Sustainability, Cost Savings, Resilience. Can you really achieve all 3?

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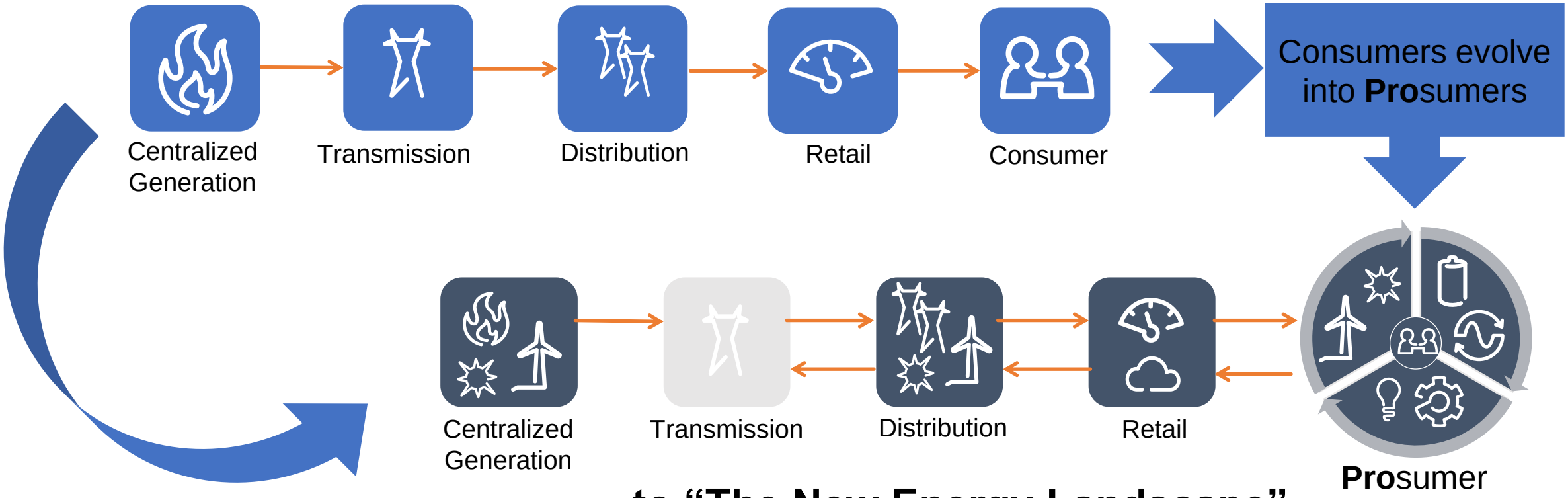
Life Is On Schneider Electric

Energy Trends

- Renewables – At Grid Parity
- Battery Energy Storage – Declining
- Natural Gas Pricing
- Over past decade, electric costs have risen 50%
- Energy Vulnerabilities - 35% of C&I users have weekly outages
- Sustainability Goals
- Third Party Capital is Available

