carbon being sequestered within the wood used for building[10]. Not to mention, following decades of use the original building material, assuming the building gets demolished, can be repurposed therefore continue to contain the $CO_2$. Thus engineered wood products offer a strong combination of environmental performance and sustainability, design flexibility, cost-competitiveness and structural integrity.

*9 FP Innovations CLT Handbook*

*10 http://www.woodworks.org/why-wood/carbon-footprint/*

*Figure 6 Pictures of various CLT panels and production.*

## Business Development

One of the biggest advantages in using glulam structures in construction is the design flexibility. The beams can be assembled to suit most design criteria. The exposed beams are attractive and give any structure a natural appearance. The route to market for glulam is through building owners who have a vision of the design they wish to have. This is communicated to the architect and the engineer who source the most cost effective manufacturer sometimes directly or through a tendering process. Glulam columns or beams are sometimes seen as just another building material, albeit with beautiful external appearance when exposed, that will compete with a variety of other choices such as steel or concrete. There is a strong movement towards all wood construction of tall buildings in which case the glulam beams are integrated with CLT or other mass timber panelized products into a building shell. The prefabricated building system has many advantages in the Canadian context. The route to market at the moment is limited by few companies capable of delivering the total package.

The expanded use of CLT is a function of the design of a virtual building. The close relationship between the developer and the engineering/architectural teams is facilitated by the use of 3D modeling for conceptualization. Broad design concepts are rendered at many levels using CAD software packages. As layers of detailed design are exposed the demand for wood panels, beams and columns is expressed. Eventually, the specification for the individual material elements are isolated and can be then used to define costs. Sales channels are defined by the conversations between owner's team of designers and their counterparts from the manufacturer. About 50% of the sales work by the manufacturer is done prior to the discussion of cost and the remaining sale is accomplished through negotiation of price and timeline. The use of glulam, which is perhaps viewed as more of a commodity, still requires very specific shop drawings because they are usually purpose built. However, this usually means longer lead times are required. Also, once on site, there is limited opportunity for modification. Some of the construction industry finds laminated veneer lumber (LVL) or similar products of more utility because they are readily available in standard sizes and when seen at a distance there is little difference in the aesthetics.

To date in North America, customers who would consider using CLT are developers building mid-to high rise industrial complexes because the economics do not work for smaller structures. In Europe however, companies are moving into the multi-family dwellings because the volume for these homes are increasing. Cost optimization for mass timber is governed by repeatability in building elements and volume. An urban single family dwelling of stud frame construction is still the most cost effective option. However, if the total cost of a development is considered, the use of mass timber may bring some future advantages. For example, in remote areas or places with a limited building season such as northern regions, shortened time on site is a distinct advantage. These places also have a limited the supply of workers. The extra cost because of the shortened season or the higher paid labour and/or labour accommodation can be offset by the use of mass timber because of the significantly reduced time to erect the structure or the smaller workforce required.

As the customers' knowledge base expands, so too will the market for mass timber products. Officials at the municipal level of government across BC should make it a priority to learn about the advantages of alternatives offered by mass timber and when possible incorporate it into the design of public building as an example to developers in general.

### Industry

Global supply has been dominated by European suppliers. Some of this dominance is the result of European universities with strong capabilities in wood engineering producing graduates tailor made for the industry. The universities' long track record of wood materials research coupled with a strong workforce will ensure dominance in the global industry for many more decades.

Panelized wood products have been on the market for almost as long as glulam. Their simple manifestation is sheet material such as plywood nailed together. The combination of more sophisticated industrial control with lighter and stronger composite metals has provided for a more automated machining of wood with very high tolerances. As with glulam, global supply has been dominated by Europe suppliers. FP Innovations report that there are half a dozen major producers, located mainly in Austria, Germany and Scandinavian countries. This emerging successful system from Europe has been identified by the forest products industry and the research and wood design communities in Canada as a new opportunity for wood in non-traditional applications.

It is anticipated that European CLT production will double out to 2020 with an estimated annual production of 1.2 million $m^2$/year[11]. Indeed, the European timber industry has claimed the export market in North America will favour a European supply because of the high US dollar and the continued pressure on Canadian suppliers because of the softwood lumber trade dispute.

