Megatrends & Energy Transition in the Mining Sector

Energy Transition | Jim Sarvinis

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Understanding requirements for a lower carbon future

Managing Aging Assets

- Maintain existing base
- Increase reliability
- Refurbish
- Uprate

Storage solutions

- Battery Energy Storage
- Pumped Hydro Storage

Electrification/ Decarbonization

- Renewables (Solar/Wind)
- Hydroelectric
- Nuclear
- Fuel switching
- Hydrogen
- CCS
- Geothermal
- Large Scale Transmission

Grid Modernization

- Smart Grid
- EV connections
- Distribution upgrades

Building Resiliency

- Adaptation
- Resource Adequacy
- Fire Protection
- Flood Control

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Investment in renewables is crucial to reduce carbon emissions

Nanticoke 44MW Solar PV Power Plant

Ontario Power Generation, Canada

Brownfield project for the repurposing of retired coal-fired power station site

Coram 102MW Wind Farm

Brookfield, USA

Greenfield, fast-track construction project

800MW Offshore Wind Farm

Confidential, USA

Injection point analysis, power cable connection to onshore substation, permitting assessment

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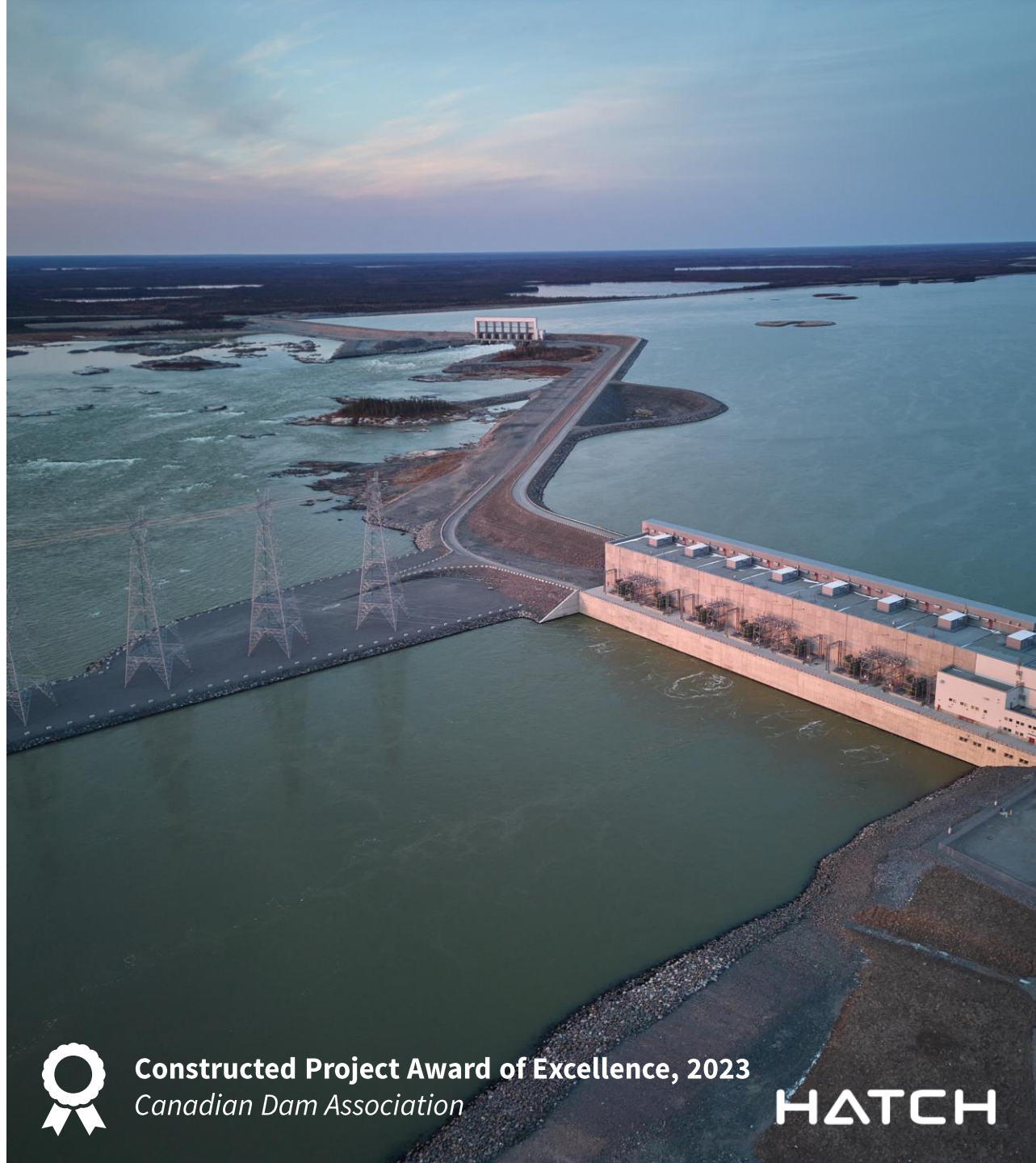
And hydropower plays a central role in the transition to cleaner energy

