

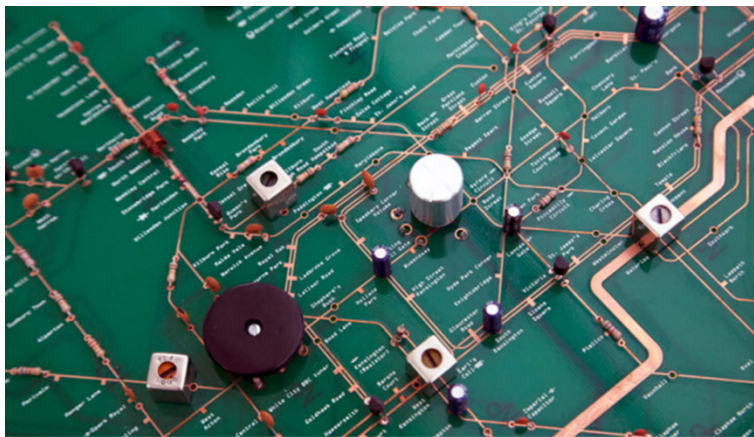
Discover Technata Hackathon Challenge Statement: September 2024**“Advancing Kanata North as a Clean Energy Resilience District”**

The Ottawa Climate Action Fund envisions the Kanata North tech park as a Clean Energy Resilience District in which **the lights and heat stay on and businesses continues** uninterrupted, no matter the weather or state of the power grid by **integrated low-carbon energy solutions** within the special economic district.

Hackathon participants will examine and refine integrated solutions from the scale of the circuit board to the building to the full tech park site. Solutions can include: deeply efficient buildings, on-site renewable energy generation, storage, thermal sharing and district energy solutions.

Participants will propose **combinations of solutions** that can cut carbon emissions and enhance energy resilience.

Entries will be judged on the basis of both innovation and practicality with a preference for replicable solutions that can be deployed in the buildings and infrastructure systems of the tech park – and across the Ottawa region.



Yuri Suzuki: "Tube Map Radio" <http://yurisuzuki.com/archive/works/tube-map-radio/>

See below for further information and background reading.

CONTEXT

1. **Climate change**
 - a. Climate change is increasing the frequency of severe storms and is a threat multiplier to power outages
 - b. Buildings and transportation account for 90% of Ottawa’s greenhouse gas emissions
2. **Power grid capacity:**
 - a. Increasing electrification (EVs, heat pumps) will pose strains on Hydro Ottawa’s distribution infrastructure.
 - b. **Kanata North** has known electricity capacity constraints – and is growing

WHY

Deep building efficiency, Distributed Energy Resources, storage and district energy solutions can

- Provide valuable **resilience** benefits: decrease strain on local distribution infrastructure and reduce power outages
- **Save money**
 - From business interruption
 - **Background reading**
 - [A day without power: Outage costs for businesses - Bloom Energy](#)
 - [Eaton-blackout-tracker-annual-report-canada-2017.pdf](#)
 - Reduce scope of required grid capacity upgrades
 - Ontario could save **\$9.5 billion** via efficiency instead of new natural gas plants
 - RBC Climate Action Institute concluded that timely conservation could save enough electricity to power three million homes by 2045 and [save ratepayers \\$500 million per year](#).
- Enhance **GHG mitigation** and reduce costs
- Provide a **flagship community electrification project** can draw attention to what the future can/should/will look
- Offer valuable lessons to Hydro and IESO and inform their planning

WHAT

Key Elements

1. **Deeply efficient buildings:**
 - a. Robust thermal insulation can reduce energy load to zero or near zero
 - b. The most cost-effective energy resource – it displaces the need for new electricity generation, transition and distribution

Background reading

- [Passive House Canada](#)
- [Ottawa Retrofit Accelerator | Hydro Ottawa](#)
- [Retrofit Hub \(NRCan\)](#)
- [Audette | What is Decarbonization Planning? OCAF partnership | Audette](#)

2. *Distributed electricity generation*

- a. E.g., **solar** on every practical surface (roofs, building envelopes, solar canopies over parking lots)
- b. Micro wind as/if practical
- c. Geothermal if practical

Background reading

- [Why Putting Solar Canopies on Parking Lots Is a Smart Green Move - Yale E360](#)
- [Solar windows, shingles and cladding? The building itself is now the solar panel | CBC](#)
- [State-of-the-art review of micro to small-scale wind energy harvesting technologies for building integration - ScienceDirect](#)
- [Rooftop turbines aim to capture power in windy cities | CBC](#)

3. *Storage / Demand Management*

a. **Batteries**

- i. e.g., Nokia's new system and strategic timing of charging
- ii. EVs for Vehicle-to-Building (V2B) and Vehicle-to-Grid (V2G)

Background reading

- [Ontario Completes Largest Battery Storage Procurement in Canada](#)
- [These giant batteries store energy, but not as electricity | CBC News](#)
- [How electric vehicles could transform the power grid | CBC](#)
- **EV Everywhere** - Hydro Ottawa and [BluWave AI](#)'s effort, focused on the assessing and shifting the *timing* of EV charging to manage demand. (The original project does not include on-site generation or storage – but BlueWave's software tools do.)

b. **Thermal storage**

- i. using the earth as a thermal battery and the sewer too through ground-source heat pumps, wastewater energy transfer can be a lot more cost effective \$/Joule than electric batteries
- ii. via hot/cold water tanks 'charged' from waste heat or at off-peak rates

Background reading

- [Wastewater Energy Transfer at Lebreton Dream Development - OCAF](#)
- [Geothermal heat pumps are helping clean up city... | Canary Media](#)

- c. **Thermal sharing** – w/in and between buildings (e.g., using waste heat from a data centre to heat office buildings)

Background reading

- [Waste heat recoveries in data centers: A review - ScienceDirect](#)

4. *District energy*

- a. **District energy** – e.g., thermal networks fed by multiple sources (waste heat, geothermal....)
- b. **Microgrids** – integrating electric generation, storage, demand management and thermal

Background reading

- [Zibi Community Utility District Energy System](#)
- [Canadian communities are tapping into greener ways to heat and cool buildings | CBC](#)
- [Imagine a furnace that heats the whole neighbourhood, not just your home | CBC](#)
- [Microgrids: A review, outstanding issues and future trends - ScienceDirect](#)

5. *Travel-efficient communities*

Walkable, bikeable, 15-minute, transit-oriented development improves community and economic health and resilience.

Background reading

- [Economic, Social & Environmental Benefits of Smart Growth - OCAF](#)
- [Car-oriented sprawl increases driving & GHGs in greater Montreal — Green Resilience Strategies](#)
- [Avoiding Clean Congestion — Green Resilience Strategies](#)