Feasibility Study for a 10 MW Biomass Fired Power Plant

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January, 2010
1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

As directed by the British Columbia Provincial Government in its BC Energy Plan: A Vision for Clean Energy Leadership, BC Hydro is implementing a Standing Offer Program to encourage the development of small and clean energy projects throughout the Province of British Columbia. The program is a process to purchase energy from small projects with a nameplate capacity greater than 0.05 megawatts but not more than 10 megawatts (MW). In order to respond to BC Hydro’s Standing Offer Program call for power, Kelly Lake Métis Settlement Society (KLMSS) is proposing to build a 10 megawatts alternative green and clean energy biomass generation facility near the Kelly Lake community which is approximately 120 kilometers Southeast of Hudson’s Hope, B.C.

The transmission and sales to Alberta through Alberta Electric System Operator (AESO) and under the System Access Service (SAS) Agreements is briefly considered but not pursued in this study as the power purchase agreement with AESO would generally not qualify as a long term power purchase agreement as the sale price for electricity is based on spot pricing and is viewed as high risk by most financial institutions.

The goals of the KLMSS are to develop economically viable energy production facilities using readily available renewable biomass fuel sources at an acceptable cost per kilowatt hour ($/kWh), to provide new and meaningful permanent employment, retain and expand existing employment (logging) and provide revenues for both producers and sellers of the finished product. The biomass power project will create urgently needed aboriginal employment opportunities and revenues, while providing energy in an environmentally sound manner. In addition to helping to meet area power demands, the projects will help reduce dependency on imported non-renewable energy sources.

The project is of enormous importance to the KLMSS in terms of its economic diversification and job creation. It will also be important to the region as a whole in moving toward requiring increased emphasis on renewable power and there is a projected shortage of power generation in an area of increasing population and business growth. Moreover, we believe that this project will increase service reliability in the area.

1.2 BACKGROUND

The Kelly Lake Métis Settlement Society, besides being a recognized Aboriginal Community is a not-for-profit Society registered in British Columbia under the Societies Act since April 26, 2002. Registration No. S-44582. The Society is in good standing and continues to meet all annual filing requirements.
An economically-depressed area, Kelly Lake is seen as the only Métis community with historical roots in B.C. having lived in the area since the early 1800s – membership of which approximately 138 adults live in the settlement with their children.

KLMSS has focused on addressing governance and socio-economic issues facing the community and has continued to identify economic opportunities through various relationships and joint ventures. KLMSS has contracted services in mining, road upgrading, provision of dust control system, provision of camp services, and underground piping. To diversify the local economy and create employment opportunities that take advantage of technological advances and utilize resources that are currently underutilized, KLMSS is proposing to build an alternative energy project. The Kelly Lake alternate energy project will generate 10 MW of electricity – enough to power approximately 7500 homes - using biomass from pine beetle killed fibre, agriculture and wood residue from forestry operations as well as other sources.

Historically, KLMSS continue to hold to their traditional visions of community renaissance and values. Sustainable, efficient resource development requires KLMSS to create an environment in which the whole community can thrive and prosper. The continued protection and utilization of aboriginal rights of sovereignty and self determination are key strategic elements to achieve a higher quality of life.

Currently, BC Hydro is implementing a Standing Offer Program to encourage the development of small and clean energy projects throughout the Province of British Columbia. The program is a process to purchase energy from small projects with a nameplate capacity greater than 0.05 megawatts (MW) but not more than 10 MW. To further diversify its economic base, KLMSS begins to examine the possibility of developing a 10 MW electrical generation facility on its traditional lands.

This study includes an assessment of available biomass fuel by KLMSS to satisfy the fuel requirements of a 10 MW power plant on a continuous basis, technology assessment, site selection, economics viability given the foreseeable fuel and generation costs for renewable energy generation.

This effort has identified a potentially viable biomass-fueled renewable energy project using proven technology and available and proximate fuel supplies on a 40 acres site on KLMSS traditional territory.

Based on a 10 MW plant selling electricity to the grid at 90% net of the plant capacity, the plant would produce 72,000 MW hours (MWH) per year. At electricity sale prices of $120.00 to 150.00/MWH would indicate annual gross revenues of $8.64 to $10.80 Million in its first full year of operation, respectively. At biomass fuel price at $15 per ton, the project suggests earnings before income tax, depreciation and amortization (EBITDA) of $ 4.61 and $6.77 Million for the first full year, respectively.

Our assessment has shown that project viability is highly dependent upon resolution of two issues:
• Acceptable costs and interconnection agreement with BC Hydro High Voltage (HV) system, and suitable site location close to BC Hydro substation
• Acceptable Purchase price for generated renewable power by BC Hydro.

Because of these factors, it is clear that in order to keep the transmission cost low, the power plant site has to be close to BC Hydro grid. The ideal plant site should be no more than 15 km with BC Hydro substation in Dawson Creek Substation (2552 DAW). KLMSS will have to consider purchasing or leasing a power plant site of 40 acres. And then there is the additional cost of $3.75 million for the 15 km HV transmission line to the BC Hydro interconnection point.

The current anticipated purchase price as offered by BC Hydro for green and renewable power will probably not support the costs of about 15 km of HV transmission connection. As plans were being discussed with the gas transmission industries to improve the global greenhouse gas emissions by converting their gas-fired turbines for the gas transmission compressors to electricity drives, it will be necessary for the gas industries to construct HV transmission lines to service these compressors. It will possibility for KLMSS to negotiate with the local gas industries to connect to the gas industries’ new HV transmission line.

While almost all of North-Eastern British Columbia’s electricity is produced from coal, and/or fossil fuels, the Province clearly has a sustainable supply of wood/biomass fuel to supply relatively small generating facilities such as the KLMSS is pursuing.

Potential biomass fuel sources considered include:
• Wood waste from gas operation, gas transmission line clearings;
• Wood waste from sawmills and wood products manufacturing operations;
• Biomass from pine beetle killed fibre;
• Wood waste from logging operations;
• Forest management waste (such as fire prevention thinning, bio fuel); and,
• Local land owners, tree farming.

An annual estimated amount of 130,000 green tons of biomass fuel is required to fuel a 10 MW power plant. The amount of biomass fuel within the KLMSS traditional territory that the potential biomass sources including gas industries, forestry, plantation, sawmill residues and pine beetle kill as well as from agriculture and other sources will be sufficient to fuel the Power Plant for more than 20 years. The local gas transmission industries have pledged support of fuel contributions to KLMSS in the amount of 15,000 m$^3$ from each of their annual clearings.

We have identified the wood waste streams from most of the above potential sources that sell for $10 to 15 per ton. In addition, biomass material can be sourced from land owners or tree farms for whole tree chipping operations. Another possibility for supplying biomass to the proposed facilities is to collect logging residue. Waste residue (treetops, limbs, stumps and brush) comprises about 20% of
the volume of trees now logged for the paper, wood, and wood products industry. This wood waste is not only unsightly; they pose a great threat for forest fire. For power production, the logging residue would be cut to transportable size, or chipped at the landing or trucked to the generation project site for further hogging. The advantages of using logging residues are that it is currently not utilized, relatively abundant, will clean-up logging cut areas, and produce “green and clean” electrical power. Working to establish an aboriginal collection operation is a possibility. Annual usage of a 10 MW plant would total 130,000 tons in a 50 km radius of the proposed plant site.

Another option to supply biomass fuel to the energy facility is for KLMSS to obtain it from local farmers and land owners. Such farms and land owners have been contacted and fuel purchase arrangements are being pursued to ensure long term fuel supply is established. Many land owners were contacted and currently letters of intent with local land owners (more than 240 acres producing biomass fuel for $5 per m³ or about $10 per ton) have been signed.

1.3 PROJECT DESCRIPTION

A 10 MW biomass fuelled power plant is a state-of-the art facility and will utilize approximately 16.8 green tons per hour (t/hr) of biomass fuel to produce approximately 43 tons/hr (94,000 lbs/hr) of 4.24 MPa (600 psig) of high pressure steam at 400°C (750°F) and up to 10 megawatts (MW) of electricity. The biomass fuel for the project will be primarily collected from the local area. The biomass fuel for the Power Plant will amount to about 130,000 green tons per year. The biomass fuel would be transported to the Power Plant by shuttle trucks. It is anticipated that there would be ten truck trips per day to haul the wood residue to the proposed facility.

The state-of-the-art Power Plant will consist of a biomass fuelled steam boiler capable of generating high pressure and temperature steam from biomass primarily collected in the local area, a 10 MW design capacity condensing steam turbine generator, a cooling tower, a biomass fuel preparation, storage and reclamation system, an ash handling system, and electrostatic precipitator, an electrical distribution/switch system, and a boiler/steam turbine/DCS control/ and administration building.

Superheated high pressure steam generated from a biomass fuelled boiler is expanded in a condensing steam turbine-generator to produce electrical energy. A water cooled condenser will be equipped with the condensing turbine to maximize the negative condensing pressure. The cooling water to the surface condenser will be in a closed loop and heat from the condenser will be ejected in the cooling tower inside the closed loop. Make-up water to handle the evaporative loss totaling less than 6.3 l/sec (100 USGPM) will be provided from Kelly Lake or well water. Electricity produced will be sold to B.C. Hydro.

The Power Plant cooling system will consist of a steam surface condenser connected to the steam turbine condenser, cooling tower, circulating water pumps, and auxiliary cooling system pumps. The cooling water will be pumped out of the cooling tower basin by the circulating water pumps, through the condenser and back to the cooling tower. Cooling water for the generator air coolers, lube oil coolers
and other auxiliary equipment will be pumped from the circulating water line through the equipment and returned to the circulating water line by the auxiliary cooling system pumps.

