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Status of Microgrid RD&D in Canada 2018

Farid Katiraei

Bucharest 2018 Symposium on Microgrids

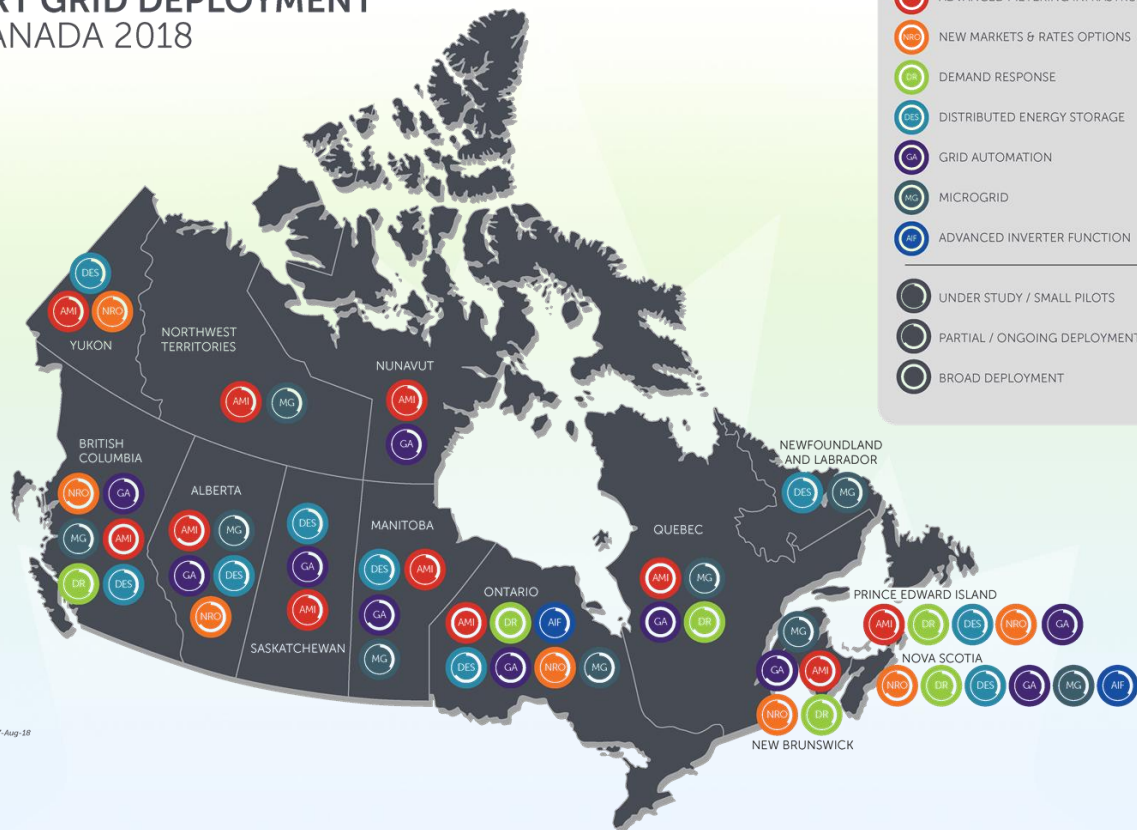
CanmetENERGY

Leadership in ecoInnovation



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SMART GRID DEPLOYMENT IN CANADA 2018



Data as of: 17-Aug-18

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CUMULATIVE PUBLICLY FUNDED SMART GRID DEMONSTRATIONS AND PILOTS IN CANADA SINCE 2003



