VOISEY'S BAY WIND ENERGY PROJECT

December/2019

Voisey's Bay Mine Expansion Project

Underground mine to extend LOM to 2032

ENERGY SOLUTION

Underground mine development will **increase energy requirement** due to ventilation/heating systems.

- Previous energy solution: 6 new diesel generating units
- Wind Energy Project: can replace diesel generators **reducing operational costs and emissions**

	Existing Site (Open Pit + Concentrator)	Future Operations (Underground Mines + Concentrator)
Power Supply	6 x 4.4 MW diesel generators	6 x 4.4 MW diesel generators 6 x 6.2 MW diesel generators
Average Energy Demand	11.8 MW	35 to 40 MW
Annual Fuel Consumption	25,180,550 L	80,000,000 L
Annual GHG Emission	67,695 T CO2e	215,000 T CO2e

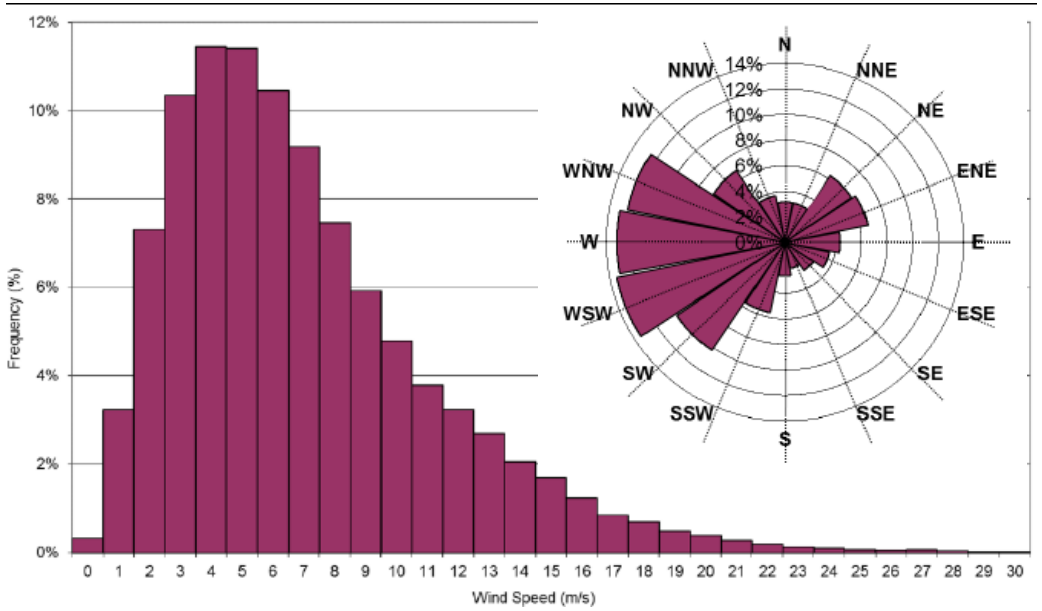
Voisey's Bay Wind Project Concept

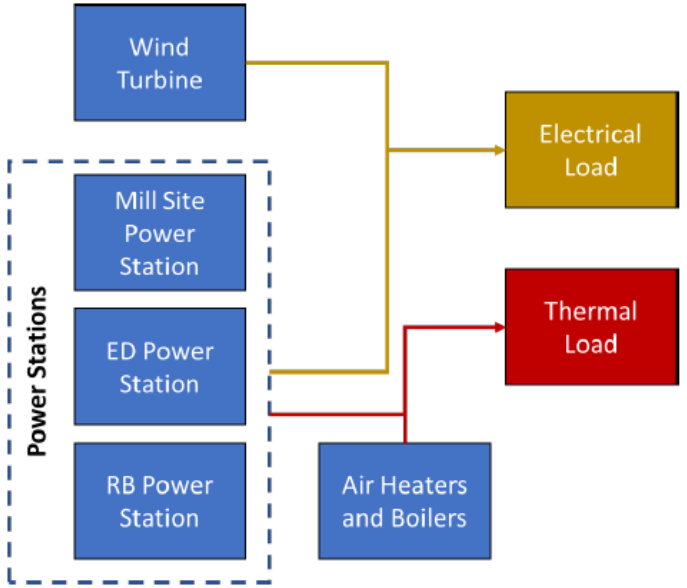
Wind has proven the best solution to offset diesel

