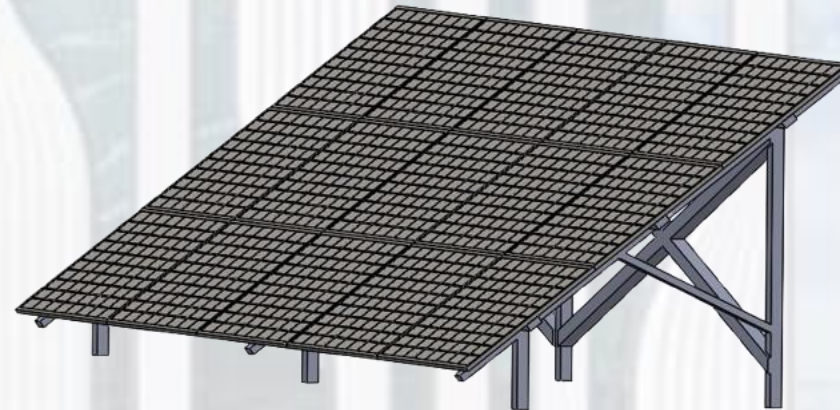


DC MICROGRID FEASIBILITY FOR GRID-CONNECTED REMOTE COMMUNITIES

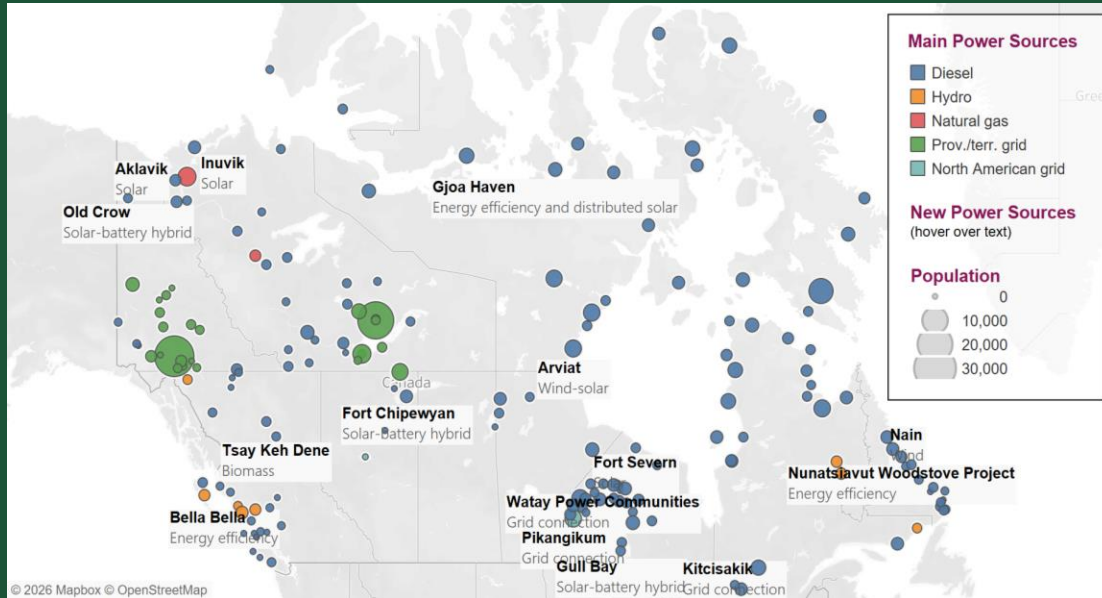


VerdeNova



Ahmed Vajahath
Nalyssa Runge
Cyrus Urbanowicz
Aisha Shata

The Challenge

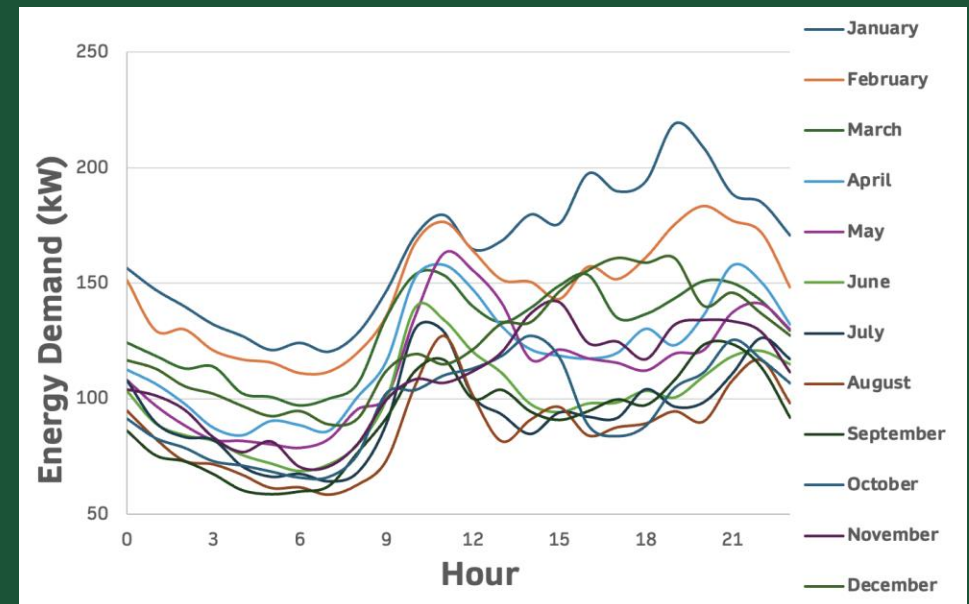


Map of Remote Communities in Canada & their primary electricity source

Government of Canada. (2023, March 14). CER – Market Snapshot: Clean Energy Projects in Remote Indigenous and Northern Communities. [Www.cer-rec.gc.ca](https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2023/market-snapshot-clean-energy-projects-remote-indigenous-northern-communities.html). <https://www.cer-rec.gc.ca/en/data