11 https://www.timber-online.net/

Without question the domestic supply of mass timber will grow in the coming decades to meet the demands of the market. To date, there are relatively few suppliers compared to Europe but the market, at least for CLT, is in an "early adopter" stage. Table 7 is a non-exhaustive list of glulam and CLT manufacturers in Canada. In a search of companies on the BC Government's NaturallyWood web portal, there lists 2 suppliers of CLT and 32 suppliers of glulam. Included, are those coming online such as Structurecraft in Abbotsford who will be producing dowel laminated timber from a new facility. Not included, for example, is Centurion Lumber in Chemainus who manufactures access mats from cross laminated timber fastened with bolts.

*Table 8 Canadian Glulam / CLT Manufacturers & Suppliers*

| **Company Name** | **Head Office** | **Website** |
|---|---|---|
| Structurlam | Penticton, BC | *http://www.structurlam.com/* |
| Structurecraft | Delta, BC | https://structurecraft.com/ |
| Fraser Wood Industries | Squamish | *http://www.fraserwoodindustries.com/* |
| Goodfellow | Delson Quebec | *http://www.goodfellowinc.com/en/* |
| Western Archrib | Edmonton, AB | *http://westernarchrib.com/* |
| Coast Clear Wood Ltd | Surrey, BC | *http://www.coastclearwood.com/* |
| Nordic Structures | Montreal, Quebec | *http://nordic.ca/* |
| Chantiers Chibougamau | Chibougamau, Quebec | *http://chibou.com/en/home* |
| IWS Wood Products Inc | Mindemoya, Ontario | *http://iwswoodproducts.com/* |
| Ambiance bois | Mont St-Hilaire, Quebec | *http://ambiancebois.ca/* |
| Guardian Structures | St. Marys, Ontario | *http://guardianstructures.ca* |

In a study of market conditions in Canada, FP Innovations conservatively estimated that a 5% penetration of the existing Canadian construction market could require 1.2 million $m^3$ of CLT panel per year[12]. In 2016 Canada used about 6,000 $m^3$ of CLT panel. The potential for growth in Canada is tremendous. The global usage of CLT is expected to double by 2020.[13] The average annual North American CLT production is about 80,000 $m^3$ of CLT per year. Given the short period of time CLT has been available for use in the North American market relative to Europe, it would not be unreasonable to think North American growth would outpace the growth in global CLT usage. It can be expected therefore, that there will be an appetite for investment in CLT production in both Canada and the US.

## CLT Operations

For purposes of this report, operational considerations for CLT will be presented. Most operations would apply to a glulam beam manufacture but perhaps as a subset of size or capability of equipment or staff.

12 https://fpinnovations.ca/media/publications/Documents/clt-primer.pdf

13 http://www.timberprocessingandenergyexpo.com/presentations/2016/Muszynski.pdf

Any saw mill producing dimensional lumber can provide the raw materials for CLT production. In British Columbia, SPF dimensional lumber from most mills is satisfactory. Although, for glulam beams there exists a specialty product called lamstock which is milled to higher tolerances and exhibits better aesthetic character.

In a 2013 state-of-the-art report, Reinhart Brandner of the Graz University of Technology in Austria summarized the CLT production process (Figure 7)[14]. He noted that a similar process flow would occur for glulam production. The raw materials used for the dimensional lumber input were the species available regionally. Spruce, pine and fir (SPF) made up the bulk of the materials in the European product. In British Columbia, SPF also makes for good CLT. The reason is primarily because of cost and availability. Strength and stability characteristics also play a role. There are other species of use such as hemlock for aesthetics on exposed surfaces but that species comes with other challenges such as extra requirements for drying. During investigations for this report, it was noted that Island grown second growth Douglas Fir would be a most excellent choice of raw material for CLT. In terms of aesthetics, keep in mind that most of the material is covered up within the confines of each lamella.

