

DEC

Decentralised Energy Canada

POWERING THE 21ST CENTURY

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Decentralised Energy Canada
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State of the DE Industry
Annual Presentation to Alberta Innovates

1. What is Decentralised Energy?
2. The Value of Microgrids
3. Canada's Energy Transition
4. A Focus on Sustainability
5. Alberta's Net Zero Advantage
6. Notable Innovators
7. Decentralised Energy Forum 2023



1.0 WHAT IS DECENTRALISED ENERGY (DE)?

Defined as thermal energy or electricity that is produced, managed and/or stored close to load(s).

Other key industry terms:*

- Onsite Energy Generation
- Microgrids, Mini-Grids, and Nanogrids
- Behind the Fence (BTF) Generation
- Embedded Generation
- Distributed Energy Resources (DER)

Off-grid, distribution-connected and occasionally transmission-connected.

**Coming Soon National Technical Specification by SCC and CSA Group*

1

Global Commitments to Emissions Reduction

197 countries have adopted the Paris Agreement – of those, 179 have solidified their climate proposals with formal approval.

5

Lower Cost Renewable Energy and Storage

Solar PV module prices down by ~90% since 2009 and wind turbine prices down ~55-60% since 2010. Battery prices down by ~87% since 2010.

2

Traditional Electrical Grid Challenges

Expensive, limited functionality, and time consuming. Today, >50% of a consumer bill can be delivery charges. Alberta alone has 26,000 km of transmission lines worth USD\$88 billion but in rural areas there can be as few as 3 customers/ km.

6

Extreme Weather and Natural Disasters

Total global economic losses from hurricanes, severe storms, wildfires, floods and other weather events:

2017 USD \$330 billion
2018 USD \$155 billion
2019 USD \$166 billion
2020 USD \$220 billion
2021 USD \$320 billion
2022 USD \$270 billion

Source: Munich RE

3

Rise of Prosumers

When a consumer also produces energy, they are called prosumers. Most DE systems are developed by prosumers.

Global DE investments:

2000 USD \$30 billion
2012 USD \$150 billion
2020 USD \$246 billion
2030 Forecast USD \$919 billion

7

Electrification of Society

Electricity for data centers, transportation and agriculture. More than 90% of all passenger vehicles in the U.S., Canada, Europe and other rich countries could be electric and autonomous by 2040. An autonomous vehicle uses and generates around 4000 GB of data per day

4

Digitalisation of Utilities

Digital transformation could unlock \$1.3 trillion of value for the electricity sector. Four high value themes are: asset life cycle management, grid optimisation and aggregation, integrated customer services and beyond the electron.

7 DRIVERS OF DECENTRALISED ENERGY SYSTEMS

SECTOR INTEGRATION



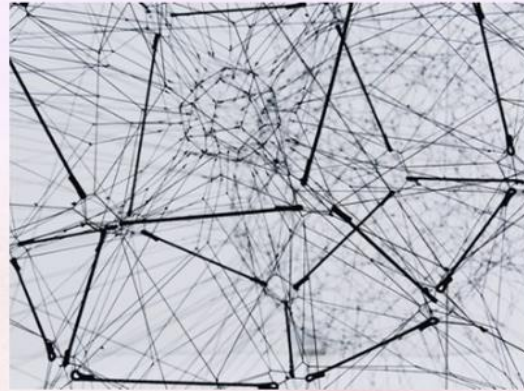
DE enables the 5IR and the energy transition. Both require systems thinking. Look at energy in terms of relationships rather than siloed management to navigate the sea change.

SYSTEMS THINKING



Generation

Thermoelectric Energy, Fuel Cells,
Geothermal, Hydroelectric, Small Modular
Reactors, Solar, Bioenergy, Wind



