Unity Bay Energy Ltd.

Power generation through renewable resources

750 KW Wind Turbine Farm
Nain, Labrador

Environmental Assessment Registration

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Unity Bay Energy Ltd.

Unity Bay Energy Ltd. is a Newfoundland and Labrador privately owned electric power generating company.

Business of the Corporation: The company is in the business of generating and marketing electrical Green Energy sourced through long-term renewable sources. The products and services of U.B.E.L. are designed to be purchased by retail electrical power supply companies, large commercial customers and residential consumers throughout Newfoundland and Labrador, Canada and around the world. Unity Bay Energy Ltd. is involved in power site analysis and development, site management, power project management, commercial needs analysis and power generation marketing.

Mission: To be a world leader in electrical energy supplied through long-term renewable resources.

Immediate Goals: To have U.B.E.L.'s renewably sourced projects reduce green house gas emissions by 1 million tonnes per year by 2008. This can be done by supplying 100 megawatts of power.

Overview of Project:

Unity Bay Energy Ltd. is planning to construct and operate a 750 KW wind turbine generator (WTG) farm in Nain, Labrador, Canada. (See Map #1).
It is planned to have 15 50 KW wind turbines generating a total of 750 KWs. The power generated from these WTG's will be used to complement the power already produced at the diesel generating plant. This renewably sourced electrical power will be used to reduce the diesel costs at the diesel plant as well as reduce green house gas emissions (GHG). The farm will be located just to the SSE of Nain on the flatted hills approximately 1 km west of South Channel Cairns. Refer to the topographic map in the Appendix. The proposed site is approximately 650 feet high. This location gives easy access to the Hydro plant without running transmission wires through the town of Nain.

NAME OF UNDERTAKING:

Wind Turbine Generation Farm-
Nain, Labrador

PROPONENT:

1. Name of Corporate Body:

Unity Bay Energy Ltd.

2. Address:

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3. Chief Executive Officer and Principal Contact Person for Environmental Purposes:

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THE UNDERTAKING:

1. Nature of the Undertaking:

To construct, and operate a 750 KW wind turbine generator farm in Nain, Labrador. This renewably sourced energy will be sold to Newfoundland and Labrador Hydro.

2.Purpose/Rationale/Need for the Undertaking:

(a) To reduce the real and associated costs of diesel fuel at the Newfoundland and Labrador Hydro (NLHydro) diesel generating plant in Nain, Labrador by providing lower cost renewably sourced electrical energy.

(b) To reduce carbon dioxide, sulfur dioxide, and nitrous oxide and all other associated hydrocarbon emissions.

(c) The global wind energy potential, excluding environmentally sensitive areas, is roughly five times the current global electricity use.

(d) Wind power is the fastest growing energy source with sustained growth rates in excess of 30% per year. At the beginning of 2003, world-wide wind-generated capacity exceeded 31,000 megawatts.

(e) In the last decade the cost of wind generated electricity was typically $.30/kilowatt-hour. Today's costs range from about $.08/kilowatt-hour at a site with wind speeds averaging 29km/hr. to about $.12/kilowatt-hour for sites with wind speeds of 22km/hr. Even lower rates can be achieved at large wind farms through economies of scale. (David Millborrow, Wind Power Monthly, January 2002.)

(f) Presently, Canada has about 205 megawatts of electricity generated from wind power plant installations which produces

about 449,000,000 kilowatt-hours of electricity per year-enough to supply 56,000 homes. If this electricity is used to displace fossil fuel generated electricity, it avoids discharging 449,000 tons of carbon dioxide into the atmosphere annually.

(g) The Right Honourable Mr. Herb Dhaliwal states " As minister of Natural Resources Canada, I am proud to support a new program that furthers our commitment to wind power. The Wind Power Production Incentive (WPPI), with a budget of $260 million over 15 years, will encourage the development of a wind power industry in Canada...I invite all interested stakeholders to take advantage of the WPPI and to work with the Government of Canada to contribute to the quality of life all Canadians through the sustainable development of our Natural Resources."

