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Clarke Lake Geothermal Project

Overview

The Clarke Lake Geothermal Project is a joint economic development initiative of Fort Nelson First Nation (FNFN) and Saulteau First Nations (SFN) to re-purpose the Clark Lake gas field as one of Canada's first commercially viable geothermal electricity production facilities.

The Clarke Lake Field is the oldest and one of the most historically productive gas fields in BC. The Field is located on, and adjacent to, Fort Nelson First Nation Reserve #2. After nearly 60 years of gas production the Field is nearing depletion. Low prices have driven away investment, royalties have diminished, and job losses have been devastating to the regional economy.

The project will utilize the mid-grade geothermal heat resource known to exist in the Clarke Lake Reservoir. Decades of data collection from the gas industry as well as studies by academic, industry and public-sector experts leave this resource fully explored and ready for development. The fully commercialized geothermal electricity production facility that will be developed at Clark Lake will feature an Organic Rankine Cycle binary geothermal electricity generation plant that is anticipated to produce 6-15 MW (net) of clean, baseload electricity with a capacity factor of approximately 95%. Additional geothermal resources exist for future developments in the reservoir.

The Project is one of the first of its kind in Canada – a large-scale, cutting-edge clean energy development that is 100% indigenous-owned. It will create much needed economic opportunities for local community members and former oil and gas industry workers. It is therefore a strategically vital development in Western Canada considering the rapidly changing environmental, economic and political landscape of energy development in this region.

The project is strongly supported by both the provincial and federal governments. The BC Ministry of Energy, Mines and Petroleum Resources has granted a Geothermal Permit for the project. The Federal government has offered a generous multi-year funding commitment. The Project schedule is aggressive to achieve development within in the funding deadline of March 31, 2023 and commercial operation by early 2024.

The BC Hydro market is being accessed through an Electricity Purchase Agreement (EPA) option held by SFN that will ensure a stable, long-term, and favorable rate for the sale of electricity. Additional revenue generation opportunities include the sale of waste heat generated by the plant. One such option being explored is to co-locate greenhouses for an indigenous-owned commercial food production facility at or near the plant location.

The project team is comprised of Canadian and international geothermal experts as well as seasoned renewable energy project managers from British Columbia and drilling engineers from Alberta. The project enjoys significant stakeholder support from indigenous groups, the Canadian energy sector, and from government and NGOs.

FNFN has completed a Community Energy Plan and a Training and Employment Plan to ensure that the local community members are engaged and prepared to capitalize upon the variety of

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job and capacity development opportunities that will be created by the project. An estimated 10,000 workdays are projected during this development.

This project will bring jobs and economic vibrancy back to Fort Nelson and will provide a new source of sustainable long-term revenue for the region. The clean energy generated will directly offset the burning of fossil fuels and deliver an historic commercial scale demonstration of geothermal energy production in Canada. It will help pave the way for future developments in Northern BC where the geothermal resource exists and there is a need for new forms of electrical and heat energy generation to reduce reliance upon fossil fuels. In every aspect this project exemplifies British Columbia's CleanBC plan.

Benefits

- It will provide **baseload renewable electricity** to the region demonstrating geothermal energy as a new clean energy technology in Canada and **de-risking future projects**.
- The project is being pursued collaboratively with parallel projects in Alberta and Saskatchewan, resulting in significant **expansion of Canadian geothermal energy sector expertise**.
- The Project will provide **capacity building, training and long-term employment** opportunities within the regional communities and to the Canadian professionals engaged in the Project. This includes **underemployed local oil and gas sector workers** who have skills that are directly transferrable to geothermal project development.
- As a First Nations led economic development initiative it advances **indigenous reconciliation**.
- It is a **shovel-ready project** ready for immediate development at a time when economic stimulus is needed, particularly in the Fort Nelson region which has suffered increased unemployment due to sustained downturns in the local oil and gas and forestry sectors.
- It displaces gas-fired generation of electricity – on which the islanded grid of Northeast BC is wholly dependent – **reducing Canada's greenhouse gas emissions**.
- It re-purposes a gas field for clean energy development and aims to demonstrate the **re-use of wellfield infrastructure** for clean geothermal energy production.
- Several existing local businesses, particularly those involved in the oil and gas sectors, will benefit from **wellfield development, plant construction, and other contracts**.
- Procurement processes will ensure a high level of **indigenous employment** throughout the project's development, construction, and operations phases.
- It produces a positive, sustainable and **long-term revenue stream** for the Nations which will be reinvested in long-term economic, social, and cultural initiatives.
- It is a **Nation-building project** that will raise the Canadian profile of Fort Nelson First Nation and Saulneau First Nation
- Excess heat from the plant can be available to **stimulate additional economic opportunities** in the region. This may benefit the local forestry sector (through timber drying), increase regional food security (through greenhouse food production), or have other regional economic and social benefits.

Financial Need

The Clarke Lake Geothermal Project has a total estimated CAPEX of \$95M. ~95% of the project's required funding has been secured or assessed to be financeable. However, there is an immediate cash shortfall on the order of ~\$6M. This capital is needed to cover a portion of project costs for the next two project phases, which aim to prepare the project for commercial bankability and construction. Historically, successful geothermal energy developments have relied on early-in government funding during initial project phases that pave the way for commercial financing.

The project is proceeding in 7 Phases according to the international best practices in geothermal energy development. Phase 2, which has involved extensive analysis of reservoir data, as well as conceptual level wellfield and plant design work, project costing, business planning, fundraising, community engagement, and other activities, is nearing completion. Phase 3 is planned for late summer 2020. It involves drilling and testing a *characterization well* that will be the first full sized production well for the final plant. It will acquire specific data intended to 'prove' the productivity of the geothermal resource. Phase 4 will entail completion of the final plant design using data from Phase 3 and will prepare the project for construction. At the end of Phase 4 the project will be 'bankable' and ready to receive commercial financing.

We seek funding – preferably in the form of a grant – in order to ensure that Phases 3 and 4 can be completed on schedule by the end of 2020.

This is a shovel-ready project that will immediately employ labour, equipment and expertise within the region and in Western Canada. It will draw on oil and gas sector experts, equipment and contractors that have recently faced exceptionally turbulent times.

The project team has completed a COVID-19 risk analysis indicating that proper containment measures can allow site activities to proceed with minimal risk to workers or the regional population.

We value all suggestions for how to keep this tremendously promising project on track.