

# Pellet Mill Business Plan Development

*Prepared for the*

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*Prepared by*



P.O. Box 1109140

Anchorage, Alaska 99511

Phone: 907-274-5600

Fax: 907-290-2464

[www.northerneconomics.com](http://www.northerneconomics.com)

**PROFESSIONAL CONSULTING SERVICES IN APPLIED ECONOMICS AND SOCIAL SCIENCES**

**Principals:**

Marcus L. Hartley, M.S. – President  
Michael Fisher, MBA – Vice President  
Diane Sauer – Office Manager

**Consultants:**

Leah Cuyno, Ph.D.                      Tom Sanborn, MSc  
Melissa Errend, M.S.                 Don Schug, Ph.D.  
Colleen File, MBA

**Administrative Staff:**

Terri McCoy, B.A. – Editor



P.O. Box 110914  
Anchorage, Alaska 99511  
Phone: 907.274.5600  
Fax: 907.290.2464

Email: [mail@norecon.com](mailto:mail@norecon.com)  
[www.northerneconomics.com](http://www.northerneconomics.com)

## Preparers

Team Member	Project Role
Mike Fisher	Project Director
Cal Kerr	Project Manager, Lead Analyst
Terri McCoy	Editor

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## Abbreviations

APS	Alaska Pellet Supply
BC	British Columbia
BSS	Biomass Systems Supply
EIA	U.S. Energy Information Administration
FTE	Full-time equivalent
GWP	global warming potential
IEA	International Energy Agency
NAICS	North American Industrial Classification System
OD	Oven dry
PFI	Pellet Fuels Institute
PNW	Pacific Northwest
RFP	Request for Proposals
RMA	Risk Management Association
SEC	Southeast Conference
SV	Selling Value

## Executive Summary

The purpose of this report is to assist the Southeast Conference (SEC), based in Juneau, Alaska, with the development of a business plan outlining startup and operational steps for a wood pellet mill.

This report addresses the following topics:

- **Management and organizational structure:** Suggested staffing and responsibilities are proposed along with a draft mission statement.
- **Process of wood pellet production:** A general series of steps guides the plan from raw material acquisition to sales and distribution of bagged or bulk heating pellets.
- **Biomass Sources:** There are two potential sources of biomass stock for the pellet mill: 1) byproducts from existing wood product mills in Southeast Alaska and 2) used shipping pallets from Alaska Marine Lines and other shippers.
- **Competitors and suppliers:** Competitors and suppliers are listed from the Pacific Northwest north through British Columbia. Retail prices (referred to a selling value (SV) in the break-even analysis) range from a low of \$4.76 per 40-pound bag (Prince Rupert, BC) to a high of \$12.52 per bag in Petersburg Alaska.
- **Capital costs:** these range from \$1.1 million for the basic mill to \$1.3 million including site preparation at an Industrial Park at Gravina Island, west of Ketchikan.
- **SWOT Analysis:** Northern Economics provided a Strengths, Weaknesses, Opportunities, and Threats analysis to highlight operating factors, positive and negative. Strengths include SEC support and ownership, and funding from the Denali Commission and U.S. Forest Service. Weaknesses are centered around risks of a small startup in a limited market. Opportunities include developing operations that could be duplicated elsewhere in Alaska, especially with others in the wood manufacturing field. Threats are related to transportation, especially the closure of ferry service to Prince Rupert, British Columbia. Competition from large cost-efficient mills in the PNW and BC remains a major market consideration.
- **Financial analysis:** A key element of the financial analysis is a break-even analysis which seeks to either: 1) find the minimum selling value for a given level of production that will cover all costs (fixed and variable), or 2) find the minimum variable cost required for assumed selling value, level of production and fixed cost estimate. The key equation for any break-even analysis is:  $Total\ Revenues = Total\ Cost$ , where Total Revenue is calculated as  $Selling\ Value\ (SV\ or\ price)\ per\ Unit \times Units\ Produced$  and  $Total\ Cost = Fixed\ Costs + Variable\ Costs$ . In any case, if the variable cost per unit of production exceeds the selling value per unit, then it is not possible to break even.

In addition to the break-even analysis, the financial analysis compares potential operating figures with 11 firms in the pellet mill business.

- **Data and Analysis file:** Finally, the delivered report provides a separate Excel workbook that includes formulas, assumptions, and results.

Table ES-1 summarizes the results of the break-even analysis, which makes the following assumptions:

- **Production Capacity:** The pellet mill (as indicated by its manufacturer, Biomass Systems Supply) has a stated maximum production capacity of 1,000 pounds per hour with a single trained operator.
- **Production Goal:** The Southeast Conference has indicated an initial annual production goal of 320 tons of bagged pellets (40 lb/bag). At 2,000 lb per ton this translates to 640,000 lb of production and implies that the mill will need to operate a minimum of 640 hours at its stated production capacity.
- **Fixed Costs (FC)** are set at \$6,000 per year. This amount is sufficient to cover annual insurance, taxes, lease costs, and electricity for the office space, and administrative overhead.
- **Non-Labor Variable Costs:** Non-labor variable costs (NLVC) include the assumed costs of biomass feed stock (\$27.30)/ton if sourced from mill scraps, packing materials (bags, pallets, stretch wrap, etc.) at \$31.00/ton., and maintenance costs of \$5.00/ton. Total NLVC are \$63.30/ton.

The break-even analysis uses two labor cost scenarios that reflect relative levels of efficiency of the pellet mill operations. Both scenarios assume the mill will utilize 2 “yard-laborers” that feed biomass to chippers, clean machinery, operate forklifts, and drive delivery trucks. Under both scenarios it is assumed management labor hours (including consulting labor) are identical with an annual cost of \$92,867.

- **1,200 Hours Scenario:** This scenario assumes mill operations will be relatively inefficient at startup and that the two yard-laborers will both work 1,200 hours to attain the production goal of 320 tons. Labor variable costs (LVC) under this scenario are \$175,889, comprising \$79,800 for yard labor and \$92,867 for management and consulting costs. This translates to \$542.50/ton. Since NLVC are \$63.30/ton, the SV/ton must exceed \$605.80 if operations are going to cover any of the fixed costs.
- **800 Hours Scenario:** This scenario assumes mill operations will be relatively more efficient and that the yard laborers will both work 800 hours to reach the production goal of 320 tons. Total LVC are \$155,889 with yard labor costs of \$59,800 or \$480.00/ton. Since NLVC are \$63.30/ton, the SV/ton must exceed \$543.30 to cover any of the fixed costs. This scenario is less likely but potentially possible to be attained in the first years of operations.



From the break-even analysis we conclude that the pellet mill can potentially cover all its costs if prices are relatively high and variable costs are relatively low. Under the 1,200 Hours Labor Scenario the margin is relatively thin, with revenues for 320 tons of production exceeding costs by only \$462. If labor and mill operations are relatively efficient and production goals can be attained under the 800 Hour Scenario, fixed costs can be covered with relatively low levels of production (72.55 tons) and net revenues could exceed \$20,000. We conclude that SEC can achieve project goals through a combination of careful cost control, expanded market presence, and enhanced transportation channels.

**ES Table 1. Break-even Analysis Results Summary**

Per Ton	Amount	Cost, Unit	Comments, Notes
Fixed Cost	\$6,000	Fixed Cost	Estimated Fixed Cost
<b>Selling Value (SV)</b>			
Low Selling Value (\$4.67/bag)	\$238.24	\$/Ton	Unlikely to meet this, too low, revenue deficit
Medium Selling Value (\$8.04/bag)	\$392.58	\$/Ton	Unlikely to meet this, too low, revenue deficit
Goal, \$10/bag, \$500/ton	\$500.00	\$/Ton	SEC Stated Target Price
High Selling Value (\$12.52/bag)	\$625.99	\$/Ton	High Price (from prices seen in Petersburg—see Table 7.)
<b>Variable Cost (including labor and non-labor variable costs)</b>			
1,200 Hours Scenario	\$605.80	\$/Ton	High-cost scenario; relatively inefficient, but not unreasonable
800 Hours Scenario	\$543.30	\$/Ton	low-end estimate, but potentially attainable
<b>Break-even tons with Medium SV (\$8.04/bag – \$10.00/bag)</b>			
1,200 Hours Scenario + Medium SV	Not Attainable	Ton	Variable Costs exceed Selling Value
800 Hours Scenario + Medium SV	Not Attainable	Ton	Variable Costs exceed Selling Value
<b>Break-even tons with High SV</b>			
1,200 Hours Scenario + High SV	297.1	Ton	Total Revenue and Total Cost both equal \$185,982
800 Hours Scenario + High SV	72.55	Ton	Total Revenue and Total Cost both equal \$45,616
<b>Production Using All Available Labor in each Scenario</b>			
1,200 Hours Scenario + High SV	320	Ton	Total Revenue = \$200,317; Total Cost = \$199,855; Net Revenue is positive at \$462.
800 Hours Scenario + High SV	320	Ton	Total Revenue = \$200,317; Total Cost = 179,856; Net Revenue is \$20,461

Source: Northern Economics

# 1 Introduction

The mission of the Southeast Conference (SEC) is to “undertake and support activities that promote strong economies, healthy communities, and a quality environment in Southeast Alaska.” In support of that purpose, SEC has received a federally funded grant to purchase a small wood pellet mill and work with an operator to manage it. The purpose of this report is to help develop a business plan for the Pellet Mill Project.

## 1.1 Report Organization

This report is organized as follows:

- **Section 1.** The remainder of this section summarizes project goals, provides background information, and describes recent changes to the business environment since SEC began pursuing the project.
- **Section 2** drafts a potential mission statement and describes potential public benefits of the project.
- **Section 3** discusses the proposed business and describes a potential business organization and job roles.
- **Section 4** discussed potential products and services of the project.
- **Section 5** provides a market and competitor analysis.
- **Section 6** provides a marketing and sales forecast.
- **Section 7** estimates capital costs and operating revenues and expenditures.
- **Section 8** provides a break-even analysis and results.

## 1.2 Project Goals, Objectives

A main project goal is securing a wood pellet supply for the Ketchikan Federal Building, the Ketchikan Airport, and commercial sites such as the Sealaska Building in Juneau. As such, the project scope includes all of Southeast Alaska, from Yakutat south to Ketchikan. Further, some components of the proposed project are still being defined. For example, machinery to disassemble wood pallets is available but there is uncertainty about cost, site requirements, and operational needs.

SEC expects project spreadsheets and findings may be used to analyze and model possible future wood pellet mills in other communities.

### 1.3 Background

As part of a program to reduce use of fuel oil and other hydrocarbons, the federal government retrofitted the Ketchikan Federal Building to burn wood pellets, along with a new pellet boiler installation for the Ketchikan Airport, located on Gravina Island, across Tongass Narrows from Ketchikan itself.

Both sites were supplied by a local wood product mill (Tongass Forest Enterprises), situated near Ketchikan’s Ward Cove, on Revillagigedo Island. The mill included primary log breakdown into rough lumber, wood chips, and pellets. Mill equipment included pellet delivery trucks, one with an auger feed system. Pellets loaded at the mill could be delivered on island or at remote sites by means of ferries or commercial barges on the Alaska Marine Highway.

Tongass Forest Enterprises began its forest products operation in 1997 (Dun and Bradstreet 2023). It ceased operations in approximately 2020, primarily due to the health of the owner, according to SEC staff. After the company closure, SEC assumed the role of supplier to wood pellet customers in Southeast Alaska, under the name Alaska Pellet Supply (APS). APS secured a site on Gravina Island, located west of Ward Cove and the City of Ketchikan across Tongass Narrows, and is completing a business case, or business plan, for potential operations on the site. See Figure 1, below.

**Figure 1. General Location Map, Prince of Wales Island, Ketchikan**



Source: Google Maps, June 2024.

Figure 2 provides an aerial view of the Tongass Narrows, City of Ketchikan, and the pellet mill site.

**Figure 2. Aerial Image of Ketchikan and the Pellet Mill Site**



Source: Google Maps, June 2024.



The pellet mill site (with Phase one area and Phase two expansion area shown in Figure 3) is part of a long-term, no-cost site lease from the Ketchikan Gateway Borough, and is named the Southeast Conference Industrial Incubator Business Park.

Figure 3. Gravina Island Pellet Mill Site



Source: Ketchikan Gateway Borough. November 2023.

## 1.4 Current Business Factors

While APS has been seeking funding for a pellet mill, several factors have changed the business environment:

- The closure of the Ketchikan pellet mill and its operations at Ward Cove shifted bulk supply sources from the local area to Prince Rupert, British Columbia (BC), approximately 90 miles south of Ketchikan. An auger-equipped pellet truck was loaded on the State of Alaska marine ferries and transported to Pinnacle Pellets' plant near Prince Rupert. The trip was reversed (or extended) to deliver bulk pellets to Ketchikan and other sites along the Southeast Panhandle, including Juneau, Haines, Kake, and Hoonah.
- This BC supply option was removed due to two events. First, the State of Alaska halted its ferry service to Prince Rupert and has, to date, not restarted it. Second, in April of 2021 Pinnacle Pellets sold its BC operations to a large European pellet firm, Drax, who told SEC that their orders were too small and infrequent to continue.
- SEC requested and received a detailed pellet mill construction bid from Biomass Systems Supply (BSS) of Chico California, dated March 17, 2023. See Appendix B. The proposal was based on a BMQ Containerized Pellet Plant, manufactured in New Albany, Indiana. Total mill cost was quoted as \$1.1 million (rounded) for Phase I and \$0.7 million for Phase II (dryer). The costs quoted did not include concrete foundations, buildings, field wiring or water supply/treatment. The final estimated Phase I amount is \$1.34 million. Further details are discussed in Section 7 of this report.
- Regional population projections are in decline (Alaska Department of Labor and Workforce Development 2022), with an estimated population of 68,679 in 2035, a 5.3 percent decrease (3,815) from 2021 numbers (72,494). Prince of Wales Island and the Hyder area are projected to lose the greatest population percentage, at 17.2 percent. (Skagway, on the other hand, is expected to grow with a population increase of 27.5 percent.) These overall declines reduce market demand and make it less likely that a skilled workforce can be retained.