The Power Plant air quality impacts will be minimized by providing the following emission control measures:

- Particulate from boiler flue gas will be removed in a mechanical (multiclone) dust collector and a multiple-field electrostatic precipitator before the flue gas is released to the stack for dispersion.
- The boiler will be equipped with low NOx burners as required and combustion air control instrumentation designed to minimize the emissions of nitrogen oxides (NOx) and carbon monoxides (CO).
- The equipment for removing, storage and disposing ash produced by the boiler will be enclosed and sealed to prevent escape of dusty ash. The ash will also be wetted and conditioned prior to disposal to eliminate dusting during hauling and landfill.
- The cooling towers will be equipped with mist eliminators designed to reduce mist droplets which may get entrained in the plume.

The Power Plant liquid effluent impacts will be minimized by providing the following measures:

- Plant waste water from the facility would be limited to either reverse osmosis (RO) reject or demineralizers effluent which will be treated to neutralize acids and caustics and boiler blowdown and to remove oil, grease and suspended solids prior to discharge.
- Chemical storage tanks and turbine lube oil tanks will be curbed to catch potential spills of chemicals and lube oil.

The Power Plant will conduct safe solid and hazardous waste management practices to minimize air, water and soil contamination. These practices will include:

- Ash disposal in an approved landfill or return to the ground as fertilizer;
- Use of non-toxic corrosion inhibiting chemicals in the cooling and boiler feedwater treatment systems;
- Collection and recycling of lube oils and chemical containers; and
- Segregation of industrial wastes from laboratory and other plant operations for storage and regular disposal to an authorized waste treatment facility.

The Power Plant will be designed and operated to meet all current noise control guidelines and regulations. Noise control measures will be incorporated into the overall facility layout, equipment specification and selection, and operating practices.

**Design Criteria**
Electrical Energy Output at Full Condensing  10 MW
Generator Power Factor Design  0.85
Generator Electrical Voltage:  4,160 or 11,500 Volts
Maximum Steam Flow (Maximum Continuous Rating):  43 t/hr (94,000 lbs/hr) @ 4.24 MPa (600 psig)
Operating Pressure:  4.24 MPa (600 psig)
Operating Temperature:  500 °C (750 °F)
Feedwater Temperature at Economizer Inlet:  108 °C (228 °F)
Saturated Steam Carryover Moisture:  0.5%
Fuel Flow:  16.8 t/hr

The proposed power plant site of approximately 40 acres is located Block B DL 340 on KLMSS traditional land adjacent to the Alberta border. Its proximity to Kelly Lake will ensure sufficient water supply to operate a power plant of this capacity.

Presently, access to High Voltage (HV) BC Transmission system from the Kelly Lake area is not readily available. KLMSS Biomass Team plans to meet with the local gas transmission industries to arrange HV transmission access via the local gas transmission industries planned HV transmission system and subsequently interconnect to the existing BC Transmission HV network.

The biomass power plant will be built with conventional, proven technology and fuelled with available biomass materials from the vicinity of the proposed sites. As such, the facility is expected to be operational full time except for reasonable downtime for maintenance.

The operation of the plant will create about 24 long term high paying skilled jobs including a licensed first class steam engineer, in addition to the construction jobs, and will provide additional opportunities to increase production and long term employment. The electrical generating facility will be staffed by licensed full time operators, 24-hours per day, and 7-days per week. It is expected that many local people will have the skills and experience or will be trained to fill these roles. It is also anticipated that there will be many spin-off jobs created in the community as a result of the 24 permanent jobs from the electrical generating facility.

In addition to the handling of the biomass/wood wastes in the electrical generating facility, the collection of the waste wood will employ a number of new full time employees. This will include equipment operators, truck drivers and management support for those functions. The supplier (possibly an aboriginal business venture) will require new trucks and other equipment, which will also benefit the local and regional economy.

Capital Costs associated with a 10 MW biomass power project have been estimated at $26.5 million as follows:
- Project Development Costs: $ 1.5 million
- Land: $ 0.5 million
- Permits: $ 0.4 million
- Turbines: $ 5.0 million
- Boiler & Combustion Equipment: $ 9.0 million
- Fuel Preparation Equipment: $ 1.5 million
- Buildings: $ 1.0 million
- Ancillary Equipment: $ 2.5 million
- Electrical and Substation: $ 2.5 million
- Construction: $ 2.6 million

1.4 BUSINESS PLAN / NEXT STEPS

KLMSS has proposed a 10 MW biomass-fired project that appears to be potentially viable. Technology, location, fuel supply, markets, financing and transmission issues have each been addressed to the point where KLMSS is confident that biomass-fired power projects are “do-able” in the region. It is clear that the energy project satisfies the requirements of BC Hydro’s small power project standing offer in the region for the renewable based energy power supply in the near future. The proposed facility can serve the anticipated increased demand in the region and reduce the dependency of fossil fuel. For the project to be implemented, two things must be accomplished:

- Acceptable costs and interconnection agreement with BC Transmission High Voltage (HV) system, and
- Acceptable purchase price for generated renewable power.

1.4.1 Secure Biomass Fuel Supply

In order to be reasonably assured of a predictable, attractive fuel price and a reliable sustainable supply mechanism, KLMSS has begun negotiating long term biomass fuel supply agreements in the form of letters of intent with the following industries:

- BP
- Encana
- Enbridge

Our analysis to date demonstrates that there is enough wood waste at an affordable price from local area sawmills, natural gas and transmission operations, biomass from pine beetle kill, as well as from logging operations. In addition, there is an ample supply of forest biomass material from land owners and tree farms that will provide the volumes sufficient to fully support a 10 MW biomass power plant over the life of the project.
1.4.2 Determining Electricity Sale Price

Utilities across the country have implemented or plan to provide “green pricing” programs that involve wind, biomass and other renewable technologies. The payment price offered by BC Hydro for energy delivered under the Standing Offer Program is determined by the location of the Project and the year, month and time of day the energy is delivered. An additional payment for Environmental Attributes may apply. It is important to note that without an acceptable resolution for interconnection to the BC Transmission HV system with the local gas transmission industries, the additional costs of the 15 km of HV transmission line from the proposed power plant to the BC Transmission HV system have not been included in the project costs and may have to be negotiated with BC Hydro.

1.4.3 Project Implementation

The project implementation phase includes the following activities:

- Negotiate long term fuel supply agreements
- Negotiate energy purchase agreement with BC Hydro
- Transmission and interconnectivity coordination
- Environmental permitting
- Negotiate Engineering, Procurement and Construction (EPC) agreement for the construction of the power plant
2 PROJECT OVERVIEW

KLMSS has decided that it will explore the feasibility of developing a 10 MW biomass fired power generation facility fueled by locally-available biomass. In areas adjacent to the KLMSS traditional lands, there is a substantial amount of biomass fuel potentially available, including:

- Wood waste from gas operation and transmission line clearings;
- Wood waste from sawmills and wood products manufacturing operations;
- Biomass from pine beetle kill;
- Wood waste from logging operations;
- Forest management waste (such as fire prevention thinning, bio fuel); and,
- Tree farming.

This study included an assessment of available biomass fuel from KLMSS, technology assessment, site selection, economics feasibility given the foreseeable fuel and generation costs, as well as creating meaningful employment opportunities for the members in the Kelly Lake Traditional Territory. KLMSS is interested in “Green Business” development and sustainable economic development that promotes a better balance between environmental protection, jobs, and wealth distribution. KLMSS economic development goals are closely aligned with a “Renewable and Clean Energy Development on Traditional Lands” project. Therefore, KLMSS is very interested in development of a biomass power project on traditional lands. The feasibility study looked at a site for a renewable energy power plant within the settlement community.

2.1 COMMUNITY PROFILE – KELLY LAKE MÉTIS SETTLEMENT SOCIETY

KLMSS is a not-for-profit Society registered in British Columbia under the Societies Act April 26, 2002. KLMSS is governed by corporate bylaws that define corporate and community governance. KLMSS has maintained their society in good standing and continues to meet all annual filing requirements.

In February of 2006 KLMSS members ratified their first official Constitution at their Annual General Meeting. The ratification of the Constitution truly marked a significant step to ensure a true representative and democratic governance structure for all residents of Kelly Lake. The Constitution defined 4 year terms for elected leadership, accountability measures for membership, processes to address issues, and definition for membership.

Presently KLMSS leadership continues to design strategies to ensure proper governance is designed for the community. In fact KLMSS recognizes that good governance leads to the ability to address the socio-economic issues facing the community; health, education, housing, and economic development.
KLMSS leadership continues to lobby both the Federal and Provincial Governments in this era of a “New Relationship” that has stressed the commitments of both governments to address socio-economic issues in all Aboriginal communities.

KLMSS consists of a group of Métis members that have a historic connection to the traditional territory since the early 1800s. The Métis community of Kelly Lake is often described as the only historically connected Métis community with historical roots in B.C. According to current leadership, the community has up to 350 people, approximately 138 of which are accredited members of KLMSS and their children living in the settlement. Another 56 accredited members (and their children) are living outside of KLMSS Traditional Territory. The remaining Métis are not accredited members, but look to the KLMSS for leadership. The population fluctuates as members move in and out of the community according to employment opportunities and family needs (health, education, housing, etc.).

KLMSS has focused on addressing governance and socio-economic issues facing the community. KLMSS has continued to identify contracting opportunities through various relationships and joint ventures. KLMSS has contracted services in mining, road upgrading, provision of dust control system, provision of camp services, and underground piping.

KLMSS leadership has stated that they want to create meaningful employment opportunities for their members in the Kelly Lake Traditional Territory. In spite of tremendous resources in the territory, there are few opportunities for employment in Kelly Lake and people often are forced to leave the community for work or commute to work, thereby putting a strain on families.

The average KLMSS member income in 2005 was estimated at $20,000 to $25,000 per family per annum. KLMSS is confident that secure employment and a successful housing initiative will ensure strong community health for the Métis people in Kelly Lake.