Welcome to the New Energy Landscape

Historical Energy Value Chain transitions …

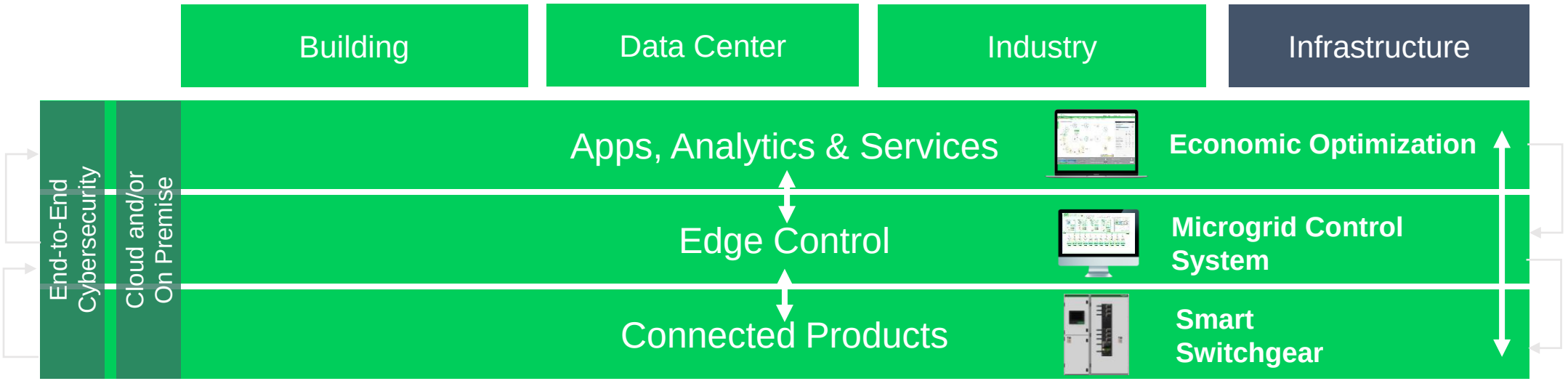


… to "The New Energy Landscape"

…built for the *Prosumer*!

Implementing Layered Microgrid Control Architecture

to attain resiliency, sustainability, and savings goals



Microgrids Solve for Integrated Outcomes

Resilience

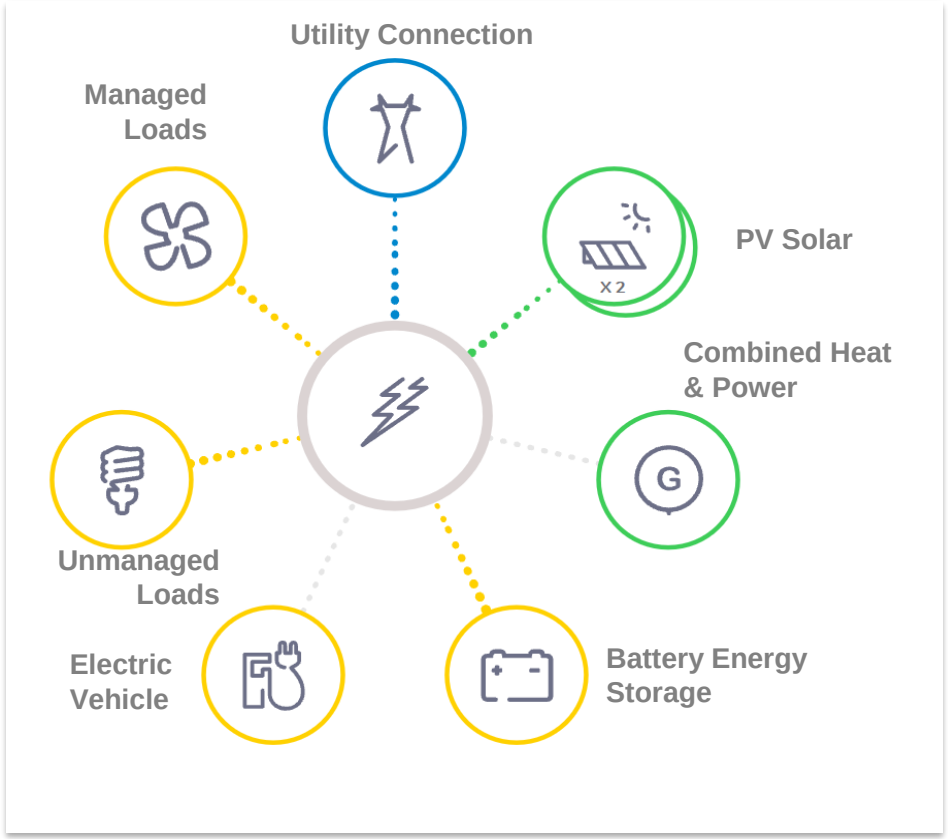
- Serve loads during times of grid instability
- Oasis for employees / customers – shelter in place
- Protect power sensitive / critical assets from poor power quality

Cost

- Lower / More Predictable Energy Costs
- Energy / Fuel Source Arbitrage
- Flexibility drives savings / incremental revenue

