

MICROGRID EMPOWERING RESILIENCY, EFFICIENCY AND SUSTAINIBILITY

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Energy landscape is undergoing a massive transformation

Carbon Pricing

- Current Policy: **\$65/t** CO₂_e in 2023 will escalate to **\$170/t** CO₂_e by 2030
- Evolving policies scenario: **\$15/t** CO₂_e/year increase beyond **2030** up to **\$470/t** by **2050**

Source: Canada's Energy Future 2021

Electricity Demand

- **47%** Demand growth **2021 -2050** [E-Mobility, Thermal Electrification, Green H₂ Production]
- **Greener Electric Grid (95% by 2050)**
 - By **2050 59%** of new capacity additions will be **Wind** and **Solar**
 - **Electricity storage** reaches **15%** of total installed capacity in **2050**

Source: Canada's Energy Future 2021

Limited Transmission

- **New Inter-Intra provincial transmission** line expansion will be **expensive**.
- Energy needs and economic driving **decentralized energy generation & distribution**

Emerging Technologies






- Green H₂ production and energy generation using **Fuel Cells**
- **Bio-Fuels** and Bio-Combined Heat and Power (**CHP**)
- **Efficient** Vertical Axis Wind Turbines (**VAWTs**)
- **Carbon Capture** technologies

Emission reduction targets - Government of Canada

Canada committed to reduce its GHG emissions by **40** to **45%** below **2005** levels by **2030** and achieving **net-zero GHG emissions by 2050**

Federal Level

2030 Emission Reduction Plan allocated new investments of **\$ 9.1 B** to reduce GHG emissions

 E- Mobility	<ul style="list-style-type: none">• 100% EV passenger car sales by 2035• \$ 2.9 B allocated for charging infrastructure
 Building	<ul style="list-style-type: none">• \$ 1 B towards ‘Net Zero by 2050 building plan’
 Industries	<ul style="list-style-type: none">• \$ 194 M incentives allocation for improving Energy Mgmt. System
 Power Grid	<ul style="list-style-type: none">• Transition electric grid to zero-emissions by 2035.• \$ 850 M clean energy project investments
 Communities	<ul style="list-style-type: none">• \$ 2.2 B towards Low Carbon Economy to support community level green projects & jobs

Provincial Level

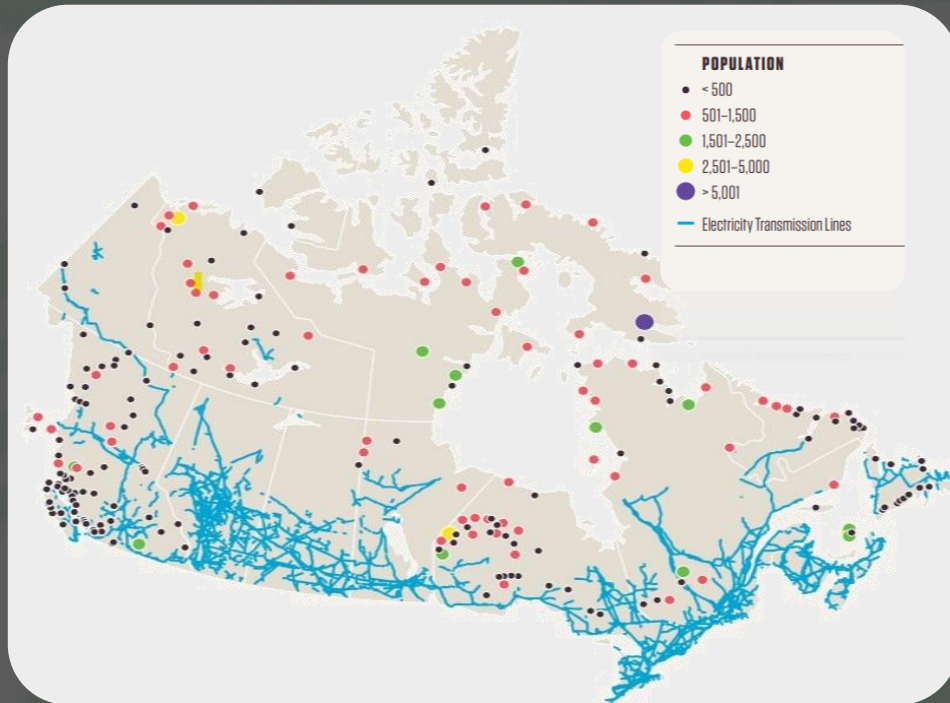
Example: (City of Toronto)



- **45%** reduction in GHG emissions by **2025**, from **1990** levels
 - **65%** by **2035** and **Net zero** GHG emissions by **2040**
- Source: Toronto City Council TransformTO - Critical Steps for Net Zero by 2040 (IE26.16)
- New buildings mandated to reach net zero by **2030**
 - **Electrify** all buildings by **2030** & **reduce EUI** by **11** times
- Source: Toronto Green Standard V.3)

Impact of Diesel Use in Canadian Remote Communities

Reliance on Diesel Fuel



Source: Pembina Institute Diesel Reduction Progress in Remote Communities



Difficult Fuel
accessibility



Cold & Harsh
Climate



High Variance
in Demand



Generation
Capacity Limit

Impacts



Economic

- Increasing and fluctuating cost of fuel, including high delivery costs.
- Higher maintenance costs and higher scalability cost.