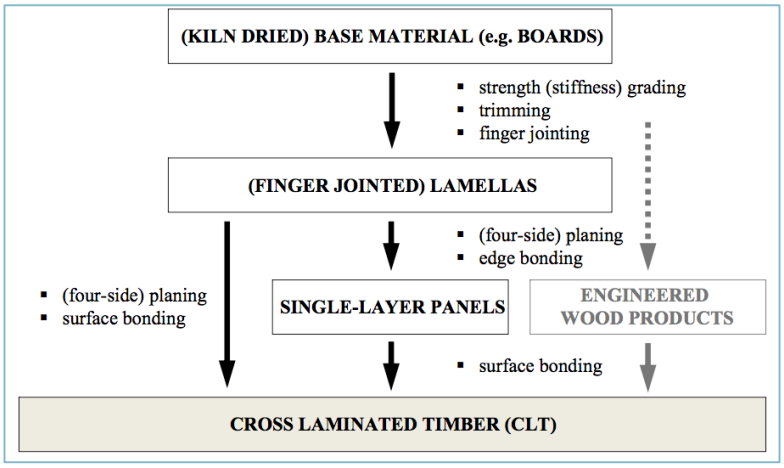


*Figure 7 Summary of CLT production steps.*

Price and delivery times of SPF in BC can vary but "mainland British Columbia has an excellent supply of raw material at a reasonable cost", according to one CLT business executive. It is noteworthy that dimensional lumber for the North American market comes in two thicknesses, 19mm and 38mm while in Europe there are 3 or more standard sizes. Having access to more standard lumber thicknesses would serve to provide more flexibility in CLT production thus providing a greater degree of market uptake. If

*14 Brandner R (2013) Production and technology of cross laminated timber (CLT): a state-of-the-art report. In: Harris R, Ringhofer A, Schickhofer G (eds) Focus solid timber solutions—European conference on cross laminated timber (CLT). The University of Bath, Bath*

considering a CLT production facility where the business model includes sawing feed stock from logs, there is available technology to vary output thickness for each log run. The capital cost of these saw mills can run between $5-8M.

Once the raw materials are available, they must be graded and sorted for layup preparation. There are considerations in this process. For example, clear wood is needed where finger jointing is to happen. Individual boards must be planed on four sides, unless otherwise specified from the mill. This is because most dimensional lumber has radius corners. The boards are then finger jointed to meet the length requirements. There are optimal sizes for CLT layer thicknesses and no upper to board width but there is a minimum due to rolling stresses in-between CLT layers. Lamella are built by assembling boards, edge gluing and pressing. Pressing can be accomplished using large hydraulic presses or in small to medium size enterprise with a vacuum press using a rubberized bladder. The process is repeated for each lamella except for the transverse orientation. The flow of glue onto the material is highly controlled. In addition, the timing of each operation should be monitored to ensure production efficiency. For example, “open time” for the glue or time for glue to cure will establish baselines for throughput. These operations in the production flow can vastly limit thru put.

Once the panels have been built, the next phase of manufacture involves cutting and trimming to meet the design. This involves the use of a CNC machine. These machines perform trimming for irregular edges using a saw blade or router attachment, cut-outs for windows or doors using a chain saw attachment or router. CNC machines to perform these types of work can be purchased for about $2.5M. Lift point fixtures can be embedded into each panel to facilitate panel movement and installation on site.

In an industry where repeatability and volume equate to gross margin, capturing the value stream during production is key. It has been said that CLT production in North America has to improve automation to remain cost competitive. Applying concepts such as Industry 4.0 and establishing a more “informationally integrated” production flow will serve to increase margin.

While the manufacturing (raw material assembly, planning, jointing, gluing and pressing) is a cost driver, there are other manufacturing considerations for CLT production. These include the soft costs for labour in translating the contracted specification within a CAD software package to manufacturing product flow. There are optimal ways to stage the elements to be built and each construction project will be different. Once each component has been identified and the production flow determined, the digital information must be translated into the language a CNC machine can understand. This can be labour intensive in instances where there is less than optimal integration between CAD package and CNC machine. According to one CLT manufacturer, there exist opportunities for software houses to build expertise in this area to improve production flow.

## Financial Overview

In setting the context for the financial picture of a glulam or CLT manufacturing enterprise, there are a couple of items of note. If commercial financing is a requirement, the advice from a major bank is to understand the expected monthly burn rate and to have financial resources to withstand lows in the value-added forestry cycle. The lows can come from a temporary lack of business due to delays in construction or, on Vancouver Island, the lows can come from a lack of feed stock. On Vancouver Island, fluctuations in fibre supply are the norm due to internal and external demand on supply and pricing. This can be a 6-8 month window.

Table 8 is a theoretical income statement for a CLT business. It was built from information contained in an FP Innovations publications describing the value proposition for CLT[15].