-analysis/energy-markets/market-snapshots/2023/market-snapshot-clean-energy-projects-remote-indigenous-northern-communities.html>

Test Case Community

- 150 residents, ~38 dwellings
- Moderate Climate (snowy winters, dry summers)
- Max/Min Temps of $\pm 35^{\circ}\text{C}$
- ~100km from nearest substation
- Frequent Blackouts + Limited Capacity



Simulated average monthly energy demand by the hour

Our Decision Process

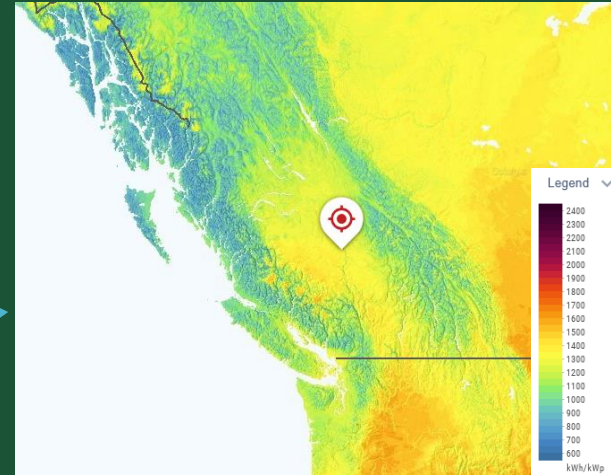
Energy Source Selection:

Characteristics	Solar Photovoltaics
Operation (Power Density, Maintenance req., Lifespan)	✓(!)
Geographic Feasibility	✓
Costs (Capital, O&M, ROI)	✓
Safety/Standards (incl. embodied carbon)	✓

