Smart Microgrid Solutions to Reducing Fossil Fuels Dependence in Canada's Rural and Remote Communities

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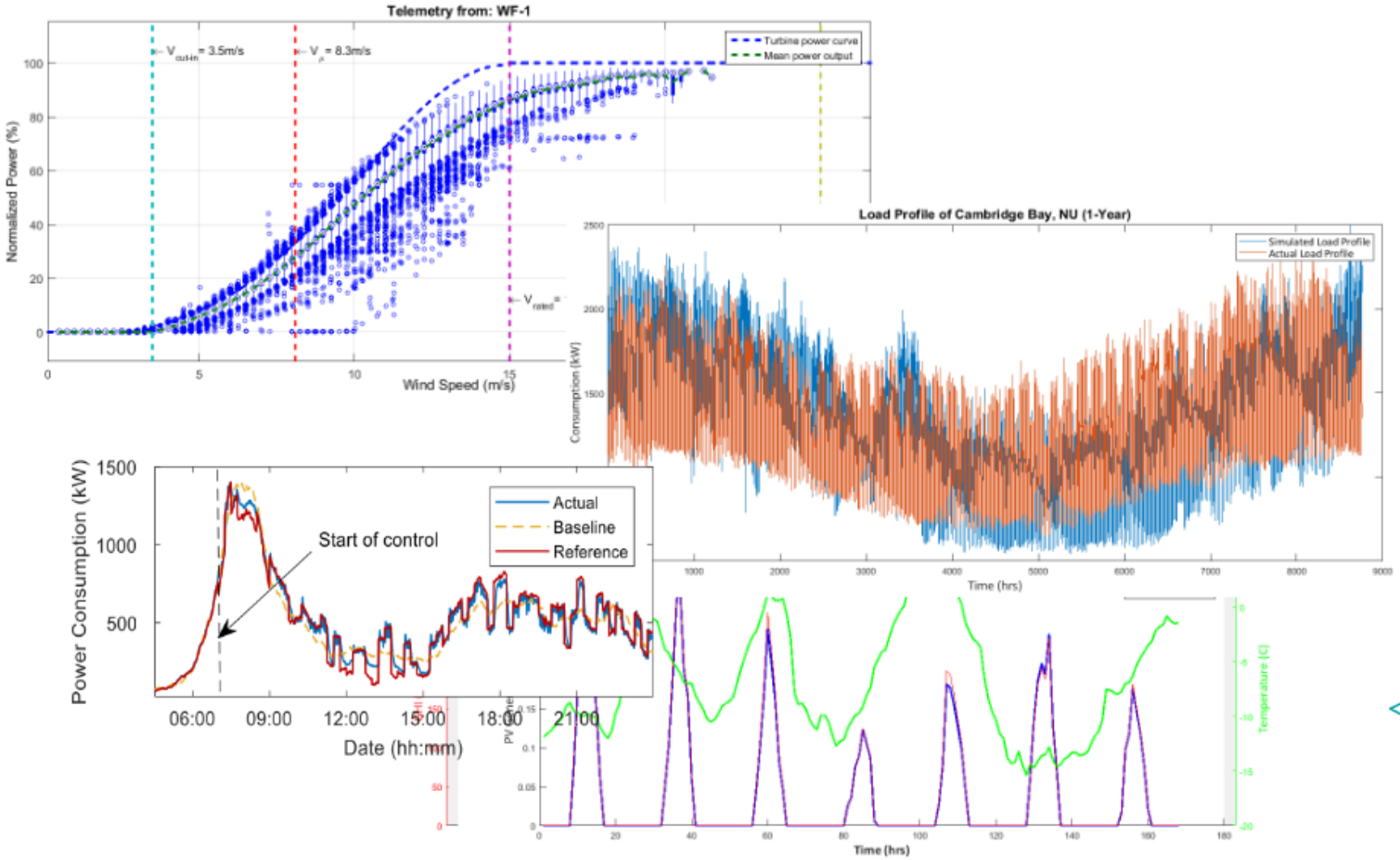
Data is everything...