Sustainability

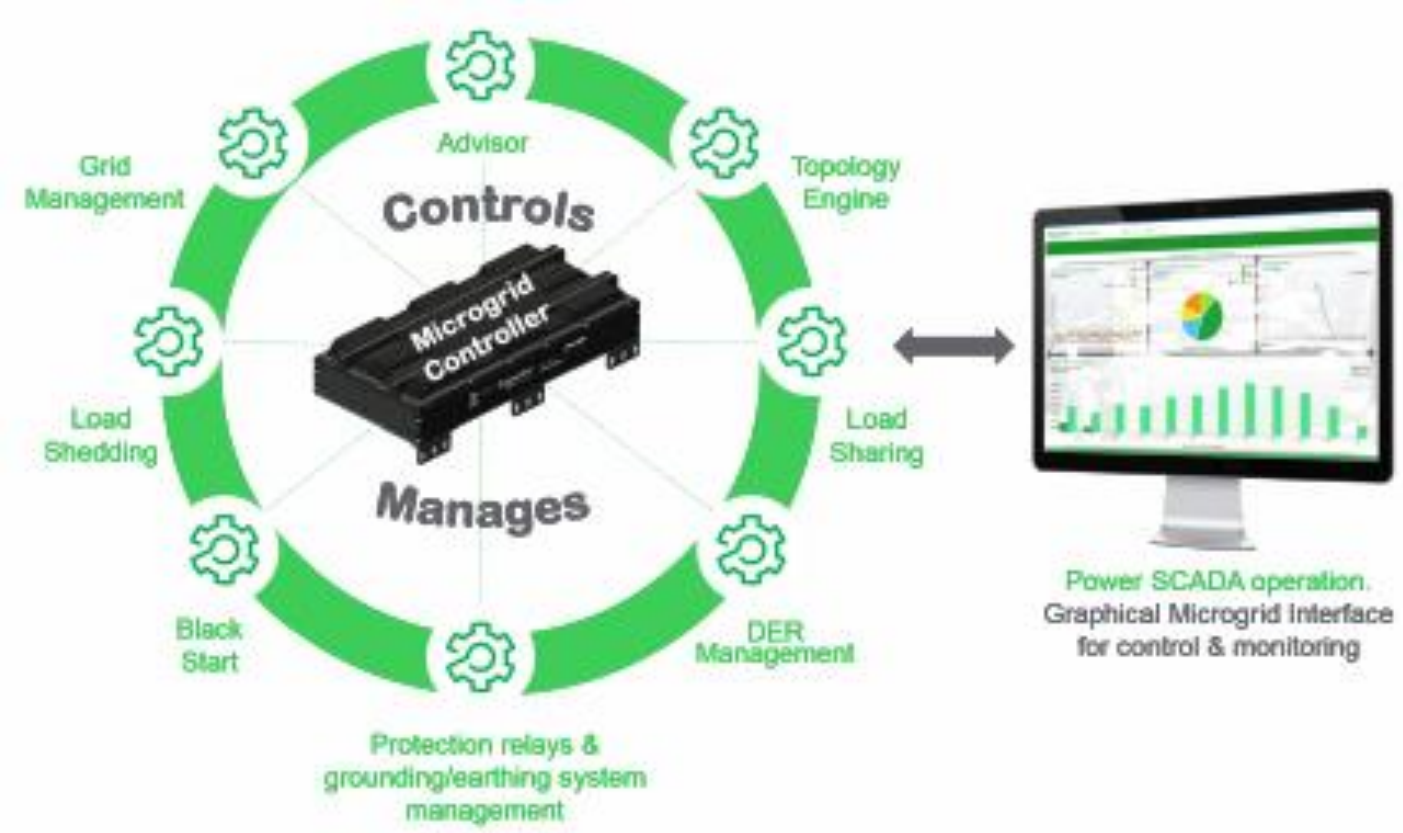
- Reduce carbon footprint
- Improve brand image
- Attract / Service carbon sensitive customers