Environmental

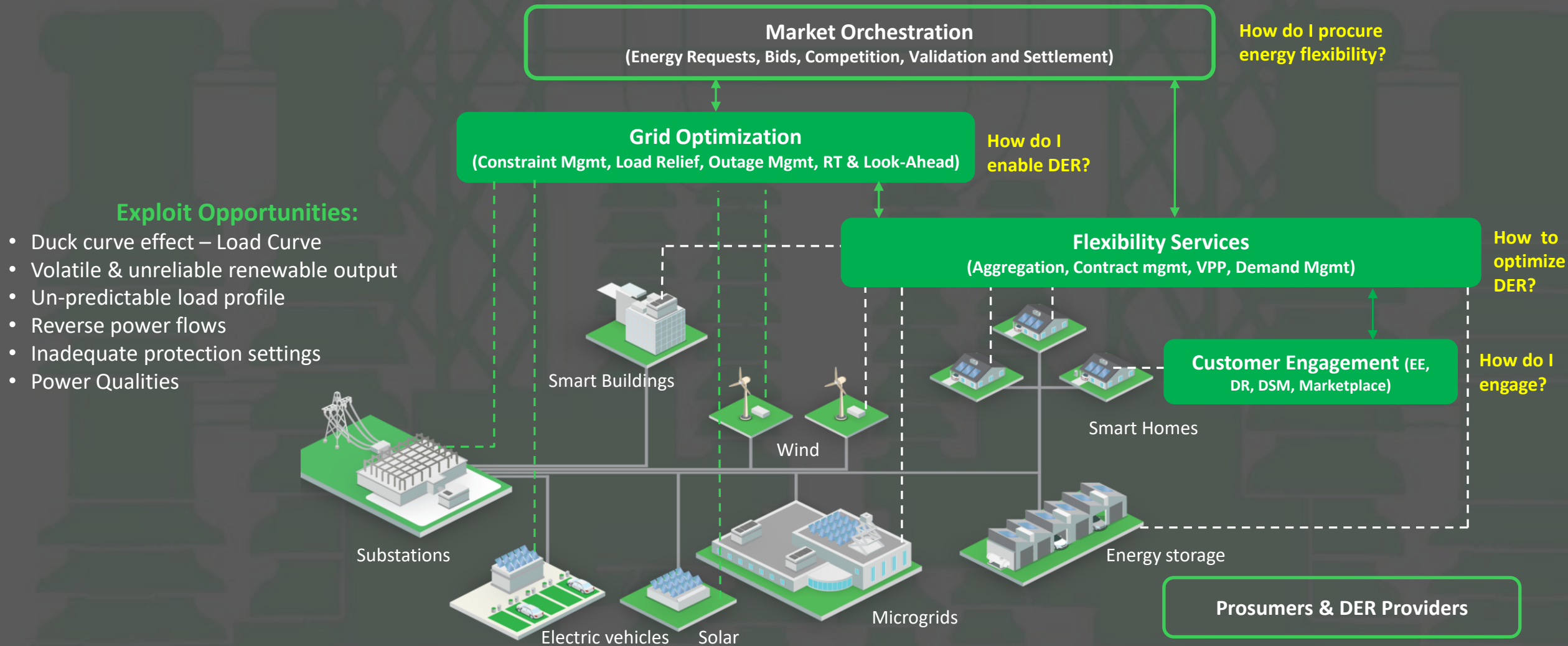
- Greenhouse gas emissions from diesel combustion & transportation.
- Risk of diesel spills in-situ and in transit, causing soil & ground water contamination
- Health implications to the local population and wildlife.



