

Williston Basin Geothermal Power Project Development

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Summary

The DEEP Earth Energy Production Corp. (“DEEP”) geothermal power project is located in Southeastern Saskatchewan, Canada, a few kilometres north of the United States border. In December 2018, DEEP successfully drilled the first geothermal test well. The vertical well reached its target total depth of 3,530 metres (m), the deepest well ever drilled in Saskatchewan’s history. Preliminary data, acquired to assess the geothermal reservoir, indicate bottom-hole temperatures exceeding 125°C, in addition to positive reservoir pressure and permeability exceeding the minimum threshold for project feasibility. This was a major step forward for the first renewable power project of its kind in Canada. Final testing results from the drilling program will refine the assumptions made on the reservoir and effectively optimize the design parameters. This has the potential to be a transformative energy innovation for Saskatchewan.

The DEEP well, named Border-01, targeted the early Paleozoic age basal clastic reservoirs of the Winnipeg and Deadwood formations and fractured Precambrian granite. Injection wells for water disposal in Saskatchewan and gas wells in North Dakota demonstrate a basin-scale resource with reservoir characteristics suitable for large fluid production and injection rates, however temperatures greater than 100°C are only found in the south-easterly most part of Saskatchewan and western North Dakota. Analysis of image logs, drill stem tests and the flow and build-up test from the DEEP well indicate that fractured Precambrian basement is an important contributor to fluid flow. The well is unique in that it targets deep hot water in a highly productive oil region. The well has hundreds of horizontal oil wells as neighbours and is located in a Saskatchewan oil field and just north of North Dakota’s renowned Bakken trend. The decades of petroleum exploration data were critical to the development of DEEP’s project. DEEP’s project will have benefit of local petroleum industry expertise and services.

A Prefeasibility Study was completed in 2014 through grant funding from Natural Resources Canada and SaskPower Corporation. The study concluded that the project is viable from an economic, legal, environmental, and technical perspective. The full Bankable Feasibility Study is scheduled to be completed early in 2020.

The next steps for the project include the analysis of an injectivity and fall off test completed on the Border-01 well in October 2019 and drilling and drilling additional wells for injection and production. During production testing operations, brine from the new source well will be injected into Border-01 enabling the first production/injection doublet. Further geothermal parameters will be acquired during this process, which includes a long term (30-60 day) production/injection flow and build-up test. Final feasibility engineering reporting are expected by Q2 2020, with full scale construction commencing later in 2020 and final commissioning scheduled for completion by the beginning of 2022.

DEEP’s long-term strategy is to build geothermal power facilities with the capability of generating hundreds of Megawatts (MW) of power. This strategy complies with a vision of a cleaner energy future for Saskatchewan and simultaneously supports SaskPower’s goal to

reduce 2005 emission levels by 40 per cent by 2030. Produced electricity from the first facility will be sold under an existing Power Purchase Agreement with SaskPower and will generate roughly the power required by 5,000 homes and offset about 27,000 tonnes of carbon dioxide per year, equal to removing 7,400 cars off the roads annually. In addition to revenue from direct power sales to SaskPower, DEEP is exploring additional revenue streams including a commercial greenhouse development, which would be a new opportunity for the Saskatchewan agricultural sector.

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