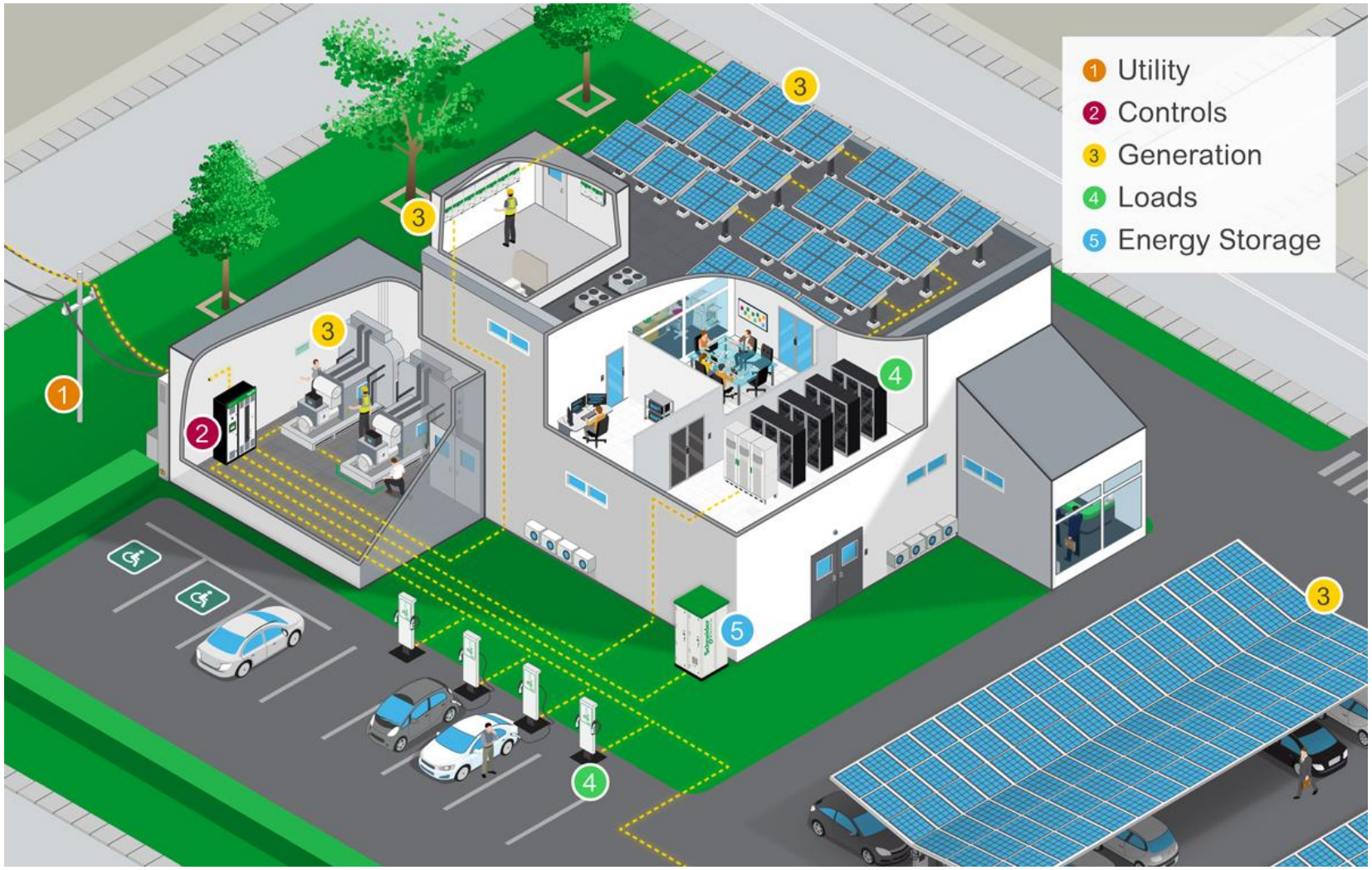
Microgrid Controller

Real-time control of Distributed Energy Resources & islanding management

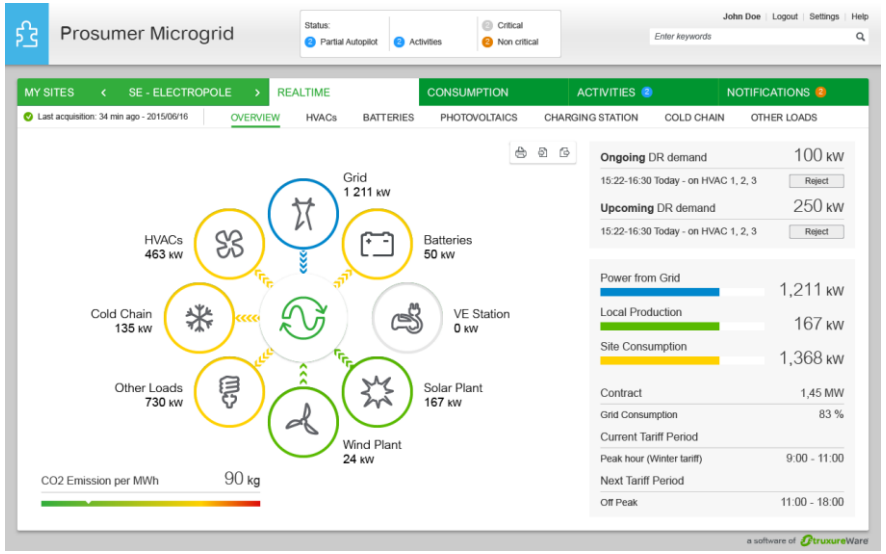
- A two-part solution:
  - Microgrid Controller
  - Graphical User Interface (Local HMI/SCADA)
- Primarily responsible for:
  - Managing the grid-connect vs. island mode decision and transitions
  - The real-time optimization of DER in island mode
- Flexible & Future-Proof for additional DER, re-configuration



Economic Optimization with Asset Management



Energy Optimization



Predict when its best to buy, sell, store & consume energy for the best economic outcomes

DER Monitoring & Autonomous Optimization

- Web accessible multi-stakeholder dashboards

Tariff Management

- Consume or produce energy at the most advantageous time based on variable utility rates