WIND MEASUREMENT

- Wind energy solution started being investigated in 2012
- **Met tower installed in 2013. A**fter initial assessment showed potential good results

80m mast, January 28, 2013 to November 5, 2014

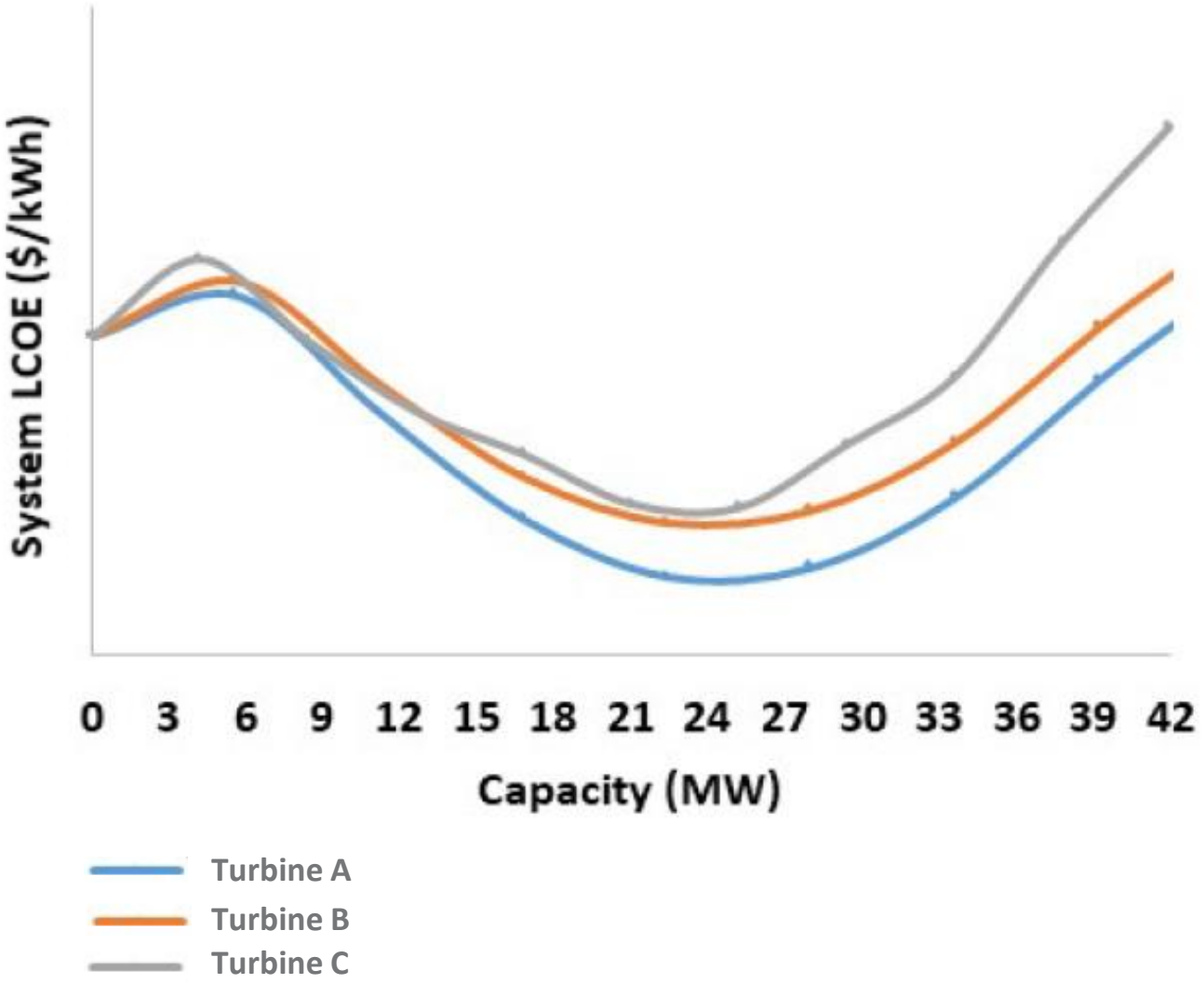




- Assessment needs to consider both **power and heat demand** for a comprehensive energy solution