(h) Canada's largest wind power plant is in the Gaspe region of Quebec. The Le Nordais project currently has 133 750 kilowatt turbines producing100 megawatts of electricity at two locations-Cap Chat and Matane

(i) The benefits of wind energy are very long-term, with a life span of 25-30 years it ensures electricity price stabilization without the uncertainty of fossil fuel price fluctuations

DESCRIPTION OF THE UNDERTAKING:

1. Geographic Location: The proposed location for this project is

adjacent to the town of Nain, Labrador, Canada. Labrador is the land portion of the province of Newfoundland and Labrador. Labrador is located on the eastern edge of the Province of Quebec in Canada. (See Map # 1 in the Appendix).
The exact location of the proposed windmill site is located at 61 degrees 41' west. and 56 degrees 32' north. The area to be used will be approximately 2,000 metres in length by approximately 500 metres in width at the widest point. The total area to be used is approximately 30 Hectares (approximately 78 acres). The area runs NNE by SSW. Please refer to the Nain, Labrador North District topographic map provided in the Appendix for complete visual details.

2. Physical Features: The major physical features of this project are:

a) Wind Turbine Generators. The proponent plans to erect 15 50 kilowatt turbines on the site. Each WTG will sit on a 24-30 metre high, galvanized steel, 3 legged, bolted lattice self supporting triangular base that is 12ft from leg to leg to leg. A full description of this tower is provided in the Appendix. Each WTG has a 15m diameter 3-blade rotor with a swept area of 1902ft^2.

Key Specifications of turbines:

i) Rated electrical power: 50 kW @ 12 m/s (25.3 mph).
ii) Shut down is @ 22.4 m/s (50 mph).
iii) Survival Peak is @ 59.5 m/s (133mph).
iv) Rotor speed is 65 rpm @ 12 m/s (25.3 mph).

b) Control Panel Room (CPR). Located on the site which will house all the controls for the on-site electrical portion of the project. The CPR will be approximately 12' by 12' by 8' high

and sit on a concrete base. Inside the CPR the electrical power from all the WTG's will merge The electrical wiring will then leave the CPR and go to the Newfoundland and Labrador Hydro (NLHYDRO) diesel generating plant located in the town of Nain via transmission poles.

c) Storage Shed. The proponent will be putting a storage shed on the site. The storage shed will be made with a steel bottom and aluminum sides and top. The shed will be used to store extra parts for the turbines such as extra rotors, hubs, turbine and small all-terrain vehicles. The dimensions will be as follows: 54' long by 10' wide by 10' high. A portion of the storage shed will be used as a security office. A clearing will be made and then levelled with a structure to place the shed

d) Neo-Arctic Living Quarters. (NALQ) An efficient living quarters designed for the extreme north. Energy efficient, compact and comfortable with full electrical power. Including an electrical dry composting toilet, lots of light, heat and modern conveniences . The NALQ will be approximately 20' by 20'.

e) Transmission lines. Transmission lines will be used to bring power to the Hydro plant. Single pole transmission poles will be used and are approximately 10-15 metres high. Poles are made of untreated wood. Three phase wires will be used approximately 1 metre from the top of the poles. The cleared right of way will be approximately 5.4 metres. The total distance that the line will travel be approximately 1500 metres.

f) The Physical and Biological Environment. Generally, Nain and the coast of Labrador is hilly however, the proposed site is on flat land with minor sloping hills (<15-20 degrees) with moss and Caribou moss overstory. These "coastal barrens" carry

approximately 10cms up to 1 metre of dark topsoil over the quartz granite bedrock underneath. No mammals or birds have nests or homes on this particular area. Sparse shrubs exist but no trees. See figure 1 "**The Environment**" in the appendix for several colour views of the site's environment.

g) Environmental Intrusions of physical attributes:

(i)Transmission line poles will be dug into the ground or bolted to the bedrock depending on where the poles will be situated and secured with guy wires.
(ii) The overstory and topsoil will be cleared to bedrock for each of the WTG's then, anchor bolts for the towers will be drilled into the bedrock and a cement foundation added to level off the tower.
(iii)The Storage Shed, CPR and NALQ will be put on a level foundation.

h) Present Land Uses:

i) Presently the proposed area is used for minor recreational hiking. Landmarks such as large boulders (those over 6 feet high) will remain as part of the landscape. Berries grow on the hills leading up to the site but there is no berry picking on the proposed site .

