Geothermal Power Generation: A new application for petroleum technology expertise

Saskatchewan Oil and Gas Supply Chain Forum

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Geothermal Benefits

- Geothermal has zero CO2 emissions and the smallest environmental footprint of the renewables
- Geothermal power is baseload power with up to 95% availability - not intermittent like wind and solar
- Low operating costs

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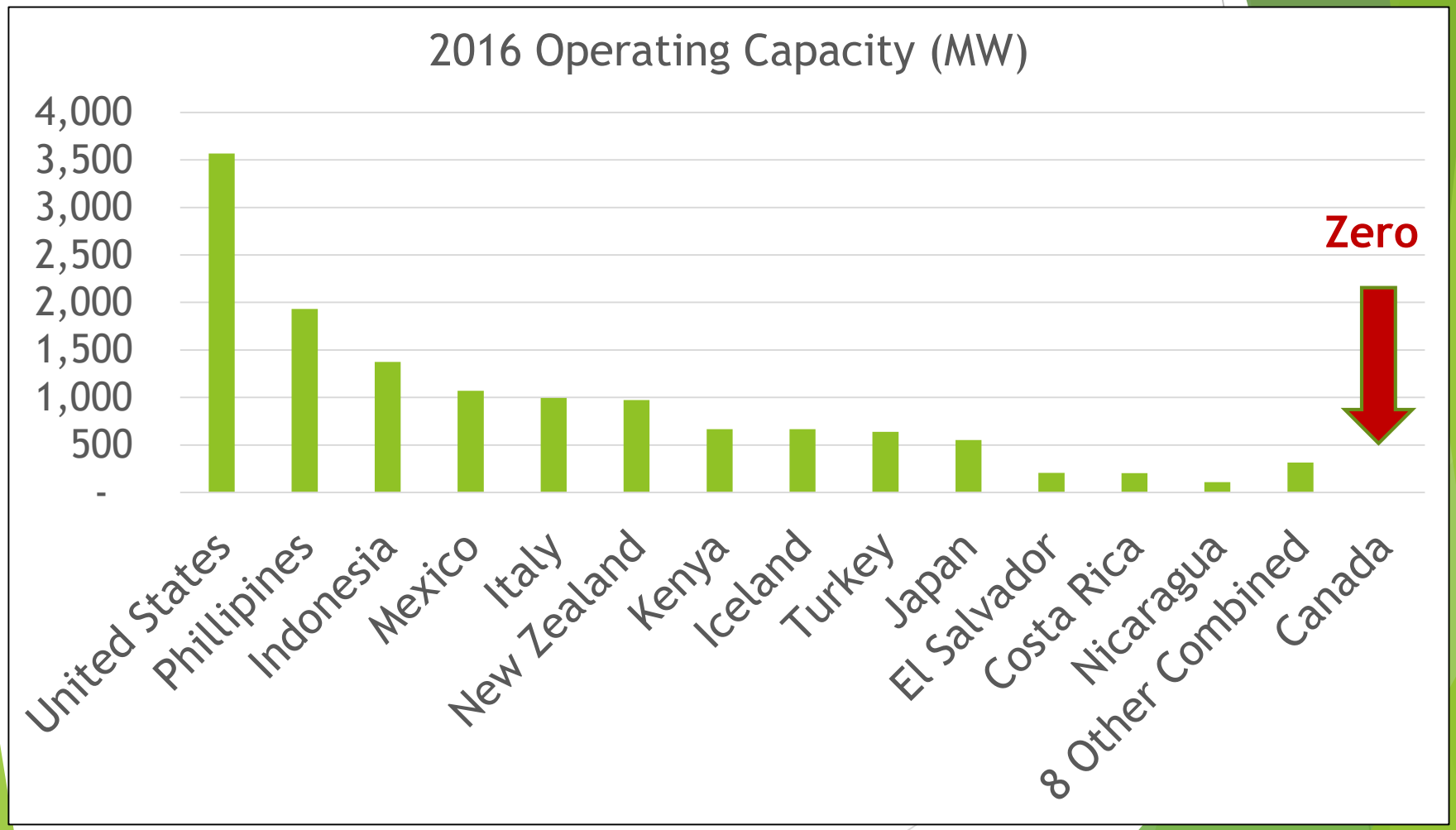
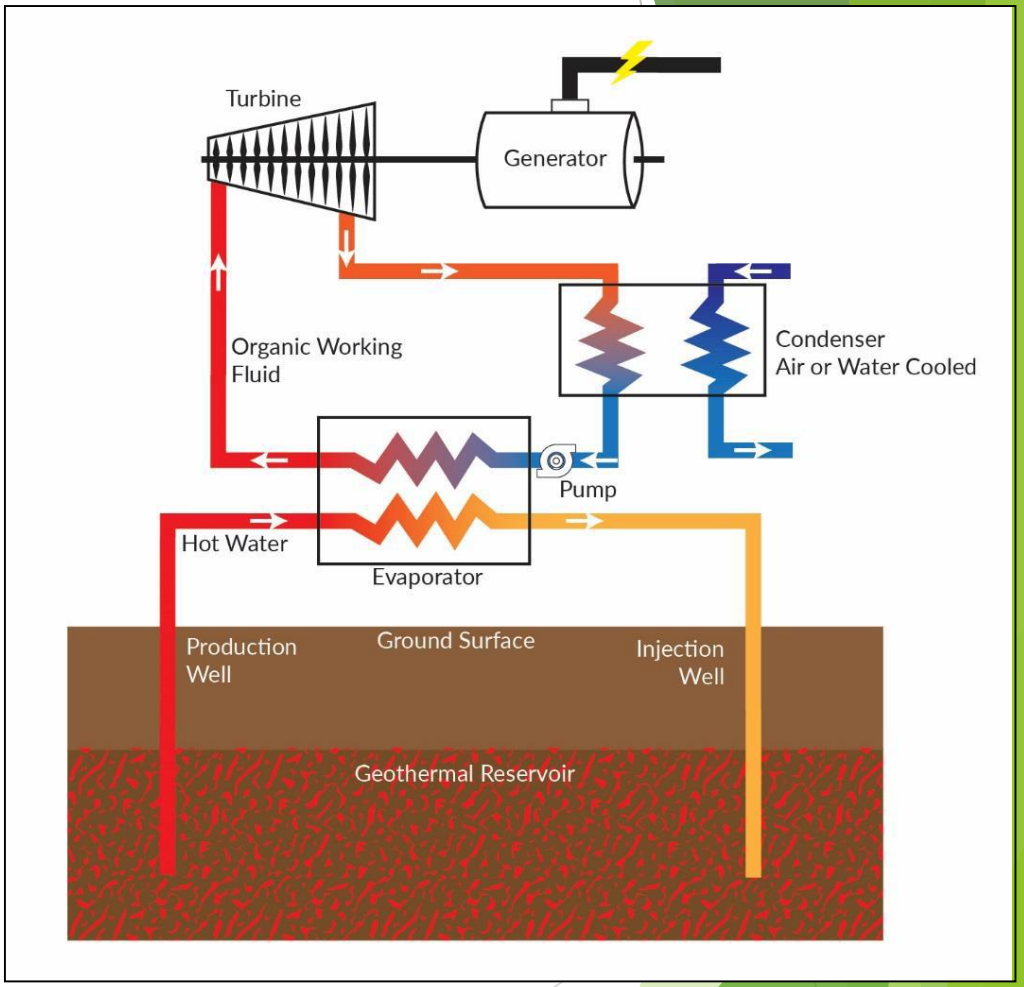
Canada Lags in Geothermal - A Successful Project Would Open the Door to a Brand New Canadian Clean Energy Industry