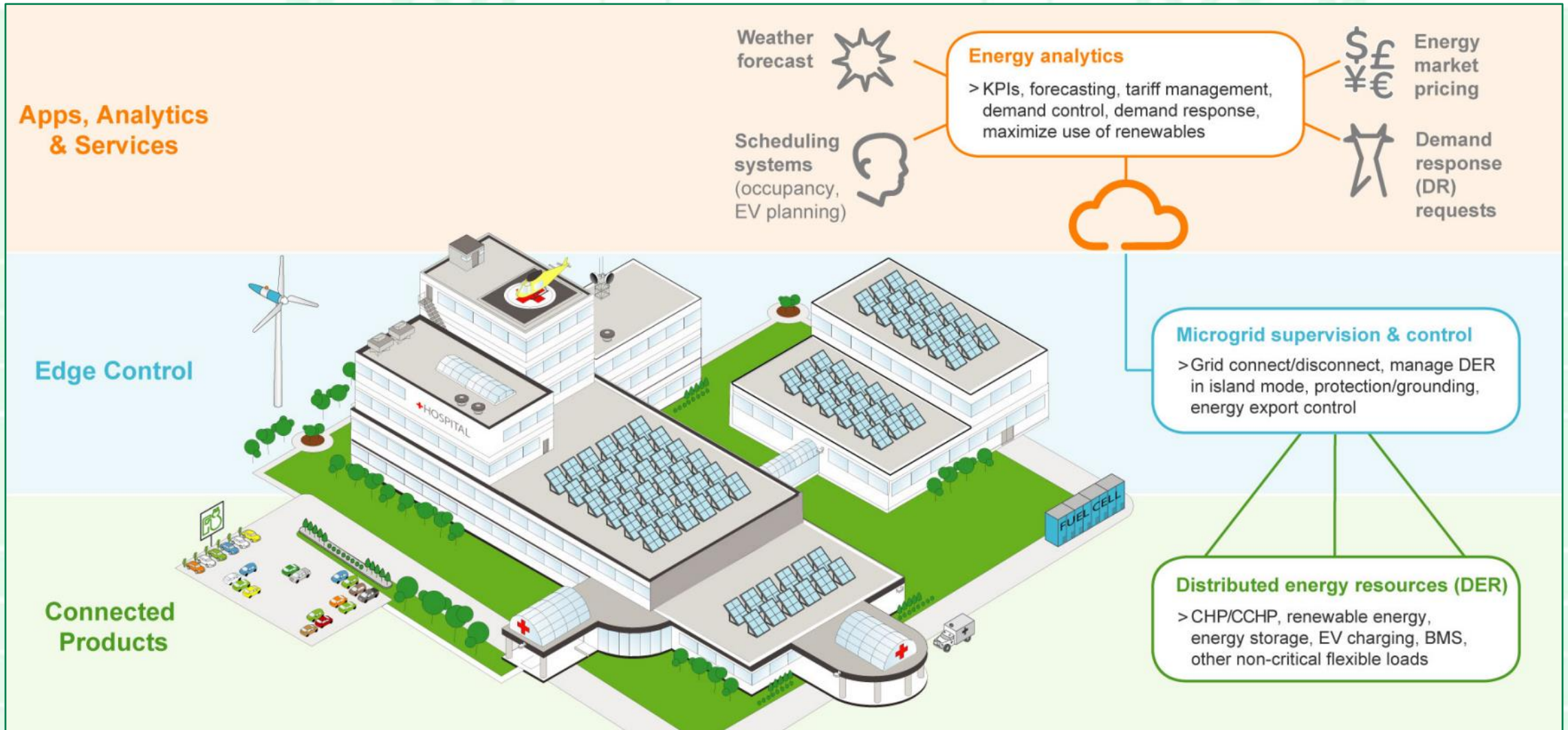
Social

- Capacity limits growth and economic potential of communities, and other critical infrastructure development
- Noise and local air pollution emissions affect well-being of local population