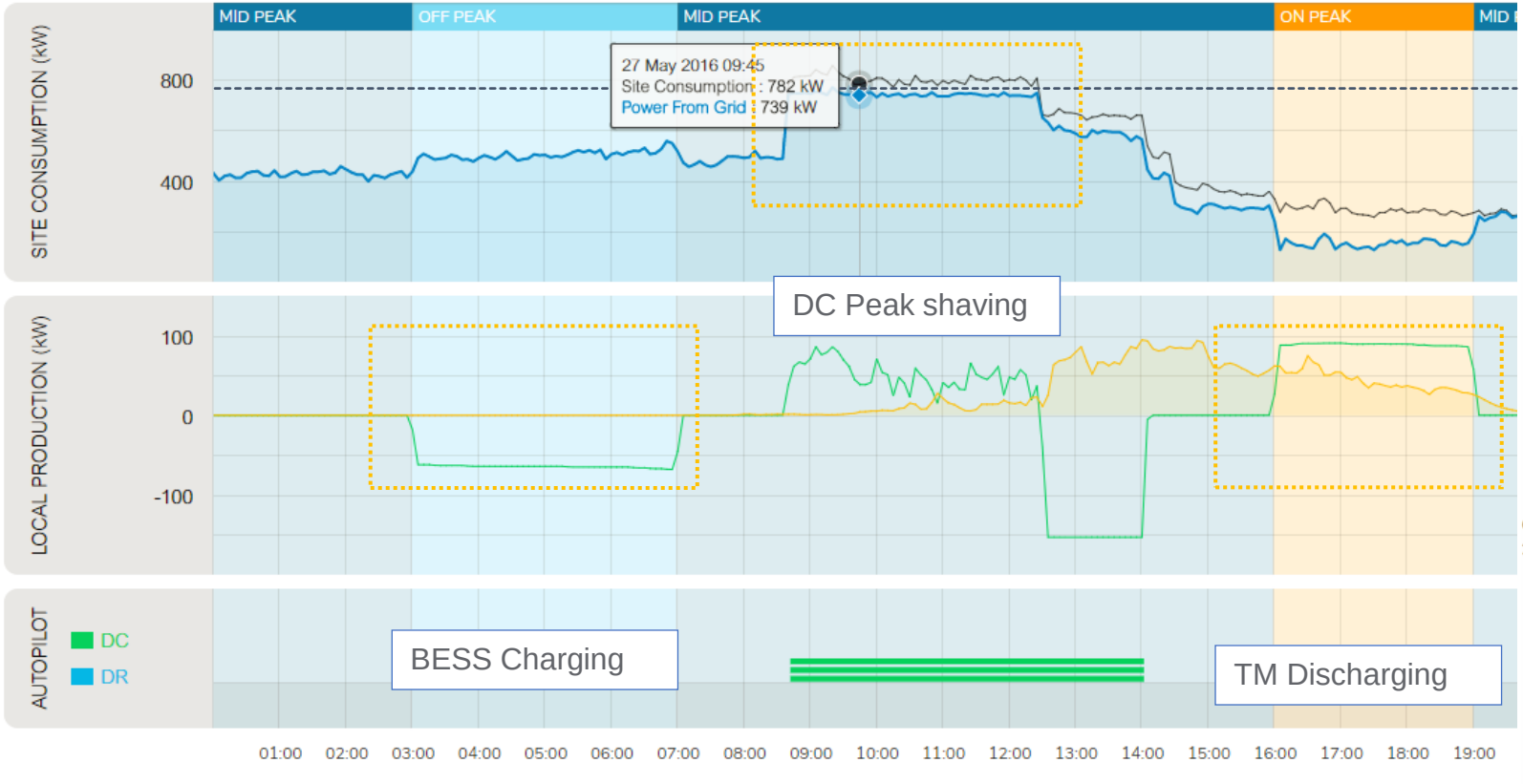
Demand Response & Control

- Reduce peak demand charges
- Partner with curtailment service providers for grid ancillary services

Self Consumption & Island Mode

- Toggle from economic optimization to resiliency storm mode

Time of Use & Demand Charge Management



Active Mode

M	Monitoring	DC	Demand Charge	OG	Off-Grid Preparedness
TM	Tariff Management	DR	Demand Response	OG	Off-Grid

