Sustainable Energy Systems Portfolio
SESP: 2023 – 2024

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Project focused on designing energy systems

https://doi.org/10.1126/science.aas9793
Project focused on designing energy systems

- Transition to net-zero emissions mandated by 2050
- Objectives? Affordable, reliable, low-carbon, sustainable, equitable
- Consideration of energy supply options, demand types, balance of system, system integration, user behavior, risk, and other facets
For 3 years, focus has been on Canada’s Remote and Northern Communities
Facilitating diesel exit in these communities is difficult

Rankine Inlet, NU:
2.5 MW Electric Peak
~2400 People (2016)
$1.1/L Diesel Costs (Subsidized)
This year, focus is designing net-zero Carleton campus
Solar PV, solar thermal, hydrokinetic, and hydrogen
Using large amounts of real data from campus
Subgroups often divide along technological lines

- Integration
- Nuclear
- Wind
- Solar (PV and thermal)
- Battery energy storage
- Hydrogen fuel cells and electrolyzers
- Diesel engines or gas turbines
- Systems and controls

Task is to optimize energy system, given a range of constraints:
- Safety
- Performance
- Environmental impact
- Cost
- Reliability
- Stakeholder preferences
Previous examples of hardware development
Large emphasis on numerical methods

- HOMER Pro, DER-CAM, Matlab Simulink, RETScreen among tools used
Questions?