Population Demographics

KLMSS represents Métis members as defined in the KLMSS bylaws and constitution. In February 2009 KLMSS membership totaled 138:

- 62 Men
- 76 Women

KLMSS continues to review socio-economic needs for the Métis members by identifying information regarding the following areas:

1. Unemployment Rate: 36% (n=28)
2. Education Level
   a. Elementary: 47% (n=30)
   b. High School: 33% (n=30)
   c. College: 17% (n=30)
   d. University: 3% (n=30)

3. Percentage of KLMSS residents in Kelly Lake: 86% (n=28)

4. The average age of Kelly Lake members is: 35 (n=24)

2.2 COMMUNITY BENEFITS

Using locally available biomass fuel directly supports the community, economic, social, and cultural goals of KLMSS. A biomass fuel power project leverages community assets and resources and helps provide the foundation for future sustainable development. Among KLMSS’s significant assets and resources are its political status, cultural identity, legal rights and unique opportunities for economic development as aboriginal entities.

KLMSS will continue to hold to their traditional visions of community renaissance and values. Sustainable, efficient resource development requires the aboriginal nation to support the individual by creating an environment in which the whole community can thrive and prosper.
3 OBJECTIVES

The goals of the KLMSS are to develop economically viable energy production facilities using readily available renewable biomass fuel sources at an acceptable cost per kilowatt hour ($/kWh), to provide new and meaningful permanent employment, retain and expand existing employment (logging) and provide revenues for both producers and sellers of the finished product. The biomass power project will create urgently needed aboriginal employment opportunities and revenues, while providing energy in an environmentally sound manner. In addition to helping to meet area power demands, the project will help reduce dependency on imported non-renewable energy sources.

The biomass power project is of enormous importance to KLMSS in terms of its economic diversification and job creation. It will also be important to the region as there is an increased emphasis on renewable power within the whole country, and there is a projected shortage of power generation in an area of increasing population and business growth. Moreover, we believe that this project can serve as a catalyst for creating an energy-producing region which has many advantages:

- It will increase service reliability utilizing existing BC Transmission HV system, and
- It will create much needed economic development opportunities and diversification in the region.
4  METHOD OF IMPLEMENTATION

4.1 IMPLEMENTATION

The Initial Plan was to conduct the project in four distinct phases:

- Project Initiation
- Phase 1 – Conceptual Project Definition
- Phase 2 – Detailed Project Definition
- Phase 3 – Project Implementation

Specific tasks for each phase are outlined below.

Project Initiation

- Complete Project Feasibility Study
- Conduct project initiation meeting with the Ministry of Energy, Mines, and Petroleum Resources representative of Renewable Energy Development and representative of Electric Policy Generation and Regulation and meeting with BC Hydro and BC Transmission representatives on the 10 MW standing offer program

Phase 1 – Conceptual Project Definition

- Preliminary assessment of biomass fuels supply (sources, volumes, pricing, fuel value, current uses)
- Candidate technology assessment (equipment manufacturers, commercial viability, experience, capacity, fuel compatibility, impacts, site requirements, preliminary economics screening)
- Preparation of detailed site selection criteria (proximity to interconnect points, proximity to fuel source, transportation infrastructure, utility infrastructure, environmental considerations, land and buffer requirements, etc.)

Phase 2 – Detailed Project Definition

- Fuel supply strategy
- Project structure alternatives strategy (ownership definition, i.e. Joint Ventures (JV) or Partnership arrangements, operation and staffing responsibility, etc)
- Technology Screening / Technology Selection
• Site Selection
• Permit planning

**Phase 3 – Project Implementation**

The project implementation phase includes the following activities:

• Negotiate power purchase agreement
• Negotiate fuel supply agreements
• Negotiate equipment purchase agreements
• Transmission and connectivity filings and coordination
• Environmental permitting
• Engineering, Procurement and Construction contracts

4.2 **WORK PROCEDURES**

All work will be performed by bonded EPC Contractors in Phase 3 in accordance and with approval by the JV or Partnership arrangements.
5 BC HYDRO 10 MW POWER PURCHASE STANDING OFFER

5.1 INTRODUCTION

As directed by the British Columbia Provincial Government in its BC Energy Plan: A Vision for Clean Energy Leadership, BC Hydro is implementing a Standing Offer Program to encourage the development of small and clean energy projects throughout the Province of British Columbia. The program is a process to purchase energy from small projects with a nameplate capacity greater than 0.05 megawatts but not more than 10 megawatts (MW). In order to answer BC Hydro’s Standing Offer Program call for power, Kelly Lake Métis Settlement Society (KLMSS) is proposing to build a 10 megawatts alternative green and clean energy biomass generation facility near the Kelly Lake community which is approximately 120 kilometers Southeast of Hudson’s Hope, B.C.

The transmission and sales to Alberta through Alberta Electric System Operator (AESO) and under the System Access Service (SAS) Agreements is briefly considered but not pursued in this study as the power purchase agreement with AESO would generally not qualify as a long term power purchase agreement as the sale price for electricity is based on spot pricing and is viewed as high risk by most financial institutions.

The goals of the KLMSS are to develop economically viable energy production facilities using readily available renewable biomass fuel sources at an acceptable cost per kilowatt hour ($/kWh), to provide new and meaningful permanent employment, retain and expand existing employment (logging) and provide revenues for both producers and sellers of the finished product. The biomass power project will create urgently needed aboriginal employment opportunities and revenues, while providing energy in an environmentally sound manner. In addition to helping to meet area power demands, the projects will help reduce dependency on imported non-renewable energy sources.

The proposed biomass power plant site will be on KLMSS traditional territory and is to be within 5 to 15 km of the assigned electric service territory of BC Hydro Dawson Creek Substation (2552 DAW).

5.2 KLMSS SMALL RENEWABLE ADVANTAGE

While utility companies generally do not resist renewable energy in principle, in reality the argument exists since some “renewable” are generally unreliable (i.e. wind and solar) and tend to raise the average of embedded generation costs, and ultimately the price of power to consumers.

While most of BC Hydro’s electricity is produced from hydro, almost all of North-Eastern British Columbia’s electricity is purchased from Alberta and is produced from coal, and/or fossil fuels, the
province clearly has a sustainable supply of wood/biomass fuel to supply relatively small generating facilities such as KLMSS is pursuing.

5.3 BC HYDRO STANDING OFFER

In previous years, BC Hydro has issued a number of calls for power with varying requirements of the projects and participants. While these calls were successful in obtaining power for the province from both small and large sources, both BC Hydro and the provincial government were concerned that the administrative burden of participation in the calls was too great for small developers.

A Standing Offer Program has been designed to simplify the process, the contract and its administration, and to decrease the costs of participation for developers while remaining cost-effective for the BC Hydro ratepayer. The Program was developed to meet the need identified by the Energy Plan and embodies its policy and principles.

The Program is currently limited to Proven Generation Technologies, with the exception of nuclear power.

The Standing Offer Program Rules explain Program details including eligibility requirements, application process and the Standard Form Electricity Purchase Agreement (“Standard Form EPA”) terms and is on the BC Hydro Website.
6 BIOMASS FUELS ASSESSMENT

6.1 INTRODUCTION

This project investigated wood residue market dynamics within 50 km radius of possible procurement areas for wood energy projects at the plant site.

Project electricity can be generated using all or any one of the following renewable fuel types:

The first is the use of “hog/chipped” wood residue abundantly available from large industries in the Kelly Lake area, such as natural gas line transmission clearings and coal mining. The three local gas industries, BP, Encana, and Enbridge, have significant volumes of wood residues accumulated from their operations. There is currently no market for these wood residues, which has a high BTU output when burned. Currently, open fire is the only solution in reducing the volume of the accumulated wood residues. This supply is abundant for the foreseeable future and is widely available near the proposed project site. Chipping could be conducted at the landing and chips delivered to the plant site in “walking bed” trailers.

The second renewable energy fuel source is through existing wood residue suppliers. Generators of wood residue were contacted to determine volumes of wood residue currently generated, the nature of that residue and existing markets within which the residue is traded. These confidential interviews also included prices received for the wood residue, where it was sold and how far (and at what cost) it has to be transported.

Possible sources of wood residue were investigated including:

- Primary forest products industries,
- Secondary forest products industries, and
- Loggers.

"The pine beetle kill", as it’s known to British Columbians, refers to the millions of hectares of trees left for dead in the wake of the voracious insect. Forestry officials in Canada’s westernmost province estimate the volume of wood lost to be around 620 million cubic metres - roughly equivalent to 15 million logging truck loads.

According to a B.C. Ministry of Forests report, roughly half of the province’s pine trees are now destroyed by the bug, with the most extensive damage occurring in the central Canadian Rockies, where two-thirds of the region’s lodgepole pine forests have been transformed into a sea of orange needles. The harvesting of local pine beetle kill would be an ideal fuel source for generating power.
Local pine beetle kills are currently underutilized with very little or no market, they have a high BTU output when burned, are abundant and widely available near the proposed project site. Hogging and chipping would be conducted at the landing and hogg ed or chipped fuel delivered to the plant site by “walking bed” trailers.

In addition, producing biomass fuel from tree farms was also investigated as a long-term source of supply. As the project proceeded, the focus of the investigation evolved with more emphasis placed on those sources of material which seemed most promising. Both aspen and poplar are fast growing trees in the area. The use of “hogged or chipped” local aspen and poplar would be an ideal renewable fuel source for generating power. Both aspen and poplar are currently underutilized with little or no market, they have a high BTU output when burned, are abundant for the foreseeable future and are widely available near the proposed project site. Hogging and chipping would be conducted at the landing and hogged or chipped fuel delivered to the plant site by “walking bed” trailers. Tree farms can provide biomass fuel from whole-trees. Chippers can reduce entire trees to chips. These chips are sold for boiler fuel. A number of the land owners were contacted and some (over 240 acres on traditional land) have agreed to provide biomass fuel for $5 per m³ or $ 10/ton and have signed letters of intent and were included as part of the study.