Voisey's Bay Wind Project Concept

Defining the optimum size and turbine manufacturer



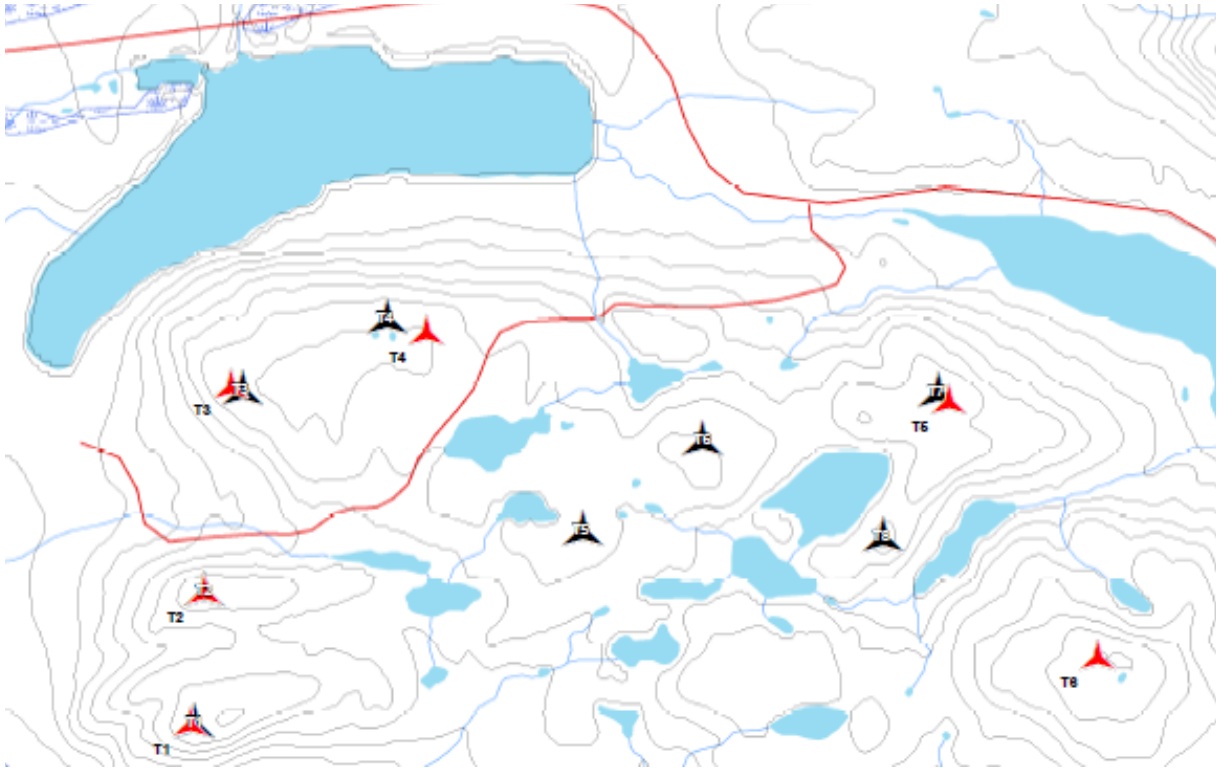
- As Voisey's Bay is an off-grid site the challenge is to optimize the size of the Wind Farm
- Unlike other projects, the optimum size is not necessarily where the best capacity factor is achieved
- Assessment was done considering different turbines, diesel displacement, wind data and load profile