## 2 Mission Statement, Public Benefits

One of the early steps in preparing a business plan is determining the “why” of the project. This section provides a first-step mission statement along with a discussion of public benefits of pellet operations, primarily related to local employment, regional economics, and climate impacts.

### 2.1 Mission Statement

A suitable mission statement for the pellet mill includes economic development, creation of jobs and generation of heat (and, potentially, power). As with most wood products manufacturing, a key factor is consistent high-quality output with adherence to accepted harvest and manufacturing standards and at the lowest competitive price. The following draft mission statement serves as a point of departure for the proposed Gravina Island Wood Pellet plant.

***Gravina Island Wood Pellets: Sustainably Powering the Future:***

*At Gravina Island Wood Pellets, our mission is to harness the natural resources of Gravina Island and Southeast Alaska to produce high-quality wood pellets that provide a sustainable and reliable source of energy. We are committed to using environmentally friendly manufacturing processes that minimize waste and reduce our carbon footprint. Our goal is to support the local economy of Ketchikan and Southeast Alaska by creating jobs and contributing to the community. We believe in the power of sustainable energy and are dedicated to making a positive impact on our environment and our community. Together, we are powering the future.*

### 2.2 Economic, Social, Environmental Framework

Biomass energy is known for its ability to help meet economic, environmental, and social sustainability goals. For instance, it can generate local jobs, stabilize the local economy, and make energy access more equitable. Additionally, managed forests such as the Tongass National Forest, State of Alaska forestlands, and private timber holdings can all enhance carbon capture and storage, thereby contributing to greenhouse gas mitigation. However, land managers have faced economic hurdles for many years, and Alaska’s timber industry has been in decline for several decades (Schultz 2010). In 1990 there were about 4,000 timber industry jobs, but just 10 years later that number had dropped to 1,500. By 2009 the number had declined further to about 600 timber jobs, and currently there are an estimated 450 jobs in southeast Alaska. These declines have had significant impacts on local communities, tax bases, businesses, churches, and schools.

### 2.2.1 Economic Development, Job Creation

Various direct and indirect economic factors are tied to the forest products sector, ranging from timber harvest to transport, milling, and young growth forest management. As a basic industry, timber harvest creates additional jobs in support industries, like the pellet mill, through the economic multiplier effect. This effect means that for every primary or direct job there are one to two indirect jobs. Successful local manufacturing can strengthen local economies through import substitution, local and regional tax payments, and workforce development.

This proposed project involves establishing a pellet mill manufacturing facility in Gravina Island, in the Ketchikan Gateway Borough. The facility will produce wood pellets and possibly other densified biomass (e.g., logs) for commercial and residential use in Ketchikan and other communities along the Alaska panhandle. The proposed facility is anticipated to generate direct, indirect, and induced employment effects in the region both during the construction and operations phases of the project.

Activities during the construction phase of the facility will create short-term economic stimulus in the region. Local spending associated with the construction activities will benefit businesses across various economic sectors in the region, including companies involved in construction services and transportation logistics as well as businesses that supply goods and services to these companies and their workers.

The proposed wood pellet mill will require site preparation, a cement slab for mill foundations, and a canopy building tied into steel shipping containers set on site. Utility connections for both power and water will also need to be constructed, all of which will presumably involve local contractors. Note, however, that not all capital costs would be spent locally as some of the materials and equipment are not available locally and will be imported from outside the region. For example, the building itself will be supplied by Seattle Tarp (at a freight on board Seattle cost of \$42,300). Total capital cost for this facility is estimated to amount to about \$1.3 million (see Table 12). We estimate that  $\approx$  \$250,000 (19 percent of the capital cost), is anticipated to be spent locally.

This short-term economic stimulus from direct local construction spending is projected to support three local jobs (direct, indirect, and induced) in the region over the course of 26 weeks. These short-term construction phase jobs will generate about \$150,000 in total direct, indirect, and induced labor income.<sup>1</sup>

In the long-term, the operations and maintenance of the facility is expected to generate additional year-round economic benefits to the region. The region would benefit from having a continuous year-round business that would support long-term jobs and generate additional labor income. As noted in Section 2.3, the facility will require a manager, operations lead, yard laborers to feed biomass to chippers, clean conveyors, and other machinery, operate fork-lifts, and delivery truck drivers. It is estimated that the annual operations and maintenance of the facility will support eight direct,

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<sup>1</sup> Induced and indirect effects were estimated by Northern Economics using IMPLAN software and multipliers.



indirect, and induced long-term jobs in the local economy and generate about \$360,000 in total (direct, indirect, and induced) labor income. The indirect and induced jobs will be in sectors that provide goods and services to the mill as well as to the employees.

### **2.2.2 Renewable Energy, Reducing Carbon Emissions**

Renewable energy is continuing to grow internationally as an important sector to address carbon emissions and address climate change. It is a growing sector in Alaska as well, with programs such as the Alaska Energy Authority's Renewable Energy Fund grant program promoting renewable projects (AEA 2024).

In 2017, the U.S. Forest Service published an environmental assessment evaluating possible impacts on global warming potential (GWP). The focus was directed toward converting home heating systems from oil to wood pellets in Southeast Alaska (Brackley et al. 2017).

This research used a Life Cycle Assessment model to capture impacts of environmental releases, from cradle to grave (or forest to mill to heating device). The model results indicated that use of wood pellets from either local mills or imports from Seattle would reduce GWP. The magnitude of any reduction would depend on distance from Seattle, type of stove, mill location, combustion efficiency and other site-specific variables. Five scenarios developed a range of reduction in GWP from 10.2 percent to 51.0 percent, expressed as CO<sub>2</sub> equivalent in metric tons. The most likely scenario generated a GWP reduction of 14.0 percent, based on a 20 percent market penetration (for wood pellets) and local production.

Total market size was projected as 22,000 tons of pellets per year for an estimated 3,426 households in Southeast Alaska. The then-current regional pellet consumption was forecast at 10 percent of the total or 2,200 tons annually.

In 2018, the Sealaska Corporation, based in Juneau, became the first entity to issue carbon credits under the California cap-and-trade program (Sealaska undated). The project covered 165,000 acres and contained an estimated 9.3 million carbon credits (metric tons) sold primarily to BP. This is a further example of Southeast Alaska's role in carbon sequestration and reduction of carbon emissions.

When compared to Alaska (or the United States), European use of renewable energy to reduce carbon emissions is more structured, especially through organizations such as the International Energy Agency (IEA 2023). Several IEA programs and practices can serve as a model for the development of renewable energy projects in the US and Alaska.

Task 32, a subset of IEA's Bioenergy group, zeroes in on biomass combustion, from domestic wood stoves to industrial power plants, and promotes international collaboration in this field (IEA 2023). Experts from countries like Austria, Canada, and Denmark share knowledge and experiences to

advance bioenergy technology. Group members note wood pellets (in Europe) are displacing fuel oil while forest growth helps capture and store carbon emissions.

### **2.2.3 Use of Biomass to Displace Fossil Fuels in Alaska**

The IEA Bioenergy Technology Collaboration Programme also emphasizes the versatile role of bioenergy in heat, power, and transport, especially its utility in phasing out fossil fuels and its compatibility with intermittent renewable sources due to its storability (IEA 2023). Bioenergy, particularly when paired with carbon capture and storage, can lead to negative emissions, and contribute to a biobased economy.

This is not new in Southeast Alaska, where both Ketchikan Pulp Company and Alaska Pulp (Sitka) generated power from shredded bark and wood product waste materials<sup>2</sup> burned in power boilers interconnected with local utilities. This biomass-based power ended when the pulp mills closed—Alaska Pulp in 1993 and Ketchikan Pulp in 1997.

Estimated (initial) annual pellet mill production is approximately 320 tons. Using higher (nominal) heating values of 8,200 BTUs per pound of dry pellets, and 139,000 BTUs per gallon of heating oil, projected mill production would displace approximately 37,755 gallons of heating oil. Some variation in these figures can be expected as heating systems have different heating and combustion efficiencies. Using the same higher heating values, a ton of pellets would displace 118 gallons of heating oil.

### **2.2.4 Demonstration Projects**

The proposed Gravina Island pellet mill is a demonstration project, funded by the U.S. Forest Service and the Denali Commission. Such projects will hopefully be a model for others, leading to locally produced pellets that meet local and regional market needs.

In Europe, the IEA Bioenergy group focuses on bioenergy's role in decarbonization, contributing to sustainable development, promoting advanced biofuels, and optimizing supply chains and operations (IEA 2023). Collaboration with stakeholders and expansion to emerging countries are part of their operational optimization strategy and include demonstration projects,

### **2.2.5 Use of Economic Incentives**

Again, in Europe, Task 32 members have several projects that address industrial biomass combustion, negative emissions, and innovations for low-emission biomass combustion in medium-sized plants. These projects include case studies, policy reports, and technology overviews for industry stakeholders and policymakers.

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<sup>2</sup> Bark and wood waste that has been shredded by a mechanical shredder or grinder is often referred to as “hog fuel” after the colloquial name (“hog”) for mechanical shredders/grinders.

Sweden and Denmark are noted for their policy approaches to incentivize biomass over fossil fuels through taxation and exemptions, respectively. Alaska could adopt such policies, especially in rural Alaska, to reduce dependence on fossil fuels.

In Alaska, the state's Alaska Energy Authority has funded multiple biomass projects such as chip boilers (Tok), cordwood boilers in many communities and, notably, chip boilers at the Ketchikan Airport (AEA 2024). Funding options included feasibility studies, design funds, and outright grants.

**Figure 4. Extruded Wood Pellets**



Source: Adobe Stock

## 3 Business Management and Organization

This report section broadly outlines the type of business, its organization and likely job roles and responsibilities. A key factor is the mill manager (operator) and how he or she plans to manufacture wood pellets. SEC issued an RFP in November of 2023 to help secure a manager or contractor to acquire and install a mill that can produce 1,000 pounds of pellets per hour (SEC 2023b). SEC did not receive any responses to that RFP.

### 3.1 Business Description

The proposed business is a private enterprise with an Alaska business license, a manufacturing site on Gravina Island, and market access via barge, ferry, or fixed wing airplane. The business will produce wood pellets and possibly other densified biomass (e.g., logs) for commercial and residential use in Ketchikan and other communities along the Alaska panhandle.

### 3.2 Business Organization

The choice of a business organization depends on operational risks related to financial structure, liability, and owners' objectives. As a for-profit organization, the mill would seek to maximize return to shareholders; and as a limited liability corporation, it could help reduce operating risks. A not-for-profit organization (a 501(C) entity) could reduce emphasis on revenue and perhaps seek broader goals, including those related to climate change, training, and employment.

### 3.3 Job Roles, Responsibilities

Staffing of a mill producing 320 to 400 tons of pellets per year will be limited. A manager is required along with yard or operations labor. Not all will require full-time employment. SEC has forecasted staffing needs as described in the following subsections.

#### 3.3.1 Manager, Operations Lead

**Manager.** A manager will oversee mill operations, responsible for day-to-day operations along with securing biomass, ensuring mill operations are on schedule, and handling administrative chores, especially those related to sales and marketing.

**Operations Lead.** The operations lead will have several responsibilities: keeping biomass fiber stocked and ready for in-feed to the pellet mill, overseeing pellet bagging, tallying inventory, and loading bags and bulk pellet orders. The operations lead will need strong mechanical skills and the ability to run equipment and machinery.

### 3.3.2 Equipment Operations, Yard Labor

**Yard labor.** Yard labor will be needed to feed biomass to chippers, clean conveyors, and other machinery, operate forklifts, and drive delivery trucks. Laborers will be hired on an as-needed basis and at the early stages of start-up they will be employed for less than a full year.

### 3.3.3 Consultants, Others

**Biomass consultant.** A person filling this role will help connect operations to markets, especially commercial operations such as the Sealaska biomass heating system in Juneau. The consultant could also serve as an administrative assistant for tasks such as payroll, audits, and answering web inquiries, as well as phone calls.

**Other needs** include legal advice, accounting, and employee relations. Again, at startup, needs can be met by referrals to external consultants and contractors.

Consultants and similar contractors will report to SEC in Juneau.



## 4 Pellet Mill Overview

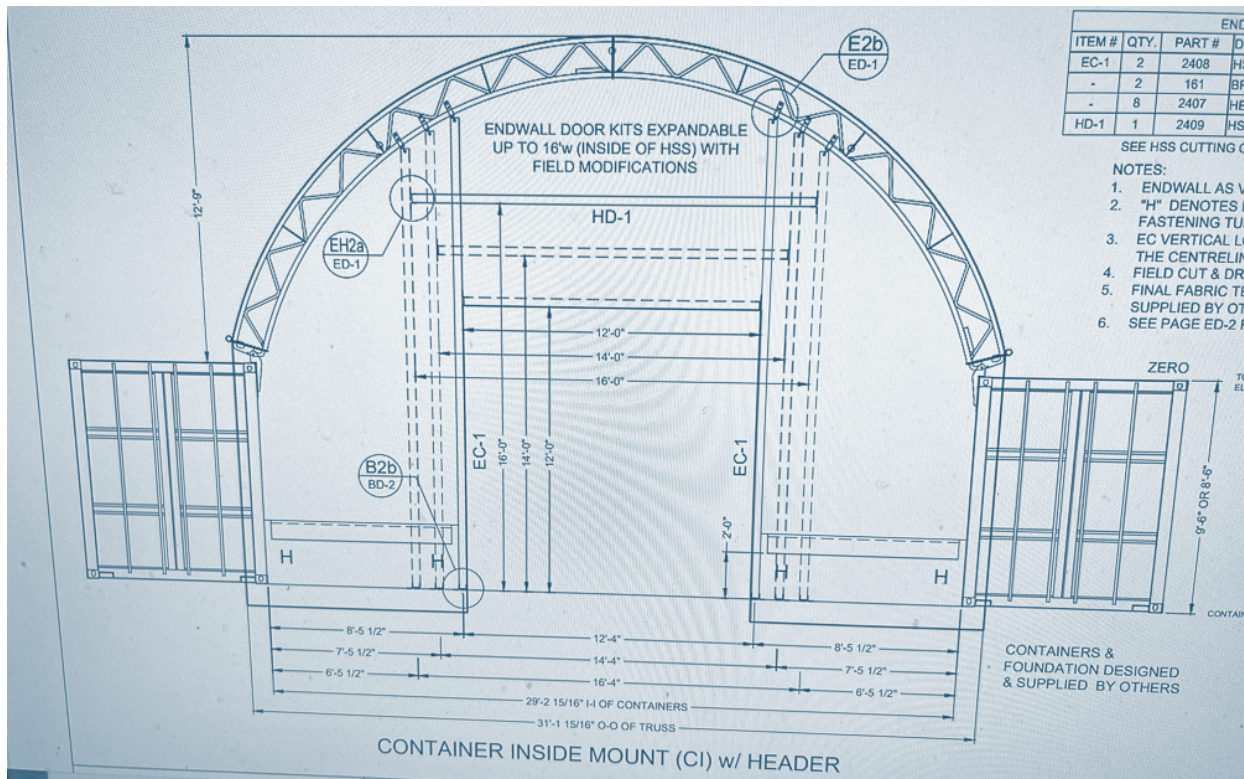
This report section describes the proposed pellet mill and its potential feedstocks. Parts of the proposed operation are firm and well-identified, while others are still a work in progress. Both parts are discussed in the following report sections.

