**Small Wind Turbine for the Arctic Test and Demonstration Project**

**at Canadian High Arctic Research Station**

Polar Knowledge Canada (POLAR) are seeking advice and permission from NPC/NIRB for the installation of a small 15m high, 6kW wind turbine on the campus of the Canadian High Arctic Station (CHARS) in Cambridge Bay, Nunavut. The approximate proposed installation of the small, 6 kw wind turbine on the CHARS campus is at Lat Long of 69°7’18.10”N ; 105° 2’ 46.32”W.

Although the project is being initiated as a three year monitoring project it is envisaged that after three years the turbine will remain in place provided limited off-grid renewable energy at CHARS. There is no plan to connect this project into the Cambridge Bay power grid and therefore no requirement to apply to QEC’s Commercial Independent Power Producer (CIPP) program

This application is being submitted to determine if a formal permit will be required for the installation. The tower to be installed is a SD6 Wind Turbine (<https://sd-windenergy.com/small-wind-turbines/sd6-6kw-wind-turbine/>) on a 15m tower with a pad foundation. Widely used throughout the world, there are two SD6’s currently installed and operating in Goa Haven, Nunavut.

Renewable energy from wind and solar as a sustainable means to meet energy needs in the Arctic has had historic interest, but only recently growing success. Equipment designed for and able to withstand the high winds, extreme cold, and unique precipitation of the Arctic is a crucial aspect that is often overlooked. Capacity to operate and maintain the equipment in a remote community is also crucial to success. Wind turbines have been installed in the past in some Arctic locations, such as Cambridge Bay, but have not had a successful operational life due to these factors and more. Technology, capabilities, and interest has advanced over the intervening years, but due to the very challenging environment, installation and testing must still be approached with care and from a perspective of research and development. In other words, like many technologies, renewable energy system composed of wind and solar generation are in the initial stages of utilization in Canada’s Arctic and much is still to be learned as they function through their planned lifecycle through the application of appropriate measuring, monitoring, maintenance, analysis, and advancement of design.

The purpose of the project is to assess the impacts on installing small wind turbines at off-grid locations in remote communities and determining the safe operations and effectiveness of such turbines in arctic and sub-arctic environments and in consideration of the logistics capabilities in remote northern communities. This project will make publicly available all reports and data on all aspects of the project including financing, operational data and logistics data. Findings can be used to help with assessment of future projects across Nunavut of a similar size and scale.

Using a tilt-up tower ensures that it is easy to raise and lower the tower for maintenance and there is no requirement for heavy equipment to be used for installing the turbine. This design on a pad foundation will minimise the impacts on surrounding tundra

The 15m turbine is around the same height as the surrounding infrastructure so no risk to migration patterns of birds or mammals

It is proposed that the energy produced by the turbine will power an existing off-grid shelter on the CHARS campus. The tower will be positioned adjacent to the shelter, in a location selected for optimal wind characteristics, therefore there will be a minimum of ‘transmission’ line from the turbine assembly to the electronics compartment in a 10ft sea can already on site. It is proposed that this transmission line will run underground.

**High level project plan**:

Community Engagement

Limited geo inspection to assess requirements for pad (Quarter 2 2021)

Leveling ground and laying shingle base for pad (Q2/Q3 2021)

Install concrete pad (Q2/Q3 2021)

Run, underground cable from pad to shelter (Q3 2021)

Horizontally install tower and turbine to pad (Q3 2021)

Raise tower (Q3 2021)

Electrically connect turbine into electronics control and storage assembly in pre-existing 10’ sea container (Q3 2021)

Begin operating and monitoring wind turbine

Turbine will be monitored for ice build-up on blades through vibration and video monitoring and visual inspections and shut down if required. Site location selected, in part, to minimise any hazards for ice falling from blades