Identify opportunities to drive change

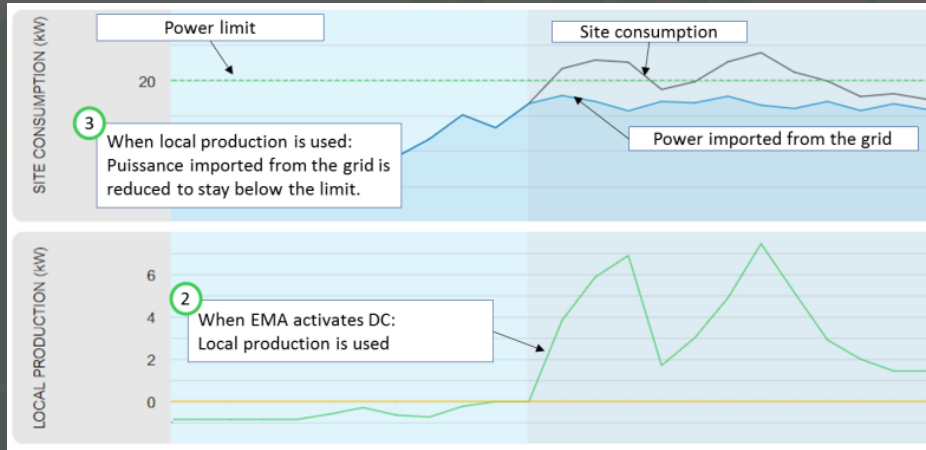


Deploy Analytics Powered Infrastructure

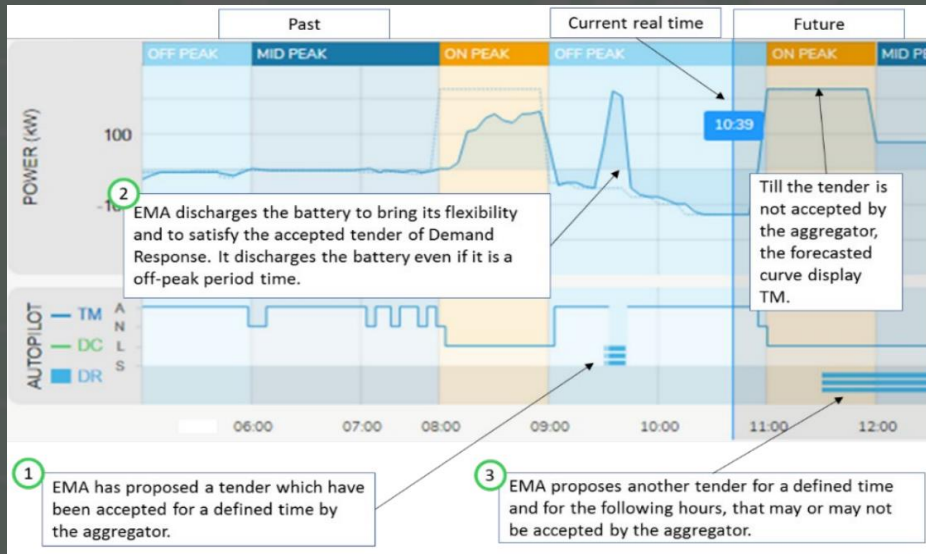


Microgrids Benefits are 3-fold: Financial, Sustainability and System Resilience.