### 4.1 Project Description

The wood pellet mill will be established on Gravina Island, located west of Ketchikan, and just north of the Ketchikan Airport. Access to Gravina from Revillagigedo Island is via ferry, boat, or air taxi (see Figure 2).

The proposed wood pellet mill will require site preparation, a cement slab for mill foundations, and a canopy building tied into steel shipping containers set on site. Utility connections will be needed for both power and water. Figure 3 illustrates the proposed wood pellet building, anchored by steel containers on each side of the bowed arch roof. The canvas shelter is manufactured by Norseman.

Figure 5. Proposed Pellet Building, Gravina Island



Source: Karen Petersen, SEC

The building will be supplied by Seattle Tarp at a freight on board Seattle cost of \$42,300. Transport to Gravina is estimated to cost \$5,000, but more definitive costs will follow once the project schedule is finalized.

The estimated lead time for manufacturing a pellet mill, according to BSS, is approximately 26 weeks.

## 4.2 Process Description

Feed stock for the mill will come from forests on Gravina Island as well as other operations, especially those on Prince of Wales Island. Feed stock will be hammer-milled and screened for size, contaminants (rocks, nails, cable), and type of biomass (bark versus wood fiber).

Much of the identified source material will be green and it will need to be dried. This presents a challenge as the SEC estimates the required dryer will cost \$700,000 or more. As such, the dryer purchase and installation were moved to Phase 2 of the project, currently not funded. In the interim, wooden pallets are proposed as the biomass source.

Steps in manufacturing wood pellets, in general, follow the steps listed below (Huang 2016). Steps vary by plant size. Large plants are those that manufacture over 10,000 tons per year and small plants manufacture products from one ton to just under 10,000 tons of pellets per year. For comparison, the former Superior Pellets plant near North Pole was classed as a large plant, capable of producing at least 30,000 tons of pellets per year.



Source: Aurora Energy (formerly Superior Pellet Fuels) Facebook page

1. **Raw Material Preparation.** Woody biomass may be obtained from sawmill operations, logging by-products, and wooden pallets. The Gravina plant is near Prince of Wales Island with its extensive roads and harvesting operations. As an example, Viking Lumber is located at Klawock and saws lumber for both in-state and Pacific Northwest (PNW) distributors. Viking is also a potential source of woody biomass. In addition, a woody biomass drying facility is located near Craig and could be contracted to supply dried material to Gravina Island.

Table 1 is reproduced from the Tongass National Forest: 2022 Sawmill Capacity and Production Report. (Daniels and Morris 2023) and provides a partial list of active sawmills in Southeast Alaska. The mills listed in the table are a subset—not all SE wood product mills are included. Nonetheless the table provides an indication of potential sources of biomass in the area near Ketchikan. Please see Figure 1 for an indication of communities near Ketchikan and

note that the largest of the listed mills (Viking Lumber in Klawock) is readily accessible to Ketchikan via the Inter-Island Ferry, which makes daily trips from Hollis to Ketchikan. Other communities on Prince of Wales Island are similarly accessible to Ketchikan including Coffman Cove, Craig, and Thorne Bay.

**Table 1. Partial List of Potential Sources of Woody Biomass in Southeast Alaska**

Sawmill	Community	Description	Current Status	Employment (FTEs)
Icy Straits Lumber and Milling Company	Hoonah	Mighty Mite sawmill, horizontal band resaw, log debarker and merchandiser (not installed), dry kiln, planer, moulder	Active	5
Peak Engineering (formerly Falls Creek Forest Products)	Petersburg	Portable circle sawmill, trim saw, log deck	Active	2
St. Nick Forest Products	Craig	Portable circle sawmill	Active	1
Viking Lumber Company	Klawock	Conventional carriage, band saw headrig, linebar and gang resaws, edgers, trim saw, log debarker and merchandiser, end-dogging circle saw scragg. Added chipping head slabber to large mill in 2018.	Active	45
Western Gold Cedar Products	Thorne Bay	Shake and shingle mill, Meadows carriage mill, chain-fed scragg added in 2018	Active	3
Alaska Specialty Woods	Craig	3 Mighty Mite bandsaws, 2 head horizontal resaw, 2 planers	Active	3
Fair and Square Lumber	Coffman Cove	Portable circle sawmill	Active	2
JK Forest Products	Thorne Bay	Bandsaw, resaw	Active	2.5
K&D Lumber Company	Thorne Bay	Sawmill: auto log deck/turner, resaw; shake and shingle mill	Active	7
Luther Coby	Kake	Mighty Mite circle sawmill	Active	1.5
Mike Allen Enterprises	Wrangell	Mighty Mite circle sawmill	Active	2.5
Tenakee Logging Company	Tenakee Springs	Woodmizer portable band saw, Mobile dimension circle saw, Woodmaster planer shaper (electric)	Active	2

*Adapted by Northern Economics from Daniels and Morris (2023).*

- Initial Size Reduction.** Raw materials are reduced in size to approximately 5 mm. Larger material may be chipped into material no larger than 40 mm, followed by processing with a hammermill. This may not be needed for smaller pellet plants that utilize sawmill by-products such as wood shavings, slabs, and trim ends.
- Drying.** Raw materials from the prior step are dried to a moisture content of 8–12 percent, usually with a rotary drum dryer. Heat can be provided from burning woody biomass or, alternatively, fuel oil or propane.



4. **Initial Screening.** Sources of biomass will determine the need for screening. The aim at this stage is removing stones, “tramp” metal, and other contaminants. SEC staff have visited a site in Ohio that turns old wooden pallets into wood pellets; this is considered a source of woody biomass from shipping operations ongoing regularly in Southeast, most notably Ketchikan.
5. **Grinding.** Grinding is another size reduction step, usually with a hammermill, which results in woody material under 5 mm in diameter.
6. **Pelletizing.** Prior steps create material that meets necessary moisture and size requirements and pellets are subsequently extruded from a pelletizer. There are two types of pellet mills: a ring die mill and a flat die mill. The former has a capacity of over 1 ton per hour while the flat die is about half that capacity.
7. **Cooling.** Cooling forms pellets with the required rigidity and temperature, using horizontal, vertical, or counter-flow coolers.
8. **Final Screening.** High quality pellets may be screened again, after cooling, to reduce the percentage of wood fines. A vibrating screen is a common device at this stage.
9. **Bagging.** Pellets may be stored in large heavy-duty bags (also known as Super Sacks) for bulk delivery or fed into plastic sacks, usually containing 40 pounds each, and stacked 50 bags per wooden pallet. Each one-ton pallet is usually wrapped with plastic film and moved (loaded) with forklifts.
10. **Storing, Delivery.** Depending on customer requirements, pellets may be delivered directly to users or held for seasonal deliveries.

### 4.3 Types of Feedstocks

The U.S. Energy Information Administration (EIA) collects and publishes monthly data on four types of feedstocks (EIA 2023):

- Roundwood, pulp. These are usually lower quality logs.
- Sawmill residuals. Typical examples are sawdust, planer shavings, and trim wood.
- Wood product residuals.
- Other Residuals. This category includes bark, logging residues, and wood chips.

The large plant at North Pole, Alaska primarily used roundwood and residuals from chipping as in-feed. Gravina Island will likely use other residuals, especially from wood pallets. This category includes bark, logging residue, wood chips, post-consumer wood, unmerchantable wood, and other materials.

See Table 2 for the four types of feedstocks and average cost per ton, as reported by mills to the EIA, through July 2023.

**Table 2. Feedstocks and Average Cost per Ton, Manufacture of Densified Biomass Products, 2023**

Month	Roundwood, pulp		Sawmill Residuals		Wood Product Residuals		Other Residuals	
	tons	\$/ton	tons	\$/ton	tons	\$/ton	tons	\$/ton
January	298,280	32.04	626,580	36.53	35,540	42.73	W	W
February	350,839	29.63	655,276	36.17	38,143	41.51	W	W
March	339,537	30.75	702,367	36.94	52,609	39.10	W	W
April	259,739	29.07	629,190	34.45	47,016	43.85	W	W
May	218,362	27.20	603,592	38.01	38,011	37.38	W	W
June	214,125	26.96	769,555	33.16	39,888	41.37	W	W
July	169,670	27.70	551,673	38.88	35,129	40.36	732,014	27.30

*Note. Other residuals categories include bark, logging residues, wood chips, post-consumer wood, unmerchantable wood and others.*

*W = Withheld to avoid disclosure of individual company data*

*Source: EIA, Form EIA-63, Densified Biomass Fuel Report*

For purposes of break-even analysis, the \$27.30 per ton of other residuals will be used as a direct cost of raw materials.

### 4.3.1 Wood Pallet Moisture Content, Juneau

As noted above, the first phase of the project will not include the drying equipment, so the pellet mill will plan to use wood pallets as its initial feedstock. BSS and other reviewers noted moisture contents of finished pellets range from 10 to 12 percent at the extruder (before any further drying) but could range upward to 18 percent. These wetter pellets could be dried to more desired ranges through careful operation and slower extruder speeds. Also, softwoods (spruce, pine, fir) may have lower moisture contents than hardwood (birch, alder, cottonwood). Wood pallet species in Ketchikan, Juneau, and other southeast communities are unknown but believed to be mostly softwoods due to proximity to the PNW.

Wood pallet moisture contents in Southeast are also unknown, but high moisture content can hinder the manufacturing of pellets. Towards that end, Northern Economics conducted a limited sample of ten wooden pallets stored outside at the Home Depot receiving dock in Juneau as summarized in Table 3. Additional samples are recommended for pallets secured from Ketchikan.

**Table 3. Moisture Contents, Ten Samples, Wood Pallets, Juneau**

Number	M1	M2	Sq Inches	Sq Ft	MC1 %	MC2 %	Avg MC %	Lb	Lb/SqFt	OD Weight
1	36	48	1,728	12.0	17.3	16.1	16.7	32.0	2.7	
2	40	48	1,920	13.3	30.2	30.2	30.2	60.8	4.6	42.4
3	46	39	1,794	12.5	14.1	13.2	13.7	21.6	1.7	
4	36	33	1,188	8.3	24.7	15.2	20.0	21.0	2.5	
5	24	25	600	4.2	26.7	28.9	27.8	13.2	3.2	
6	42	48	2,016	14.0	24.5	18.1	21.3	47.4	3.4	
7	40	48	1,920	13.3	22.0	19.1	20.6	69.2	5.2	55.0
8	40	40	1,600	11.1	19.9	26.2	23.1	38.0	3.4	
9	40	36	1,440	10.0	24.4	26.1	25.3	38.4	3.8	
10	48	40	1,920	13.3	21.1	21.7	21.4	47.6	3.6	37.4
Average			1,613	11.2			22.0	38.9	3.4	44.9
Low			600	4.2	14.1	13.2	13.7	13	1.7	
High			2,016	14.0	30.2	30.2	30.2	69	5.2	

Note. M1, M2 are measurements in inches. MC1, MC2 are moisture readings. OD is oven dry.

Source. Northern Economics, November 2023.

Dimensions were measured with two readings, one for width and the other for length. Moisture contents were taken with a two-prong, handheld moisture meter (General MM70) at a top surface and either a bottom or side location. Nine of the sample pallets were stored outside and those nine reflect a major rain event in the Juneau area. Weights were measured with a digital Taylor bathroom scale that was checked for zero readings before each measurement. Receiving dock staff suggested they could load 200 pallets per 20-foot container, and they cautioned that returned pallets had a market in the PNW. They are not considered a waste by-product.

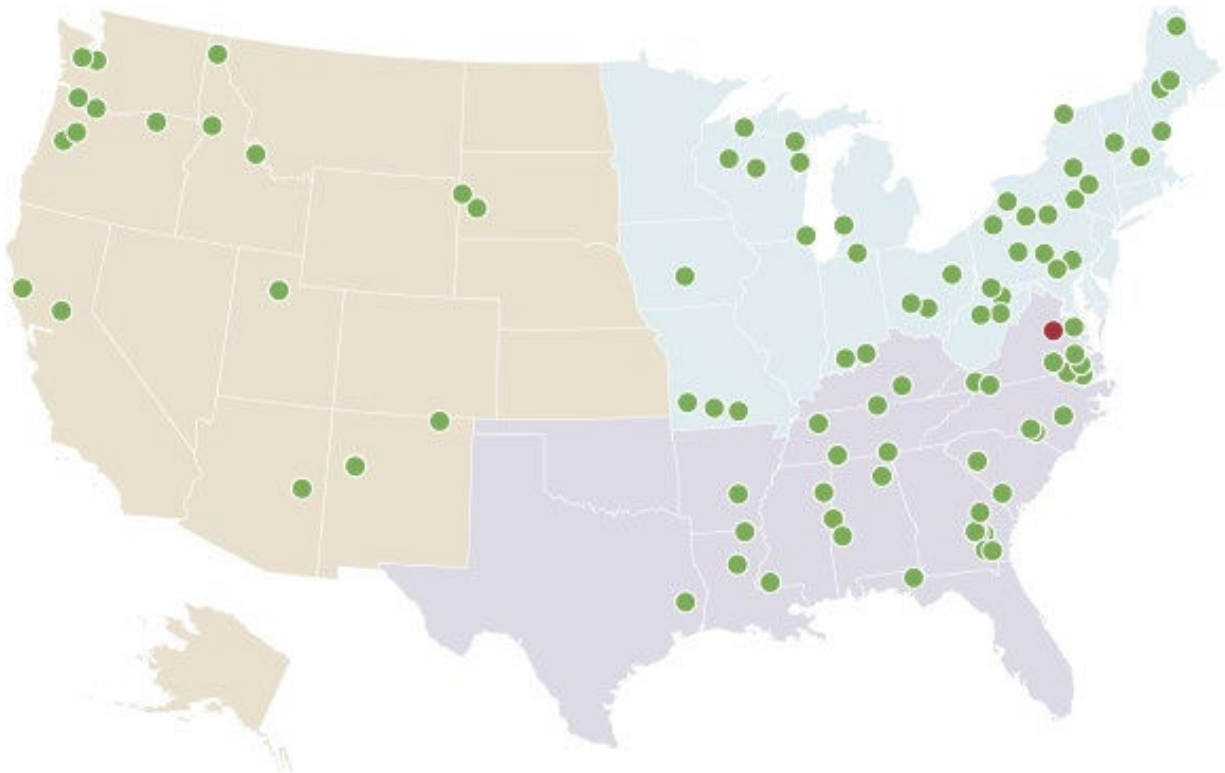
The three pallets with oven dry (OD) calculations were wood pellet pallets with an average of 45 pounds each at zero moisture. Their average green weight was 59 pounds each.