Heat to Power

- Drill into a hot geothermal reservoir
- Naturally heated water comes to surface and the heat is harvested using a heat exchanger
- Heat is introduced to a working fluid that can flash at low temperatures to drive a turbine to generate power
- Water is re-injected, re-heated and used again



Turbine Technology - Organic Rankine Cycle (ORC)

- Proven technology – 40 years of field implementation around the world
- Four - 5 MW ORC power facilities installed in Saskatchewan already – NRGreen / Alliance Pipeline – waste heat from engines to power
- DEEP will use the similar technology using heat from geothermal fluid

- 5 MW waste heat facility, at Estlin, Saskatchewan

Why Saskatchewan?

- Williston Basin Geothermal Aquifers have been ignored because they are no associated hot springs or geysers
- Water in the Williston Basin has historically been considered an oilfield operational cost versus a valuable resource
- We wouldn't even know this geothermal resource existed if it weren't for the oil and gas industry exploring for energy

Iceland Blue Lagoon

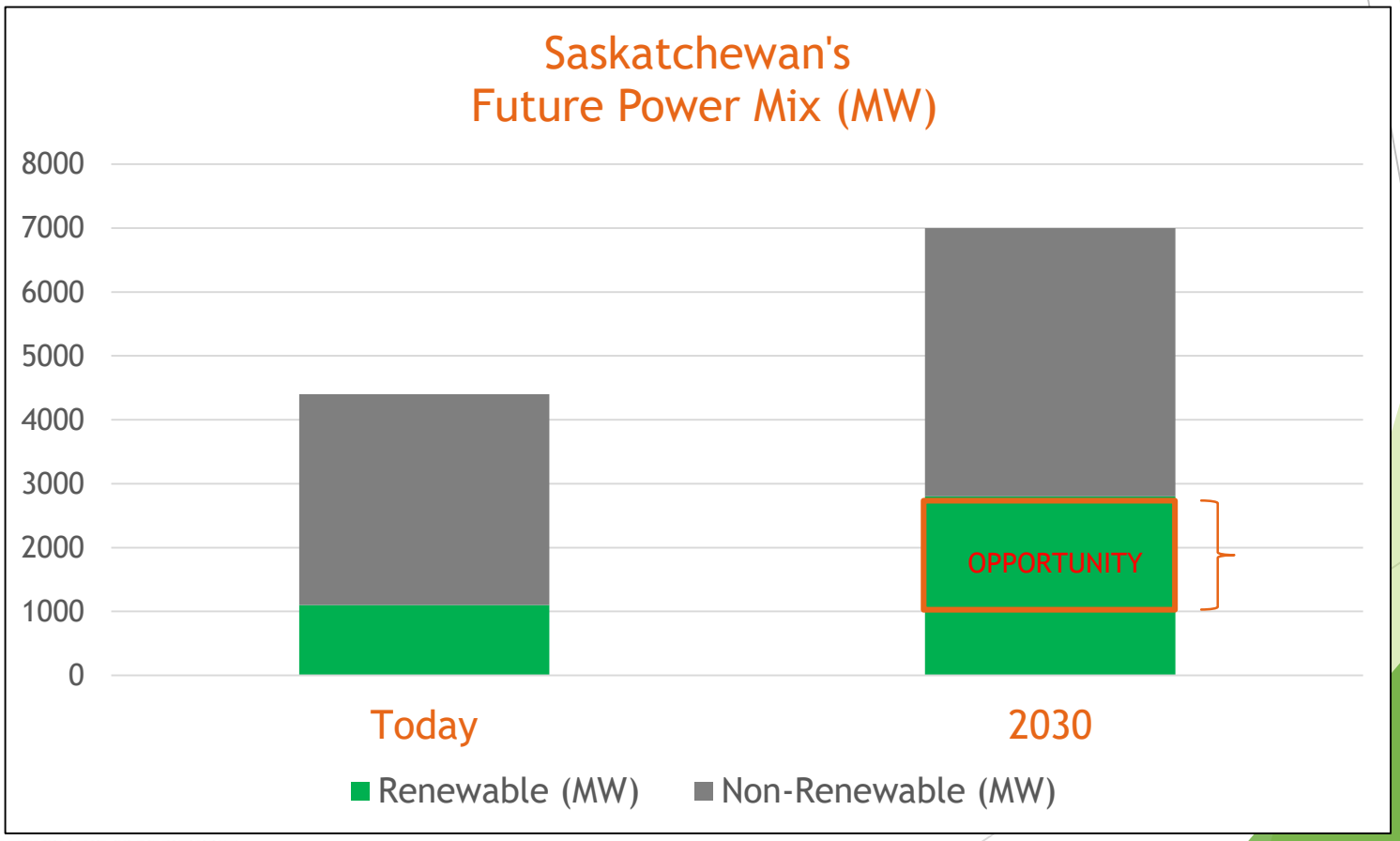
DEEP's drilling location, south of Torquay, SK

A Made-in-Saskatchewan Energy Opportunity

- Highly supportive and streamlined regulatory environment thanks to 60 years of oil and gas development and mining
- Using Canada's world class oil and gas technology, and unleashing it for the first time on a renewable resource

Saskatchewan's Vision for the Future

Supports SaskPower's goal to reduce emissions from 2005 levels by 40 per cent by 2030



www.saskpower.com/our-power-future/powering-2030/creating-a-cleaner-power-future

Power Purchase Agreement “PPA”

- First geothermal Power Purchase Agreement contract in Canada, announced May 16, 2017
- Guaranteed government revenues for 25 years means no commodity risk