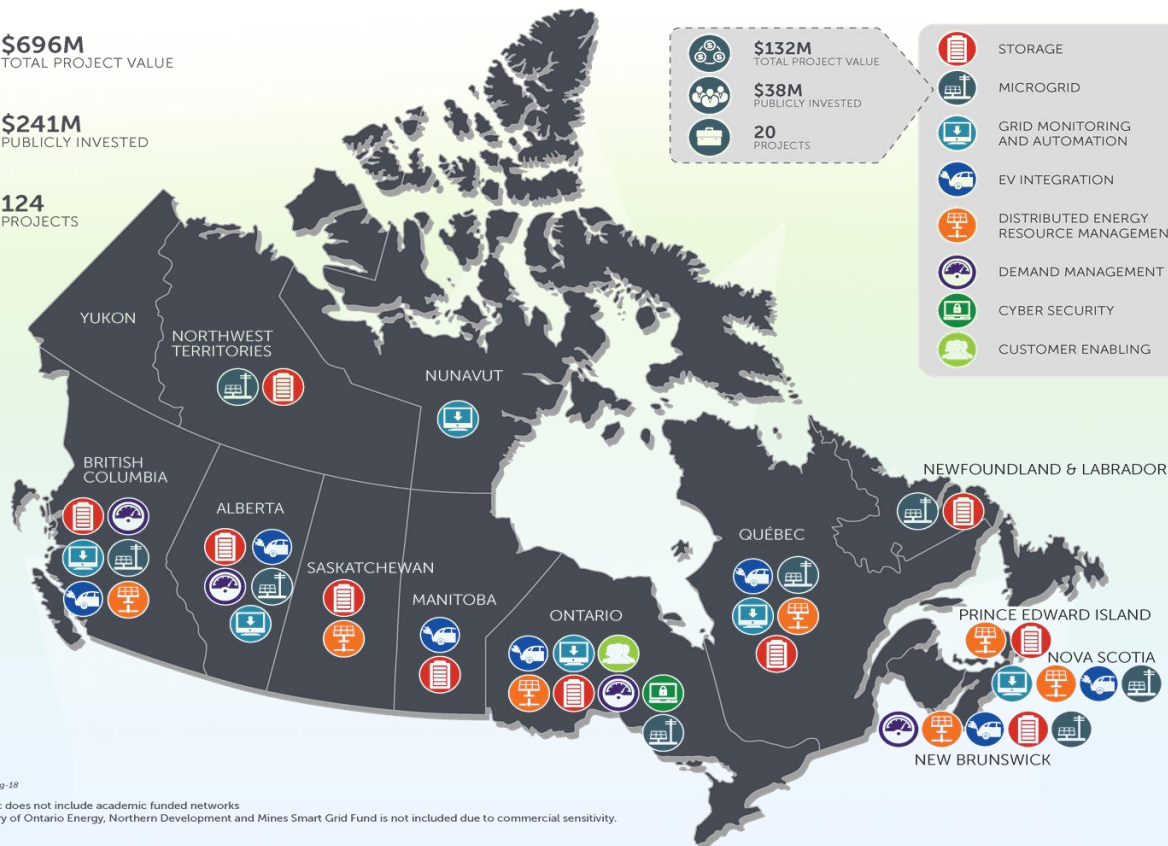
\$696M
TOTAL PROJECT VALUE



\$241M
PUBLICLY INVESTED



124
PROJECTS



Data as of: 17-Aug-18

1. Infographic does not include academic funded networks
2. The Ministry of Ontario Energy, Northern Development and Mines Smart Grid Fund is not included due to commercial sensitivity.

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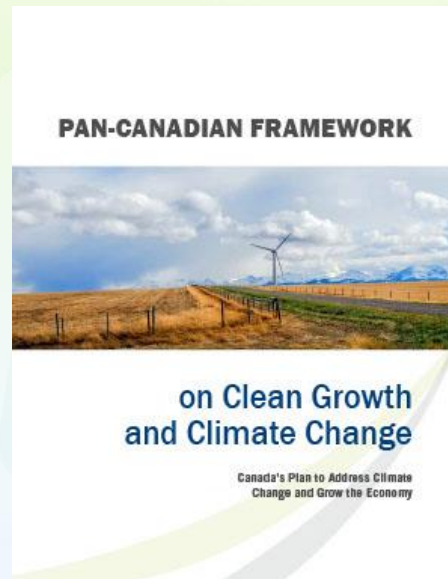
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Public Funding from 2018-2024 under Pan-Canadian Framework

- Green Infrastructure Phase 2
- Energy Innovation Program
- Program of Energy Research & Development
- Clean Growth Program
- Strategic Innovation Fund

Total Funding \approx \$ 2.4 B CDN



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Recent Publicly Announced Microgrid Projects

- [Transactive Energy Network for Clean Generation, Storage, EV Charging Microgrid](#)
- [Grid Connected Solar PV + Energy Storage Microgrid](#)
- [100% Renewable \(Solar PV + Wind + Storage\) Microgrid Study](#)
- [North Bay Community Energy \(Solar PV + Battery + Co-generator + EV Charging\) Microgrid](#)
- [Mobile Microgrid Container Capable of Generating and Storing Renewable Energy](#)
- [Building-Scale Microgrid Integrated with Solar PV + Storage with Smart Controls](#)
- [Community Renewable Energy Microgrid](#)
- [Grid-Tied Microgrid UOIT Campus](#)
- [Burlington DC Microgrid](#)
- [Modular Nanogrid with Solar PV + Battery with Load Control](#)
- [Community Microgrid and Feeder Automation on Distribution Energy Service Platform](#)
- [Gull Microgrid with Solar PV + Battery](#)
- [Lac-Megantic Microgrid with Solar PV + Battery + EV Charging](#)
- [Colville Lake Solar PV + Battery + Diesel](#)
- [Aklavik Variable Speed Generator Integrating Solar PV](#)