Each 20-foot container has an approximate capacity of 5.9 tons of green biomass. Rounded to 6 tons, the total estimated need is 16 containers of wooden pallets per year.

## 5 Market and Competitor Analysis

Wood pellets are manufactured in most parts of the United States as shown in Figure 4. For the purposes of this business plan, the ten mills located in the PNW (Idaho, Washington, Oregon) are considered as major competitors and potential wholesalers.

**Figure 6. U. S. Wood Pellet Manufacturing Facilities, 2022**



*Source: U.S Energy Information Administration, Monthly Densified Biomass Fuel Report 2023*

There are three grades of wood pellets manufactured in the U.S. and certified by the Pellet Fuels Institute (PFI 2023). See Table 3.

**Table 4. Selected Fuel Properties, Residential, Commercial Densified Fuel**

Fuel Property	PFI Premium	PFI Standard	PFI Utility
Bulk Density, lb./cubic foot	40.0 - 48.0	38.0 - 48.0	38.0 - 48.0
Diameter, inches	0.230 - 0.305	0.230 - 0.305	0.230 - 0.305
Diameter, mm	5.84 - 7.75	5.84 - 7.75	5.84 - 7.75
Pellet Durability Index	≥ 96.5	≥ 95.0	≥ 95.0
Fines, % (at the mill gate)	≤ 0.50	≤ 1.0	≤ 1.0
Inorganic Ash, %	≤ 1.0	≤ 2.0	≤ 6.0
Length, % greater than 1.50 inches	≤ 1.0	≤ 1.0	≤ 1.0
Moisture, %	≤ 8.0	≤ 10.0	≤ 10.0
Chloride, ppm	≤ 300	≤ 300	≤ 300
Heating Value	N/A	N/A	N/A

Source: Pellet Fuels Institute, Northern Economics

As shown, premium grade pellets have slightly greater durability, fewer fines and inorganic ash, and slightly less moisture.

U.S. pellet production is shown in Table 4, below, for the full year 2022.

**Table 5. U.S. and Western Wood Pellet Capacity, by Month, 2022**

Month	U.S. total - Full Year 2022			West – Number and Percent of Total U.S.			Facilities %	Capacity %	FTEs %
	Facilities	Capacity (Tons)	FTEs	Facilities	Capacity (Tons)	FTEs			
January	80	13,003,469	2,332	16	815,300	255	20.0	6.3	10.9
February	79	12,993,469	2,335	16	815,300	251	20.3	6.3	10.7
March	80	13,260,069	2,456	16	815,300	251	20.0	6.1	10.2
April	80	13,275,069	2,463	16	815,300	256	20.0	6.1	10.4
May	80	13,270,069	2,455	16	815,300	257	20.0	6.1	10.5
June	80	13,270,069	2,479	16	815,300	245	20.0	6.1	9.9
July	80	13,336,569	2,460	16	881,800	248	20.0	6.6	10.1
August	80	13,336,569	2,456	16	881,800	246	20.0	6.6	10.0
September	80	13,286,496	2,467	16	881,800	245	20.0	6.6	9.9
October	80	13,300,496	2,579	16	881,800	245	20.0	6.6	9.5
November	80	13,300,496	2,592	16	881,800	245	20.0	6.6	9.5
December	80	13,300,496	2,610	16	881,800	245	20.0	6.6	9.4
Average	80	13,244,445	2,474	16	848,550	249	20.0	6.4	10.1

Note: FTE is Full-Time Equivalent employment.

Source: EIA 2023

As shown in Figure 4 and listed in Table 5, pellet production is concentrated in the Western U.S., the South, and the Northeastern states.

On average, the Western U.S. capacity consists of approximately 20 percent of all U.S. facilities; just over six percent of the total U.S. capacity and 10 percent of full-time equivalent (FTE) staffing. Further, there are ten pellet mills located in the PNW with capacities as noted.

The largest four producers operate in Idaho (Lignetics), Oregon (Columbia City, Bear Mountain – Brownsville), and Washington (Olympus). There are 16 pellet mills in the PNW with an average FTE count of approximately 16 employees per mill.

**Table 6. Wood Pellet Capacity, Pacific Northwest by Location, Capacity and Percent of Capacity**

State	Name	Capacity, Annual tons	Percent
ID	Lignetics - Sandpoint	38,942	10.3
ID	Lemhi Valley Pellets	2,400	0.6
ID	Rocky Canyon Pellet Company	6,500	1.7
OR	Blue Mountain Lumber Product	22,000	5.8
OR	Columbia City	41,000	10.9
OR	Frank Pellets, LLC	29,000	7.7
OR	Bear Mountain Forest Products - Cascade Locks	27,000	7.2
OR	Bear Mountain Forest Products - Brownsville	109,648	29.1
WA	Manke Lumber Company	35,000	9.3
WA	Olympus Pellets	65,000	17.3
<b>Total</b>		<b>376,490</b>	<b>100.0</b>

Source: EIA 2023

At least two PNW companies distribute pellets to Alaska. The first is Pacific Coast Pellets (Pacific Coast Pellets 2023), based in Shelton, Washington (west of Tacoma), which sells three brands of premium pellets: Sierra Supreme, Olympus, and Cascade.

Manke Lumber (Manke 2023), based in Tacoma and Sumner, Washington, is the other major Alaska market vendor, selling and delivering pellets to residential customers on Prince of Wales Island and especially to the wood pellet boiler at the Ketchikan Airport.

Olympus brand pellets are sold in Alaska via retail sales from Home Depot stores, principally in Juneau, Anchorage, and Fairbanks. Manke pellets (brand name CleanBurn) are sold in Southeast via retail stores at Ketchikan, Petersburg, Juneau, Auke Bay, and further north in Palmer, Fairbanks, and Nome (Manke 2023).

There are extensive pellet mills in BC as shown in Figure 5 on the following page. The facilities listed are now partially or wholly owned and operated by Drax, a major woody biomass firm headquartered in the United Kingdom (Drax 2023).

Pellet production from the eight mills in BC is shipped from two ports: Vancouver (Fibreco) and Prince Rupert (Westview). Drax is reportedly looking at the Port of Longview, Washington as a third shipping node.

Of interest to this business plan are the BC mills formerly operated by Pinnacle Renewable Energy, BC's largest wood pellet producer; it previously sold pellets to APS, using bulk pellets loaded into trucks at Prince Rupert and transported by ferry to Southeast Alaska. After Drax purchased the company in April 2021, Pinnacle's bulk sales to Alaska were stopped as being "...too small..." to continue. The State of Alaska also stopped its ferry service to Prince Rupert, further stranding bulk pellet service to Southeast Alaska from Canada.

Drax reported 2022 pellet production, companywide, as 3.9 million metric tonnes at a production cost of \$152 per ton. On a per-bag basis, this is equivalent to \$3.04; for comparison, 2021 numbers were \$143/ton or \$2.80 a bag, again on a companywide basis. Drax claims to be the second largest producer of sustainable biomass in the world. It is a low-cost producer with a high output volume and is a major market presence.

**Figure 7. Wood Pellet Manufacturing Facilities, Drax, British Columbia, 2022**



Source: Drax Group Annual Report 2022



## 5.1 Market Summary, Outlook

**World.** World market demand for wood pellets is steady and growing especially in certain regions such as Europe and Scandinavia, due to concerns about global warming and ways to reduce greenhouse gas emissions. Both large-scale power plants and residential heating are fueled by wood pellets.

Figure 6 displays 15-kilogram bags of wood pellets at a retail store in Slovenia. Priced at €5.99, the cost is approximately US\$6.50. Each bag is about 3 kilos (6.6 pounds) lighter than US bagged pellets (40 pounds).

**Regional.** Recent pellet mill merger and consolidation point to increased demand for wood pellets along the Canadian provinces of BC and Alberta; two potential export sites are located at Hoquiam, Washington (ORCAA 2023) and Longview, Washington (Barber 2024). The latter plant will produce pellets for export to Asia; it is owned by Drax and was formerly operating as part of Pinnacle Pellets.

**Alaska.** Most recently, Alaska had wood pellet plants at North Pole and in Ketchikan at Ward Cove. Both are currently shut down. The North Pole plant had a 30,000-ton capacity, based on annual production and the Ketchikan plant was estimated to produce 800 tons per year (Brackley 2017). Since the Ketchikan plant sold three types of pellets (i.e., bagged, bulk local, and bulk from Prince Rupert (purchased from Pinnacle Pellets), the amount of each type is unknown.

**Figure 8. European Wood Pellets, Slovenia.**



Photo by Matthew Kerr

**Figure 9. Aesthetic Pellet Burn, Juneau**



Photo by Dr. Dana Kerr

Overall, demand for wood pellets is growing, especially in Europe and Asia. Much of the supply to meet this demand is exported from western US ports in Puget Sound and BC. These pellets are displacing other fuels, such as coal and fuel oil, for emissions and climate reasons.

Regional and local demand in Alaska is currently being met with pellets imported from the PNW and, in prior years, from Prince Rupert, BC. Both sources provide high volume and low value product manufactured by highly efficient infrastructure.

Although pellets are usually burned for heat (either primary or supplemental uses), there is some aesthetic use. Figure 7 shows pellets burned in a special container on a back deck in Juneau.



## 5.2 SWOT Analysis

Business plans are based on key assumptions, including combinations of qualitative and quantitative data. As part of this analysis, SWOT factors are classified as internal (Strengths, Weaknesses) and external (Opportunities, Threats). These are discussed in further detail below.

**Strengths.** SEC has a long history in Southeast Alaska and is very familiar with economic conditions on the panhandle. It has members in all areas of Southeast, representing government agencies, private companies, and Alaska Natives. Organizationally, it has filled several roles: as a monitor, a participant observer, and (for this project) an owner and operator of the Gravina Island Pellet Mill. SEC has secured federal grant funding for the mill demonstration and is seeking proposals from potential operators (managers). SEC also has a biomass specialist with extensive information about the subject, where it has (and has not) worked.

**Weaknesses.** Internally, SEC functions on a lean staffing basis, with limited organizational slack. Based on experience with Alaska's wood projects, it is likely that costs will change, and SEC may not have the immediate financial resources to support significant changes in scope or budget. Also, skilled labor may not be available on a less-than-full-time basis.

The size of the planned mill might be a weakness. A German biomass specialist (Mueller 2023) notes the following concerns when operating a small pellet mill:

- Smooth operation of a small pellet plant requires a consistent flow of input.
- Energy consumption plays a pivotal role in measuring the efficiency of a production line.
- Regularly stopping and starting up a pellet mill has detrimental effects on both pellet quality and overall plant efficiency.
- Repeated starts and stops impose additional equipment stress, leading to increased wear, maintenance, and unplanned disruptions.

**Opportunities.** A successful demonstration of local and regional wood pellet production could generate jobs and serve as a template or model for other communities. Another potential benefit of the project might be a closer tie to pellet producers in BC or the PNW. Gravina Pellets could contract with other pellet producers and distributors to carry Gravina Island branded bags, filled with BC or PNW pellets.

**Threats.** Local and regional markets are relatively small and are currently served by high volume, low-cost producers in both the PNW and BC. Heating fuels, whether pellets or gallons of fuel oil, are generally viewed as very price sensitive. The two large pellet consumers in Ketchikan, the federal building and the Ketchikan Airport, are reportedly looking at conversions back to fuel oil. The closing of Ketchikan's Forest Enterprises is a major factor in the current lack of local pellet production. The pellet mill in North Pole is not manufacturing pellets.

Another threat is transportation. Delivery of produced wood pellets will likely rely on waterborne transportation at one or more stages; the cessation of Alaska Marine Highway System ferries to Prince Rupert is an example of these external threats.

## 6 Local Market for Production in Ketchikan

This section focuses on the potential market and market prices for pellets that would be produced in Ketchikan. Prices described here will be used as part of the break-even analysis in section 8.

### 6.1 Pricing Discussion, Analysis

Table 6 illustrates wood pellet selling values (SV) for October 2023, at selected locations from Tacoma, Washington, to Fairbanks, Alaska. A price check for Nome is also shown, though wood pellets are shipped on pallets in 20-foot containers and only delivered once a year to Nome.