Demand Charges



Demand Response

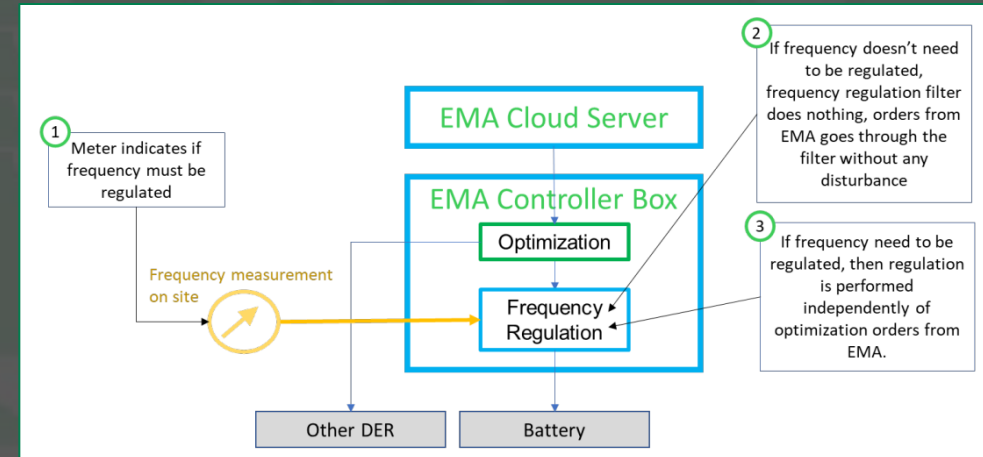


Financial

Tariff Management



Frequency Response

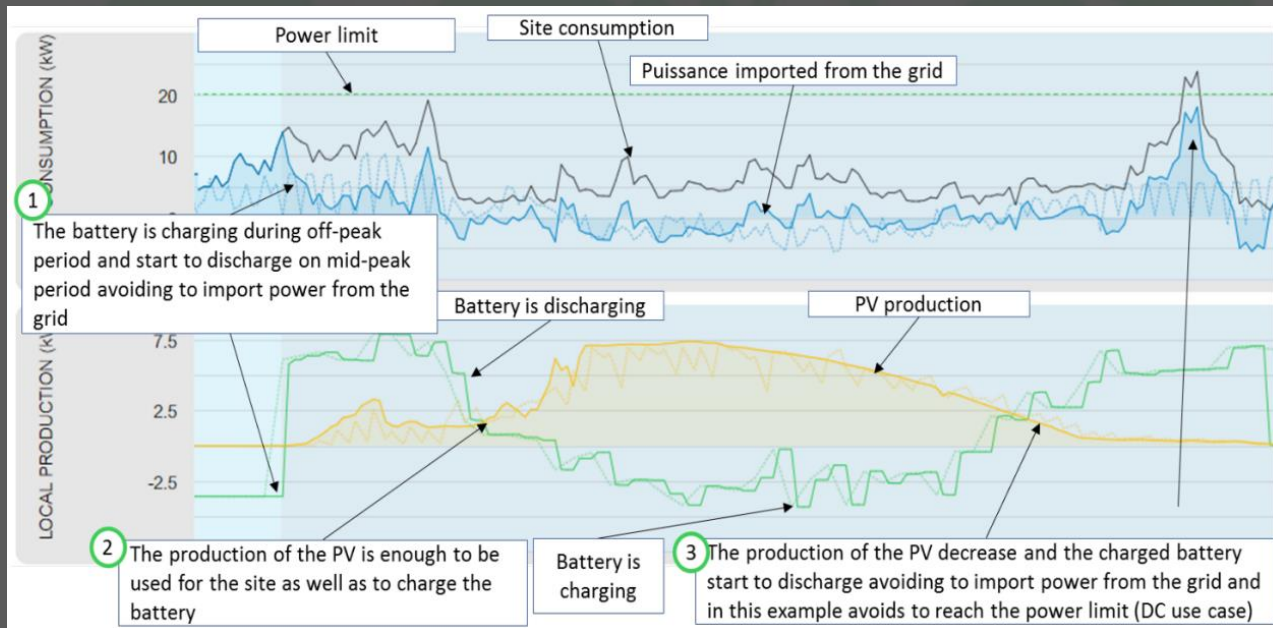


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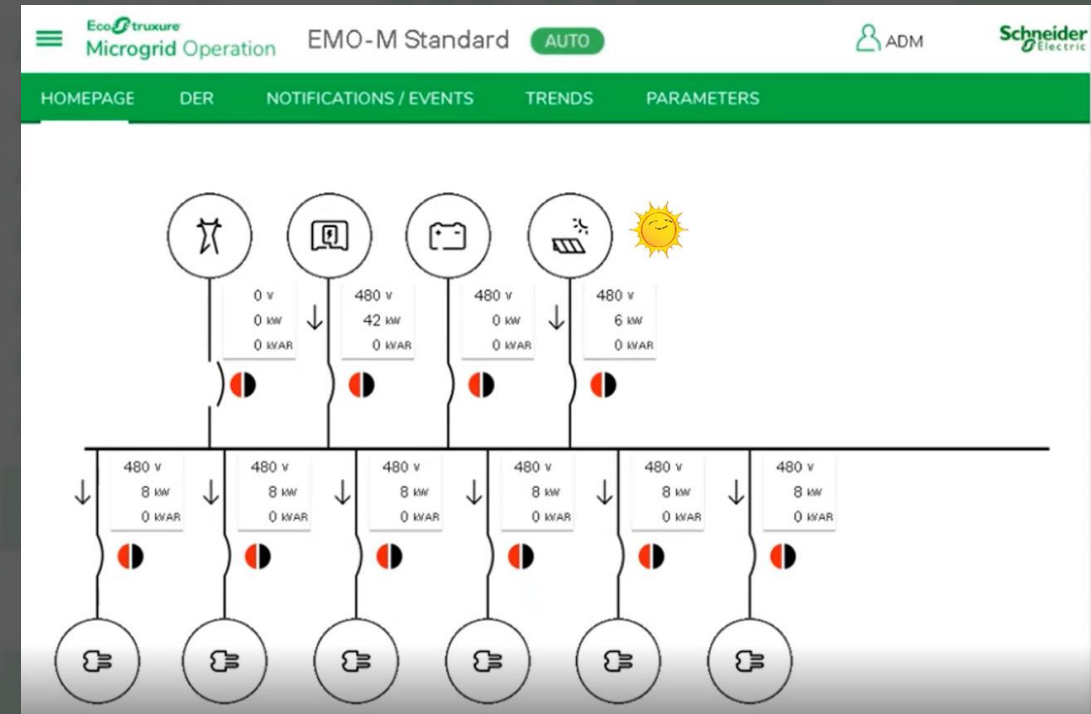