Simulation Model

- Wind generation profiles
- PV generation profiles
- Controllable load profiles
- Community load profile

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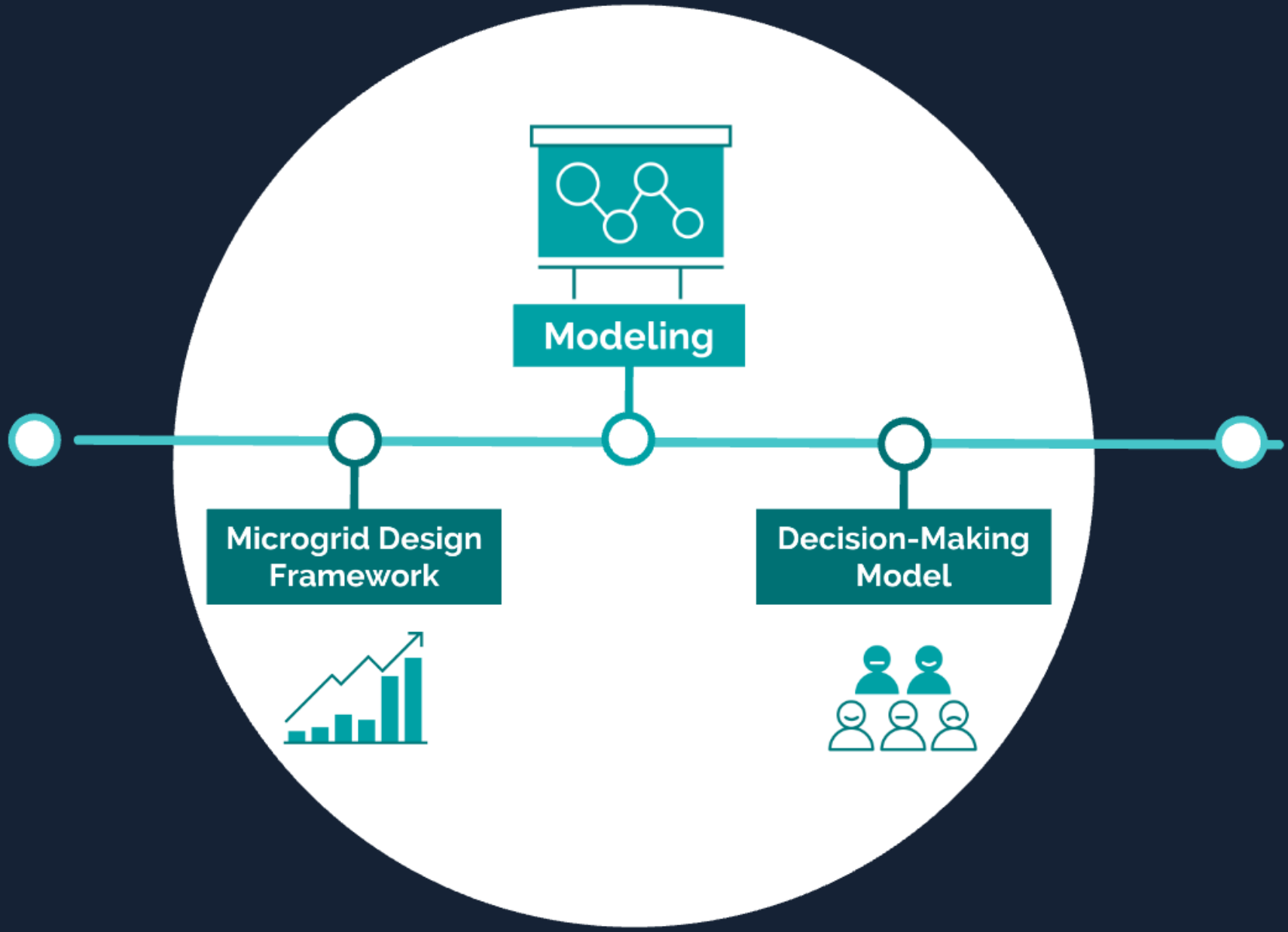
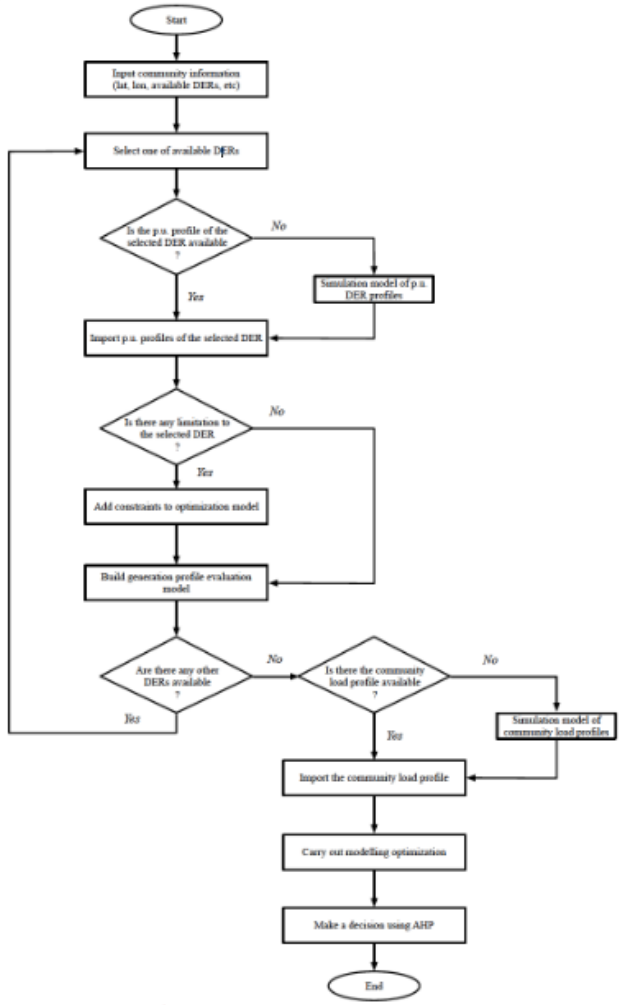