**Table 7. Wood Pellet Selling Values in the Pacific Northwest and British Columbia, October 2023**

Location	Sale Point	Date	Distance, Miles	US\$/Bag	US\$/Ton	Bulk?	Route, distance
Tacoma	Home Depot	16-Oct	0	7.38	369.00	No	
West Seattle	Home Depot	16-Oct	35	7.38	349.00	Yes	
Vancouver	Home Depot	16-Oct	174	5.57	349.00	No	Vancouver BC
Prince Rupert	Walmart	17-Oct	756	4.76	238.24	No	Ferry, 1034 road
Ketchikan	Madison	18-Oct	862	10.44	522.00	Pallet	Ferry, PR to Ktkn
Petersburg	Hammer, Wikan	31-Oct	992	12.52	625.99	Pallet	BC Road, Ferry
Juneau	Don Able Bldg	31-Oct	1150	8.39	335.60	Pallet	Ferry or barge
Juneau	Home Depot	16-Oct	1153	7.98	379.00	Pallet	Ferry or barge
Anchorage	Home Depot	13-Oct	1450	7.98	379.00	Pallet	Via Water
Fairbanks	Home Depot	16-Oct	1800	7.98	379.00	Pallet	Water, road
Nome	Nome Outfitters	31-Oct	1460	12.00	600.00	Pallet	Air miles, not barge

Note: Canadian prices converted at C\$1.36 to US\$1.00, October 16.

Source: Northern Economics, Inc.

Discussions with SEC staff suggested a target price of \$10 per 40-pound bag or \$500 per pallet of pellets for planning purposes. This price is considered a target price. For purposes of the break-even analysis, the three wood pellet SVs (low, average, high) in the Table 8 will be used in the break-even calculations. These SVs are considered representative of competitive sales in Southeast, Southcentral, and Interior Alaska.

**Table 8. Prices Used for Planning and Used in the Break-even Analysis**

Price Level	US\$ per Bag	US\$ per Ton
Low	\$4.76	\$238.24
Average	\$8.04	\$392.58
For SEC Planning Purposes For SEC	\$10.00	\$500.00
High (from Petersburg)	\$12.52	\$625.99

## 6.2 Potential Sales

This section outlines market demand, sales estimates, and known or likely customers.

### 6.2.1 Large Customer Demand

Discussions with SEC staff formed the basis for current large demand pellet consumers in Southeast Alaska (see Table 9). The three main suppliers are Home Depot (Juneau), APS (Sealaska, Tlingit and Haida), and Madison Hardware (Ketchikan Airport). Two entities, Sealaska and Ketchikan Airport, account for approximately 75 percent of this market segment.

**Table 9. Estimated Current Large Customer Pellet Demand, Southeast**

Customer	Location	Tons/trip	Trips	Total tons
Tlingit, Haida	Juneau	1	10	10
Tlingit, Haida	Angoon	10	5	50
Tlingit, Haida	Kake	4	1	4
Sealaska	Juneau	10	10	100
Haines	Borough	1	3	3
Ketchikan	Airport			120
<b>Total</b>	<b>All</b>			<b>287</b>

Source: Northern Economics, SEC

### 6.2.2 Residential Customer Demand

As shown in Table 10, there are an estimated 28,833 housing units in Southeast Alaska. Of that number, 50.4 percent heat with fuel oil (kerosene), 30.4 percent heat with electricity, and 2,117 heat with wood (7.3 percent). The Census Bureau records primary heating fuels only, not supplemental types.

Of the estimated 2,117 homes heating with wood in Southeast Alaska, it is unknown whether they burn split firewood, roundwood, or wood pellets. Some combination of all is possible depending on location, types of wood available, and whether conversion to a pellet stove makes economic sense for homeowners.

**Table 10. Southeast Alaska Home Heating Fuels, 2022**

House Heating Fuel	Estimate	Margin of Error	Percent	Percent Margin of Error
Occupied housing units	28,833	±1,413	28,833	(X)
Utility gas	384	±258	1.30	±0.9
Bottled, tank, or LP gas	1,633	±479	5.70	±1.6
Electricity	8,771	±1,225	30.40	±4.0
Fuel oil, kerosene, etc.	14,546	±1,380	50.40	±3.8
Coal or coke	0	±170	0.00	±0.4
Wood	2,117	±422	7.30	±1.5
Solar energy	13	±24	0.00	±0.1
Other fuel	1,097	±541	3.80	±1.9
No fuel used	272	±257	0.90	±0.9

Source: U.S. Census Bureau 2023

Base residential demand is forecasted as 100 homes in Southeast Alaska burning four tons of pellets per year or 400 tons annually. Discussions with SEC suggested that an annual increase of 25 homes per year converting to wood pellets is a reasonable goal. At four tons per year per home, the annual projected increase is shown in Table 11 with an approximate five percent annual growth rate.

Supplemental wood fuel estimates are based on a survey by the Fairbanks Economic Development Council (Robb 2007). For Southeast Alaska, 22 percent of households reported supplemental wood fuel usage (Daniels and Paruskiewicz 2016). The volume of supplemental firewood is 86 percent of the primary volumes.

The estimates shown in Table 11 are for the total market including sales by APS, Home Depot, and Madison Lumber (Ketchikan).

**Table 11. Estimated Pellet Markets (Tons), Southeast Alaska, 2024-2027**

Tons	2024	2025	2026	2027
Residential				
Primary Wood Households, Pellets	400	420	440	460
Supplemental Wood Fuel, Pellets	340	360	380	395
Total Residential Wood Pellets	740	780	820	855
Commercial	277	300	330	365
Total	1,020	1,080	1,150	1,220
\$/ton	500	500	500	500
<b>Total Estimated Demand</b>	<b>\$508,500</b>	<b>\$540,000</b>	<b>\$575,000</b>	<b>\$610,500</b>

Source: Northern Economics

Note: some estimates are rounded.

## 7 Capital Costs and Operating Revenues and Costs

This section discusses estimated capital costs and potential operating revenues and expenditures. These are elements that will be part of the break-even analysis in the next section.

### 7.1 Capital Cost Estimate

SEC requested a bid from Biomass Systems Supply of Chico, California. Dave Schmucker contacted BMQ Inc., based in New Albany, Indiana to help with the bid. It was dated March 17, 2023, and described two phases: a containerized plant without a dryer and, for the second phase, a dryer package to work with the first phase but separated as a stand-alone component with its own budget and construction schedule.

#### 7.1.1 Bid Cost

Table 12 (which rolls over onto two pages) provides details of the bid proposal, as submitted to SEC by Biomass Systems Supply.

**Table 12. Gravina Island Pellet Mill, Bid Proposal, March 2023**

DESCRIPTION: From BSS quote, March 27, 2023	Cost
Vecoplan VHZ 1100 XL Shredder	
Conveyor to Hammer Mill	
SDHM 6 Hammer Mill	
Dust Collection, Cyclone, Bag House, Airlock, with Spark Detection and Suppression	
Conveyor with abort gate to Pre-Pellet Bin	
1500mm Pre-Pellet Bin	
RMP 350 Pellet Mill, complete with stainless feed screw, stainless conditioner, manual water dosing valve, roller assemblies and the main shaft, 2) 40 HP motor (roll assemblies and 1 die) and die temp monitoring	
Carbon steel Pellet Mill Discharge Conveyor	
Steam Removal System with stainless Cyclone	
Stainless steel Bucket Elevator (to cooler)	
SDCC.5 Counter Flow Pellet Cooler with Airlock	
5500 CFM Dust Collection System (pellet cooler air)	
Rotex Pellet Screener	
Galvanized Bucket Elevator	
Finished Pellet Holding Bin	
Manual Weigh Scale Bagger	
Bag Discharge Conveyor	
Hot Air Bag Sealer	
Bulk Load-Out Conveyor	
Air Compressor	

DESCRIPTION: From BSS quote, March 27, 2023	Cost
Control Panel, complete with HMI touch screen, with remote operations capability.	
All equipment to be pre-wired from factory including interior lighting	
<b>Pellet Mill Total</b>	<b>\$1,103,966</b>
<b>Additional Needs</b>	
SEC: 30 yards at \$200 per yard.	\$6,000
Seattle Tarp. Tent at \$42,300. Estimate freight at \$5,000.	\$47,300
Field wiring. Set equal to cost of Phase 1 wiring.	\$17,100
Installation, Start-up, 28 days install, 14 days training	\$158,000
Spare parts, Phase 1. BSS Quote	\$6,822
Three High Cube vans. One for pellet mill, two are one-way transport	
Cost, two ancillary containers, \$10,500 each.	\$21,000
Shipping cost, IN to Gravina Island	\$54,000
<b>SUBTOTAL, VANS, TRANSPORT</b>	<b>\$239,822</b>
<b>Grand Total</b>	<b>\$1,343,788</b>

*Source: Biomass Systems Supply, Northern Economics, SEC.*

### 7.1.2 Fixed Cost

Fixed costs for the Gravina Island start-up mill consist mainly of site preparation, equipment purchase (including transportation to the site), and actual mill construction. However, grant funding means such elements as financing, debt service, and depreciation are difficult to calculate. Further, depreciation is a non-cash expense that allows for normal wear-and-tear on capital equipment.

Many large projects are based on straight-line depreciation over several years; a range from 7 to 20 years is common. Full cost analysis is used for most large projects, but cash-based depreciation may be more appropriate for Gravina, acknowledging its grant status and demonstration objectives.

For these reasons, a cash-based, grant-driven funding source was assigned a fixed cost of \$6,000 per year or \$500 per month.

### 7.1.3 Financial Data, Eleven Wood Pellet Companies

A comparison with conventional wood pellet mills is shown in Table 11 and Table 12, with a standard balance sheet and a standard income statement, respectively.

The Risk Management Association (RMA 2023) receives financial statements from member banks and codes them by North American Industrial Classification System (NAICS) code. Wood pellet mills are coded as NAICS 321999 and there are 11 sets of recent annual financial statements for the asset class \$500,000 to \$2 million, the size of the proposed Gravina Island mill.

Data from these pellet manufacturers are collected from commercial banking firms, consolidated and summarized, and published on an annual basis. Northern Economics entered these consolidated data

into two Excel spreadsheets that form a “standardized” balance sheet and a standardized income statement. The highlights of the standard balance sheet are as follows:

- Total assets are \$1.2 million, very similar to the Gravina mill.
- About 30 percent of total assets are inventory.
- Long term debt is approximately 23 percent of total assets. This reflects years of operation; startups could range from 70 to 90 percent of debt-financing, based on Alaska firms.
- Liabilities are 55 percent of total assets and net worth is 45 percent. The 11 firms are likely mature in age.



Table 13. Standard Balance Sheet, NAICS Code 321999, Wood Pellets, 2023

Wood Pellets, 500M to 2MM		
NAICS:	321999	
Asset Range	\$500,000 to \$2 million	
Total Assets reported:	\$12,774,000	
Number of Statements	11	
Average Assets Per Statement	\$1,161,273	
	<b>Percent</b>	<b>Standard Amounts \$</b>
<b>Assets</b>		
Cash & equivalents	15.0	174,191
Trade receivables (net)	3.1	35,999
Inventory	30.7	356,511
All other current	5.1	59,225
Total current	53.9	625,926
Fixed assets, net	22.0	255,480
Intangibles, net	7.4	85,934
All other non-current	16.6	192,771
<b>Total Assets</b>	<b>99.9</b>	<b>1,160,111</b>
<b>Liabilities</b>		
Notes payable, short term	10.1	117,289
Current Maturity, Long Term Debt	1.2	13,935
Trade payables	5.5	63,870
Income taxes payable	0.0	0
All other current	12.0	139,353
Total current	28.8	334,447
Long term debt	23.3	270,577
Deferred taxes	0.0	0
All other non-current	3.0	34,838
<b>Total liabilities</b>	<b>55.1</b>	<b>639,861</b>
<b>Net Worth</b>		
Net worth	44.9	521,411
<b>Total Liabilities and Net Worth</b>	<b>100.0</b>	<b>1,161,273</b>

Note. NAICS is North American Industry Classification Code.

Sources: Northern Economics, RMA 2023

Highlights of the income statement are shown in Table 14:

- Average annual sales are \$3.3 million or approximately \$3 of sales per \$1 of total assets.
- Gross margin is just under 40 percent of total sales.
- Profit before taxes is approximately 7 percent of total sales.

**Table 14. Standard Income Statement, NAICS Code 321999, Wood Pellets, 2023**

Wood Pellets, 500M to 2MM		
NAICS:	321999	
Asset Range	\$500,000 to \$2 million	
Total \$Sales reported:	\$35,836,000	
Number of Statements	11	
Avg \$Sales/statement	\$3,257,818	
Income Data	Percent	Standard Amounts \$
Net sales	100.0	3,257,818
Cost of Sales, Cost of Goods Sold	60.9	1,984,011
Gross profit	39.1	1,273,807
Operating expenses	31.3	1,019,697
Operating profit	7.9	257,368
All other expenses	1.1	35,836
Profit before taxes	6.8	221,532

Note. NAICS is North American Industry Classification Code

Source: Northern Economics, RMA 2023

## 7.2 Pro Forma Operating Revenues, Expenditures

Table 15 shows projected gross revenues for the Gravina Island mill, in tons, from 2024 through 2027. These revenues are based on SEC’s stated price goal of \$500 per ton. Estimated total revenues are adjusted to reflect sales to Ketchikan Airport beginning in 2025. By that time, the Gravina Island pellet mill will have operating history and should be able to deliver competitively to the airport pellet boiler. Biomass System Supply notes that fabrication, assembly, and shipping is likely to take 26 weeks from contract signing.

**Table 15. Projected Gross Revenues, SEC and Gravina Island Sales, 2024 to 2027**

Tons	2024	2025	2026	2027
Residential	10	60	160	260
Commercial	177	227	330	363
Total	187	287	490	623
\$/ton	500	500	500	500
<b>Total Revenue</b>	<b>93,500</b>	<b>143,500</b>	<b>245,000</b>	<b>311,500</b>

Source: Northern Economics

## 8 Break-even Analysis Results

A break-even analysis is used to determine when a business operation will begin making a profit. The break-even point is the level of production at which total revenue (TR) = total cost (TC). TR is simply price of the product (selling value or SV) × break-even production or BEP. TC is comprised of two elements fixed costs (FC) and variable costs (VC), noting that FC is constant regardless of levels of production and that VC increases with the level of production. The breakeven relationship can be restated using algebra as  $BEP = FC \div (SV_{\text{per ton}} - VC_{\text{per ton}})$ . With this equation it is possible to directly calculate BEP level (if attainable) for any combination of FC,  $VC_{\text{per ton}}$ , or  $SV_{\text{per ton}}$ . In this equation it is also clear that  $SV_{\text{per ton}}$  must be greater than  $VC_{\text{per ton}}$  for at least some of the FC to be covered. In order to break even the TR must exceed TC by an amount greater than FC.