3.CONSTRUCTION: The Construction will take place in three phases and will be carried out by contract forces managed by Labrador Coastal Equipment Ltd.

Phase One: Pre-Turbine installation. This is tentatively set for September 2003. This will consist of preparing the foundations of the wind turbine towers, storage shed, CPR, and the NALQ. This will

take approximately 2-3 weeks.

Phase Two: Wind Turbine Installation. This stage is tentatively set for mid-September early October 2003, depending on delivery factors this could be staged in the spring of 2004. This stage will take approximately 2 weeks. It will consist of bringing the turbines, blades, towers and major construction materials from the dock in Nain to the site. This will be carried by helicopter services using a KAMOV KA-3211bc helicopter. This helicopter is specifically designed for carrying heavy construction loads and is in use for many remote situations in Canada. (See photo and specs in Appendix). Installation of the tower will be done by the Kamov. There is an existing un-paved road that goes about halfway up to the site smaller, lighter materials will be brought to the site using all terrain vehicles and the existing road. Construction of the CPR and NALQ will also begin during this phase.

Phase Three: Transmission lines installed. This phase will take 7 days and is set to commence in mid-October 2003. Poles will be installed 3 metres into the ground or bolted to the bedrock. Approximately 20 poles/ kilometre will be used. Final construction of all on-site structures and commissioning of electrical hook-up to Newfoundland and Labrador Hydro will be completed during phase three.

a) Construction Activities: The major construction activities of the installation of the Wind Turbines are as follows:

- surveying,
- clearing,
- preparing foundations,
- tower installations,
- building and framing of structures,
- material handling,

- pole installations,
- laying of wire
- and cleanup/rehabilitation.

b) Potential Sources of Pollutants.

The potential sources of pollutants will be from hydrocarbon leakage from equipment. All equipment will be inspected routinely to ensure that no hydrocarbon (i.e. gasoline, diesel fuel, and lubricating oils) leaks occur. Appropriate buffer zones will be maintained between equipment and any potential environmentally sensitive areas. The contractor will be responsible for restoring and cleaning the site to a level that is acceptable to Unity Bay Energy Ltd., Labrador Coastal Equipment Ltd. and to all necessary Provincial Government Departmental officials.

c) Potential Resource Conflicts:

(i)There are no protected water supply areas in the construction area.

(ii) Nain and the surrounding area around is not a legally protected Ecological Reserve, however, it is an Important Bird Area (IBA). This stretch of coastline is an important area for sea ducks and breeding seabirds. The proposed project is located approximately 200 metres (650 ft) above sea level.

(iii) Avian Collisions: There has never been a WTG on this site , the actual amount, of avian collisions, if any, is unpredictable at this point of the project. Historically, birds are not often affected by wind turbines. Certain species of birds adapt quickly to wind turbines others do not, it does depend on the bird species.

a)Some wind farms have no avian mortalities:

- 156 turbines were studied at Tehachapi Pass in California in1991 *(Orloff 1992)*. No avian fatalities
- 9 month study of 3 wind turbines in Algona Iowa (*Demastes and Trainor 2000)*. No avian fatalities
- 6 month study of 8 Turbines in Somerset County, Pennsylvania (*Kerlinger and Curry 1999*). No avaian fatalities.
- No raptor fatalities were recorded during a 2 year study at SeaWest's Mojave Park Windplant in Tehachapi Pass *(Colson and Associates 1995)*.

b) Other wind farms have recorded avian fatalities:

- In a 2000 study of 360 turbines in San Gorgonio, 42 fatalities occurred over a 15 month period.
- At Montezuma Hills 13 fatalities occurred during a 10 month study of 76 turbines.
- Buffalo Ridge Minnesota's 73 turbine wind farm recorded eight fatalities during the initial 2 years of operation *(Higgins 1996)*

Identified areas of concern have been with those wind farms or turbines that are close to shore as this is where waterfowl and shorebird mortality has been present. Unity Bay Energy Ltd. is committed to recording all avian collisions, and provisions will be set forth under the guidance of The Canadian Wildlife Service of the Department of the Environment. This includes recording any and all avian collisions and documenting them to Canadian Wildlife Services. It is important to note that wind turbines **reduce GHG emissions** and therefore improve the environment and the survival rate of **all** species. Please see attached Avian Collision Research Document in the Appendix.