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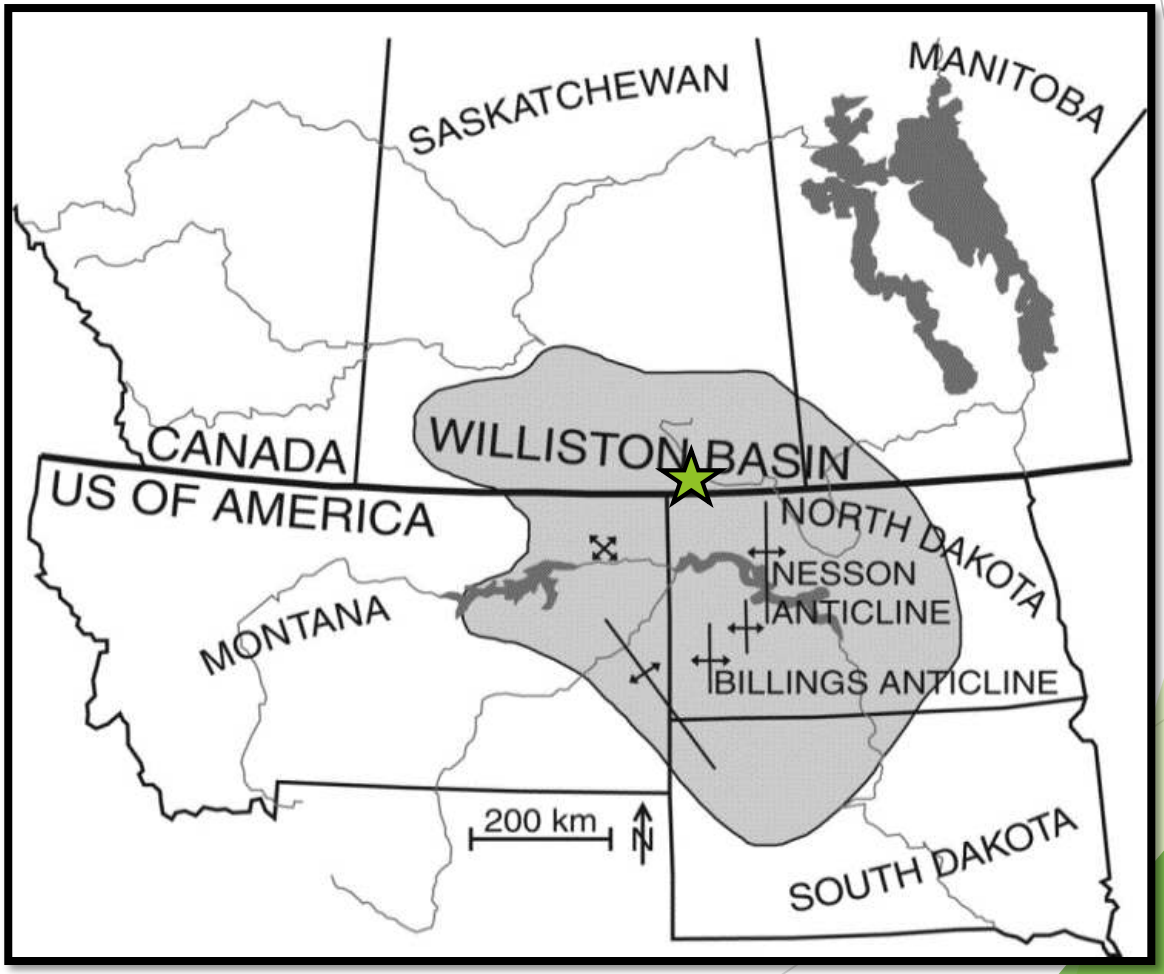
Massive Geothermal Aquifer

- The aquifer is vast and well characterized from historical oil and gas drilling and for use as waste water disposal in the Saskatchewan potash industry