Below, each of the relevant variables are defined and quantified.

### 8.1 Fixed Costs

Following discussion with SEC, fixed costs for the break-even analysis were set at \$6,000 per year, to cover known and unknown costs. Components of fixed costs include insurance, taxes, property leasing costs, equipment leasing costs (vehicles, for example), as well as the annual cost of office space.<sup>3</sup> More specific figures can be entered into the Excel model delivered with this report.

### 8.2 Selling Values

Table 8 in Section 6.1 summarized Low (\$238.24/ton), Average (\$392.58/ton) and High (\$625.99/ton) SVs as well as the SEC's goal of an SV of \$500 per ton (or \$10 per bag). These SVs will be assessed in the break-even analysis.

### 8.3 Variable Costs

As their name suggests, variable costs (VC) are tied to production levels. The break-even analysis breaks define two VC components—labor variable costs (LVC) and non-labor variable costs (NLVC).

#### 8.3.1 Labor Variable Cost

LVC is most significant of the two VC components. SEC pro forma staffing tables suggested 1,200 annual hours for mill labor (i.e., the two yard-workers would each work 1,200 hours per year). Northern Economics used the 1,200 figure and a reduced number of 800 hours to reflect initial start-up and limited first-year production.

<sup>3</sup> A capital replacement fund can also be considered a component of fixed costs.

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Table 16 summarizes estimated labor cost at a base of 800 hours per year (the 800 Labor Hour Scenario), while Table 17 summarizes labor cost at a base of 1,200 hours per year (the 1,200 Labor Hour Scenario). The tables also show total labor costs at planned production levels (i.e., 320 tons). Under the 800 Labor Hour Scenario LVC per ton are estimated at \$480.00 or \$153,599 for 320 tons of production. Under the 1,200 Labor Hour Scenario, total LVC are estimated at \$173,599 with 320 tons or \$542.50/ton.

**Table 16. Estimated Labor Cost, Gravina Island Pellet Mill Under the 800 Labor Hour Scenario**

Base	Personnel	Hours/ Year	Rate \$/hr	Wage \$	Total \$ (incl. Fringe)	Direct Labor %	Direct Labor \$	Overhead \$	G&A Overhead %	Unallocated G&A Overhead \$	Allocated to Direct Labor \$
Hours/ year	Biomass Coordinator	0	45	0	3,222	35.0	1,128	2,094	65.0	1,361	733
800	Plant Manager	1,995	35	69,825	92,867	90.0	83,580	9,287	10.0	929	8,358
	Laborer 1	800	25	20,000	29,900	100.0	29,900	0	0.0	0.00	0
	Laborer 2	800	25	20,000	29,900	100.0	29,900	0	0.0	0.00	0
	<b>Total</b>	<b>3,595</b>		<b>109,825</b>	<b>155,889</b>		<b>144,508</b>	<b>11,381</b>		<b>2,290</b>	<b>9,091</b>
<b>Planned Production</b>		<b>Tons</b>	<b>Bags</b>	<b>Total Labor Cost of Planned Production</b>							
		320	16,000	\$153,599							
<b>Allocation of Labor to Overhead</b>		<b>Direct \$/ton</b>	<b>Overhead \$/ton</b>	<b>Total \$/ton</b>							
		\$451.59	\$28.41	\$480.00							

Source: Northern Economics, SEC

**Table 17. Estimated Labor Cost, Gravina Island Pellet Mill Under the 1200 Labor Hour Scenario**

Base	Personnel	Hours/ Year	Rate \$/hr	Wage \$	Total \$ (incl. Fringe)	Direct Labor %	Direct Labor \$	Overhead \$	G&A Overhead %	Unallocated G&A Overhead \$	Allocated to Direct Labor \$
Hours/ year	Biomass Coordinator	0	45	0	3,222	35.0	1,128	2,094	65.0	1,361	733
800	Plant Manager	1,995	35	69,825	92,867	90.0	83,580	9,287	10.0	929	8,358
	Laborer 1	1,200	25	30,000	39,900	100.0	39,900	0	0.0	0.00	0
	Laborer 2	1,200	25	30,000	39,900	100.0	39,900	0	0.0	0.00	0
	<b>Total</b>	<b>4,395</b>		<b>129,825</b>	<b>175,889</b>		<b>164,508</b>	<b>11,381</b>		<b>2,290</b>	<b>9,091</b>
<b>Planned Production</b>		<b>Tons</b>	<b>Bags</b>	<b>Total Labor Cost of Planned Production</b>							
		320	16,000	\$173,599							
<b>Allocation of Labor to Overhead</b>		<b>Direct \$/ton</b>	<b>Overhead \$/ton</b>	<b>Total \$/ton</b>							
		\$514.09	\$28.41	\$542.50							

Source: Northern Economics, SEC

### 8.3.2 Non-Labor Variable Costs

Table 18 describes non-labor variable costs (NLVC) as developed by BSS, SEC, and Northern Economics. NLVC are estimated to be \$63.30/ton of pellets produced. The largest single component is the cost of feed stock (biomass) for the mill, assumed to be \$27.30/ton. Packing and shipping materials combine to \$21.00/ton of pellets produced, while electricity and maintenance costs are estimated at \$10.00/ton and \$5.00/ton. With 320 tons of production NLVC are estimated at \$20,256.

**Table 18. Estimated Non-Labor Variable Costs, in Dollars per Ton and Percent**

Variable Cost	\$/ton	Source
Biomass, \$/ton, DM	27.30	EIA "Other Residuals"
Pallet, 1 pallet/ton	5.00	BSS in an email to the author dated November 2, 2023
Pellet bags, \$13/ton	13.00	BSS in an email to the author dated November 2, 2023
Slip sheet, 1/pallet	1.00	BSS in an email to the author dated November 2, 2023
Pallet cap, 1/pallet	1.00	BSS in an email to the author dated November 2, 2023
Stretch wrap, per pallet	1.00	BSS in an email to the author dated November 2, 2023
Maintenance, \$ per ton	5.00	BSS in an email to the author dated November 2, 2023
Electricity, \$ per ton	10.00	BSS in an email to the author dated November 2, 2023. A quote using local rates would improve estimates.
<b>Subtotal, Variable Costs, \$ per ton</b>	<b>63.30</b>	
<b>Subtotal, Variable Costs, \$ per bag (50 bags/ton)</b>	<b>10.87</b>	

Source: BSS, Northern Economics

## 8.4 Sensitivity Analysis

As discussed, the proposed business plan is based on a solid concept; however, it is one that is changing with pellet markets and facility design. One recent change is housing the mill in a Quonset building (SEC 2014). Costs for the Quonset hut are similar enough to the container design in this analysis that they are considered equivalent. If actual costs vary significantly, revised figures may be analyzed with the Excel model.

The projected fixed costs of \$6,000 reflect a best estimate and may also be changed in the Excel model.

The use of three selling values (low, average, high) reflects expected market variations. SEC's target selling value of \$10 per bag (\$500 per pallet) is also a key factor in potential sales.

Variable costs reflect input from BSS, SEC, and experience with biomass projects. They, too, may be refined within the Excel model.

## 8.5 Break-even Results

Results are summarized in Table 19 below, followed by discussion. The table shows formula results for specific variables. For example, the first four items under "Selling Value" display dollars per ton

for each of the four SVs (low, medium, goal, and high). The next section shows formula results for variable costs at two levels of labor (1,200 and 800 hours), The last three table sections show breakeven tonnages (BEP) for medium (MED) and high (HIGH) selling values as well as net revenues under both scenarios if 320 tons of pellets are produced.

**Table 19. Break-even Analysis Results Summary**

Per Ton	Amount	Cost, Unit	Comments, Notes
Fixed Cost	\$6,000	Fixed Cost	Estimated Fixed Cost
<b>Selling Value (SV)</b>			
Low Selling Value (\$4.67/bag)	\$238.24	\$/Ton	Unlikely to meet this, too low, revenue deficit
Medium Selling Value (\$8.04/bag)	\$392.58	\$/Ton	Unlikely to meet this, too low, revenue deficit
Goal, \$10/bag, \$500/ton	\$500.00	\$/Ton	SEC Stated Target Price
High Selling Value (\$12.52/bag)	\$625.99	\$/Ton	High Price (from prices seen in Petersburg—see Table 7.)
<b>Variable Cost (including labor and non-labor variable costs)</b>			
1,200 Hours Scenario	\$605.80	\$/Ton	High-cost scenario; relatively inefficient, but not unreasonable
800 Hours Scenario	\$543.30	\$/Ton	low-end estimate, but potentially attainable
<b>Break-even tons with Medium SV (\$8.04/bag – \$10.00/bag)</b>			
1,200 Hours Scenario + Medium SV	Not Attainable	Ton	Variable Costs exceed Selling Value
800 Hours Scenario + Medium SV	Not Attainable	Ton	Variable Costs exceed Selling Value
<b>Break-even tons with High SV</b>			
1,200 Hours Scenario + High SV	297.1	Ton	Total Revenue and Total Cost both equal \$185,982
800 Hours Scenario + High SV	72.55	Ton	Total Revenue and Total Cost both equal \$45,616
<b>Production Using All Available Labor in each Scenario</b>			
1,200 Hours Scenario + High SV	320	Ton	Total Revenue = \$200,317; Total Cost = \$199,855; Net Revenue is positive at \$462.
800 Hours Scenario + High SV	320	Ton	Total Revenue = \$200,317; Total Cost = 179,856; Net Revenue is \$20,461

Source: Northern Economics

- A. Selling Values.** The Low and Average SVs are considered too low for the Gravina Island mill. Achieving this cost is something only large producers with very cost-efficient operations can attain. Higher per ton SVs from \$500 to \$626 are more likely to cover all FC and VC. Although not specified in Table 19, we estimate that if the efficiency of the two-person yard labor crew increased such that they could produce 320 tons of pellets working only 523 hours each (with the same fringe benefits) total revenues would match total costs.
- B. Variable Costs.** Projected labor hours in the 800 Hour Scenario are \$543 per ton and reflect a 4-to-5-month operating season as well as initial startup. The 1,200 Hours Scenario reflects a less efficient operation, and 320 tons of tons of production will a require longer operating season.



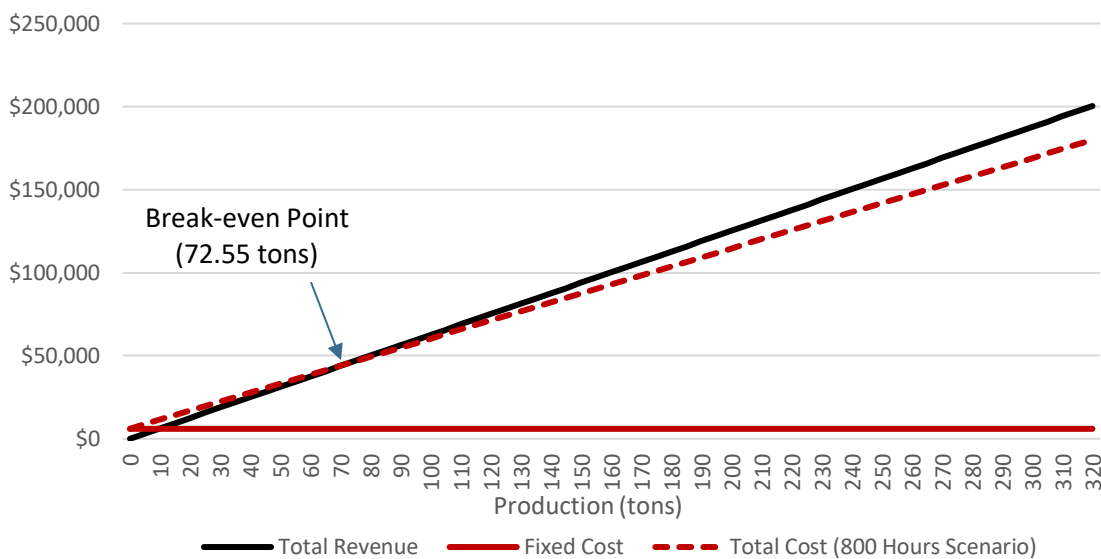
- C. **Fixed Costs.** An annual amount of \$6,000 was assigned for breakeven calculations, but this figure could vary significantly with final capital costs, full cost depreciation, and high fixed costs for power, communications, and insurance.
- D. **Break-even Tons:** The pellet mill can break even at selling values of \$625.99 per ton with the stated variable and fixed costs. Under the 1,200 Hour Scenario, the break-even tonnage (BEP) is estimated at 291.12 tons. With 320 tons, positive net revenues of  $\approx$  \$426 can be attained. Under the 800 Hours Scenario the BEP is 72.56 tons. At this level of efficiency, we estimate that positive net revenue exceeding \$20,000 can be realized.

## 8.6 Additional Findings

The model used to estimate break-even product levels can also be used to examine cost and revenues at any level of production with an assumed set of costs and SVs. A key factor in attaining positive net revenues is the SV/ton must exceed VC/ton. This is why we conclude at least in the early stages of operations that a \$500/ton SV is infeasible unless VC are significantly reduce from VC under the 800 Hour Scenario. As noted above in order to break even with a \$500/ton SV, the labor hours of the two yard-men must be cut back to 523 hours each or less. This will reduce LVC to 436.72/hour and the mill would cover all of its costs including fixed costs with 320 tons of production.

Figure 10 shows costs and revenues at production levels ranging from 0 to 320 tons under the 800 Hours Scenario with a 625.99 SV/ton. If the Total Revenue line is higher than the Total Cost line then positive net revenues are generated. At 320 tons of production, revenues are \$200,317 and total costs are \$179,855. Under these assumptions a net revenue of \$20,462 is generated.

**Figure 10. Cost and Revenues at All Levels of Production Under the 800 Hours Scenario and SV of \$625.99/ton**



Source: Northern Economics.