Modeling
Microgrid Design Framework
Decision-Making Model

Framework help find optimal solutions

An optimal combination of available DERs taking account for **costs, reliability, environmental effects and economic potential** for rural and remote communities

Input: DER simulated/physical profiles
Community load profile
Constrains / limitations

Optimizer: Best return of investment (ROI)
100% renewable
Customized objectives



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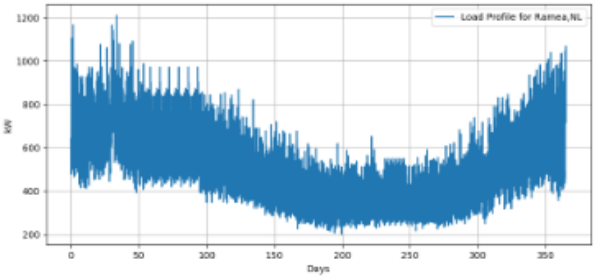
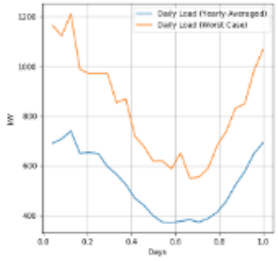
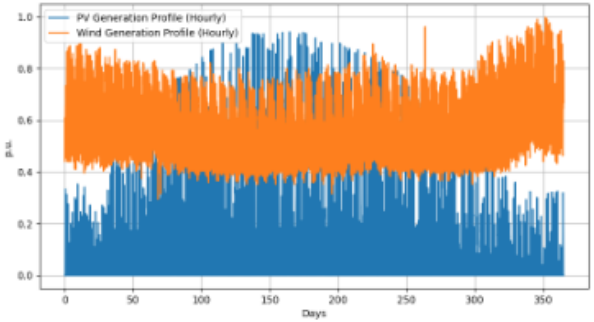
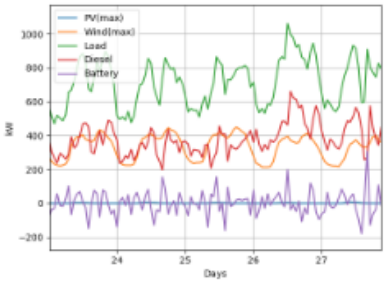
Framework help find optimal solutions