High power density but **intermittent generation**

Ongoing decrease in costs

Mature technology



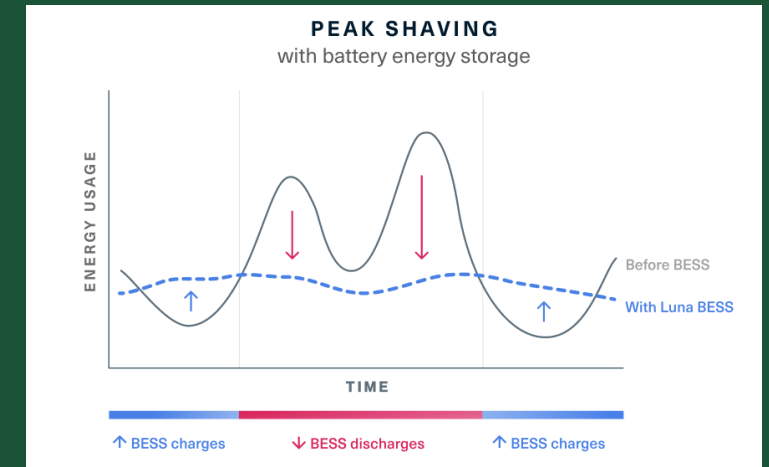
Solaris. (2026). *Global Solar Atlas*. Globalsolaratlas.info.
<https://globalsolaratlas.info/map?c=52.942639>

For Intermittent Generation:

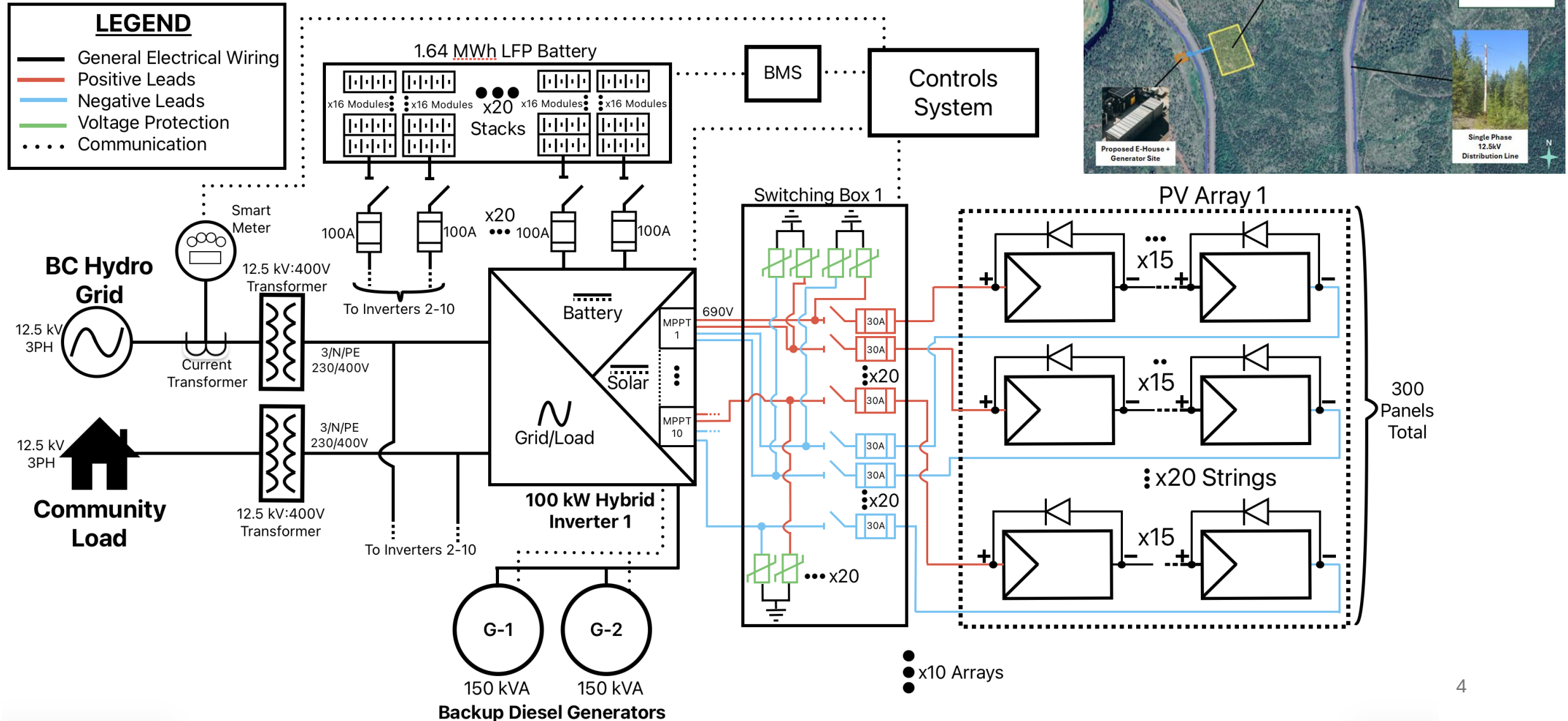
Inclusion of a **Battery Energy Storage System**
 Installment of a **Backup Generator**