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## Appendix A – Biomass Systems Supply Pellet Mill Proposal



March 17, 2023

**PROPOSAL #: DS031723-01**

**Gravina Island Pellet Mill Project-Phase 1**

Robert Venables  
Southeast Conference  
9360 Glacier Hwy #201  
Juneau, AK 99801  
Tel: 907-586-4360  
Email: [robert@seconference.org](mailto:robert@seconference.org)

Dear Robert:

In accordance with your request, Biomass Systems Supply (BSS) is acting as a dealer for BMQ, Inc and are pleased to offer the following equipment and services for your consideration. *(We have selected this equipment based on the information and application description furnished to us by you.)* We have quoted Phase 1 of the Gravina Island Pellet Mill Project and given an estimate for Phase 2 of the Gravina Island Pellet Mill Project on the itemized spread sheet dated 03.17.23. The equipment is being sold through BSS. Mfg of the equipment, installation, startup, training and the warranty will be done by BMQ, Inc.

### **Application Description**

Containerized pellet plant (up to 1,000 lbs. per hour) (wood)  
Customer to supply main power supply to control panel.  
Customer to supply 1-1/2" water supply for fire protection to plumbed port on side of container.

### **Scope of project: Phase 1**

To provide equipment, to include: Shredder, mechanical conveyance to hammer mill Pellet mill charge system, Pellet Mill, Pellet Mill Discharge, Bucket Legs, Counter Flow Cooler, Finished Pellet Screening, Finished Pellet Holding Bin, Manual Weigh Scale Bagging, Bulk Load Out Conveyor, all controls, pellet mill to be housed in (1) 40' high cube container.

No buildings, concrete, or field wiring will be included in this quote.

#### **Phase 1 - 350/40 CPP System**

- 1) Vecoplan VHZ 1100 XL Shredder
- 1) Conveyor to Hammer Mill
- 1) SDHM 6 Hammer Mill
- 1) Dust Collection, Cyclone, Bag House, Airlock, with Spark Detection and Suppression
- 1) Conveyor with abort gate to Pre-Pellet Bin
- 1) 1500mm Pre-Pellet Bin
- 1) RMP 350 Pellet Mill, complete with stainless feed screw, ,stainless conditioner, manual water dosing valve, port for steam, slippage sensors for V-belt drive of pellet mill and conditioner. Automatic greasing system of the roller assemblies and the main shaft, 2) 40 HP motor (roll assemblies and 1 die) and die temp monitoring
- 1) Carbon steel Pellet Mill Discharge Conveyor
- 1) Steam Removal System with stainless Cyclone
- 1) Stainless steel Bucket Elevator (to cooler)



- 1) SDCC.5 Counter Flow Pellet Cooler with Airlock
- 1) 5500 CFM Dust Collection System (pellet cooler air)
- 1) Rotex Pellet Screener
- 1) Galvanized Bucket Elevator
- 1) Finished Pellet Holding Bin
- 1) Manual Weigh Scale Bagger
- 1) Bag Discharge Conveyor
- 1) Hot Air Bag Sealer
- 1) Bulk Load-Out Conveyor
- 1) Air Compressor
- 1) Control Panel, complete with HMI touch screen, with remote operations capability. All equipment to be pre-wired from factory including interior lighting.

**TOTAL EQUIPMENT PRICE** (FOB Factory, New Albany, IN) ..... \$ **1,103,966.00**

**No concrete, buildings, or field wiring are included in this quote.**

VHZ Shredder panel will need to be wired to the shredder along with control wiring from panel

**Installation and Start-up**

BMQ, Inc. will mechanically install all equipment and ready for electricians. Estimated 28 days for installation. After wiring is complete, BMQ, Inc. will commission the plant and train customer-supplied operators for 14 days.....

**\$ 158,000.00**

**TOTAL EQUIPMENT PRICE WITH INSTALLATION (FOB - New Albany, IN) .....\$1,261,966.00**

**OPTIONS AFTER START-UP**

**3 MONTHS** OF OPERATION OF THE PELLETT PLANT TO CONSIST OF  
1 MAN 8 HOURS PER DAY, 5 DAYS PER WEEK ..... \$ **41,500.00**

**6 MONTHS** OF OPERATION OF THE PELLETT PLANT TO CONSIST OF  
1 MAN 8 HOURS PER DAY, 5 DAYS PER WEEK ..... \$ **83,500.00**

**12 MONTHS** OF OPERATION OF THE PELLETT PLANT TO CONSIST OF  
1 MAN 8 HOURS PER DAY, 5 DAYS PER WEEK ..... \$ **167,500.00**

## SPARE PARTS PKG - Phase 1

1) COMPLETE SET OF SPARE ROLL ASSEMBLIES.....	\$ 2,900.80
2) SPARE DIE.....	\$ 1,985.80
3) 1) SPARE SET OF HAMMER MILL HAMMERS.....	\$ 910.00
4) 1) SPARE HAMMER MILL SCREEN.....	\$ 1025.00

**TOTAL SPARE PARTS PACKAGE.....\$ 6,821.60**

### EXCLUSIONS (UNLESS OTHERWISE INDICATED):

- Any offloading, rigging equipment/operators, setting of equipment, installation or startup.
- Any electrical field wiring, power distribution or disconnects. Should electrical installation be required, BMQ, Inc. will provide upon request all required system data for equipment being supplied to customer so that customer can secure this service. However, BMQ, Inc. will not subcontract or otherwise include it in its pricing or scope of supply. BMQ, Inc. will coordinate with customer-secured local electrical subcontractors to perform the service, but pricing of this work will need to be invoiced directly from the subcontractor to the customer and will not be included in BMQ, Inc.'s pricing.
- Any buildings, building preparations, penetrations, foundations, support structures, alterations to buildings, weatherproofing, covers or enclosures.
- Taxes, fees, foreign duties, permits for local, state and/or federal compliance (Please provide a copy of valid tax exemption certificate to avoid being charged taxes).
- Freight/delivery/shipping/storage charges.

NOTE: If installation or system startup is provided, its scope will be as set forth in this document. Installation/startup is based on providing open-shop labor (either BMQ, Inc. employees or its subcontractors) and on an uninterrupted work schedule until system is complete. Interruptions or delays caused by customer or others which necessitate return trips or extended time onsite will result in additional charges to the customer. BMQ, Inc. must be allowed unrestricted access to the work area. The customer is responsible for site readiness prior to the arrival of the installation screw/startup technician. Any delays caused by customer failing to have the site in ready condition for installation crew or startup technician may affect the completion date therefore resulting in additional charges to the customer. Once crews or technicians are on site they must be allowed to continue until completed.

### PRICE:

Total List Price, Equipment and Installation only, FOB New Albany, IN..... **\$ 1,261,966.00**

Buyer Signature \_\_\_\_\_

NOTE: Shipping terms are as provided in the General Terms and Conditions below, unless otherwise indicated in this document. BSS (Seller) will advise estimated shipping charges prior to shipment. If shipping arrangements are made by Seller on behalf of (payable by) customer ("Buyer"), shipments can be made either "freight collect" or "pre-pay and add". If arrangements are "pre-pay and add", a separate freight invoice will be issued by Seller to Buyer and is due 15 days from delivery. **If "pre-pay and add" arrangements are made, Buyer will need to authorize the shipment and guarantee payment by signing the freight disclaimer above.** All accounts in arrears due to unpaid delivery costs will be subject to credit hold. All freight charges are applicable unless expressly waived by BSS in writing at time of the order acknowledgement. Any transport, storage or demurrage charges incurred as a result of customer delays or non-payment of funds owed, whether at the factory, BSS, port of arrival or third-party warehouses, is required to be paid by Buyer prior to delivery.

### PAYMENT TERMS (SUBJECT TO CREDIT APPROVAL):

25%	Deposit At Time Of Order
25%	Upon Approval Of Drawings
45%	One Week Prior To Shipping
5%	When Equipment is up and running

NOTE: Shipments to locations outside the United States and other extraordinary deliveries may be subject to alternate payment terms and delivery arrangements. BSS reserves the right to make credit determinations based on destination, creditworthiness, and other criteria. In certain situations, BSS may require a duly executed and delivered security agreement or license agreement prior to shipment and the subsequent filing of a UCC Financing Statement or foreign version of such in order to secure payment.

## **Phase 1 & Phase 2 Details**

### **Phase 1:**

Electrical: 400 amps of 460/3/60

Estimated Lead Time: 26 weeks from receipt of a signed order and 25% deposit.

Will consist of three (3) 40HC – Doors at both ends of the container with forklift pockets.

One container will house the pellet mill equipment and the other two will be one way transport containers for the other ancillary equipment. Estimated cost for the two (2) ancillary containers is \$10,500 each. Estimated cost to ship each container from New Albany, IN to Gravina Island, AK is \$18,000 each.

The shredder and conveyor do not do well in the rain, so a carport type structure should be built overhead to protect them.

### **Phase 2: Estimate**

Electrical: 150 amps of 460/3/60

Estimated Lead Time: 32 weeks from receipt of a signed order and 25% deposit.

Will consist of two (2) 40HC – Doors at both ends of the containers with forklift pockets.

Both containers will hold the ancillary dryer equipment. (Drum is already supplied and located at the job site on Gravina Island) Estimated cost for the two (2) ancillary containers is \$10,500 each. Estimated cost to ship each container from New Albany, IN to Gravina Island, AK is \$18,000 each.

**Note:** You might want to consider 600 amps of electrical service if additional equipment is needed in the future.

## WARRANTY POLICY:

BMQ, Inc. provides an express limited warranty to the first ultimate end user of its products. The terms, limitations and disclaimers associated with this warranty are set forth in the General Terms and Conditions below.

## PRIMARY CONDITIONS OF SALE:

BMQ, Inc. reserves the right to make minor technical changes without notice. BMQ, Inc. reserves the right to substitute or change component brands without notice. BMQ, Inc. will not be liable for any SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES of any nature (including without limitation production losses or loss of profits). BMQ, Inc. is not responsible for any damages or liability resulting from improper integration by others of BMQ, Inc. equipment OR for installation or performance of auxiliary equipment supplied by others and integrated into any system where BMQ, Inc. equipment is installed. This includes, but is not limited to, improper conveyance, mechanical or pneumatic systems, or any instance where damages result from improper system design or installation. BMQ, Inc. is not responsible for installation, or resulting issues or remedies of such installation, performed by others. Cancellations are subject to an additional fee. Payments due will be charged with an interest of 1.5% per month. All prices quoted are in US dollars (designated \$ US, US\$ or USD). The General Terms and Conditions below apply and supersede any and all others.

## GENERAL PRECAUTIONS FOR PELLET MILLS:

If improperly installed, abused, neglected, or used in a manner contrary to the manufacturer's instructions and warnings, any pellet mill or pelleting system can pose a number of hazards. Potential risks include damage, fire, injury or death. This BMQ, Inc. pellet mill / pelleting system is in safe and proper working order when shipped. Once delivered, it becomes the responsibility of the owner / operator of the pellet mill / pelleting system to install, operate, maintain and use it in accordance with the documentation accompanying the equipment. THE DOCUMENTATION MUST BE READ, UNDERSTOOD AND ADHERED TO AT ALL TIMES. THE OPERATOR ASSUMES THIS RESPONSIBILITY AND HAS THE OBLIGATION TO MITIGATE ALL HAZARDS SURROUNDING THE OPERATION.

**Any reference herein above to a "pellet mill", "pelleting system" or "pellet mill / pelleting system" shall include any Products sold by BMQ, Inc. hereunder, regardless of whether a pellet mill is actually included in the Products, and shall include any and all component parts, accessories, additions or ancillary equipment related thereto, whether sold by BMQ, Inc. in connection with the Products or used by Buyer in connection with the operation or maintenance of the Products.**

## General Terms and Conditions

Except as otherwise expressly agreed in writing and signed by an authorized officer of BMQ, INC. ("Seller"), these terms and conditions ("Terms & Conditions") shall solely govern all quotations and order confirmations covering purchase orders for and sales of products manufactured by Seller or Seller's parent, affiliates and subsidiaries (individually each a "Product" and collectively, the "Products") as well as service relating to such Products (including, without limitation, any services performed under the warranty stated hereunder), if applicable, and any provision of the Buyer's order in addition to or inconsistent herewith shall be deemed rejected by Seller and/or waived by Buyer. Any acceptance by Buyer of Seller's offer to provide Products is limited solely to the terms and conditions contained herein. All orders are subject to acceptance and approval by Seller. If in any way Seller's actions, conduct or silence would otherwise constitute an acceptance of Buyer's order or purchase agreement, any such acceptance is hereby limited to the terms and conditions herein, and is made conditional on Buyer's assent to these additional or different terms and waiver of Buyer's own additional or different terms.

### Prices:

1. Prices quoted are for prompt acceptance and subject to change without notice at any time prior to receipt and acceptance of Buyer's order by Seller unless the Seller has otherwise agreed in writing. Published prices of the Products are subject to change without notice and will be applied as in effect at the time of shipment.
2. Prices exclude Federal, State or local use, excise, transportation, occupational or other taxes. Buyer agrees to pay any such taxes applicable to the sale or use of the Products. Buyer shall provide Seller with a tax exemption certificate acceptable to the relevant taxing authorities. The Buyer shall promptly reimburse the Seller for any such tax advanced or paid by the Seller with respect to any Product. Unless specifically stated otherwise, Seller's prices do not include any applicable sales, excise or other similar taxes. If under any law or government regulation, now or hereafter in effect, Seller is required to pay or collect any tax upon the Products included in this order or predicated upon, measured by or arising from or out of the sale, transportation, delivery, use or consumption of said Products, whether directly or indirectly, the prices to be paid by the Buyer hereunder shall be increased by the total amount of such tax and Buyer agrees to pay such amount in full as part of the purchase price payable hereunder. Buyer also agrees that any such payment for taxes shall be made to Seller even if Seller learns that such taxes are due subsequent to the delivery and receipt of final payment.
3. Prices are subject to change if Buyer requests changes to or deviations from the specifications quoted by Seller after acceptance of Buyer's order.

**Installation:** Buyer has been offered the option of having the Products installed by Seller. Unless otherwise stated on the face of an order confirmation, Buyer has not requested this service and instead opted to install the Products themselves. Buyer understands, acknowledges and agrees that Buyer assumes any and all responsibility for the installation of the Products and any damages resulting therefrom.