The other renewable energy fuel source is “biomass fuel” clearing of logging residue (tree tops, limbs, stumps and brush). This waste residue comprises about 30% of the volume of trees now logged for the paper, wood, and wood products industries. This logging residue is unsightly and poses a greater risk for forest fire.

For power production the logging residue would be collected and cut to transportable size and then either chipped or trucked to the generation project site for hogging.

The advantages of using this biomass fuel are that:

- it is currently not fully utilized,
- it is abundant,
- it will clean-up logging cut areas, and
- it will provide new jobs to the area

### 6.2 LARGE NON-WOOD INDUSTRIES

Three large non-wood industries and their available wood residue were studied in this report. The study primarily accounts for transportation costs, which are dependent on the distances from the generation of the material to the power plant. These industries are:

- BP
- Enbridge
- Encana

It is estimated that over 15,000 m$^3$ per year of wood residues and wastes will be generated from each of the gas transmission industries clearing. The local gas industries have pledged to support the KLMSS project with an annual fuel contribution in an amount no less than 15,000 m$^3$ from each of their clearings.

6.3 WOOD RESIDUE GENERATING INDUSTRIES

Wood residue is not a high value resource and consequently is most economically traded in a fairly local market area which minimizes transportation costs. In the areas closest to the proposed project site, large gas industries and forest products industries are the largest, readily accessible source of wood residue.

Three types of industries were surveyed.

- Primary gas industries generate a large volume of wood waste from clearings.
- Primary and Integrated industries generally generate the highest volumes of wood waste.
- Secondary Industries use lumber and other intermediate wood products to produce final consumer products.

Any residue that is not used in products is either burnt in open fires or disposed of in landfills. Any energy facility would have to be competing for supply within these markets. Within all wood residue markets, the generators of the wood residue are price takers. For wood related industries, generation of the wood residue is a normal part of the production process and must be disposed of, the industries will send the material to any purchaser who pays the highest price after transportation costs are deducted. The one exception is in the case of an industry selling both their chips and their hog fuel to a pulp mill. In this case, producers are reluctant to separate these two waste streams.

6.4 TREE FARMS

In speaking with the land owners, it also became clear that more attention should be devoted to this possible source of supply.

Several land owners were contacted. And some are willing to sign letters of intent and have quoted a price of $5 per m$^3$ ($10 per ton).

To offer some perspective on the annual fuel requirements of the 10 MW power plant, it would require approximately 130,000 tons of fuel. It would require about 10 trucks per day with a truck that
holds 90 yards, to satisfy the fuel requirement. Therefore, supplying a 10 MW facility with biomass fuel from land owners or tree farms is very feasible over the long term.

Fuel assumptions

- Mixed species at 44 % moisture content (wet basis).
- Specific gravity = .50
- Btu/oven dry pound = 8,600
- Average Btu/green pound = (8,600 X .56) = 4,716
- Daily volume of fuel required for a 10 MW plant = 16.8 green tons/hour X 24 hours = 403.2 tons

6.5 SUMMARY AND CONCLUSIONS

There appears to be sufficient wood residue produced by the local large gas industries and forest products industries to fuel a 10 MW energy facility. The emergence of the pine beetle kill creates the opportunity to examine the possible use of selective logging of the beetle kill as a source of fuel. This could create sustainable employment within KLMSS and help thin out the pine beetle kill and further investigation of costs and production efficiencies seems warranted.

Tree farms also offer an opportunity for production of biomass fuels on traditional lands. Such farms are, at present, being managed by land owners and there is little or no market for the fibre produced. Given the current market, such farms are an economically viable option as a source of supply.
7  SITE SELECTION

7.1  INTRODUCTION

The original proposed power plant site, Block B DL 340, of approximately 40 acres is located on KLMSS traditional land adjacent to the Alberta boarder. Its close proximity to the highway will ensure ease of transportation. Also its proximity to Kelly Lake will ensure sufficient water supply to operate a 10 MW power plant. Total water requirement for the power plant will require about 6.3 l/sec (100 USGPM). It should be noted that it is over 65 km to the nearest BC Hydro HV connection. After preliminary discussions with BC Hydro, it is deemed unsuitable because of the high cost of new transmission and upgrading of the existing BC Hydro HV transmission system not to mention the time and cost for environmental impact study that is required for any new transmission systems.

It is decided that an alternate site to be found within 15 km away from the nearest connection point to the BC Transmission high voltage transmission system at the Dawson Creek Substation (2552 DAW) to export the electricity is desirable based on lowest costs and acceptable to BC Hydro. A 15 km three phase - HV transmission line may have to be constructed from the plant to the BC Transmission HV connection location.

The following criteria were used for site selection:

**Land**

- preference for land held in trust
- at least 40 acres in size, sufficient area for over a month of fuel storage
- relatively level, rectangular parcel
- no industrial land use prohibitions
- close proximity to biomass fuel
Utilities and Support Services

Reasonable access to gas, water, sewer, wastewater discharge. It is about 15 km to the nearest connection location to the BC Transmission HV systems.

Transportation

Good highway access with minimal seasonal weight restrictions.
Labour

The plant will employ 24 total full time employees (operators, material managers, and maintenance).

Environment and Community

- Surrounding land use compatible with industrial development (sensitivity to truck traffic, noise, visual impacts)
- Buffering adequate for residential and recreational use areas
- Community receptive to industrial development
- Anticipated air emission and wastewater discharge permits available for prospective site
8 TECHNOLOGY ASSESSMENT

8.1 INTRODUCTION

It was determined that the chosen technology would have to be practical and successfully utilized in other similar situations in order to provide a reasonable assurance of commercial viability. Technologies that are currently on the cutting edge of technology for similar situations were reviewed and eliminated. The selected biomass project would have to have a reasonable chance of economic success in order to justify the investment of the KLMSS’s resources.

Two primary techniques are utilized in the conversion of biomass fuel to power. These are:

- Direct Combustion
- Pyrolysis/Gasification

Direct Combustion

Direct Combustion is a proven and the most extensively used technology for existing biomass systems. Additionally, the existing successful direct combustion facilities primarily utilize lumber and wood waste, where the fuel is generated as a result of other industrial activity such as hog fuel, wood furniture scraps, etc. These materials are produced as the result of some manufacturing process on the raw lumber used onsite; such as cutting, trimming, sanding, etc. If not used as a source of fuel, the material would have to be handled as waste and disposal costs would be incurred. Thus, the cost of fuel is significantly reduced as opposed to purchasing biomass from a forest setting.

Pyrolysis/Gasification

Gasification is the process of converting biomass into a combustible gas. Any carbon-containing material can be converted into a gas composed primarily of carbon monoxide and hydrogen. This gas can then be utilized as a source of fuel such as may be used to drive a combined cycle gas turbine.

The gasification process controls the temperature and pressure to convert biomass into low or medium BTU gas in a reducing, or oxygen starved, environment. Gasification has been used for almost two hundred years. Early gasification development utilized coal as the source of fuel to make a gas referred to as town gas. Today, there are many research and test projects using wood wastes, forest cuttings, and manufacturing wastes.

The process generally has two steps: pyrolysis and char conversion. The pyrolysis step releases volatile components from the fuel when it is heated in an environment where the air in the reaction is typically much less than that found in the fire box of a boiler. The temperature is generally maintained between 400 °C and 600 °C to release a complex gas called syngas, producer gas, woodgas, etc.
Gasification appears to offer a promising future; as systems are developed and improved. A great deal of research has been conducted in the recent past, but overall cost to create power compared to contemporary power sources is still not practical. However, due to the currently unproven commercial nature, these units would not be applicable for the KLMSS needs.

8.2 SELECTED TECHNOLOGY

It was determined that the proven and practical methods for today are direct combustion. A direct combustion electrical power generation unit of 10 MW would be appropriate for the conditions in the KLMSS region. The amount of biomass to support the system is available, local regional needs would consume the electrical load, and existing distribution systems could handle, or be readily modified to handle the electrical load.

Facility Description

A 10 MW biomass fuelled power plant will utilize approximately 16.8 green tons per hour (t/hr) of biomass fuel to produce approximately 43 t/hr (94,000 lbs/hr) of 4.24 MPa (600 psig) of high pressure steam at 400 °C (750 °F) and up to 10 megawatts (MW) of electricity. The biomass fuel for the project will be primarily collected from the local area. The biomass fuel for the Power Plant will amount to about 130,000 green tons per year. The biomass fuel would be transported to the Power Plant by shuttle trucks.

The state-of-the-art Power Plant will consist of a biomass fuelled steam boiler capable of generating high pressure and temperature steam from biomass primarily collected in the local area, a 10 MW design capacity condensing steam turbine generator, a cooling tower, a biomass fuel preparation, storage and reclamation system, an ash handling system, and electrostatic precipitator, an electrical distribution/switch system, and a boiler/steam turbine/DCS control/and administration building.

Superheated high pressure steam generated from a biomass fuelled boiler is expanded in a condensing steam turbine-generator to produce electrical energy. A water cooled condenser will be equipped with the condensing turbine to maximize the negative condensing pressure. The cooling water to the surface condenser will be in a closed loop and heat from the condenser will be ejected in the cooling tower inside the closed loop. Make-up water to handle the evaporative and blow down losses in the amount of 6.3 l/sec (100 USGPM) will be provided for from well water. Electricity produced will be sold to B.C. Hydro.