Sustainability

Self Consumption

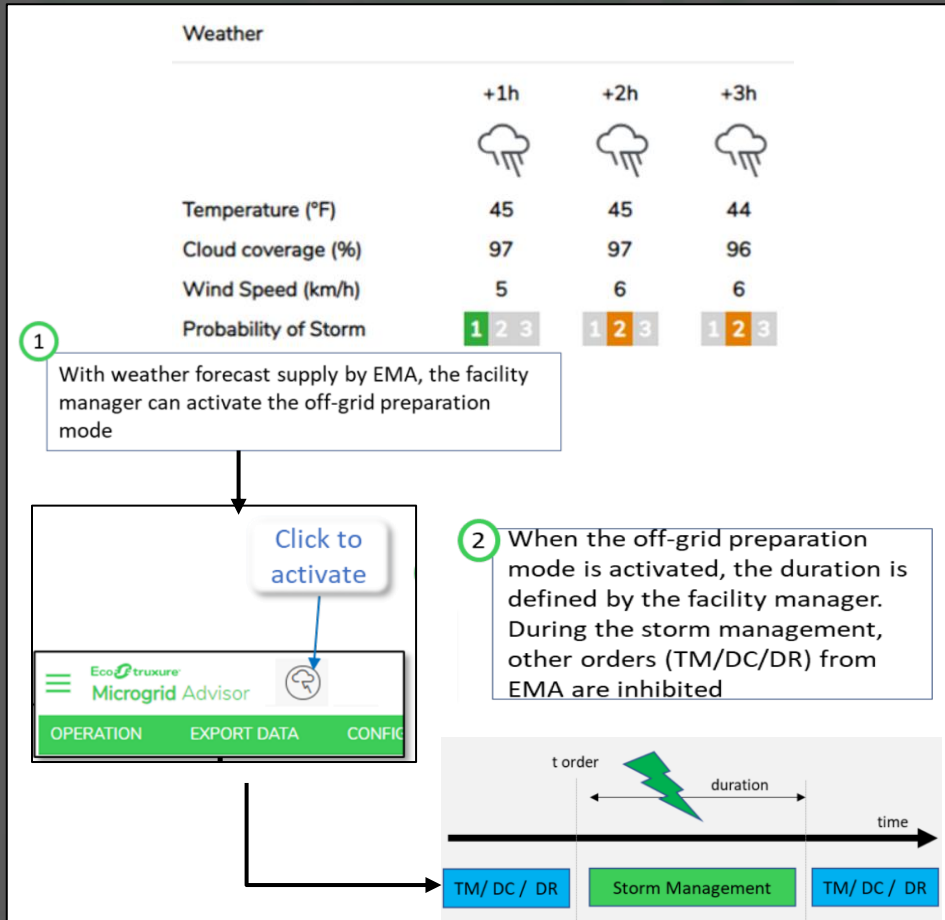


Fuel Saving



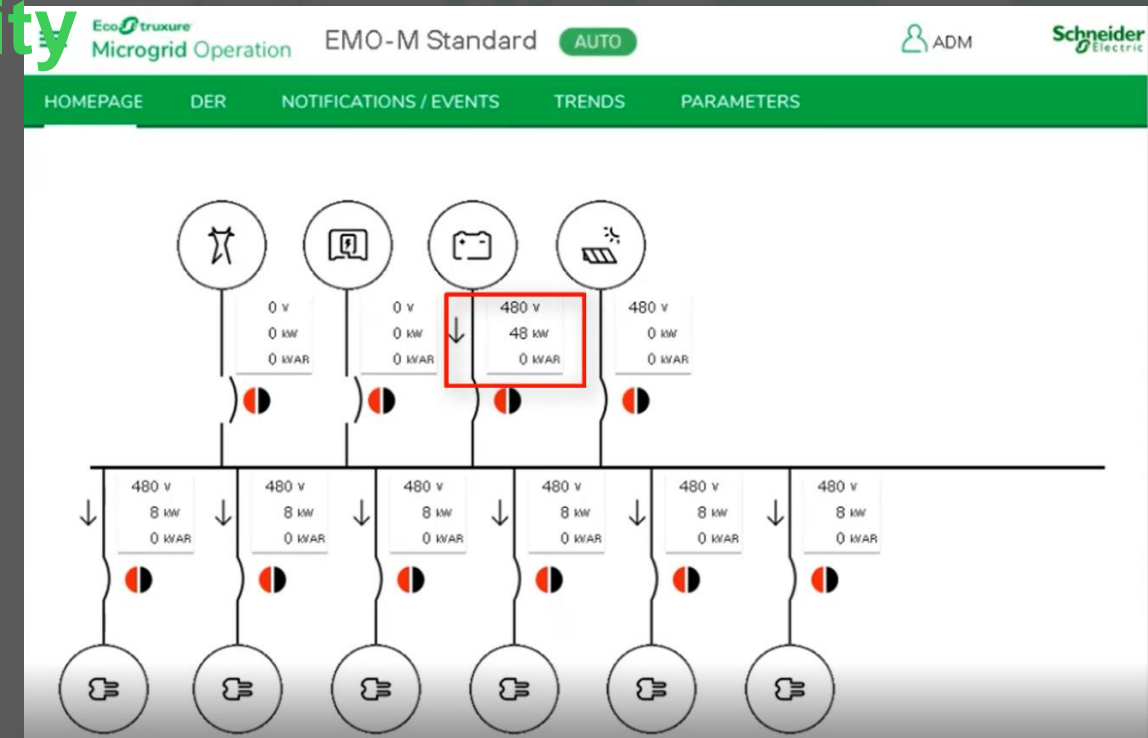
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Storm Hardening