Smart Switchgear

The Distributed Energy Resource Command Center

Utility

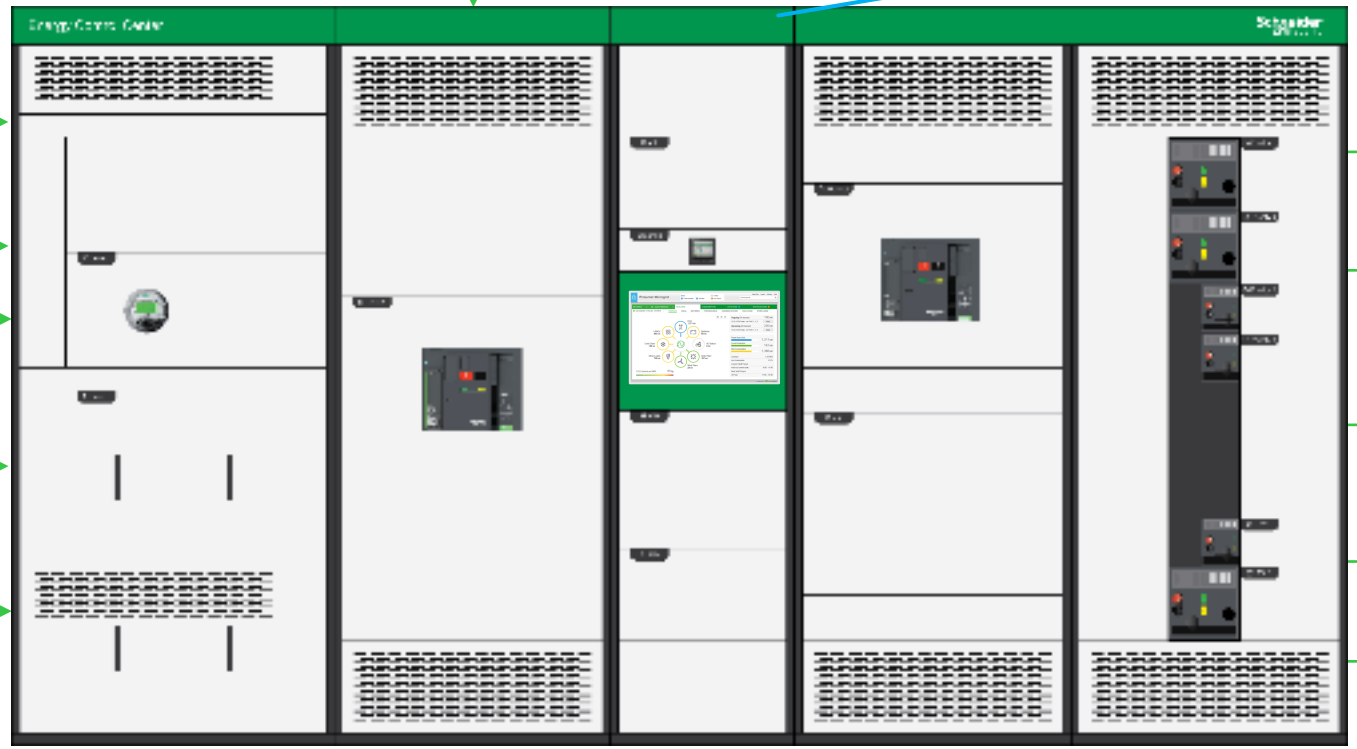
Wind

Genset(s) & CHP

Covered Parking PV Or Ground Mount

Rooftop PV

Battery Energy Storage



Critical Loads
Industrial Plant or Process Loads Healthcare

Critical Loads
Pumps, VFDs, and Motors

Essential Loads
HVAC System Coolers Freezers

Essential Loads
BAS, Lighting, Public Safety

Standard Loads
EV Charging Non-Essential Lighting