Voisey's Bay Wind Project Concept

Wind Project can displace 10ML of diesel per year

CONCEPTUAL LAYOUT

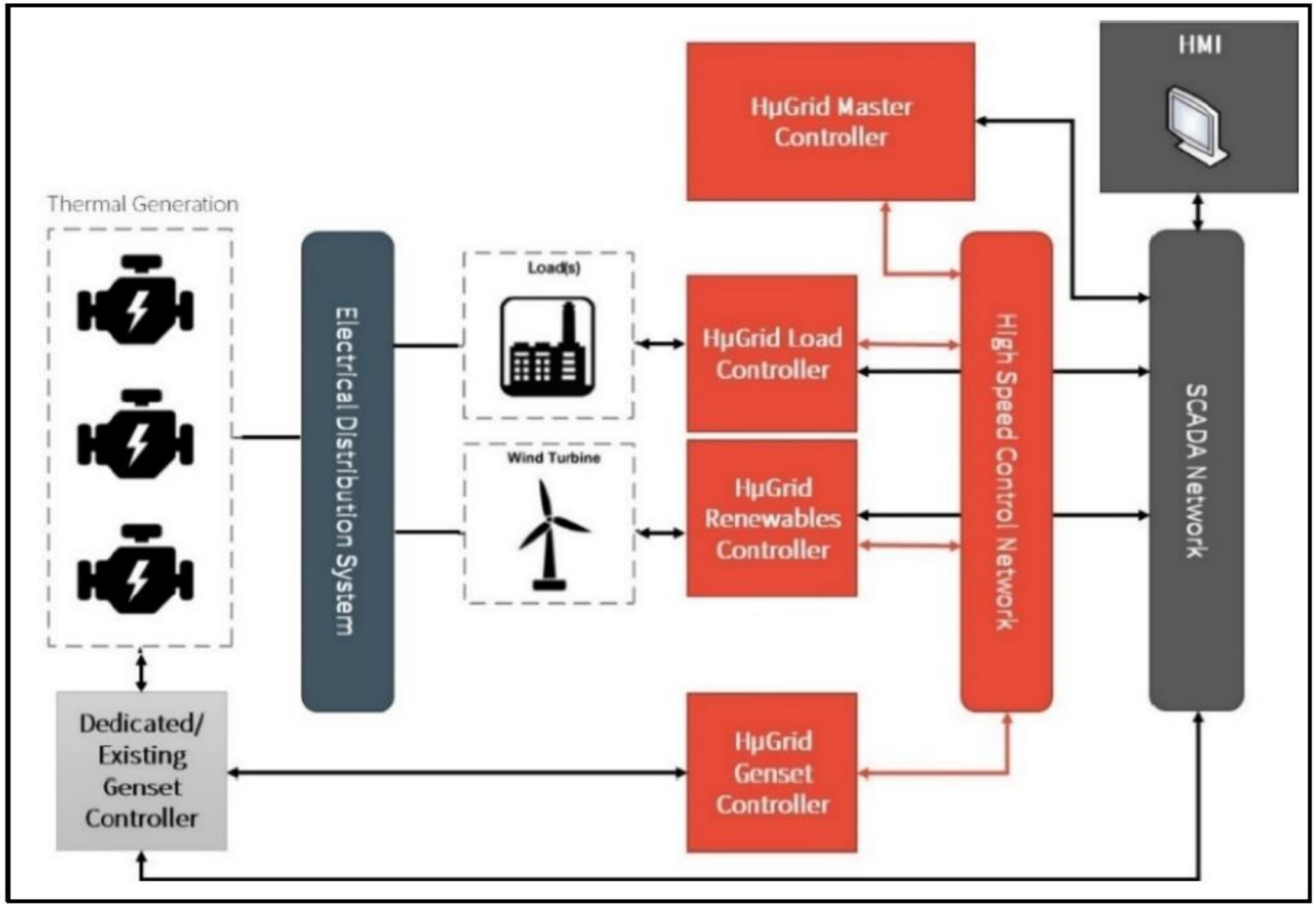
- Potential layout studied at concept design
- Optimal solution would have 4 wind turbines, with **~23MW of installed capacity**



Project Info	
Installed Capacity	22.4 MW
Capacity Factor	30.5 %
Average Wind Generation	6.8 MW/year
Wind Penetration	17,9%
Fuel Savings	10.3 ML/yr
Annual GHG Emission (CO2eq)	27,801 t/yr