Ensures reliable access even in **grid outages**

Ensures reliable access when **battery discharged**



Presented Design

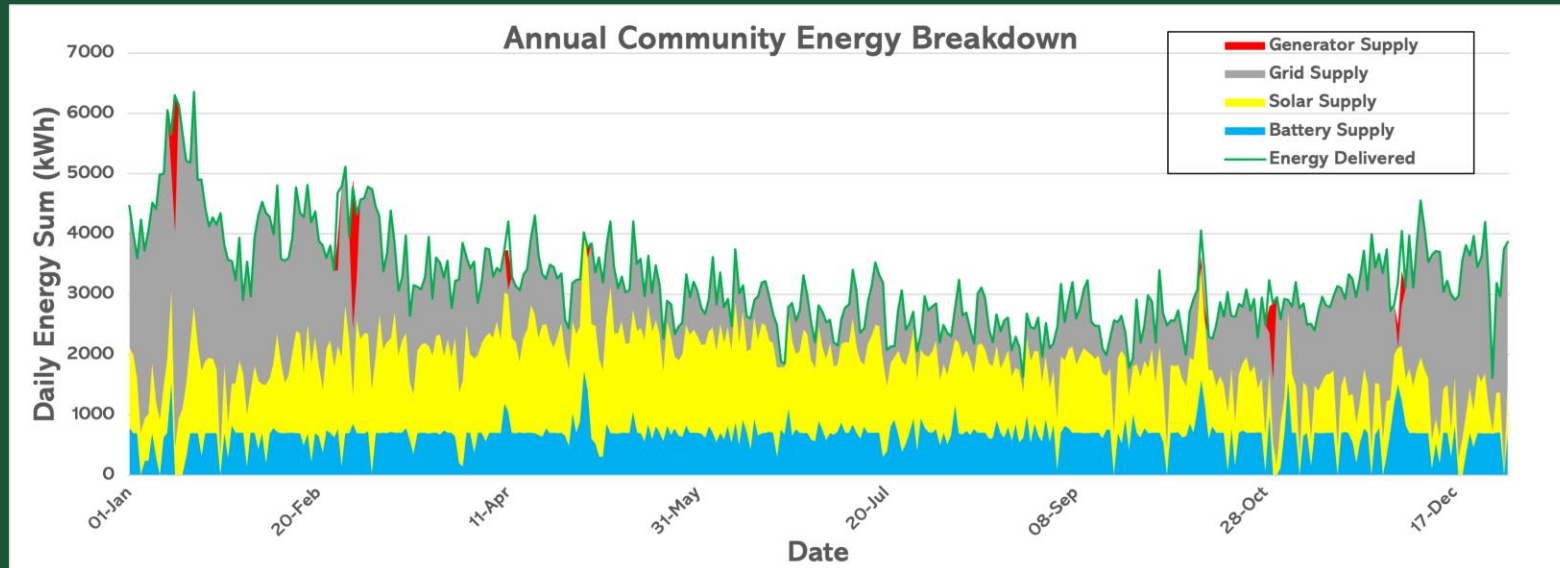


Impact of Solution

Annual Cash Flow:



+ Various community-based socioeconomic benefits



Grid Outage Scenarios