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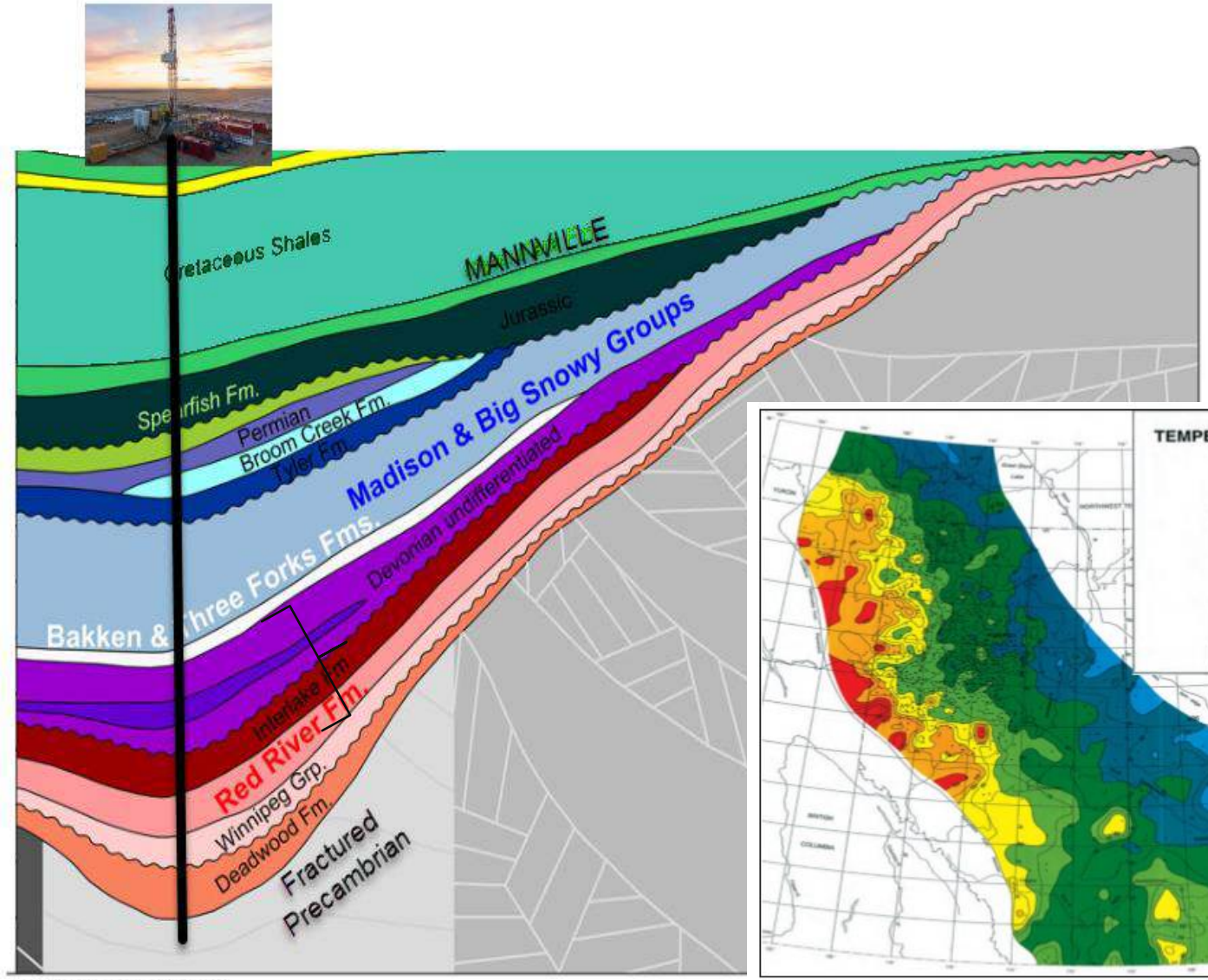
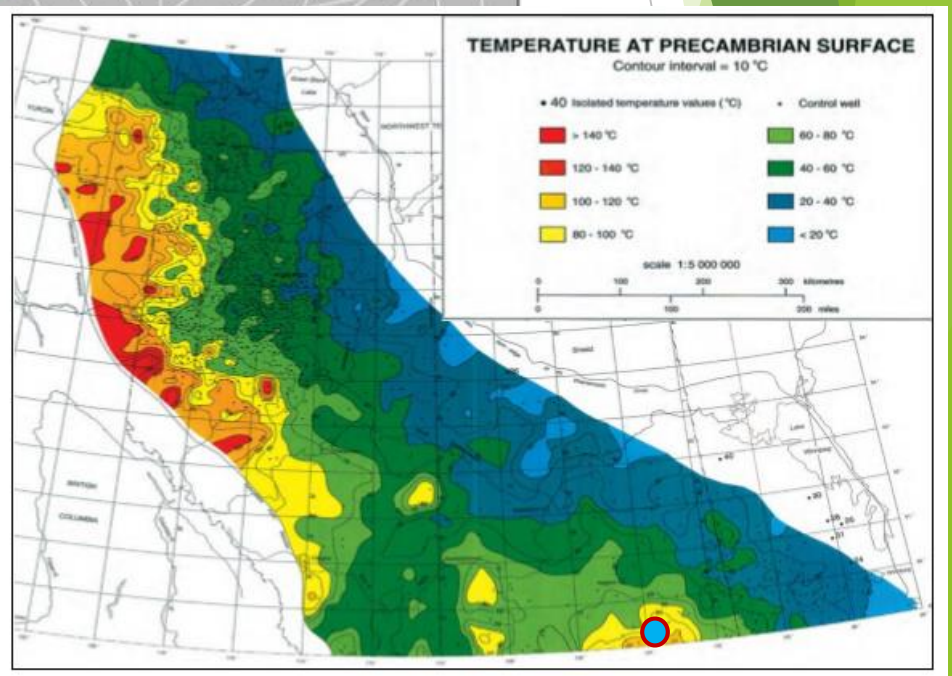