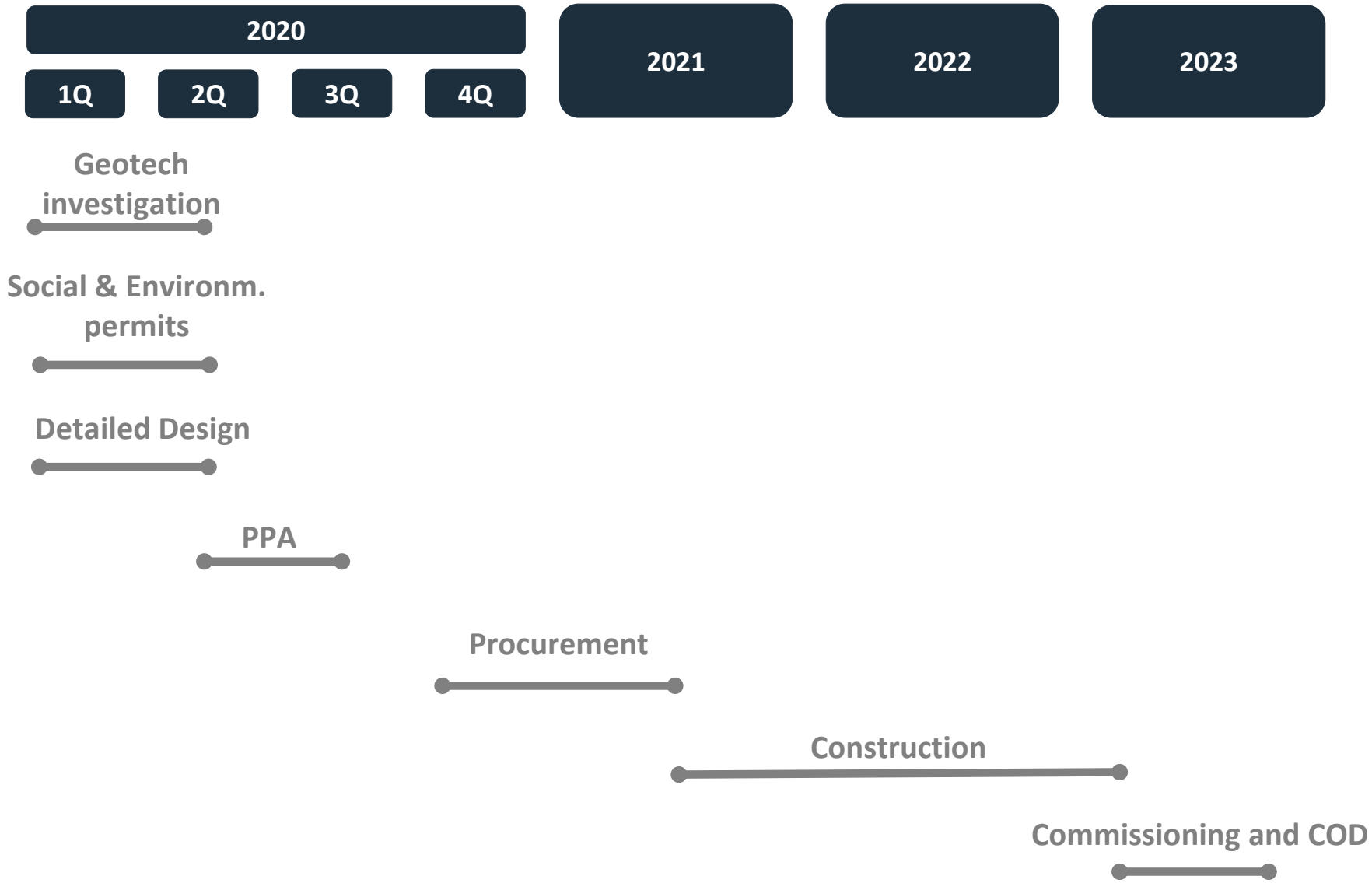
Voisey's Bay Wind Project Concept

A microgrid controller can be used to smooth the transition between diesel and wind production to meet load requirement



Voisey's Bay Wind Project – Overall Schedule

COD expected to 2023



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