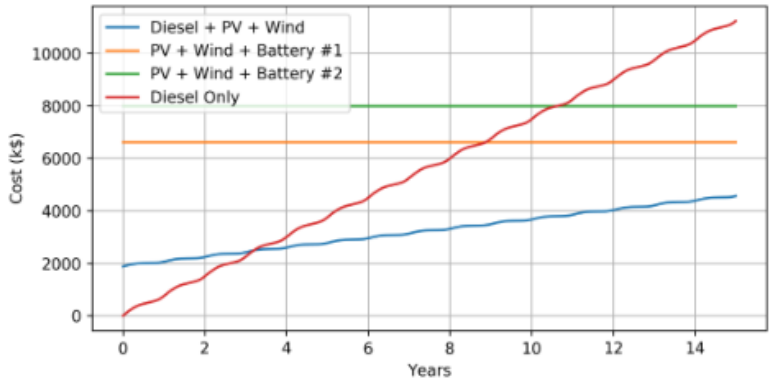








Case Study: Ramea, NL



Scenario / Study	DER Solution	Wind Turbine (kW)	PV Panel (kW)	Battery (kWh)	Capital Investment (k$)
a	Diesel + Wind + PV	600 (150×4)	30 (2×15)	0	$1,875.00
b	Wind + PV + Battery (#1)	1650 (150×11)	30 (2×15)	1293	$6,604.00
c	Wind + PV + Battery (#2)	1500 (150×10)	630 (2×315)	1386	$7,984.00

The framework can bridge the **gap** between related policies and practicality.

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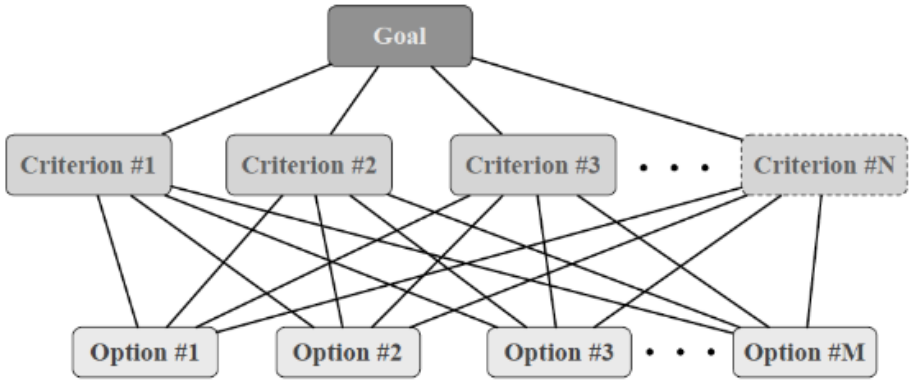
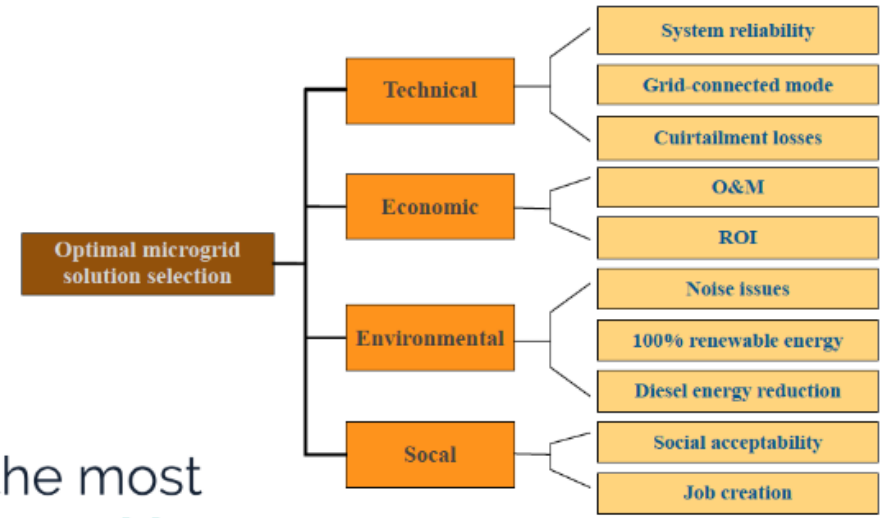
AHP: an efficient decision-making model



Architecture of AHP

An example for microgrid design



Analytica Hierarchy Process (AHP) is one of the most effective and efficient **multi-criteria decision-making** methods in **group** decision-making applications.