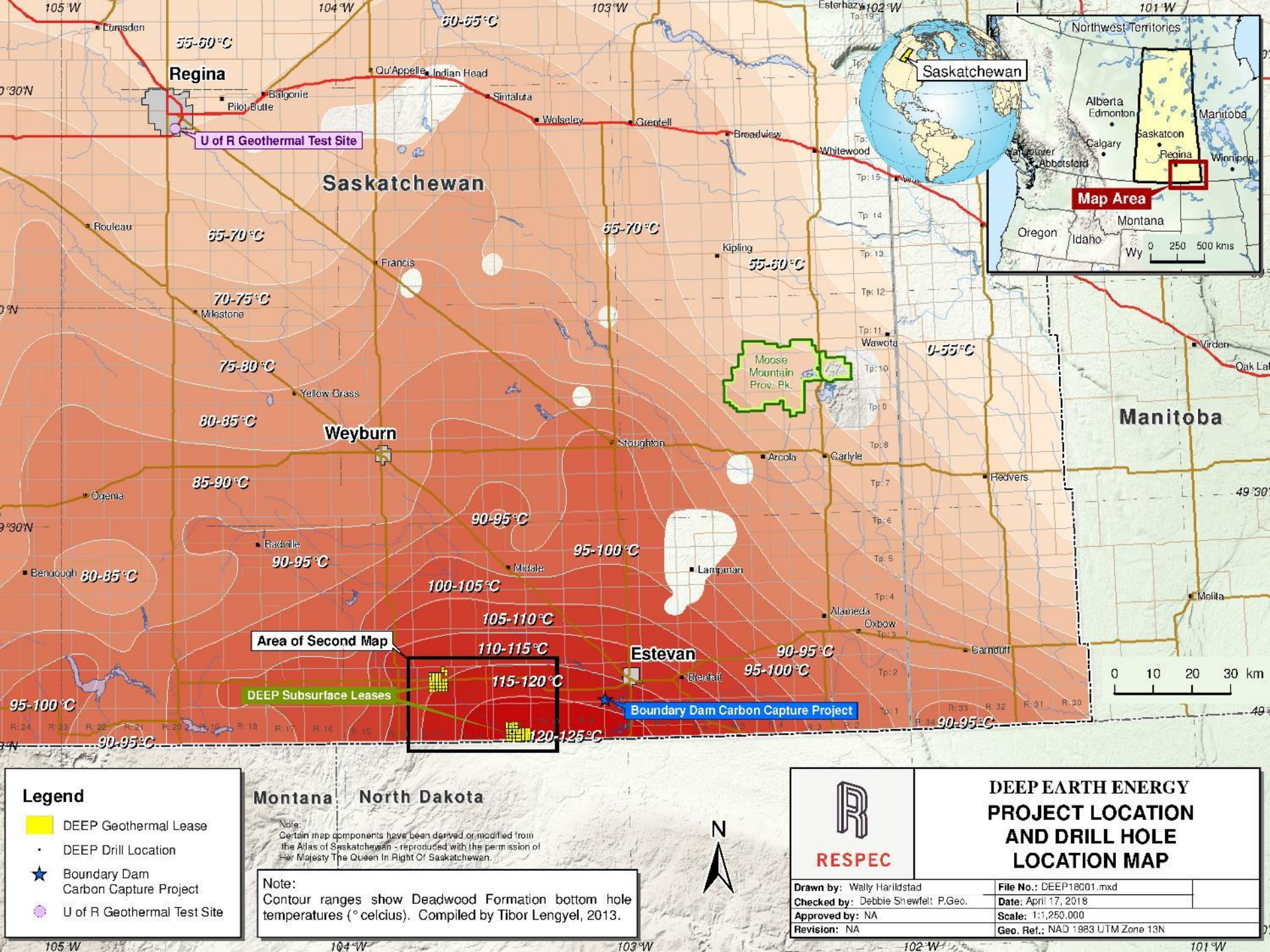
Targeted Hot Basal Clastics and Precambrian Fractures in the Williston Basin