The Power Plant cooling system will consist of a steam surface condenser connected to the steam turbine condenser, cooling tower, circulating water pumps, and auxiliary cooling system pumps. The cooling water will be pumped out of the cooling tower basin by the circulating water pumps, through the condenser and back to the cooling tower. Cooling water for the generator air coolers, lube oil coolers and other auxiliary equipment will be pumped from the circulating water line through the equipment and returned to the circulating water line by the auxiliary cooling system pumps.
The Power Plant air quality impacts will be minimized by providing the following emission control measures:

- Particulate from boiler flue gas will be removed in a mechanical (multiclone) dust collector and a multiple-field electrostatic precipitator before the flue gas is released to the stack for dispersion.
- The boiler will be equipped with low NO\textsubscript{x} burners if and as required and combustion air control instrumentation designed to minimize the emissions of nitrogen oxides (NO\textsubscript{x}) and carbon monoxides (CO).
- The equipment for removing, storage and disposing ash produced by the boiler will be enclosed and sealed to prevent escape of dusty ash. The ash will also be wetted and conditioned prior to disposal to eliminate dusting during hauling and landfill.
- The cooling towers will be equipped with mist eliminators designed to reduce mist droplets which may get entrained in the plume.

The Power Plant liquid effluent impacts will be minimized by providing the following measures:

- Plant waste water will be treated to neutralize acids and caustics and to remove oil, grease and suspended solids prior to discharge.
- Chemical storage tanks and turbine lube oil tanks will be curbed to catch potential spills of chemicals and lube oil.

The Power Plant will conduct safe solid and hazardous waste management practices to minimize air, water and soil contamination. These practices will include:

- Ash disposal in an approved landfill;
- Use of non-toxic corrosion inhibiting chemicals in the cooling and boiler feedwater treatment systems;
- Collection and recycling of lube oils and chemical containers; and
- Segregation of industrial wastes from laboratory and other plant operations for storage and regular disposal to an authorized waste treatment facility.

The Power Plant will be designed and operated to meet all current noise control guidelines and regulations. Noise control measures will be incorporated into the overall facility layout, equipment specification and selection, and operating practices.
### Design Criteria

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Energy Output at Full Condensing</td>
<td>10 MW</td>
</tr>
<tr>
<td>Generator Power Factor Design</td>
<td>0.85</td>
</tr>
<tr>
<td>Generator Electrical Voltage:</td>
<td>4,160 or 11,500 Volts</td>
</tr>
<tr>
<td>Maximum Steam Flow (Maximum Continuous Rating):</td>
<td>43 t/hr (94,000 lbs/hr) @ 4.24 MPa (600 psig)</td>
</tr>
<tr>
<td>Operating Pressure:</td>
<td>4.24 MPa (600 psig)</td>
</tr>
<tr>
<td>Operating Temperature:</td>
<td>500 °C (750 °F)</td>
</tr>
<tr>
<td>Feedwater Temperature at Economizer Inlet:</td>
<td>108 °C (228 °F)</td>
</tr>
<tr>
<td>Saturated Steam Carryover Moisture:</td>
<td>0.5%</td>
</tr>
<tr>
<td>Fuel Flow:</td>
<td>16.8 t/hr</td>
</tr>
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</table>
KLMSS – 10 MW Steam and Power Balance
Specific Performance Guarantees

Specific performance guarantees will be required. These will be based upon the following when firing at 100% of continuous maximum steam flow:

- **Steam Output**: 4.24 MPa (600 psig)
- **Steam Temperature (Temp.)**: 400 °C ± 5 °C (750 °F ± 10 °F)
- **Steam Flow**: 43 t/h (94,000 lbs/hr)
- **Steam Purity**: 0.5%
- **Gas Stack Temperature**: 350°F
- **NOx Emissions**: mg/Nm³
- **CO Emissions**: mg/Nm³
- **Particulate Emissions**: <50 PPM
- **Feedwater Temperature at Economizer Inlet**: 108 °C (228 °F)
- **Generator Voltage**: 4,160 or 11,500 Volts
- **Power Factor**: 0.85
- **Fuel Flow**: 16.8 t/hr

Fuel Description

An initial fuel analysis has been prepared; however, the following are general guidelines. The proposed fuel source also presents a number of technological challenges that must be overcome. These include variability in:

- Composition,
- Energy content, and
- Physical characteristics

Prior to finalizing the design, a formal fuel analysis will be prepared. The available fuel will be typical hogged clean fuel sized to the requirements indicated below:

- **Minimum Size**: Sawdust Particle (1/8” minus)
- **Maximum Size**: 100% <4”
- **Size Distribution**: 95% < 3”, 90% <2”

The dry basis Higher Heating Value (HHV) is 8,500 to 8,700 BTU/lb. It is assumed that the moisture content (MC) wet basis is typically between 45 to 50 percent with a maximum MC not to exceed 65 percent. The density of the wood is approximately 18 pounds per cubic foot (lbs/ft³).

The following table provides the Ultimate Fuel Analysis used for initial equipment design:
Carbon 51.0%
Hydrogen 6.0%
Nitrogen 0.3%
Oxygen 40.7%
Sulphur <0.05%
Chlorine <0.05%
Ash 2.0%
HHV (bone dry) 8600 BTU/lb

The ash softening temperature is greater than 1,320 °C (2,400 °F). The fuel will not contain tramp metal or rocks, or abnormal quantities of other materials such as silica, sodium, calcium or potassium other than which would normally form part of the wood cellular structure.

On-site storage will be designed for approximately 15 days. Conceptual design calls for the wood residue to be delivered in trailers complete with integral walking floors. The rear trailer doors will be opened and the truck will discharge the wood residue into a Fuel Storage area. Final design will be based on actual operations confirmed with fuel supply contractors.

8.2.1 Basic Components

Fuel Infeed System

The fuel supply contractors will deliver fuel to a fuel storage area. A frontend loader will move the fuel to a reclaim in which the boiler infeed system accepts the fuel and moves the fuel via conveyors in an environmentally acceptable and controlled manner into the combustion system.

Combustion System

The fuel which is conveyed from the reclaim will discharge into the metering bin complete with screw feeders which regulate the amount of fuel into the boiler combustor.

The combustion grate or combustion chamber floor will be constructed of high temperature alloy cast grates arranged in an inclined step fashion. The grates will be reciprocating in nature, and will continually and gently roll the wood residue and provide for complete carbon burnout.

All of the combustion controls required to provide operator interface both locally and remotely to monitor and efficiently control the combustion of the wood residue via a boiler control master will be included.

The combustion process transforms the waste wood into two products: ash and hot exhaust gases. The hot exhaust gases exit the combustion chamber and discharge directly into the steam generator (boiler). The ash will be handled for offsite disposal.
Steam Generation System

The hot combustion gases will enter into the steam generator (boiler). The steam boiler will be supplied in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code – Section 1, and will remove heat from the gases as the gas flows through the unit.

After exiting the boiler, the hot gases will enter an economizer which further removes thermal energy from the gas stream and transfers the heat into the inlet water. The gases then enter a flue gas system.

Flue Gas System

The cooled flue gases discharged from the economizer will enter a mechanical (multiclone) dust collector where the course ash particulates are removed from the gas stream and collected within a hopper. The flue gases will then be pulled by an induced draft fan into an electrostatic precipitator (ESP) where the fine particulates are collected in the ESP hoppers prior to exiting the stack. A continuous emission monitor (CEM) will be provided at the stack outlet to monitor the flue gas exit conditions on a continuous basis.

Electrical Generation System

The high pressure (HP) and superheated steam from the boiler outlet will be connected through HP piping to a steam turbine inlet throttle valve of a 15 MW condensing steam turbine-generator. The HP steam will be allowed to expand through the turbine and exhaust into a surface condenser to a negative pressure to convert the mechanical energy into electricity. The condenser is a surface condenser and cooling of the surface condenser is by cooling water which is interconnected with a cooling tower in a closed loop.

A 11,760 kVA generator and exciter will be self-regulated and generate electricity. The generator output in full extraction/condensing operation will be approximately 10 MW. The generator will automatically synchronize with the utility bus. The functions and data required for operation and monitoring the turbine generator will be interconnected with the main plant control system.

Ash Disposal System

The ash from the combustion of the wood residue fuel will come from three locations throughout the plant:

- the combustion chamber (coarse ash),
- the boiler and economizer hopper (fine ash), and
• the flue gas emission control system, mechanical (multiclone) dust collector hoppers and the ESP hoppers (fine ash).

The coarse ash may be handled separately from the fine ash to a bunker with front end loaders used for removal of the coarse ash and the two sources of fine ash may be connected together within one final transfer conveyor which conveys the ash into a standard dumpster for removal by truck.

Final disposition of the ash has not been determined, but it is likely to be a local municipal or commercial landfill authorized to handle such materials or return to land owners as fertilizers.

**Technical and Documentation Supply**

Initial design specifications calls for the EPC contractor to provide all of the Engineering, Procurement and Construction as required for the power plant.

A complete set of design drawings and documents are to be provided as follows:

- Foundation Outline and Loadings Diagrams
- General Arrangement Drawings
- Piping Drawings
- Electrical One Line and Three Line Diagrams
- Electrical Drawings
- Control Logic Diagrams
- Hydraulic Logic Diagrams
- Equipment Data Sheets
- Process and Control Diagrams
- Instrument Data Sheets
- ASME Code Component Drawings
- Breeching Drawings
- Insulation and Lagging Requirements
- Detailed Project Schedule

On site staff training will be provided by the EPC contractor both prior to start up and during the start up and commissioning activities of the plant. The total training period will be approximately thirty (30) eight-hour days, of which five (5) days will be in-class discussions of equipment covering operational theory and maintenance of the equipment.

**Schedule**

An approximate schedule of activities is:
- Equipment should be on site within 40 weeks from approval date of the engineering submittals.
- The erection of the equipment should be completed within 180 days after initial equipment delivery.
- The commission of the plant will require an additional 21 days to complete.
- All equipment will be scheduled for just-in-time delivery consistent with field erection scheduling. This minimizes field handling and aids in an efficient construction process.