Manitoba Hydro Keeyask Generating Station

695 MW Powerhouse with 7 units

362 k m^3 of **concrete**	**6.4 M m^3** of **fill**	**2.0 M m^3** of **rock excavation**
3.4 M m^3 overburden removal	**19 m Low head**	**3D data-centric model**

Fully operational - June 2022



Constructed Project Award of Excellence, 2023
Canadian Dam Association

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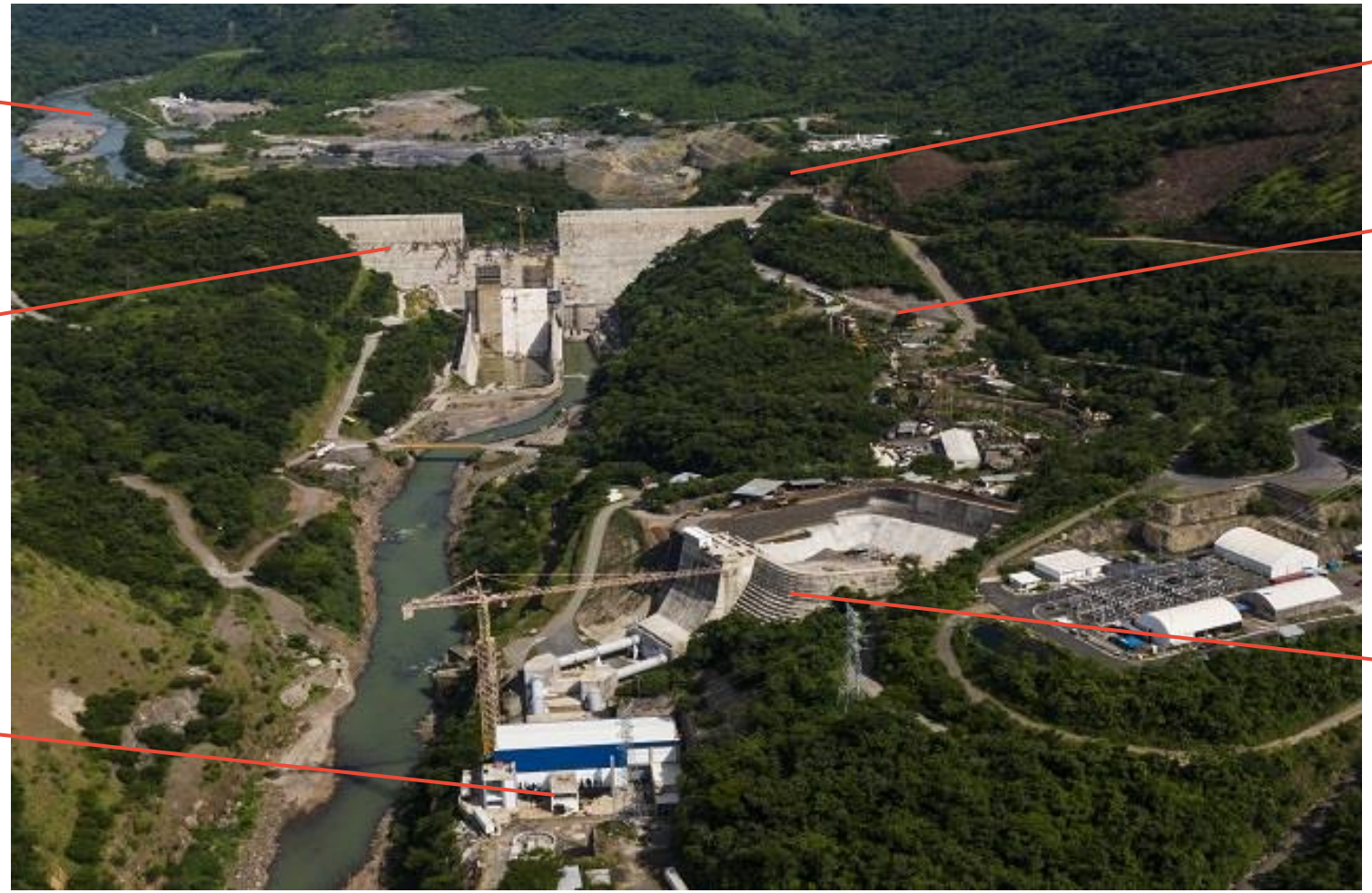
Hatch is also involved in Hydroelectric projects in Latin America