Legend

- DEEP Geothermal Lease
- DEEP Drill Location
- Boundary Dam Carbon Capture Project
- U of R Geothermal Test Site

Note:
Contour ranges show Deadwood Formation bottom hole temperatures (°celcius). Compiled by Tibor Lengyel, 2013.

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DEEP EARTH ENERGY
PROJECT LOCATION AND DRILL HOLE LOCATION MAP

Drawn by: Wally Haridstad	File No.: DEEP18001.mxd
Checked by: Debbie Shewfelt P.Geo.	Date: April 17, 2018
Approved by: NA	Scale: 1:1,250,000
Revision: NA	Geo. Ref.: NAD 1983 UTM Zone 13N

First Test Well Complete

- First production well drilled – the deepest well ever drilled in Saskatchewan
- Major, positive step forward in this first-of-its-kind Canadian geothermal power project
- Drilling and validating the resource potential is the biggest achievement, this project has seen to date

First Test Well Complete

- The vertical well was completed for preliminary flow testing at a depth of 3,530 metres into a hot (+130˚C) aquifer
- Successful DST indicating excellent transmissivity and permeability
- 200 metres of core acquired – Winnipeg, Deadwood and Precambrian

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Coring

- 212.6 metres of core recovered (3294m – 3506m) in 6 core runs
- Recovered slowly to surface to reduce the risk of false fracturing from rapid degassing
- Captured in sleeves
- Transported in a heated trailer

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Coring

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Coring

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DEEP Q3 & Q4 program

- August: Flow and Build-up test 3 day flow time and 12 day shut-in
- October: Injectivity test
- October: Drilling of Second well - Production test followed by production and injection cycle of DEEP's first geothermal doublet

Flow and Build up Test

- 1,500 m3 of fluids monitored and produced into a tank farm over 3 days via a downhole electric submersible pump

Flow and Build up Test

- A shut-in period of 12 days to measure pressure data that will be acquired by paired subsurface gauges.
- The well will then be recompleted into an injection well, to enable an injection test by pumping the produced brine held in the tanks back down while recording surface injection rates and pressures.