The following is a summary of preliminary project durations:

**TIMELINE FOR PLANNING, CONSTRUCTION & PRODUCTION**

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Durations (Months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement of Equip</td>
<td></td>
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<tr>
<td>Site Prep., Found. &amp; Building</td>
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<tr>
<td>Engineering</td>
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<tr>
<td>Equipment Installation</td>
<td></td>
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<tr>
<td>Piping Installation</td>
<td></td>
</tr>
<tr>
<td>Commissioning and Start-up</td>
<td></td>
</tr>
</tbody>
</table>

The actual schedule will depend on a number of factors including engineering and fabrication schedules at the time of order, scope of equipment, and weather conditions during construction.
9  PROJECT ECONOMIC VIABILITY ASSESSMENT

Economic analysis and power production cost analysis was conducted to evaluate economic viability of a 10 MW plant at the KLMSS.

Cases were modeled to assess project viability with respect to the following:

- Capital Costs
- Project Financing Terms (interest rate, term)
- Fuel Costs
- Electricity Sale Price

The following assumptions were made for the economic modeling:

- On-line factor – 91.3%
- Plant operation labour force
- Total investment - $26.5 Million
- 15% equity financing
- 85% debt financing

Based on a 10 MW plant selling electricity to the grid at 90% net of the plant capacity, the plant would produce 72,000 MW hours (MWH) per year. At electricity purchase prices of $120.00 to 150.00/MWH would indicate annual gross revenues of $8.64 to $10.80 Million in its first full year of operation, respectively. At biomass fuel price at $15 per ton, the project suggests earnings before income tax, depreciation and amortization (EBITDA) of $4.61 and $6.77 Million for the first full year, respectively.

Our assessment has shown that project viability is highly dependent upon resolution of two issues:

- Acceptable costs and interconnection agreement with BC Transmission High Voltage (HV) system, and
- Purchase price for generated renewable power.

9.1  ESTIMATED CAPITAL COSTS

Capital costs associated with a 10 MW project have been estimated at $26.5 million as follows:

- Project Development Costs: $1.5 million
- Land: $0.5 million
- Permits: $0.4 million
- Turbines: $5.0 million
• Boiler & Combustion Equipment: $ 9.0 million
• Fuel Preparation Equipment: $ 1.5 million
• Buildings: $ 1.0 million
• Ancillary Equipment: $ 2.5 million
• Electrical and Substation: $ 2.5 million
• Construction: $ 2.6 million

9.2 SENSITIVITY CASES
Project economics relating to financing terms, capital costs, fuel costs, power costs, operating and maintenance, etc. were tested. Input to the financial models were varied to ascertain the key factors. The variables included:

• Fuel Costs
• Capital Costs
• Financing costs and length of service
• Potential sources of grants to reduce financing requirements
• KLMSS equity position and expected return on investment
• Revenue potential based on sales price of electricity produced

Fuel Costs
The data collected in this report suggests that current fuel costs from readily available local sources are in the range of $15 to 20/ton. Fuel costs are the overwhelming variable in the economics, and can affect the viability of the project. It is anticipated that KLMSS has the ability to stay within its target price range.

Capital Costs
The capital costs collected in this report reflect the costs generally required to construct a new biomass power plant in North America. The additional costs for constructing a 16 km three phase HV transmission line to the nearest connection point of BC Transmission lines have not been included in this report. The HV transmission line costs are the overwhelming variable in the economics, and almost disproportionately affect the viability of the project. Significant assistance from the gas transmission industries will be required to minimize the costs of the HV transmission lines and are necessary for project viability.

Project Financing Sensitivity Costs
We considered project financing sensitivity cases where debt financing was as low as 4 ½ % and as high as 8 % and for a period varying from as short as 8 years to as long as 10 years. While longer financing periods and lower rates certainly showed positive impacts on the project, they were not as
important as obtaining fuel costs at a rate less than what is currently available or the additional costs of the 15 km HV transmission line.

**Revenue Potential**

Various sale prices for produced electricity were modeled. This included on-peak and off-peak pricing, as well as a blended price. The blended price range was obtained through analysis of potential market conditions. It is found that the required sales price is most sensitive to fuel cost and capital costs.
10 PERMITTING AND ENVIRONMENT ASSESSMENT

Based on the current design criteria, the project is not anticipated to trigger an assessment under the BC Environmental Assessment Act (BCEAA), as it does not have a generating capacity over 50 MW, and will likely not involve the construction of more than 40 km of 500 kV (or greater) transmission line (Reviewable Projects Regulation, BC Reg. 370/2002). Further, the project is not expected to trigger an environmental assessment under the Canadian Environmental Assessment Act (CEAA). CEAA applies where the federal government has decision-making authority on a project (e.g., is a proponent; provides funding; provides federal land; or provides a licence, permit, or approval listed in the Law List Regulations).

Common environmental assessment triggers under CEAA include:

- Approval under the Navigable Waters Protection Act, should the project or transmission line cross a navigable waterway
- Authorization under the Fisheries Act, should the project or transmission line affect fish habitat.

The environmental approvals will be confirmed once more information on the project is available. In the absence of a requirement for a provincial or federal-level environmental assessment, the permitting process will be limited to a permit under the Environmental Management Act, as the project involves an activity listed in Schedule 1 of the Waste Discharge Regulation (burning or incineration of wood residue). Additional authorizations, such as Water Act approvals, may be required based on site-specific conditions and project activities.

Tasks required for completion of a waste discharge permit application are summarized below. Given the preliminary nature of the available project information, this is meant to provide an overview and does not constitute an exhaustive list of tasks.

- Development of a Terms of Reference (TOR) outlining the proposed scope of the technical report for the project. This is completed to ensure the application meets agency requirements for permitting the project and to allow an efficient review process.
- Pre-application meeting with Ministry of Environment (MOE) to discuss the proposed TOR and establish the scope of the assessment. This could be completed via conference call to minimize costs. The MOE would also provide guidance regarding agency referral and consultation requirements for the project.
- Notification of the public, agencies, and other stakeholders, as recommended by the MOE representative and prescribed under the Public Notification Regulation (BC Reg.202/94) including posting and publishing the application. Consultation with First Nations would be undertaken as directed by MOE and in accordance with the Provincial Policy for Consultation.
with First Nations. A consultation report would be prepared in accordance with MOE guidance for the application package.

- Site visit to confirm environmental and archaeological conditions on the site as summarized from the environmental baseline information. A registered professional biologist and archaeologist would complete the site visit to gather information for the technical report.

- Completion of an Archaeological Overview Assessment to identify lands within the proposed development area with potential to contain archaeological sites or areas significant to First Nations; identify potential conflicts between known archaeological sites, known traditional land use sites, and proposed project development activities; and provide recommendations for additional archaeological investigations as required.

- Air quality modeling and assessment in accordance with Guideline for Emissions from Wood-Fired Electrical Power Generation (Environmental Protection Division 2008), and Guidelines for Air Quality Dispersion Modeling in British Columbia (MOE 2008). The assessment will include the following tasks: regional ambient background and study area definition, climatology analysis, dispersion modelling, and technical reporting.

- Preparation of a technical report in accordance with Guidance on Applications for Permits Under the Environmental Management Act – Technical Assessment. Major report components would include a project description, environmental baseline information, impact assessment (including air emissions modelling, human health and ecological risk assessment, and an archaeological overview assessment), and a proposed discharge monitoring program.

- Compilation of the application package for submission to MOE. This includes standard forms, maps, and plans, as well as the technical and consultation reports for the project.
11 SOCIO ECONOMIC IMPACTS

An economically-depressed area, Kelly Lake is seen as the only Métis community with historical roots in B.C. having lived in the area since the early 1800s – membership of which approximately 138 adults live in the settlement with their children.

The intent and purpose of the project is to generate financial support and continue the diversification of the KLMSS's economy and revenue in order to increase, enhance, and improve the quality of life of KLMSS community members. KLMSS is proposing to develop an economically viable energy production facility using readily available, acceptably priced renewable biomass fuel sources. The project would provide new meaningful permanent employment, retain and expand existing employment (logging), and provide revenues for both producers and sellers of the finished product. KLMSS’s goals are those of economic stability, economic growth, and economic development.

KLMSS has focused on addressing governance and socio-economic issues facing the community and has continued to identify economic opportunities through various relationships and joint ventures. KLMSS has contracted services in mining, road upgrading, provision of dust control system, provision of camp services, and underground piping. To diversify the local economy and create employment opportunities that take advantage of technological advances and utilize resources that are currently underutilized, KLMSS is proposing to build an alternative energy project. The Kelly Lake alternate energy project will generate 10MW of electricity – enough to power approximately 7500 homes - using biomass from pine beetle killed fibre, agriculture and wood residue from forestry operations as well as other sources.

There is a need to provide permanent full-time employment opportunities in a diversified local aboriginal economy. The project would contribute to KLMSS employment and income. This project would have a positive effect on KLMSS economics, stimulating employment by creating construction and long-term jobs, while stabilizing the existing logging operations in the area. In addition, the project would provide career paths to some KLMSS people who choose to pursue them.

The estimated cost of a proposed 10 MW biomass facility is $26.5 million. It is anticipated that construction would cost $2.6 million. A significant portion of that cost would be for labour to construct the facility. We anticipate approximately 35 full-time equivalent construction jobs during the anticipated 1-year construction period. Many of these jobs would be filled by people who live in or travel to the area. The increased purchases from area suppliers and added income generated in the vicinity of the project would certainly have a beneficial impact on the economy.

The project is expected to create long-term employment, in addition to the construction jobs, and would also help sustain the long-term employees at the biomass facility. The biomass facility would be staffed 24 hours per day, 7 days per week. It is anticipated that the facility will require four shifts of about 24 -26 trained personnel in order to cover the weekends and holidays shifts.
Operators will require sophisticated training in operating the mechanical and electrical components of the facility and be licensed under BC Safety Branch. Additionally, the facility will serve as a training ground for KLMSS members to be licensed power plant operators.