Special New Document: Attached in Appendix. Entitled...

"*The Baseline Information Requirements for Evaluation of Effects of Wind Power facilities on Migratory Birds in Atlantic Canada" - Canadian Wildlife Service.*

The proponent is committed to conforming with *the Migratory Birds Conservation Act* and *The Species at Risk Act* and Provincial Wildlife Legislation during all phases of the project.

Steps taken by Proponent:

- Marked Blades for Birds
- NL Department of Tourism, Culture and Recreation/Inland Fish and Wildlife Division have been contacted, and have received our photos of the area as well as a topographic map of the proposed site. Their advice has been requested concerning migratory birds, breeding areas, and wintering areas
- Zoologists and Botanists have been contacted from the Atlantic Canada Conservation Data Centre for their advice on rare and endangered species could be present near the proposed site. The AC CDC has our topographical maps and photos of the proposed site. AS of the date of this assessment, the AC CDC has not yet defined their Botany program for Newfoundland and Labrador but descriptions are forthcoming
- Revegetation plans put in place for cleared areas.
- Helicopters will be used in transportation so as not to damage the landscape with heavy machinery and unnecessary roads.
- Site chosen away from potential bird gathering areas, protected areas, migratory stops and breeding areas such as a sea level coastal site

- No Hazardous Materials stored on site.
- No extra roads are planned to be built over the landscape. Maintenance work will be carried out by ATV's/snowmobiles with no extra access roads to be built.

(iii) Wind Noise: The site is 1500 metres away from the nearest human working or living population. No mechanical sound emanates from the wind turbines. Humans can have conversations at the base of the tower. According to The Canadian Wind Energy Association, at the base of the turbine the noise is about the same sound level as a clothes dryer. Please refer to Figure #2... "The 15 Metre Diameter Rotor Wind Noise Decibel Chart" located in the appendix. This chart demonstrates how the sound from the proposed 50KW wind turbine with a rotor diameter of 15 metres and a 100db sound level at the hub of the blades dampens with distance. Any person standing more than about 350 metres away from the turbines will, according to the chart, receive negligible wind noise (i.e. less than 45dbs, same level as the rustling of leaves).

4.Operation: The average lifespan of a typical wind farm is about 25 years. This wind power project is intended to be a "lifetime project".

a) Description of the Operation: The wind turbines will be operating on a 24 hour, seven days per week basis. The amount of energy created is dependent on the rated wind power of a turbine. Generally the larger the swept area of the rotors the more energy is produced given equal wind speeds. Also, the higher the wind speed the more energy is produced The proposed turbine is rated at 50 Kilowatts. This means that given a wind speed of 12m/s or about 25mph the turbine will produce 50 kilowatts of power every hour. The power is collected by the turning of the blades which creates a charge in

the turbine. This charge is electricity. The electricity from all the turbines travel down individual wires to the CPR. In the CPR the electricity is gathered and merged into one main wire which travels to the Hydro plant through the 3 phase transmission lines. The amount of power travelling to the plant is recorded. The turbines in themselves are self sufficient but need monitoring.

b) Monitoring Devices:

(i) A PLC based control system this tells the operator/owner of the turbine several key statistics and its present status, such as: present speed of blades, wind speed, generator shaft speed, lightning strikes or if the turbine is malfunctioning. A telecommunications line is used to connect the Turbines to the online operator.