El Chaparral - Comisión Ejecutiva Hidroeléctrica del Río Lempa (CEL):
Electricity generation entity of El Salvador's government (operational in late 2023)



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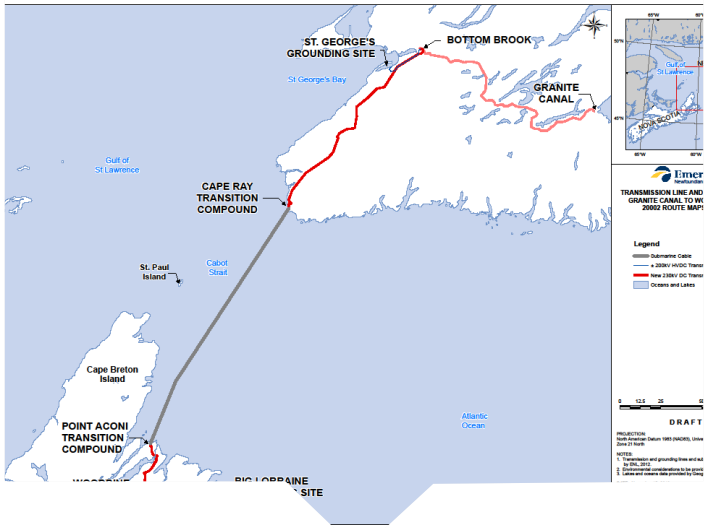
In addition to greener energy sources, a resilient future requires investment in enabling transmission & distribution

Wataynikaneyap Power Transmission Line

Watay Power/Fortis, Canada

17 Communities over 1800 kilometers of 230-kV, 115-kV and 44-kV transmission lines and substations.

Maritime HVdc Link



EMERA, Canada

180 km of +/- 200-kV DC lines, 160 km of 230-kV AC lines, two VSC AC/DC converter stations, two shoreline grounding sites, and 80 km of grounding lines.

Cahora Bassa HVDC Link

Hidroelectrica de Cahora Bassa, Mozambique

Complete replacement and upgrade of the Songo Converter Station to increase the rating from +/-533kV 1.8kA to +/-600kV 3.3kA.

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However, renewables alone are not sufficient – other sources such as thermal are also required (for stability, dispatchability, industrial needs) – how to do it best?

Al Taweelah Alumina Power and Steam

Emirates Global Aluminium (EGA), United Arab Emirates

Brownfield supply of steam, power, and utilities to the refinery. The plant supplies steam to the refinery from several HRSGs and is equipped with a steam-management system.

Hell's Kitchen Geothermal Study

Controlled Thermal Resources, USA

Complete engineering for a 49.9 MW high temperature flash steam geothermal power plant. Integrated into the lithium extraction facility to deliver sustainable, battery-grade lithium.

Voisey's Bay Mine Expansion

Vale, Canada

22 MWe LFO combined heat and power plant with heat recovery and fired boilers for an underground mine complex. Engineering for integration with existing power plant, glycol heating network, and overall mine development and facilities expansion.

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Alternative fuels (including hydrogen) are also being explored to meet demand while reducing greenhouse gas footprints

Bécancour Hydrogen Plant Expansion

Air Liquide, Canada

Project is largest of its kind to produce green hydrogen which involves a 20 MW PEM electrolyzer.

Greenfield Hydrogen Electrolysis & Storage

Douglas County PUD Utility, USA

New 5 MW electrolyzer project with high pressure hydrogen storage and a refueling station.

Raglan Nickel Mine – Hybrid Power Plant

Glencore, Canada

Hybrid Power Plant Diesel, Wind, Hydrogen and Battery Storage. First-of-kind facility in the world, designed by Hatch to significantly reduce diesel fuel consumption by 2.4 million litres per year.