The construction and operation workforce associated with the project is expected to consist of people who already live in or travel to the area, with tribal members receiving a preference, and as such is not expected to place a strain on local housing.

The project would utilize approximately 16.8 tons per hour of wood residue expected to be harvested from within a 50-km radius of the project site. This would be a beneficial addition to the local economy and provide additional employment in the logging industry.

The collection of the wood waste, in addition to providing environmental benefits and reducing the usage of fossil fuel, will also employ a number of new full time employees. These employees will work for the wood waste suppliers. It is estimated that this will include loggers, truck drivers and management support for those functions. In addition, the supplier will require new trucks and other equipment, which will also benefit the local and regional economy. The actual number of jobs created has not been estimated. This may also provide the impetus for new business development opportunities for KLMSS community. Economic developers generally use a multiplier of 4-7 jobs for every base manufacturing job created.

The effect on the level of provincial and local sales, property and income taxes cannot definitively be estimated. Additionally, the wages and benefits to the power plant operators are estimated to be in the range of $ 50,000 to $100,000 per year depending on the levels of the operators' certificate.

The benefits to the KLMSS communities, both on the community and in the surrounding communities, are substantial. The development of the Biomass Project would provide stable sources of new revenue and increase employment opportunities for KLMSS. The revenue generated would be used for badly needed improvements in KLMSS health care, housing, education, social services, community development, human resources, other services, and necessary infrastructure.

The project is clearly in the best interests of KLMSS. The project will provide new jobs and economic activity to KLMSS and the communities surrounding the settlement.
12 LONG TERM SUSTAINABILITY AND REPLICABILITY

12.1 KLMSS COUNCIL RESOLUTION PLAN

KLMSS Council fully supports implementation of a biomass fired power generation project on KLMSS traditional lands. A project of this type is consistent with KLMSS objectives to diversify their economic base and create economic opportunities. It is also consistent with the KLMSS’s concerns regarding environmental stewardship and maintaining cultural values. KLMSS Council has been fully informed of developments that have occurred throughout the feasibility study period.

12.2 PROJECT IMPLEMENTATION FUNDING

Project implementation funding will be anticipated to be comprised of a 15% contribution by KLMSS with the remaining 85% provided through supplier’s credit. The facility will either be operated by KLMSS or contracted to an operating and maintenance contractor, who will also be the plant operator.

12.3 ANTICIPATED BENEFITS AND ASSESSMENT PLAN

The potential benefits to KLMSS and its members include meaningful employment, revenues, reliable energy, diversification of economic base and infrastructure improvement. A biomass fuelled power plant is a good fit environmentally, socially, economically, and culturally.

12.4 TRAINING, OPERATION AND MAINTENANCE PLANS

Training, Operation and Maintenance plan details will be determined once financing and operation plans have been established. We anticipate the equipment vendors being heavily involved.
13 CONCLUSIONS

This effort has identified a potentially viable biomass-fueled renewable energy project using proven technology, and readily available and proximate fuel supplies for a 10 MW biomass fired power generation facility located near Kelly Lake, on KLMSS traditional territory.

Based on a 10 MW plant selling electricity to the grid at 90% net of the plant capacity, the plant would produce 72,000 MW hours (MWH) per year. At electricity purchase prices of $120.00 to 150.00/MWH would indicate annual gross revenues of $8.64 to $10.80 Million in its first full year of operation, respectively. At biomass fuel price at $15 per ton, the project suggests earnings before income tax, depreciation and amortization (EBITDA) of $4.61 and $6.77 Million for the first full year, respectively.

Our assessment has shown that project viability is highly dependent upon resolution of two issues:

- Acceptable costs and interconnection agreement with BC Transmission system, and
- Acceptable purchase price for generated renewable power.

Because of these factors, it is clear that in order to keep the transmission cost low, the power plant site has to be close to BC Hydro grid. The ideal plant site should be no more than 15 kms with BC Hydro substation in Dawson Creek Substation (2552 DAW). KLMSS will have to consider purchasing or leasing a power plant site of 40 acres. And then there is the additional cost of $3.75 million for the 15 km HV transmission line to the BC Hydro interconnection point.

The current anticipated purchase price as offered by BC Hydro for green and renewable power will probably not support the costs of about 15 km of HV transmission connection. As plans were being discussed with the gas transmission industries to improve the global green house gas emissions by converting their gas-fired turbines for the gas transmission compressors to electricity drives, it will be necessary for the gas industries to construct HV transmission lines to service these compressors. It will possibility for KLMSS to negotiate with the local gas industries to connect to the gas industries’ new HV transmission line.

While over 85-percent of British Columbia’s electricity is produced from hydro, the province clearly has a sustainable supply of biomass fuel to supply a relatively small generating facility such as KLMSS is pursuing.

Our analysis to date demonstrates that there is an ample supply of fuel material and numerous large industrial operations in the area. In order for KLMSS to be comfortable investing in biomass-fired power plants, it must be assured of a predictable, attractive fuel price and a reliable, sustainable supply mechanism. Potentially viable fuel supply alternatives that have been identified include:

- Contracting with locals for delivery of biomass (pine beetle kill and gas transmission site clearings) to on-site hog fuel storage.
• Contracting with locals for delivery of logging residue (treetops, limbs, etc.) to on-site chipping operations.
• Developing a KLMSS venture to supply logging residue to on-site chipping operations or deliver chips directly to the plant site.
• Contracting local landowners (tree farms) for delivery of wood chips to on-site chip storage.

The current price paid for biomass fuel materials that are suitable for fuel use in areas near traditional lands ranges from a low of $10 to $20/ton. KLMSS is hopeful that it could obtain an average fuel cost of less than $15/ton.
14.1 APPENDIX A - BIOMASS FUEL SURVEY INSTRUMENT

FUEL SUPPLY AGREEMENT

THIS AGREEMENT is dated for reference the _______ day of _____________, 2009.

BETWEEN:

The Kelly Lake Métis Settlement Society

(the “Buyer”)

AND

________________________________________

(the “Seller”)

WHEREAS:

A. The Seller owns wood products comprised of tree logs, branches, and/or byproducts including sawdust or chips (the "Fuel");

B. The Buyer intends to use the Fuel in the production of electricity on a continuing basis and the Seller is prepared to supply the Buyer with the Fuel for such purpose; and

C. The Buyer and the Seller wish to agree to terms for the supply of the Fuel;

NOW THEREFORE in consideration of ten ($10) dollars and the mutual covenants herein contained and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged by each of the parties hereto, the parties agree as follows:

1. SALE AND PURCHASE

1.1 With effect from__________________ 2009 (the “Commencement Date”), the Seller agrees to sell to the Buyer the following aggregate volume of Fuel on an annual basis for the duration of the Term (as defined below) of this Agreement and on the terms and conditions set out therein:

OPTION A ☐ a minimum of ________ cubic meters of Fuel at a cost of ________ dollars per cubic meter of Fuel (the “Delivery Fuel Cost”) which shall be delivered to the Buyer’s place of business at__________________________

or

OPTION B ☐ a minimum of ________ cubic meters of Fuel at a cost of ________ dollars per cubic meter of Fuel (the “Pick Up Fuel Cost”) which shall be picked up by the Buyer at the Seller’s place of business at__________________________
2. **ORDERS, SHIPMENT**

2.1 Orders will be placed monthly or quarterly by the Buyer.

3. **RISK AND TITLE**

3.1 Risk in the Fuel shall pass to the Buyer upon delivery. The Seller shall retain ownership of the Fuel until the Seller has received payment in full for the Fuel.

3.2 Until ownership of the Fuel passes to the Buyer, the Buyer shall insure the Fuel against all usual and commercially standard risks to full replacement value.

4. **SELLER’S OBLIGATIONS**

4.1 The Seller will obtain and maintain at its expense, and cause any approved subcontractor, contractor or agent to obtain and maintain, with respect to and for the duration of the Term, appropriate commercially standard insurance covering its obligations under this Agreement.

4.2 If the Seller is not able to procure and maintain insurance required by this agreement, then the Buyer may immediately terminate this agreement by written notice to the Seller.

4.3 The Seller will at its expense provide the Buyer such written reports relating to the provision of the fuel under this agreement as the Buyer may reasonably require, and the reports will be in such form, with such detail and submitted at such frequency and times as the Buyer may reasonably require by written instructions to the Seller.

4.4 The Seller will produce, maintain and retain records relating to the provision of the fuel under this agreement. Such records will include, but not be limited to the following:

   (i) all monies received by the Seller from the Buyer or anyone on behalf of the Buyer, and the date of receipt thereof; and

   (ii) all monies disbursed by the Seller pursuant to this Agreement and the date and purpose thereof.

4.5 All records will be maintained in accordance with generally accepted accounting principles in appropriate account classifications and in such detail as may be required to enable the Buyer to monitor and verify same, and will properly reflect the activities and transactions represented thereby.

4.6 Unless otherwise set out herein, the Buyer will at all reasonable times be entitled at its own expense to inspect and obtain copies of all records and accounts kept by the Seller and relating to the provision of the fuel.
under this agreement, and will be supplied at its own expense with copies of all reports, statements and certificates material to the fuel, together with such explanations thereof as the Buyer may reasonably require.

5  REPRESENTATIONS AND WARRANTIES OF SELLER

5.1 The Seller hereby represents and warrants to the Buyer that:

(iii) this Agreement has been duly executed and delivered by the Seller and is a legal, valid and binding obligation of the Seller, enforceable in accordance with its terms;

(iv) the Seller has or has available to it the knowledge, experience and expertise to provide and deliver the Fuel as required by this Agreement, and acknowledges that the Buyer is entering into this Agreement in reliance upon such representation and warranty; and

(v) the Seller warrants that upon delivery or pick up of the Fuel (as the case may be) such Fuel shall be sold with good, merchantable and clear title.