*Table 9 Pro forma income statement for a notional CLT business*

| | |
|---|---|
| Revenue | 25,000,000 |
| | |
| Cost of Sales | |
| Labour | 3,000,000 |
| Material inc. packaging and shipping | |
| Lumber | 11,000,000 |
| Adhesives | 1,500,000 |
| Total | 15,500,000 |
| Gross Profit | 9,500,000 |
| *Gross Profit %* | *38%* |
| | |
| Operating Expenses | |
| Manufacturing | 500,000 |
| G&A | 1,500,000 |
| | 2,000,000 |
| Operating Income | 7,000,000 |
| | |
| Non-Operating Expenses | |
| Financing | 2,000,000 |
| Deprecation | |
| Tax | |
| | |
| Net Income | 5,000,000 |
| *% of Revenue* | *20%* |
| | |
| EBITDA | 7,000,000 |
| *% of Revenue* | *28%* |

*15 FP Innovations. The Value Proposition for Cross Laminated Timber*

The intent of the table is to highlight the relative costs both in Cost of Sales (CoS) and Operating Expenses (OpEx). The revenue estimate is completely arbitrary but serves to illustrate a target revenue to satisfy a target manufacturing gross margin in the 35% range.

It is not clear if such a revenue stream can be achieved from an Island based enterprise. Total labour is estimated to be about 15% of revenue. This number is based on a Western Canadian labour profile. A comparison between so called 'living wage" between central British Columbia and Island communities is given in Table 9[16]. Wages to be paid based on regional cost of living numbers show the community spread is larger than the Mainland – Island spread.

*Table 10 Living wage comparison for selected communities.*

| **Community** | **Living Wage $/hr** |
|---|---|
| Central Okanagan | 18.42 |
| Nanaimo | 17.99 |
| Port Alberni | 17.22 |
| Kamloops | 16.90 |
| Cowichan Valley | 15.96 |

The materials portion of the CoS accounts for roughly 60% of revenue. This number was validated by a CLT manufacturer. OpEx is sitting at about 8% of revenue. This number is probably low and will depend on the size of the facility its location. Energy costs can vary between Vancouver Island and mainland British Columbia from which the pro forma was built. Using energy costs as an example, Island based consumers will be about 7% more for gasoline[17] and 8.5% more for natural gas[18]. VIEA has reported that there is support for amalgamation of natural gas prices which should, in the future, result in an harmonization of gas energy costs across BC.

Financing costs are highly dependent on the nature of the financing. Commercial bank financing can cost 15% including all fees and charges. Support from organizations such as Export Development Canada (EDC) for export ventures or the Business Development Bank (BDC) are available but will likely outpace commercial bank fees. EDC, while occasionally lending directly, is better poised to provide support such as loan guarantees and bonding support. One entrepreneur who is looking at the development of a CLT plant on Vancouver Island, indicated that venture capitalists were expecting a 25% ROI to support the new enterprise.

*16 http://livingwagecanada.ca/*

*17 http://www.bcgasprices.com/*

*18 https://www.fortisbc.com/NaturalGas/Business/Rates/VancouverIsland/Pages/Vancouver-Island-Rate-3.aspx*

## The Case for a Wood-based Thermal Insulation Manufacturing Business

### Business Overview

There are currently very few manufacturers of wood based thermal insulation in North America as this application is not currently widely adopted in the North American market. One of the main areas of demand is coming from passive housing where consumers are looking for a breathable wall. The small demand in BC for this product is being supplied out of Europe.

In Europe, this product has gained about 10% of thermal insulator market share as it is cost effective where energy prices are high as it can reduce energy consumption.

In Canada, there is a firm manufacturing thermal insulation called Matériaux Spécialisés Louiseville Inc. (MSL) based in Louiseville, Quebec[19]. MSL have been in business since the 1940's manufacturing soundproofing materials, insulation and roofing materials. MSL has two manufacturing facilities and sales offices in Montreal and Calgary. The panels produced by MSL are made from 100% recycled wood. They hold patents on many of their products. Their soundproofing panels can be found at RONA and The Home Depot.

Steico, based in Germany and recognized as a leader in Wood Fiber insulation, was interviewed to gain their perspective on positioning a wood fiber insulation facility on Vancouver Island. They are currently supplying wood fiber insulation to meet the small demand from their facility in Poland. Steico has explored the economics of establishing a facility in North America and have concluded that at this time, with their cost efficient European facilities and low freight rates from Europe to the American East Coast, they can be more cost competitive than manufacturing in North America. Their total volume of sales to the North American market over the last 4 years for all products is now at $10 million, shipping 900 to 1,000 containers (900 being bitumen boards).