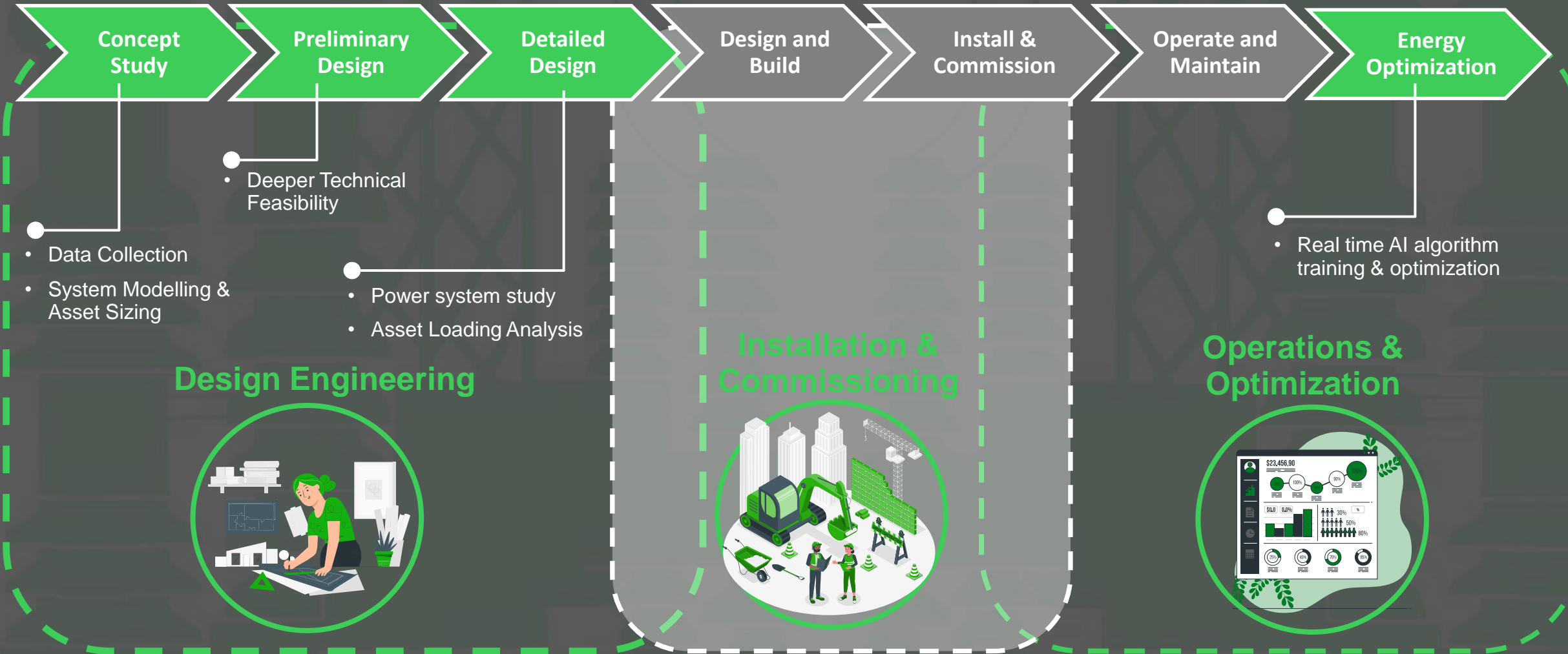


Resiliency Reliability

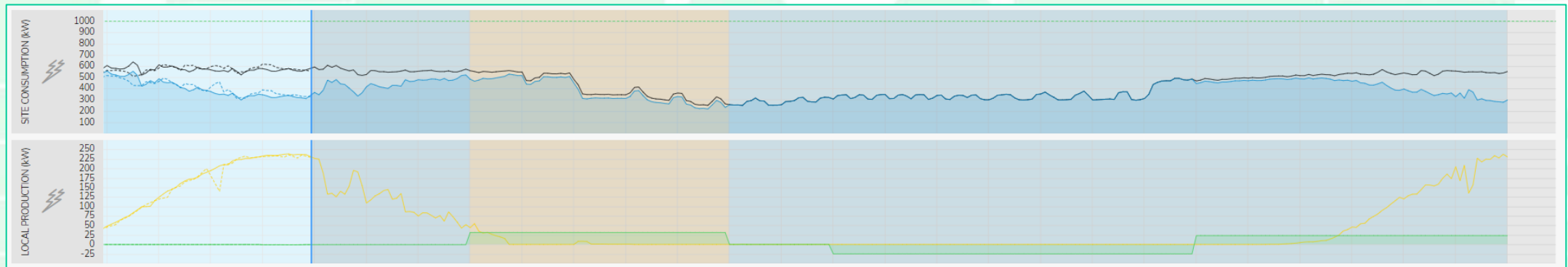
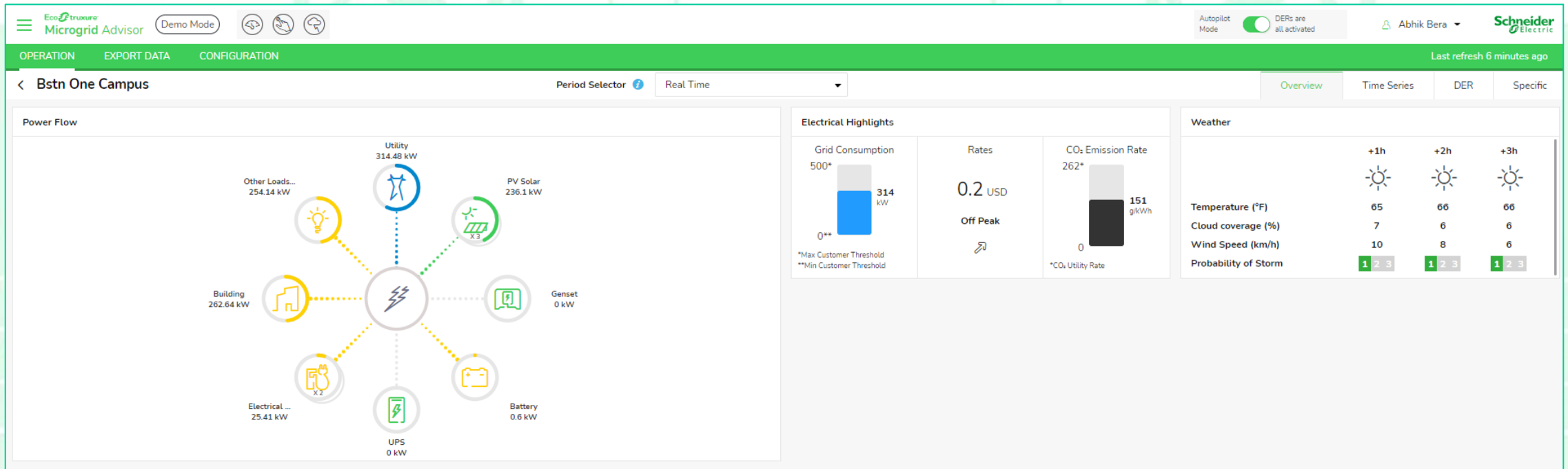
Outage Transition