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Flow and Build up Test

Flow and Build up Test

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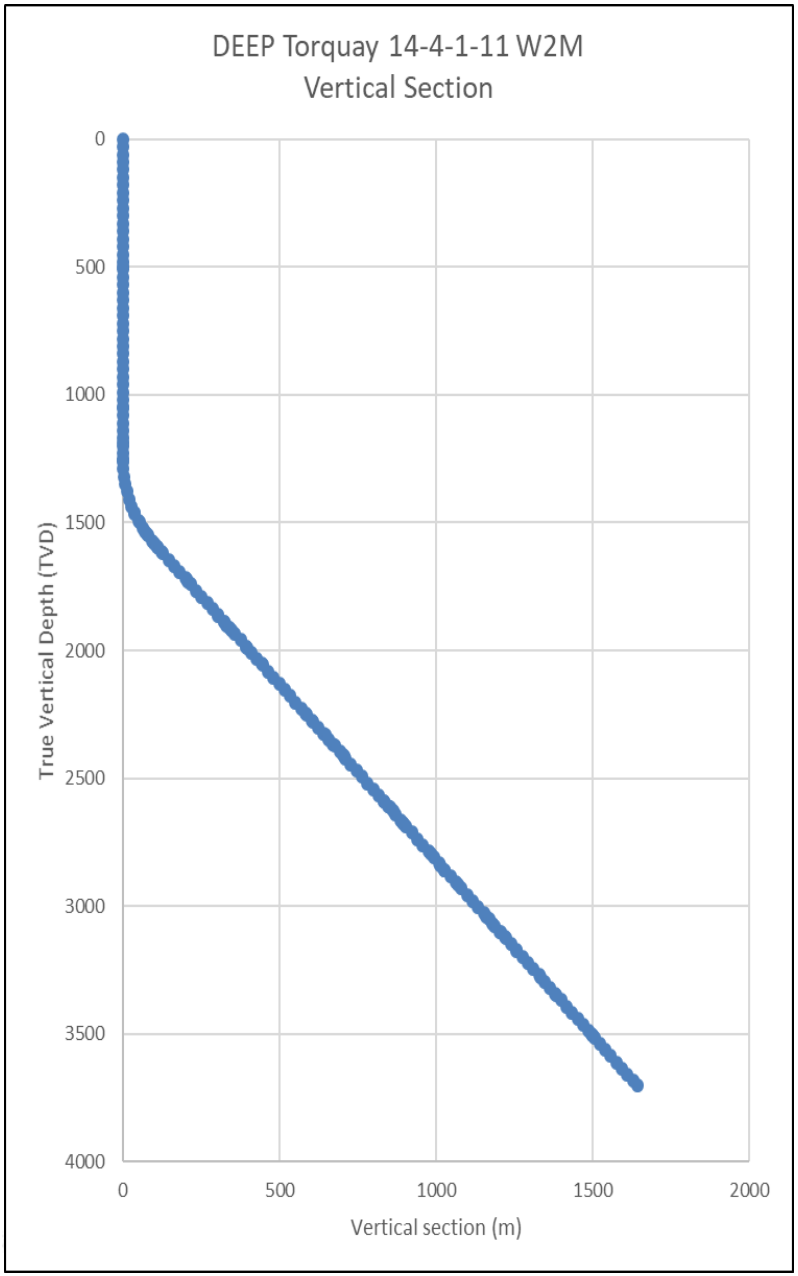
Well #2 – Directional Production Well – October