Another example of a European manufacturer of wood fiber insulation is Gutex. They are located in the Black Forest and have been in business since the early 1930's. They claim to be the first company in the world to produce single ply homogeneous wood fiberboard insulation using a dry process (see below). A consumer or contractor purchases Gutex as a product or a building system. Their products range from flooring to roofing insulating materials (Figure 8). These products can be formed in sheets up to 240 mm in thickness and measure up to 26 cm on the longest axis.

[19] *http://www.mslfibre.com/*

*Figure 8 Examples of GUTEZ product.*

## Product(s) Overview

There are two methods to produce wood fiber for insulation being the wet and dry process described below (Figures 9 and 10).

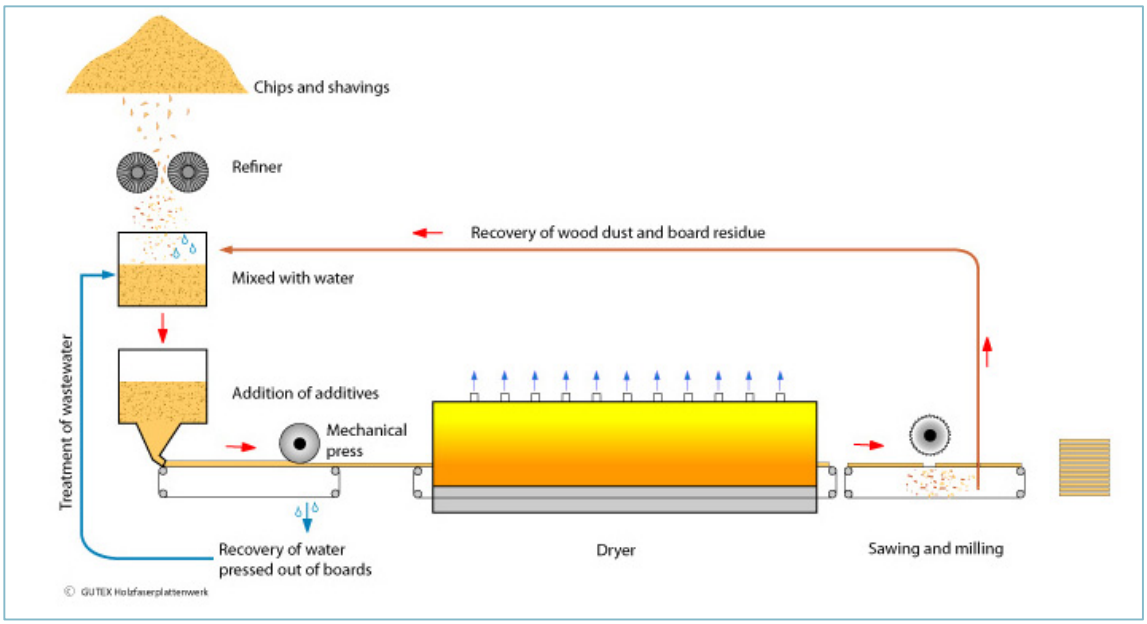


*Figure 9 The "wet" process for making fibre insulation.*

The following describes the wet process for creating wood fiber insulation:

Chips and shavings from typically spruce and fir are retrieved as waste from the manufacture of other timber products.

1. The chips are ground down into wood fiber pulp
2. The pulp is mixed with water and paraffin or latex added as binder
3. The mix is pumped into a forming box as a continuous fibre mat.
4. Around half the water is removed through pressing and vacuum pumping.
5. The board material is dried in an air drier.

6. The boards are cut to size and the edges milled.

Maximum sheet thicknesses are around 25mm. Thicker sections are built-up though the gluing together of sheets with white glue. The dry process for the manufacture of wood fiber thermal insulation is seen below.