**hyperlinks included for each project*

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2017 Renewable Energy in Remote Communities Conference

- Engaging community, utility and renewable experts to decrease the use of diesel for electricity production in northern and remote communities



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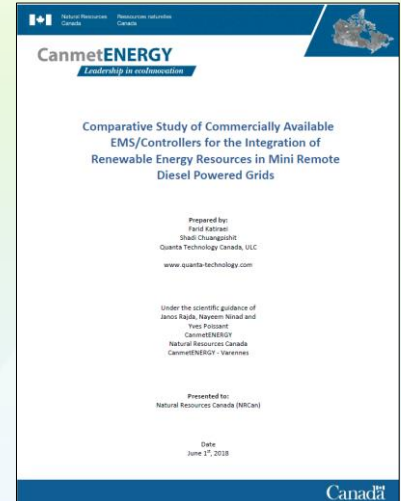
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Technology Assessment for Mini Remote Grids

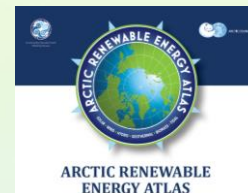
- Comparative study of commercially available EMS/controllers for the integration of renewable energy resources in small and mini remote diesel powered grids – An Industry Survey:
 - What are basic and advanced features of an EMS for mini-grid
 - Who are the players / solution providers?
 - What is the EMS cost?
 - Potential R&D areas?



**will be publicly available on NRCAN website soon*

Arctic Renewable Energy Atlas & Microgrid Research

- The Arctic Renewable Energy Atlas (AREA) is a comprehensive online tool which will include maps of renewable energy resources, data sets and case studies of renewable energy projects (endorsed by Arctic Council's Sustainable Development Working Group).
- Renewable Energy Microgrid Research in collaboration with the Canadian High Arctic Research Station (Cambridge Bay, Nunavut) and industrial research partners. Improved performance assessment tool for remote electrical microgrids (PATREM).



Source: AREA, <https://oaarchive.arctic-council.org/bitstream/handle/11374/1943/AREA-brochure-April-2017.pdf?sequence=1&isAllowed=y>;
Nunatsiq Online, http://www.nunatsiqonline.ca/stories/article/65674nunavuts_canadian_high_arctic_research_station_readies_for_july_1_2017/

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Mission Innovation Challenges

- Innovation Challenges:
 - Global calls to action aimed at accelerating RD&D in technology areas where MI members believe increased international attention would make a significant impact in our shared fight against climate change
 - cover the entire spectrum of RD&D; from early stage research needs assessments to technology demonstration projects

1. **Smart Grid Innovation Challenge** - *to enable future grids that are powered by affordable, reliable, decentralised for everyone renewable electricity systems.*
2. **Off-Grid Access to electricity Innovation Challenge** - to develop systems that enable off-grid households and communities to access affordable and reliable renewable electricity.
3. **Carbon Capture Innovation Challenge** - to enable near-zero CO₂ emissions from power plants and carbon intensive industries.
4. **Sustainable Biofuels Innovation Challenge** - to develop ways to produce, at scale, widely affordable, advanced biofuels for transportation and industrial applications.
5. **Converting Sunlight Innovation Challenge** - to discover affordable ways to convert sunlight into storable solar fuels.
6. **Clean Energy Materials Innovation Challenge** - to accelerate the exploration, discovery, and use of new high-performance, low-cost clean energy materials.
7. **Affordable Heating and Cooling of Buildings Innovation Challenge** - to make low-carbon heating and cooling affordable.

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Mission Innovation Challenges

Innovation Challenge #1: Smart Grids

- 4 R&D priority areas identified by challenge members as:
 - Regional Grid Innovation
 - Distribution Grid Innovation
 - **Microgrid Innovation**
 - Cross Innovation
- Developed 6 main tasks with work programmes involving sub-tasks looking into microgrid-related activities

Innovation Challenge #2: Off-Grid Access to Electricity

- R&D focused on systems enabling off-grid communities to access affordable and reliable renewable electricity

For More Information



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