Delivery

Microgrids, Mini-Grids, Nanogrids,
Charging Infrastructure, Thermal Grids

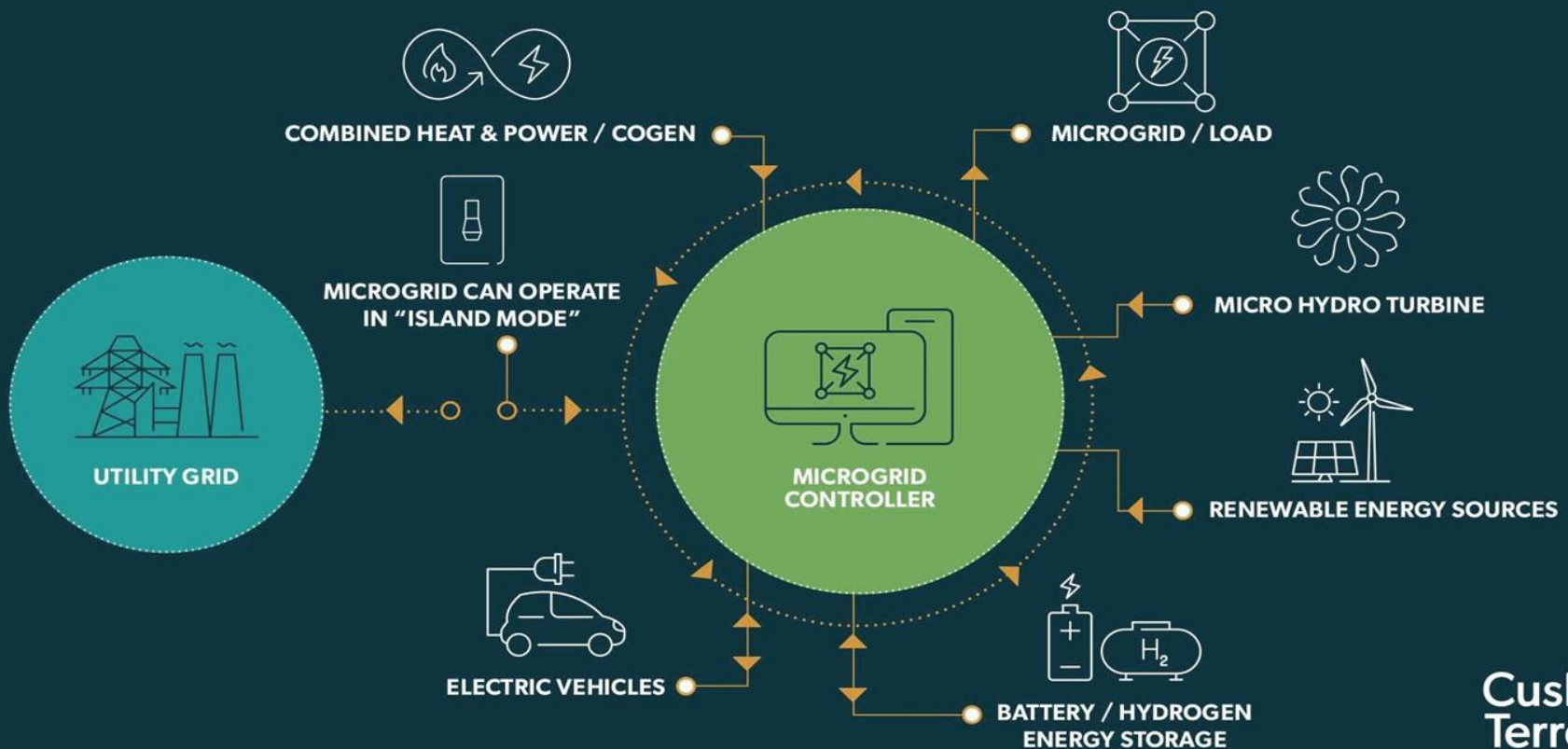


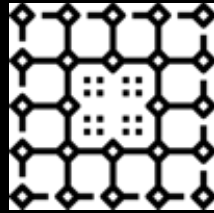
Optimisation

Energy Storage, Artificial Intelligence,
Machine Learning, Automation,
Transactional Software, Building
Management Systems, Controllers

2.0 THE VALUE OF MICROGRIDS

- Self-healing, dynamic participation and asset optimisation.
- MUSH as well as commercial and industrial campuses.

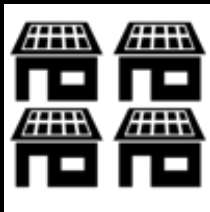




Smart Grids

Electricity networks that allow devices to communicate between suppliers to consumers, allowing them to manage demand, protect the distribution network, save energy and reduce costs

(European Commission, 2012)



Microgrids

Energy systems (electrical and thermal) with a defined geographical boundary (e.g., a community or campus) that can connect to a larger regional grid or operate autonomously (i.e., "island mode")



Mini-Grids

Off-grid energy systems (electrical and thermal) with an aggregate power rating <15MW
(United Nations Framework Convention on Climate Change (UNFCCC))



Nanogrids

Off-grid energy systems (electrical and thermal) confined to one building not exceeding 100 kW of power
(IEEE)

MICROGRIDS = ENERGY AS A SERVICE

1. Canadian electricity demand 1.6 to 2.1 times larger by 2050.
2. Why? 5IR (electrification, digitalisation and automation), population growth, climate instability, prosumer.
3. Fastest way to decarbonise energy
4. [Microgrid Benefits](#): renewable energy integration, efficiency gains, power reliability improvements, resilience to extreme weather.
5. Types of microgrids: commercial, remote, military, campus, data center, community, industrial, residential, critical infrastructure and utility microgrids.
6. Global market USD 7.76 billion in 2021 forecast USD 23.49 billion by 2029