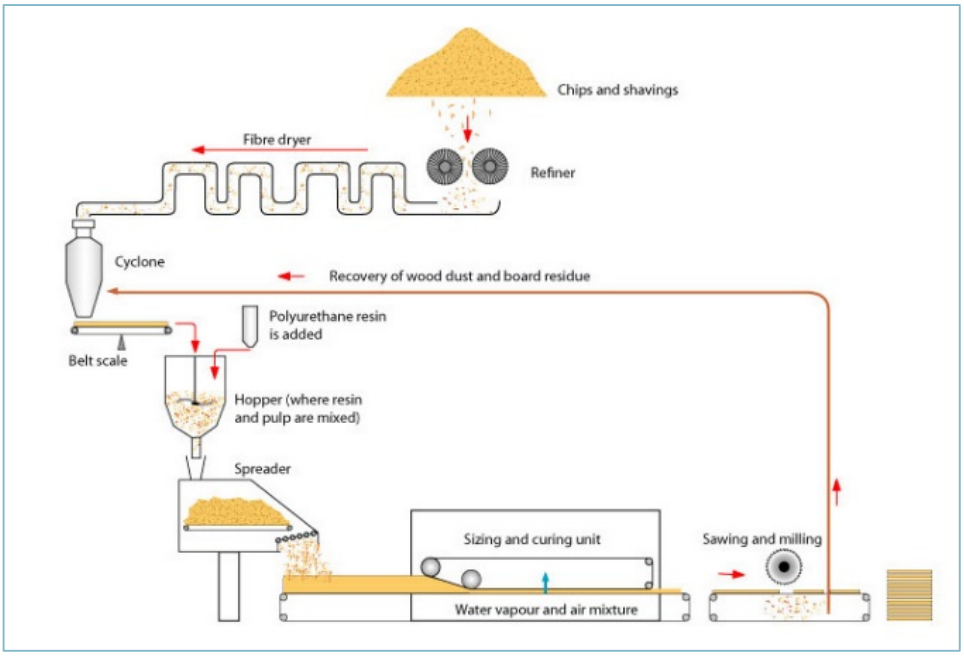


*Figure 10 The "dry" process for making fiber insulation*

1. Chips and shavings are retrieved as waste from other timber manufacturing processes.
2. The fibres are sprayed with paraffin
3. The sprayed fibres are dried using warm air
4. The fibers are sprayed with polyurethane resin as a binder
5. The fiber mats are placed in a unit where the resin is cured and hardened through exposure to a mixture of air and water vapour.

## Business Development

Wood fiber insulation would be a disruptor to the traditional fiberglass insulation that is ubiquitous in the North American market place. The product would have to be branded as very eco-friendly to influence the consumer mindset for green products. Ultimately price would be the major purchase

decision point. A brief search of the web turns up a purchase price for MSL's SonoClimat insulating panel at $22.69.

Given the size of investment required to produce such a product suite it is unlikely there is an advantage to the establishment of such a facility on Vancouver Island. There would be significant barriers to entry.

### Industry

A European manufacturer shared that the over the last three years, they have been approached by every province in Canada to establish a facility in their respective province with many offering financial incentives. To date these approaches have not been seen as financially viable.

European suppliers are carefully assessing the demand on the West Coast and when demand for the product increases (greater than annual sales reach ~$20m) they will consider investing in a facility in the USA (Oregon / Washington) to be closer to the prime West Coast markets.

According to a major manufacturer in Europe, the cost to establish a greenfield site for Wood Insulation is estimated to be 60 million Euros (~CAD$91 Million). It should also be mentioned that for existing operations with an established wood supply, energy infrastructure and drying capabilities the capital cost for such a venture could be significantly reduced.

## Recommendations

### For Pressure Treated Lumber

1. We recommend that work be done with current VI wood manufacturer to find innovative funding options to cover the capital outlay for expanding into PTL.
2. The general perception of methods to preserve wood are that they would have to surmount hefty environmental challenges. While the perception might not be totally unfounded, there are research efforts to find "greener" alternatives to the chemicals used today. This would help to incentify the enhanced use of pressure treated wood in structures both above and below ground. We recommend funding for research into more environmentally friendly chemicals for wood preservation.

### For Glulam and CLT

3. We recommend that a working committee be created. This group would be made up architects, engineers, manufacturers and installers to support the adoption of Glulam / CLT as a favoured material for public and private commercial projects and residential developments.
4. The use of CLT is most effective today by its incorporation as a part of a building system. In other words, when it is bundled with a complete service model from architects to design engineers to installers. CLT is still the higher cost option for construction when compared with other materials options directly. However, the use of CLT is seen as an overall cost saving to a project as it has the potential to reduce in-situ costs as the building is designed in a factory to be put together on-site. Leading to reduced time on site because construction is faster. Other savings include on-site labor, reduced timeline, easier staging and better construction logistics (eg. smaller staging area required).
5. We recommend that a construction forum be convened in Nanaimo or Victoria with the objective of bringing together interested parties from all aspects of industrial construction as a means to both educate parties on the use of mass timber and foster discussions on building business relationships such that a more integrated approach to the use of mass timber can be explored.
6. We recommend that efforts be made to entice officials at the municipal level of government across BC to make it a priority to learn about the advantages offered by mass timber and when possible incorporate it into the design of public buildings. As good as the BC Wood counsel and FP innovations are in marketing CLT, there is still a tremendous lack of knowledge within the construction industry at large.