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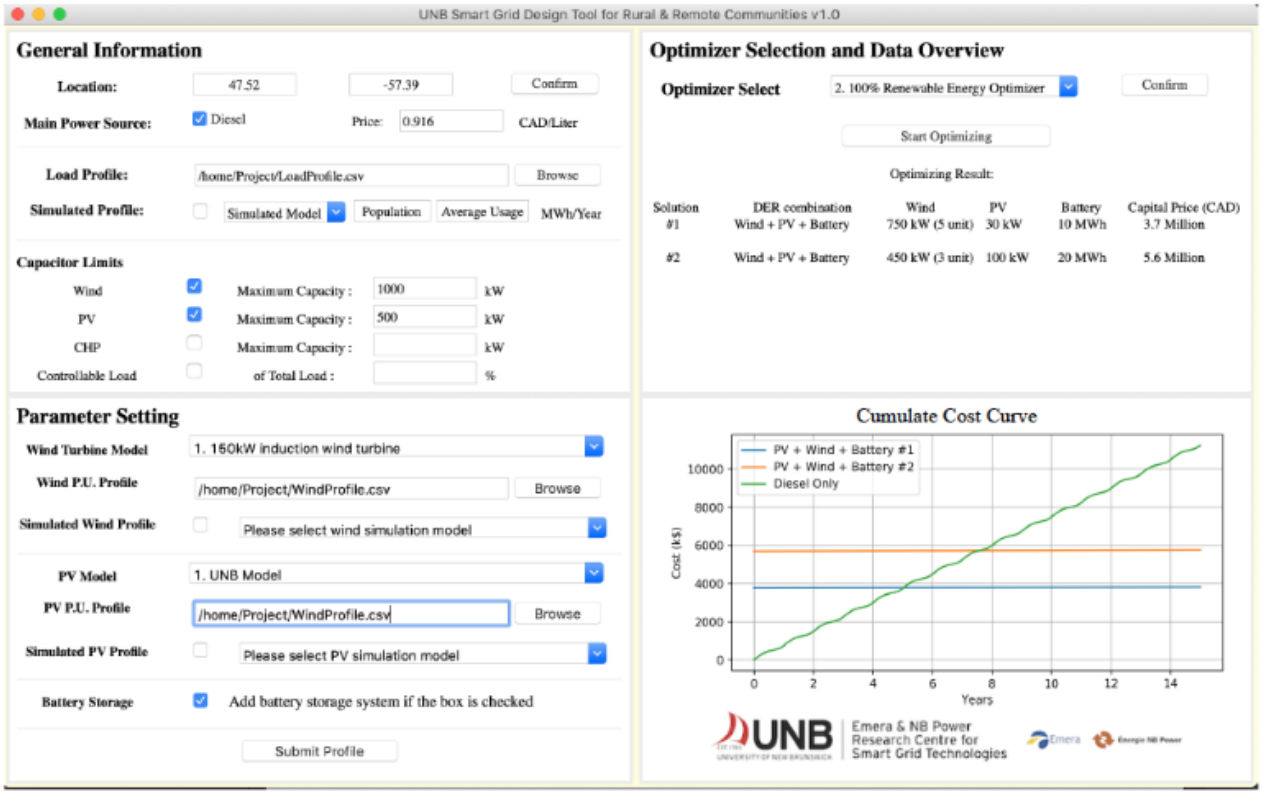
Cooperation with modelers across Canada

Python-based open-source toolkit for microgrid design



A Model provides value only when other participants can use it in a manner that is **convenient, and have the necessary resources and mechanisms in place** that helps them to make a decision.

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