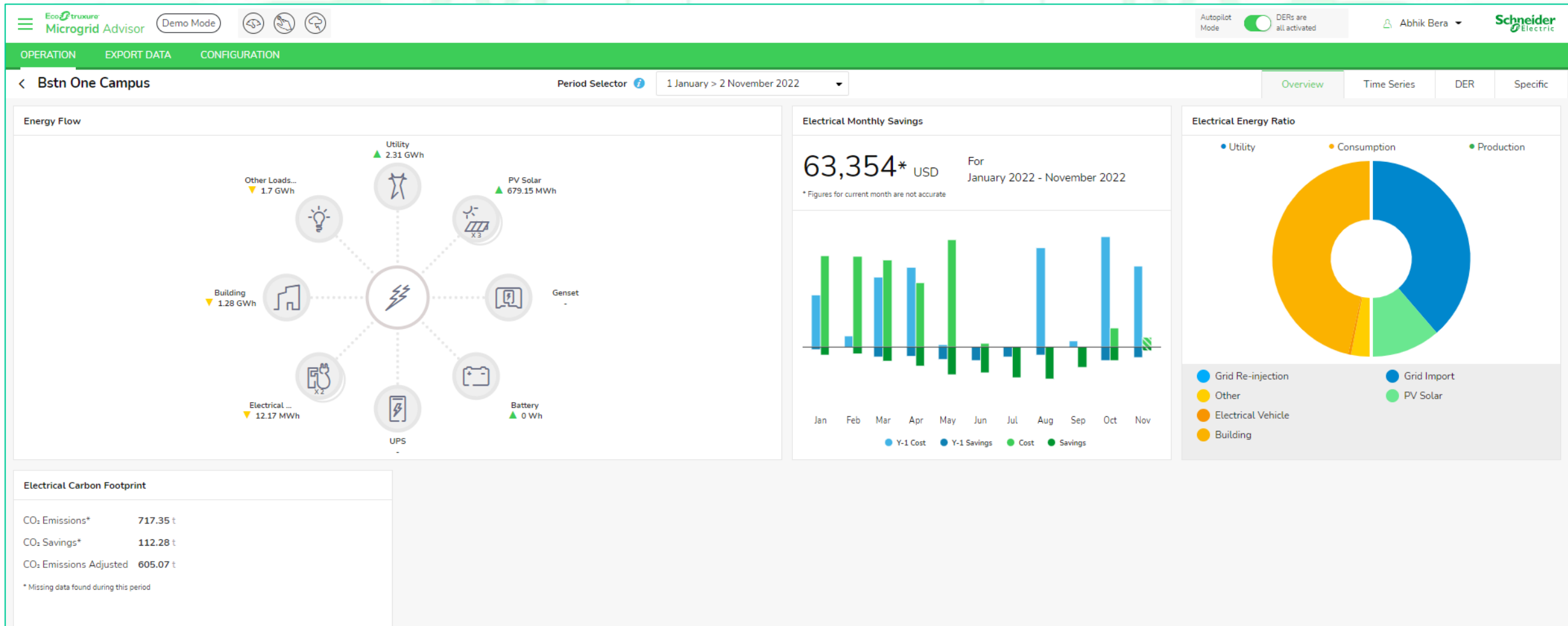
How can you ensure a Microgrid Project is designed with best outcomes?



How Microgrid will support Canada's Energy Transition?



How Microgrid will support Canada's Energy Transition?



Q & A

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