### Terms of Payment:

1. The purchase price of the Products shall be payable, without deduction of any kind, within such period of time and according to such terms as provided in the invoice.
2. If payments are late, Seller shall impose a monthly service charge which will not exceed one and one half percent (1-1/2%) of the total amount due. Acceptance of such service charge by Seller shall not constitute a waiver of any rights which Seller has due to non-payment by Buyer.
3. Buyer hereby agrees to pay all costs of collection, including reasonable attorney's fees, costs and expenses, and the costs, if any, of financial or credit checks or investigations on accounts sixty (60) or more days past due.
4. If Terms of Payment allow in excess of 5% net due after delivery, Buyer hereby grants Seller a security interest in the Products purchased from Seller (along with any and all accessions thereto, including replacements parts and equipment subsequently purchased from Seller, and replacements therefor) and agrees upon request to execute a security agreement in a form acceptable to Seller pledging such Products (along with any and all accessions thereto, including replacements parts and equipment subsequently purchased from Seller, and replacements therefor) as collateral securing any amounts due to Seller (if Seller for any reason refuses to so execute such security agreement, notwithstanding the foregoing, this provision shall constitute a security agreement for all purposes). Buyer hereby authorizes Seller to file a UCC1 Financing Statement, or any other document deemed necessary or advisable by Seller, for the purpose of perfecting its security interest in such Products.
5. Buyer hereby acknowledges and agrees that Seller may embed programming code in the Products that will render Products inoperative should Buyer fail to pay the purchase price when due.

**Title and Risk of Loss:**

1. Notwithstanding anything herein to the contrary (specifically, the shipping terms indicated under the Prices section herein above), delivery of the Products to a carrier by Seller, consigned to Buyer, or as Buyer may direct, shall constitute transfer of title, ownership, possession and risk of loss or damage to the Products at the point of such delivery to a carrier, and such carrier shall thereafter be deemed to be acting for Buyer. Seller assumes no obligation whatsoever with respect to damage in transit.
2. Seller uses great care in packing the Products and will not be responsible for damage or loss in transit. All claims for damage or loss after delivery of the Products to the carrier must be made by Buyer to the carrier, but Seller will provide all reasonable assistance in securing a satisfactory adjustment of such claims.
3. Seller's programmable logic controller ("PLC") and human-machine interface ("HMI") programming logic and source code is proprietary, confidential information belonging solely and exclusively to Seller and, other than a non-transferrable, limited license to utilize the same in connection with Buyer's operation of the Products sold hereunder, no right, title or interest in or to such PLC and HMI programming logic or source code, nor any right to receive, access, copy or reproduce such PLC and HMI programming logic or source code, is being transferred to Buyer hereby.

**Insurance:** After receipt of the Products, Buyer will maintain, as long as any part of the purchase price for the Products remains unpaid or until all servicing of the Products is completed, sufficient insurance to provide full coverage of damage or loss by fire, theft, negligence of Buyer's employees or other causes, naming the Seller as an additional insured. The insurance will also cover tools, testing equipment and other property brought onto Buyer's premises temporarily by Seller's field or service personnel.

**Delivery and Shipping Schedule:**

1. Delivery of the Products shall be as specified in Seller's acceptance of Buyer's order.
2. Seller shall not be liable for unavoidable delays in delivery or service caused indirectly or directly or in any manner by fires, flood, accidents, riots, Acts of God, war, governmental interference, embargoes, strikes, labor difficulties, shortage of labor, fuel, power, materials or supplies, transportation delays or any other cause or causes (whether or not similar in nature to any of those specified herein) either beyond its control or which it cannot remedy without great economic hardship.
3. In no event shall the contract of sale be subject to cancellation by Buyer as a result of delays in delivery or servicing or for any other cause, except by mutual written agreement (see termination and cancellation provisions below).
4. No penalty for late performance may be assessed against Seller unless agreed upon in writing when Buyer's order is placed.
5. Seller shall not be liable for any special, incidental or consequential damages as a result of delay in shipment or servicing.
6. Unless otherwise agreed upon in writing, Seller reserves the right to make partial shipments and to submit invoices for such partial shipment in accordance with Seller's standard terms.

**Limited Warranty and Disclaimers:**

1. Seller warrants that all new Products are free from defects in material and workmanship; unless otherwise stated on the face of an order confirmation, no warranty whatsoever is made as to used Products. Any warranty described herein shall extend to the first ultimate end user for a period of 12 (twelve) months for all Products from the date of shipment when properly maintained and serviced according to the technical data sheet and operating manual. This warranty covers all non-wear items only and excludes freight, labor, travel and living expenses or other incidental costs associated with any repairs, and the costs of any shipping, dismounting or reinstallation that may be required. At Vecoplan's sole discretion, claims may be evaluated for misapplication, tampering, abuse, neglect, improper installation or maintenance, failures due to environmental conditions, improper operation, use of aftermarket parts not purchased from Seller or other factors beyond Vecoplan's control, in which case claims may be disallowed. Machinery or equipment manufactured by other companies and incorporated into systems purchased from Vecoplan are subject to the independent warranty policies and procedures of that manufacturer. Reprogramming or adjustments made to Vecoplan controls by anyone other than Vecoplan technicians will automatically void any warranty offered herein. Readjustment to controls or repairs that become necessary will be invoiced accordingly.
2. Seller's obligation, and Buyer's sole and exclusive remedy, under this warranty shall be limited to (i) Seller crediting Buyer with the invoice value of any nonconforming Products upon their return to Seller or (ii) Seller repairing or replacing any nonconforming Products, in Seller's sole discretion.
3. **SELLER SHALL IN NO EVENT BE LIABLE FOR ANY CLAIM FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, AND EXPRESSLY DISCLAIMS ANY LIABILITY FOR SUCH DAMAGES.**
4. No warranty is made as to Products which have not been installed, used or maintained in accordance with Seller's instructions, or which have been subject to misuse, abuse, accident or alteration or to improper or negligent use, maintenance, storage, transportation or handling.
5. Seller shall in no way be liable for any loss or damages related to fire or combustion in or near the Products when such fire or combustion is caused by Buyer's negligence, improper maintenance, faulty operation, processing of dangerous or combustible materials or forces beyond the control of Seller, or when Products are being used outside the scope of the application for which the Products were sold to Buyer.
6. Any stated throughput rates or other estimations contained herein regarding the volume of material processed by the Products sold hereunder are maximum achievable estimates, in some cases based upon testing performed by Vecoplan at your request, and are not to be construed as an express warranty or guaranty concerning the actual performance of the Products. Actual throughput rates will be dependent upon many variables, including the type of material being processed, the size of the material being processed and the method of feeding the material into the Products. Actual throughput rates may also be limited due to worn or damaged components or improper maintenance.
7. Seller represents and warrants that the Products sold hereunder will be in compliance with Federal OSHA safety regulations and guidelines solely in terms of the design and manufacture of the Products as delivered to the Buyer and at the time delivered to the Buyer and any control panels integrated into any such Products are built to UL508A and National Electrical Code (NFPA 70) standards. Other than the foregoing, Buyer assumes any and all responsibility and obligation to insure that the Products purchased hereunder are installed, operated and maintained in accordance with and in compliance with any and all federal, state, municipal and local rules, regulations, ordinances and laws, including without limitation any and all applicable OSHA rules and regulations. Buyer may request that the Products be manufactured in accordance with other federal, state, municipal or local rules, regulations, ordinances or laws; provided, however, that any such request must (i) be in writing, (ii) specifically describe the requirements and (iii) be accepted by a duly authorized representative of Seller in writing. Any such request, to the extent accepted by Seller, may be subject to adjustment in the pricing of the Products, in the sole discretion of Seller, to the extent such request is made by Buyer or accepted by Seller after a quotation for Products has been issued.
8. **Unless otherwise agreed in writing by Seller, no warranty is made regarding the fitness of Products for any particular Buyer application or use.**
9. **THE WARRANTY CONTAINED HEREIN IS EXCLUSIVE AND EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, WRITTEN, ORAL, IMPLIED OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE. IN ADDITION, SELLER SHALL NOT BE LIABLE FOR ANY LOSS, DAMAGE OR INJURY OF ANY NATURE, WHETHER DIRECT, INDIRECT OR CONSEQUENTIAL, IN CONNECTION WITH OR RESULTING FROM THE PURCHASE, USE OR SALE OF THE PRODUCTS.**
10. **THERE ARE NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.**

**Assignment:**

Buyer shall not assign its order or any interest therein or any rights thereunder without the prior written consent of Seller.

**Cancellation:**

1. Seller shall have the right to cancel an order if at any time Buyer does not strictly comply with all the terms and conditions contained herein or if Buyer's credit standing is any time disapproved by Seller by giving written notice of this decision to Buyer. The notice shall be effective when mailed.
2. Contracts shall not be subject to cancellation without Seller's notice consent.
3. In the event that cancellation of an unfinished contract is accepted in writing by Seller, Buyer agrees to pay without delay the full contract price for all delivered Products, cancellation charges for any unfinished portion of the contract (taking into account actual expenditures by Seller, including, but not limited to, overhead charges) and reasonable profit on the unfinished portion of the contract.

**Confidentiality:**

1. All information that Buyer acquires from Seller hereunder, directly or indirectly, and all information that arises out of the sale of the Products hereunder, concerning such Products and/or proprietary processes involved, including without limitation, any confidential or proprietary information relating directly to Seller's business and that of its affiliated companies and subsidiaries, including, but not limited to, information regarding products, customer lists, pricing/costing policies and data, operational methods, marketing plans and strategies, product development techniques or plans, business acquisition plans, methods of manufacture, technical

processes, drawings, designs and design projects (specifically including, without limitation, any drawings or designs furnished in connection herewith), inventions and research programs, trade "know-how", trade secrets, specific software and computer/PLC/microprocessor programs, object and source codes, user manuals, systems documentation, and other business affairs of Seller and its affiliated companies and subsidiaries (collectively, "Proprietary Information") shall remain the sole and exclusive property of Seller.

- Buyer (i) shall hold Seller's Proprietary Information in strictest confidence, (ii) shall not disclose it to others (including, without limitation, competitors of Seller) for any purpose (including, without limitation, for the purpose of obtaining quotations for products competitive with or similar to the Products), (iii) shall use it solely for purposes of operating and maintaining the Products purchased hereunder as permitted herein and (iv) shall, upon Seller's request, either promptly deliver to Seller all such Proprietary Information that is in written, electronic or other form, including copies and summaries, or, at Seller's option, destroy such Proprietary Information and provide Seller certification of such destruction. Buyer shall limit disclosure to its officers, partners, employees and professional advisors with a reasonable "need to know" the information.
- Nothing herein shall be construed as granting any rights or licenses in any Proprietary Information beyond the right to use such information only for the limited purpose expressly specified herein.

#### Intellectual Property:

- Seller hereby retains all rights, title and interest in and to any drawings, designs, specifications, models, perspectives, software, source code or object code, or other intellectual property, including, but not limited to, copyrights, patents, trademarks and trade secrets, created or to be created in connection with any quotation for the sale of Products or the sale of any Products pursuant hereto (collectively, the "Intellectual Property").
- Seller grants to Buyer a limited, nonexclusive, royalty-free, worldwide, right and license to use the Intellectual Property solely and exclusively for the purpose of operating and maintaining the Products and for no other.

#### General:

- In the event of breach or repudiation by Seller, Buyer shall not be entitled to incidental or consequential damages, including without limitation those for loss of use.
- The Products are provided by Seller from its offices within the State of Indiana, United States of America. These Terms & Conditions and any dispute arising out of or related to the Terms & Conditions or use of the Products shall be governed in all respects by and construed and enforced in accordance with the laws of the State of Indiana, without regard to its conflicts of law principles. Exclusive jurisdiction over any cause of action arising out of these Terms & Conditions or Buyer's use of the Products shall be in state or federal courts located in Indiana. Buyer further agrees to submit to the exercise of personal jurisdiction of such courts for the purpose of litigating any such claim or action.**
- Seller's order confirmation may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. The exchange of copies of Seller's order confirmation and of signature pages by electronic transmission (including, without limitation, facsimile or electronic mail) shall constitute effective execution and delivery of Seller's order confirmation as to the parties thereto and may be used in lieu of the original for all purposes. Signatures of the parties transmitted by electronic transmission (including, without limitation, facsimile or electronic mail) shall be deemed to be their original signatures for all purposes.
- No agent, salesman, or distributor has any authority to obligate Seller by any terms, stipulations or conditions not herein expressed.
- Neither the warranty nor any other provision stated herein entitles Buyer or any third party to damages, direct, indirect or consequential, for personal injury arising from the installation, operation, servicing or use of the Products and Buyer agrees to assist the Seller and to hold the Seller harmless in effectuation of this provision.
- In the event Buyer's insurance covers any claim by Buyer resulting from or relating to damage to the Products, or loss or damage of any kind resulting from, related to or arising out of Buyer's use of the Products, Buyer waives all rights against Seller associated therewith and explicitly covenants and agrees to waive any and all subrogation rights on behalf of its insurance carriers. In the event any insurance carrier asserts a claim or cause of action against Seller in derogation of the foregoing, Buyer agrees to indemnify and hold Seller harmless from and against any and all damages, losses, deficiencies, costs and expenses (including attorneys' fees and court costs), claims or causes of action asserted against Seller resulting from or relating to damage to the Products, or loss or damage of any kind resulting from, related to or arising out of Buyer's use of the Products.
- Seller will supply Buyer with a copy of the operator's manual for the Products. Buyer, and any personnel operating the Products, must thoroughly read and review such operator's manual and adhere to any provisions contained therein at all times. It shall be the Buyer's sole responsibility to install, operate and maintain the Products in accordance with the operator's manual. Buyer hereby covenants and agrees to assume this responsibility and assumes the obligation to mitigate any hazards surrounding the operation of the Products.

**THIS PROPOSAL IS VALID FOR 30 DAYS AND CONTAINS ALL TERMS, CONDITIONS, PRICES, AND OFFERS BETWEEN PARTIES.**

Best regards,

Dave Schmucker CEO  
Biomass Systems Supply  
A division of Global Sales Group Inc

\_\_\_\_\_  
Accepted By:

\_\_\_\_\_  
Date

\_\_\_\_\_  
Title:

Biomass Systems Supply  
A division of Global Sales Group Inc  
P.O. Box 1835  
Chico, CA 95927  
P: 877-474-5521 (USA & Canada)  
E: info@BiomassSystemsSupply.com  
www.BiomassSystemsSupply.com