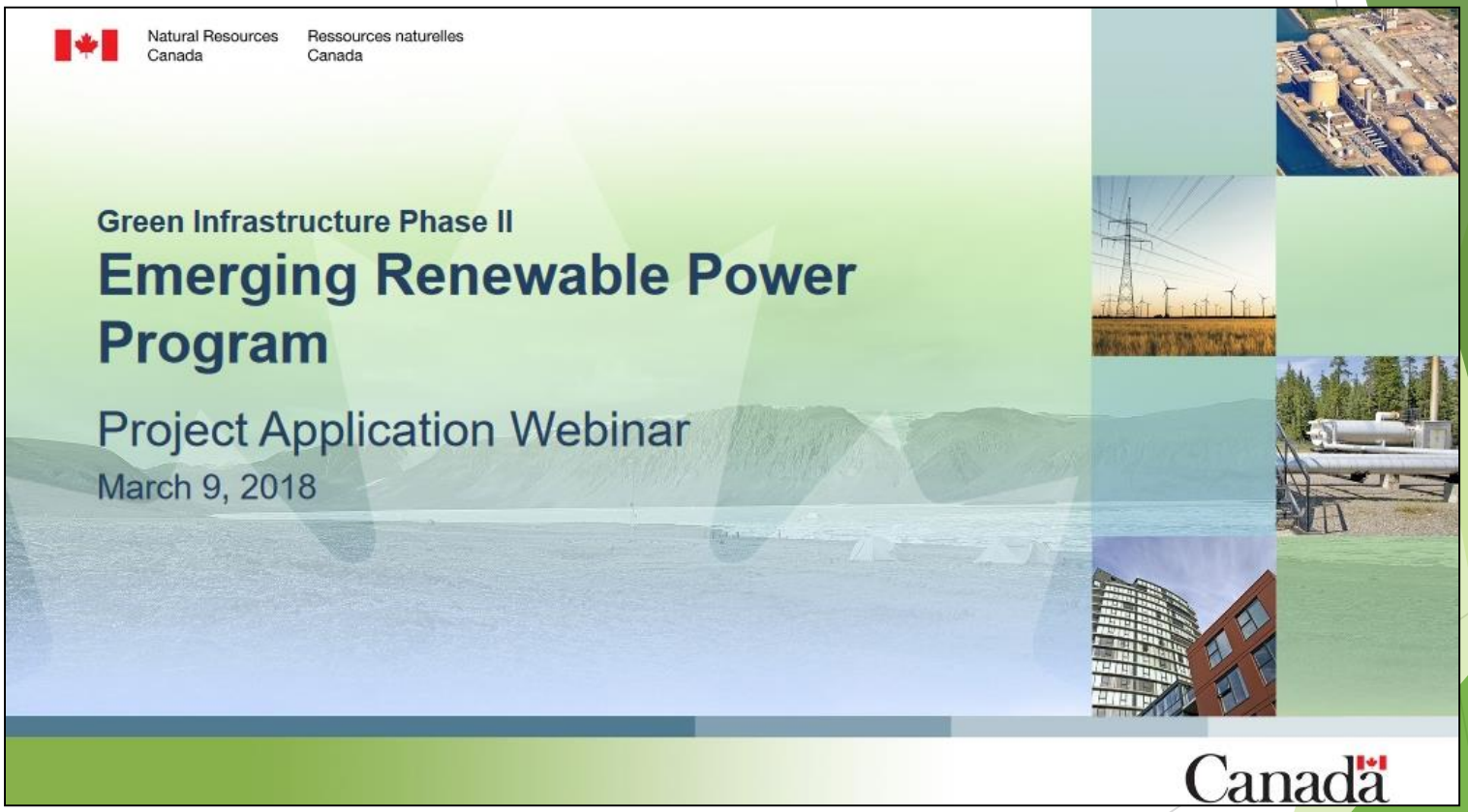
- A second well will be drilled from the same surface location as the first well directionally to the southwest with a bottom hole located 1,500m laterally from the first well
- Once complete, a 60-day production and injection test will commence on the project's first combined geothermal well pair
- Required for final engineering design

The Build-out

- DEEP's long term strategy is to build 100's of megawatts of geothermal power facilities
- Each 5MW facility would generate roughly the power required by 5,000 homes and offset about 27,000 tonnes of carbon dioxide per year, equal to taking over 7,400 cars off the roads annually
- Each facility is scalable in size and repeatable

Government Funding Support

- $25,600,000 provided through Natural Resources Canada's Emerging Renewable Power Program
- Innovation Saskatchewan $175,000



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Project Milestones

Milestones	Expected Completion	Progress
Land acquisition, 3rd party review, permitting, seismic review	Q2/3 2018	100%
Drill 1st initial test production well	Q4 2018	100%
Run flow and build up and injectivity tests	Q3 2019	10%
Drill 2nd production test well	Q3 2019	0%
Final report, construction estimates	Q1 2020	0%
Debt in Place	Q2 2020	0%
Construction Commences	Q2 2020	0%
Commissioning Complete	Q4 2021	0%

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Blue sky - Potential Waste Heat Sales - Greenhouses

- In addition to revenue from direct power sales to SaskPower, DEEP is exploring additional revenue streams
- Each 5MW plant could heat a 50 acre greenhouse

Blue Sky

- Flare gas to power the large electric submersible pumps
- Mineral rights acquired for rare earth elements.
- Applied for helium rights

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First 5MW Plant Capitalization

Facility One : 5MW	$60M	Participants
Phase 1: $10M (October 2018)		
	$5M	Equity ($3.5M Flow Through and $1.5M Hard Dollar)
	$5M	NRCan Grant Match
Phase 2: $10M (Q1/Q2 2020)		
	$5M	Equity (Oversubscribed)
	$5M	NRCan Grant Match
Phase 3: $40M (Q3 2020)		
	$20M	Debt and Possible Equity
	$20M	NRCan Grant Match

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Current Management and Directors

- **Kirsten Marcia, President and CEO, Director** – Geologist
- **Ron Carson, Director** - Founded Carson Energy Services Ltd.
- **Wade MacBain, Director -** Investor Relations at Versabank
- **Doug McNeill, Director -** Retired StreamFlow executive

- **Leo Groenewoud - Exploration and Geoscience Manager**, former VP Exploration for Steppe Resources
- **Adrian Davison - Electrical Project Engineer**, former VP Operations and Construction at Genalta Power
- **Kelly McShane, CFO -** Director of Finance, Global Institute for Water Security

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