7. In the short term, it's still less expensive to build with steel and concrete then it is wood. This is because, for industrial applications, steel and concrete have had a 150-year head start in the market. Concrete is also readily available on Vancouver Island. To counter this first mover advantage, we suggest government construction projects find subsidies or other incentives for designs using mass timber materials.
8. Existing Canadian mass timber manufactures will have to substantially increase automation to remain globally and domestically competitive. Start-ups can take advantage of Industry 4.0 concepts in their wood processing operations This applies as equally to sawmills as it does to those industries utilizing dimensional lumber. We recommend support for production operations in education and training related to information technologies and value stream mapping. For example, with sawmills operating more profitably those companies creating products from the lumber will have higher margins and be more competitive. When VI value-added manufacturers can deliver higher margins to their shareholders they can afford to pay global market prices for logs available locally and thus build a stronger industrial base on the Island.

### For Wood Fiber Insulation

9. We recommend that a watching brief be maintained on the market and that connections be made to established European manufacturers so Vancouver Island is considered as and when they look at investing in a North American facility.

### General Recommendations

10. The investigation of the value chain for the wood industry on Vancouver Island has demonstrated that a few companies hold most of the timber rights. Most of those companies are mandated to deliver the highest profits to their shareholders and therefore sell raw logs as necessary at global market prices. To ensure unfettered access to fibre, any business model using raw materials from Vancouver Island must build in to its cost of sales the purchase of raw materials at global market prices and have the financial capacity to withstand short term price fluctuations due to international demand cycles.
11. During the round table discussions in the earlier phases of this work hemlock was identified a species of wood on the Island that was underutilized. The profitable use of hemlock is governed by the ability to dry it cost effectively. We recommend that funds be sought for more research into effective techniques for drying hemlock.
12. We recommend that money be invested in wood technology or engineering education at the high school and post-secondary level. The growth in the Canadian value-added wood industry is

severely hampered by a lack of qualified graduates to support existing operations, process improvement and new product introduction.

13. In the course of the interviews other potential secondary wood processing ventures were highlighted:
    a. There are numerous opportunities for smaller ventures processing wood that are already on the ground. There is at least one new venture in shake and shingle production on the Island and given more than 10% of wood cut remains on the ground and *in situ* the opportunity for profitable enterprise using the salvage is high.
    b. To fully take advantage of the opportunity for First Nations to utilize the timber in their territories, support should be provided in the area of business education and mentorship.
14. We recommend that, in support of the growth of value-added wood enterprise on Vancouver Island, consideration is given to the establishment of an Island base wood products commercial incubator. This facility could be modeled after or situated along side existing electronics/software tech hubs. It would be a place where wood centric entrepreneurs are given access to space (both shop and lab) and business mentorship for the development and commercialization of new products

## Appendix 1 The Team

The team was led by Mr. Bill Collins a consultant and principal of CollinsWorks Ventures Inc. Bill has more than 30 years' experience in R&D, global sales and marketing, advanced manufacturing and M&A activities from bases in Canada, Europe, the South Pacific and the United States. For the past 15 years Bill has been on the leadership team for Quester Tangent, a BC based enterprise delivering engineering centric, complex technology. Bill is a member of the Professional Engineering and Geoscientists Association of British Columbia. Bill continues to be an evangelist for the growth of a vibrant advanced manufacturing sector on Vancouver Island.

John Hankins has over 25 years' experience gained across a variety of industries from agriculture, building materials, telecommunications and economic development in Europe and North America. John has led teams based in different countries and continents in B2B and business to consumer markets and managed his own consulting enterprise. John is passionate about Vancouver Island industrial growth and is presently leading the Mid-Island Business Initiative (MIBI) focused on attracting businesses to the Mid-Island of Vancouver Island. John carries significant knowledge of the local industrial sector and what it takes to establish operations in the region.