3.0 CANADA'S ENERGY TRANSITION

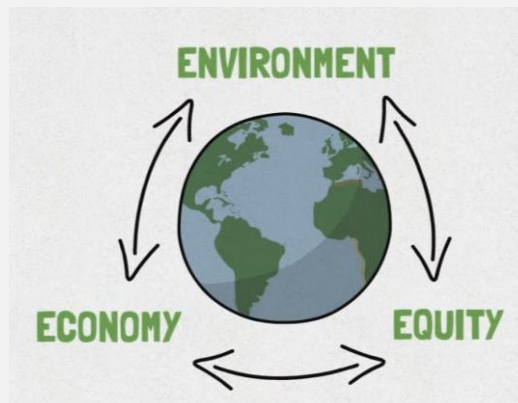
1. CLEAN ELECTRICITY STANDARD (NZ2035)
2. CRITICAL MINERALS STRATEGY
3. CANADA'S NEW 2030 EMISSIONS REDUCTION PLAN
4. 2020 MODEL CODES (NET-ZERO ENERGY READY STANDARDS BY 2030)
5. JUST TRANSITION - WORKFORCE RETOOLING, DIVERSITY AND INCLUSION, AND COMMUNITY ENGAGEMENT



4.0 A FOCUS ON SUSTAINABILITY

'Sustainability' is an ability to sustain an activity indefinitely while protecting ecological, human, and economic health and vitality. Sustainable business practices improve the quality of our lives, protect our ecosystem and preserve natural resources for future generations.

1. Common understanding of sustainability
2. Industry standards
3. National Technical Specification (NTS)
4. Standardisation collaboratives – e.g., Hydrogen Codes and Standards Working Group
5. Standards Roadmap



5.0 ALBERTA'S NET ZERO ADVANTAGE

1. HYDROGEN
2. CRITICAL MINERALS FROM WASTE STREAMS
3. RENEWABLE NATURAL GAS
4. DECENTRALISED ENERGY FOR LOCAL AND SUSTAINABLE FOOD PRODUCTION
5. DECARBONISING INDUSTRIAL POWER CONSUMPTION

<https://youtu.be/tmbxUTijYVk>



6.0 NOTABLE INNOVATORS

Sustainable Impact Capital Available

1. Arcus Power \$11M - power management with predictive analytics SaaS solution
2. Ayrton Energy \$1.4M - hydrogen-powered off grid energy generation and storage for EV charging
3. eZinc \$25M - breakthrough electrochemical technology for storing energy in zinc metal
4. Hydrostor \$250M - compressed air energy storage
5. Open Energi \$8.5M then acquired by BP - digital platform real-time data to optimise the performance of energy assets
6. Origami Energy £20M - intelligent energy trading and automation software
7. Ping Things \$4M - scalable analytics platform for high resolution utility sensor data

DECENTRALISED ENERGY CANADA

Canada's industry association for decentralised energy

Connecting industry to opportunities that accelerate the global transition to a sustainable, resilient and affordable energy future.

Core Activities:

- Events and networking
- Industry consensus building
- International trade facilitation
- Project de-risking
- Market research
- Training and education



OUR VISION

To remove barriers facing Canada's decentralised energy industry and accelerate the transition to a sustainable, resilient and affordable energy future.

OUR MISSION

To disrupt the status quo in Canada and create opportunities for decentralised energy by convening, educating and engaging stakeholders.

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2022

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Highlights

115 MEMBERS

DEF2022



Highlight Reel



Pitch Competition



Sponsors & Partners

-8 Startups Pitched
-Ayrton Energy -DEC Member & \$25,000 First Prize Winner
-Unico Power - DEC Member & 2nd Place Winner
-Valhalla Private Capital SPV to ↑ \$150,000 Investment



123 Attendees

DEC 19 NETWORKING EVENT

45 Guests

DEF2023

November 6 & 7, 2023
Chateau Lake Louise
www.deforum.ca

D.E. INNOVATION SUCCESS

BluWave AI \$5.6M
Ripple Energy \$1.4M
Arcus Power \$11M (Alberta)
Open Energy \$8.5M
Origami Energy £20M
Ping Things \$5.6M
Hydrostor \$250M
eZinc \$25M



SIEMENS



Natural Resources
Canada

Ressources naturelles
Canada



DECENTRALISED ENERGY FORUM

November 6-7, 2023 | Chateau Lake Louise, Alberta

A NEW ERA OF ENERGY

www.deforum.ca

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THANK YOU

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