6  BUYER’S OBLIGATIONS

6.1 The Seller will issue an invoice for the payment of the delivery fuel cost or the pick up fuel cost (as the case may be) at the time of fuel delivery or pick up. Such invoice will become due and payable within forty-five (45) days of the fuel delivery or pick up.

6.2 The Buyer may deduct any amount which it disputes or disagrees with from the invoice and advise seller in writing. The Buyer and the seller will use all reasonable commercial efforts to resolve such discrepancies, disagreements and disputes arising from the disputed invoice. The Buyer will pay the part, if any, of the invoice which is not affected by the discrepancy or over which there is no disagreement or dispute. Payment of any invoice or disputed portion of such invoice will not be due until any dispute in respect thereof is settled.

6.3 The delivery fuel cost and/or the pick up fuel cost includes all sales, value-added, goods and services (gst) or similar taxes or other duties, rates, charges, license fees and/or levies payable in respect of the fuel (the “charges”), including but not limited to its harvesting, refinement or production prior to its delivery to or pick up by the Buyer (as the case may be). The seller will be solely responsible for remitting any and all amounts collected and arising from the charges to the appropriate statutory authority. Further, the seller covenants and agrees to pay and be responsible for all income taxes, employment insurance, Canada pension plan, and all other taxes (including gst), charges and contributions levied as required by all competent governmental authority in respect of the monies paid to the seller under this Agreement. The seller shall indemnify and hold harmless the Buyer from all assessments, claims, demands, costs, expenses and liability that the Buyer may suffer or incur with respect to such taxes, charges and contributions and the seller's failure to pay or remit same, and the seller agrees that the Buyer may set off
any such assessments, claims, liabilities, costs, expenses and damages against any fees or other amounts payable by the Buyer to the seller.

7. COMMUNICATIONS

7.1 No announcement or press release about this Agreement or the subject matter hereof will be made by the seller unless the Buyer has given its prior written consent to such announcement or release, which consent may be withheld for any reason.

8. LIABILITY

8.1 In no event will the Buyer be liable to the seller for any indirect, consequential, special, incidental or contingent damages of any nature whatsoever, including but not limited to loss of revenue or profit, or loss of use of either, or costs of capital.

8.2 Each party agrees to indemnify and hold harmless the other party and its respective employees, agents, contractors, officers, directors and permitted assigns (the “indemnified parties”) from and against any claims by a third party, and any resulting judgments, expenses (including reasonable lawyer’s fees), damages and awards arising out of or resulting from its errors, omissions or negligent acts, except to the extent that such claim arises out of or results from any error, omission or negligent act of the indemnified parties.

9. TERM AND TERMINATION

9.1 The term (the “Term”) of this Agreement will begin on the commencement date and end five (5) years thereafter, unless extended by mutual consent in writing of the parties or earlier terminated in accordance with the terms of this Agreement.

9.2 This Agreement may be terminated:

(vi) by written Agreement of the parties;

(vii) upon a material default in the performance or observance of either party’s obligations hereunder and failure of the defaulting party to remedy such default within forty-five (45) days of receiving written notice of the default from the non-defaulting party; or

(viii) immediately upon either party becoming bankrupt or making an assignment for the benefit of creditors, or upon a receiver or trustee in bankruptcy being appointed for either party, or upon any proceeding in bankruptcy, receivership, or liquidation being instituted against a party and continuing for thirty (30) days without being dismissed, or upon a party otherwise ceasing to exist;

provided that any right of termination set out above will be in addition to all other rights and remedies available to each party, if any, for default or wrong-doing by the other party.
9.3 if this Agreement is terminated by either party for any reason except by the Buyer under section (vii), the Buyer will pay to the seller, except for any disputed account(s) or portion(s) thereof, the delivery fuel cost(s) and/or the pick up fuel cost(s) owing prior to the date of such termination.

9.4 The Seller will ensure insofar as possible and practical, that all contracts entered into by the Seller with third parties in connection with the provision of the fuel will be completely performed on the expiration or termination of this Agreement or as soon thereafter as possible, and that such contracts will not be accompanied by other or further liabilities of the seller or the Buyer continuing after expiration or termination and that any outstanding warranties under such contracts are assigned to the Buyer (or if not assignable, then Seller will continue to hold such warranties as trustee for the benefit of Buyer).

10. **GENERAL**

10.1 This Agreement may not be amended or modified except by written Agreement signed by both parties.

10.2 The Seller will not assign, transfer or otherwise dispose of any or all of the rights, duties or obligations granted to it under this Agreement without the prior written consent of Buyer, which consent will not be unreasonably withheld. The Buyer will be permitted to assign any or all of the rights, duties or obligations granted to it under this Agreement to another party of its choosing without restriction.

10.3 This Agreement may be executed in counterparts with the same effect as if both parties had signed the same document. This Agreement may be executed by the parties and transmitted by facsimile or electronic transmission, and if so executed and transmitted this Agreement will be for all purposes as effective as if the parties had delivered an executed original Agreement.

10.4 This Agreement and all appendices attached hereto comprise the entire Agreement between the parties with respect to the fuel and supersede all previous representations, warranties, dealings, agreements, understandings and expectations of the parties regarding the subject matter hereof, and there are no other representations, warranties, understandings, conditions, agreements, or expectations except as set out in this Agreement.

10.5 This Agreement will ensure to the benefit of and be binding upon the parties, and their respective successors and permitted assigns.

10.6 Both parties hereby undertake to do such further acts and take such steps as may be reasonably required to implement the intent of this Agreement.

10.7 This Agreement will be governed by and construed in accordance with the laws of the province of British Columbia and the parties hereto attorn to the exclusive jurisdiction of the courts of British Columbia.
10.8 Both parties shall keep the terms, content, and conditions of this Agreement confidential except as may be required to enforce any provision of this Agreement or as may otherwise be required by any law, regulation or other regulatory requirement.

10.9 Neither the seller nor the Buyer shall be deemed to be in default hereunder if prevented from performing its obligations resulting from this Agreement by reason of any of the following circumstances beyond its reasonable control, occurring after the commencement date including: acts of god, fire, explosion, war or acts of any government or international or supranational authority having jurisdiction over the parties hereto. The party prevented from performing its obligations by reasons referred to in the preceding clause shall inform the other party to that effect by courier or facsimile transmission immediately. It is agreed that during the period of any such circumstances the obligations of the parties shall be suspended. If, however, either the seller or the Buyer is prevented or is reasonably to be expected to be prevented from the delivering or taking off quantities ordered hereunder, either party may cancel such deliveries by written notice to the other party. Nothing in the foregoing shall relieve either party of any obligation in relation to goods already shipped.

10.10 Headings used in this Agreement are for the convenience of reference only and do not form a part of this Agreement and are not to be used in the interpretation hereof.

10.11 The parties hereto are independent contractors. This Agreement creates no relationship of a joint venture, partnership or agency between the parties. In no event will either party’s staff be considered agents or employees of the other party. Neither party has any right or authority to assume or to create an obligation on behalf of the other.

10.12 The parties each acknowledge that they have not relied upon the other party to this agreement for advice, whether legal or otherwise, in connection with this Agreement and the parties further acknowledge that they have each been advised to seek independent legal advice with respect to same.

10.13 Unless indicated otherwise, all notices, invoices or other documents under this Agreement may be delivered only by personal delivery or by registered or certified mail, or facsimile transmission, all postage and other charges prepaid, at the address for such party set forth below or at such other address as any party may hereinafter designate in writing to the others. Any notice personally delivered or sent by facsimile transmission will be deemed to have been given or received at the time of delivery or facsimile transmission. Any notice mailed in the manner described herein will be deemed to have been received on the expiration of five (5) days after it is posted, provided that if there will be at the time of mailing or between the time of mailing and the actual receipt of the notice a mail strike, slow down or labour dispute which might affect the delivery of the notice by the mail, then the notice will only be effected if actually received.

If to Seller:

_________________________
_________________________
_________________________
10.14 Failure of any party hereto at any time to require performance by the other party of any provision hereof will in no way affect the full right to require such performance at any time thereafter (always, however, in accordance with the provisions hereof) and no waiver by any party herof of any breach of condition, covenant or agreement herein constitutes a waiver of such condition, covenant or agreement except in respect to the particular breach giving rise to such waiver. Any such waiver will be effective only if made in writing by the party entitled to waive the provision.

10.15 Each party shall designate a representative who is authorized to act on behalf of that party and receive notices under this Agreement.

10.16 In the event that any part, section, clause, paragraph or subparagraph of this Agreement will be held to be indefinite, invalid, illegal or otherwise voidable or unenforceable, the entire Agreement will not fail on account thereof, and the balance of this Agreement will continue in full force and effect.

10.17 Each of the parties hereto hereby acknowledges that the recitals hereto are true and correct and are incorporated into and are deemed to be an integral part of this agreement.

10.18 All references to money in this agreement will mean the lawful money of Canada.

10.19 The terms and provisions, covenants and conditions contained in articles 3, 4, 5, 6, 8 and 10 will remain in force, survive indefinitely and be binding upon the parties, their successors and their permitted assigns notwithstanding any expiration or other termination of this Agreement for any reason whatsoever.

10.20 Time is of the essence of this Agreement.

IN WITNESS WHEREOF the parties have executed this Agreement as of the date first above written.

SIGNED by the Kelly Lake Métis Settlement Society on behalf of the Kelly Lake Métis Settlement Society, pursuant to the consent of the majority of the directors of the Kelly Lake Métis Settlement Society at a meeting duly convened, in the presence of:
Witness: _______________________________

Director

Per: _______________________________

Authorized Signatory

(print name of witness to all of the signatures)

(signature of witness)

[◊Insert Name]

[◊Insert Name]