(ii) Human observance: The proponent will have an employee in Nain to monitor the turbines as well as collect data for The Canadian Wildlife Service.

c) Maintenance Schedules: The turbines need regular maintenance every 6 months. In the long term parts may have to be replaced. The proponent's storage shed will house extra rotors, blades, drive trains, etc... in case any parts are needed in the short term or over the winter months when regular shipping lanes are closed to machinery of this size and weight. The turbine rotor hub is electronically heated and no de-icing is planned by the proponent.

d) Sources of Pollution: There are no sources of pollution from the operation of the site. It is important to note here that each turbine carries 9 gallons of lubricant. This lubricant is

environmentally friendly,95% synthetic and is housed in sealed casings. Each turbine is part of a regular maintenance program. Used lubricant is removed from the site and is used in a used oil recycling program. The proponent and the supplier Texaco, does not foresee any environmental damage from the use of lubricants. The eco-toxicology reports on the proposed lubricant rate the lubricant as “nil”, having no measurable effect on the environment. Maintenance programs are professionally monitored by the proponent and contract forces.

e) Resource Conflicts from operation of site

i) Avian Collisions: Discussed in section on construction. The proponent is aware of 8 Peregrine Falcon Nests in the surrounding areas of Nain. The Peregrine Falcon is considered a “threatened” species on the Endangered Species List. The proponent will apply a monitoring/collection program with regard to the Peregrine Falcon, that will include sitings, collisions and other relatable data collection. The Inland Fish and Wildlife Division of The Department of Tourism, Culture and Recreation has asked for a one kilometre buffer radius around these nests. The proponent will apply mitigation during special circumstances of the Peregrine Falcon and of the migratory routes of seabirds.

ii) Wildlife: Discussed. It is important to note here that the proponent has been made aware of the Torngat Mountain Caribou and their sensitivity during the calving period. The noise of windmills should not effect these calving periods, however, the proponent will apply mitigation if recommended to do so during the calving period. The most sensitive time for these caribou is the last of May to mid June. If recommended we will have no initial heavy construction during this period, future construction is also

included in the proponents desire to have respect for these animals.
iii) Vegetation: No disruption during operation.
iv) Solid Waste: None planned.

5. Occupations: the following is a list of occupations involved in the proposed project.

- General Labourers
- Construction workers
- Millwright
- Engineers
- Concrete workers
- Transmission line workers
- Riggers
- Helicopter Pilots
- ATV operators
- Safety personnel
- Iron workers.

6. Project Related Documents:

a) *"The Baseline Information Requirements for Evaluation and Effects of Wind Power Facilities on Migratory Birds in Atlantic Canada"*

b) *Avian Collisions with Wind Turbines: Summary of Studies to Date and Comparisons to Other Sources of Collisions*.-National Wind Co-ordinating Committee Resource Document.

c) *Species At Risk*- Peregrine Falcon anatum subspecies

d) *Putting Wind Power's Effect on Birds into perspective*.

APPROVAL OF THE UNDERTAKING:

- *Crown Land Lease Agreement* from The Department of Government Services and Land.
- *Environmental Permit* from The Department of The Environment.
- *Building Permit* from The Municipal Council
- *Application to construct a right of way for transmission lines on Crown land* from The Department of Government Services and Lands.

THE SCHEDULE:

The earliest project start period will be early September until the end of October 2003. The construction time frame will give the proponent adequate time to order the equipment, prepare the site, install the turbines, towers and transmission lines, and clean the site before any winter conditions set in. If there are any delays; the spring of 2004 will be the next available construction period. The proponent and contract forces may choose two construction periods. Phase 1 to be completed in the fall of 2003 and Phase 2 and 3 in the spring of 2004.

8. Funding:

Presently no grants, loans or funds have been officially requested. Several Federal and Provincial Government agencies have been contacted. The proponent's tentative funding plan is to receive 30% privately, 20% from financial institutions and 50% from public institutions.

Appendix

1) Map #1 Map of Canada

2) Topographic View of Proposed Site

3) Aerial View of Proposed Wind Power Site

4) Fig #1 “The Environment” Colour Views.

5) The Kamov Helicopter

6) 15 Metre Diameter Rotor Decibel Chart

7) “The Towers”- 3 Pages

8) Artist’s Rendering of Proposed Wind Power Project.

9) Project Related Documents (...copies of).