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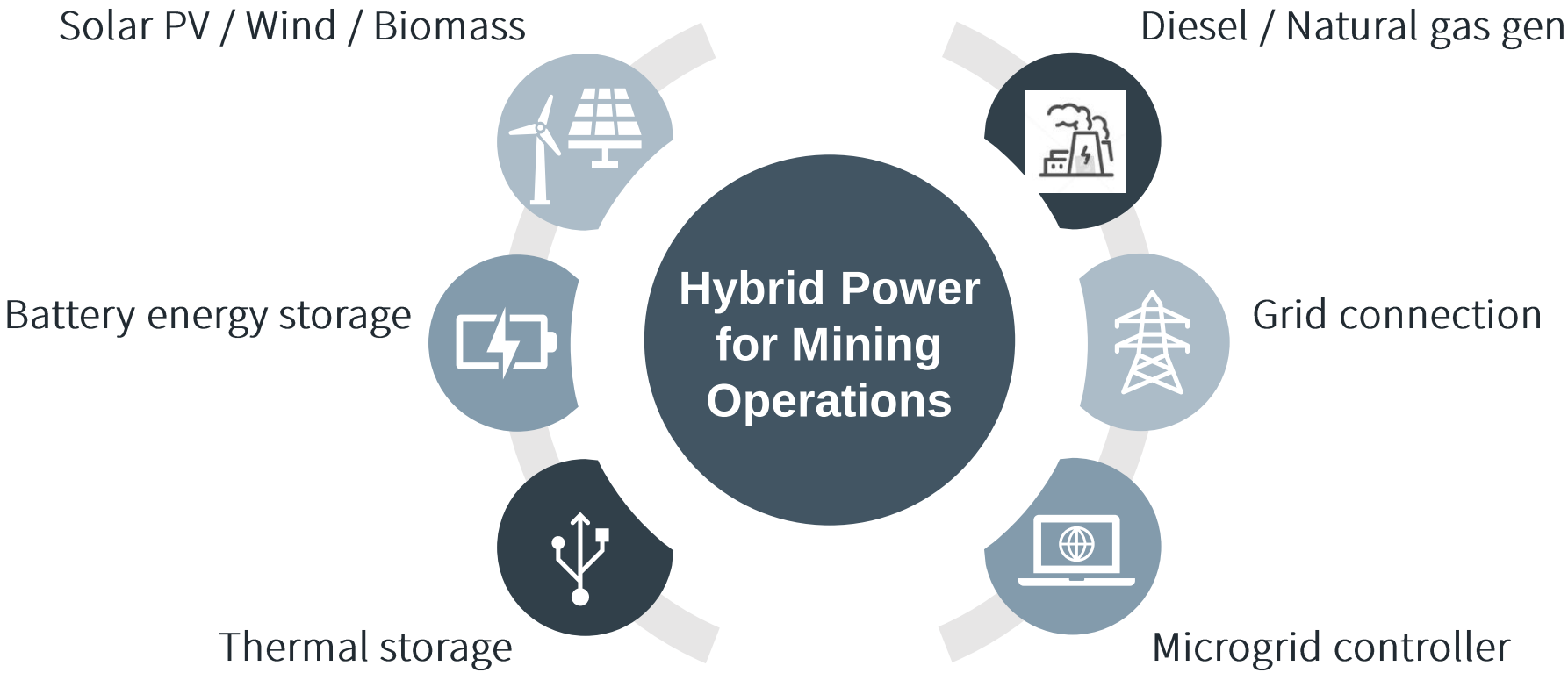
Integrated energy solutions



Integrated energy solutions

Selected Mining Project References

100% Renewable Power Mine, Namdeb Mine (Namibia)

Aim to reduce emissions generating 60-100% of the energy consumed by the mine.

Hatch performed the technical-economic assessment, considering a range of options and energy storage.

Solar + Energy Storage for Gahcho Kué Mine (Canada)

Study for the construction of a 2 MW/ 1MWh BESS and 3 MW solar PV to provide energy for the mine.

Hatch performed the pre-feasibility study, construction supervision and commissioning support.

Red Dog Mine Wind and Battery Project (Canada)

Project to integrate wind power at the remote mine, combining battery, wind power and existing reciprocating engines.

Hatch developed the engineering (FEL 3) and installation for one site.

Telfer and Havieron Solar, Wind, BESS Project (Australia)

Solar PV and Wind integration Study at two mines with up to 130 MW of combined capacity.

Hatch developed the operations and control assessment, ranking different power alternatives.

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Energy resiliency is key

Current scenario and climate change perspectives require more than just developing cleaner energy alternatives.

There is a need for resilient energy systems.

Hatch has recently designed a project to build resiliency against floods in Trujillo

Quebrada El Leon - Flood Control

Location: Trujillo, Peru

Client: ARCC (Autoridad para la Reconstrucción con Cambios) & Consortio Besalco-Stracon

Date of completion: 2024

Scope:

- Headworks with 1,200 m long basin, dykes and concrete spillway
- 20 km canal
- Outlet structure on the coast

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Specific infrastructure to collect, conduct and discharge water during El Nino storm events

Quebrada El Leon - Flood Control

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