Supply, Demand, & Process Management

Fully Integrated Controls:

Microgrid Controller

&

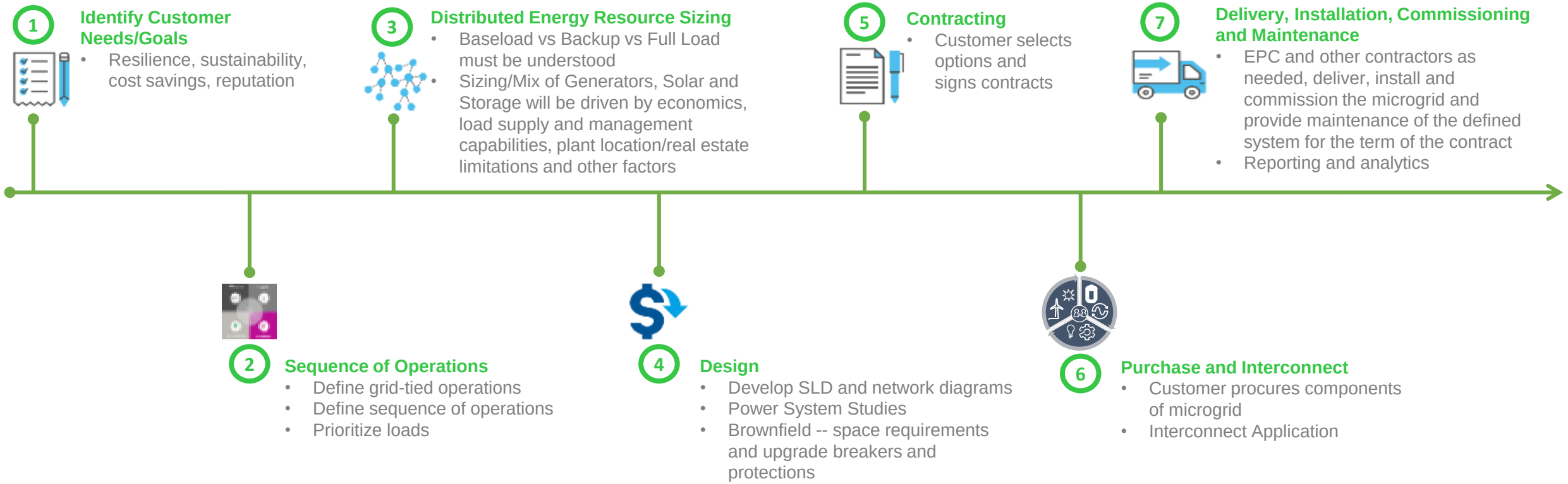
Microgrid Advisor Optimization Platform

&

Load Shedding

Microgrid Project Process

Building out an advanced microgrid



1 Identify Customer Needs/Goals
- Resilience, sustainability, cost savings, reputation

2 Sequence of Operations
- Define grid-tied operations
- Define sequence of operations
- Prioritize loads

3 Distributed Energy Resource Sizing
- Baseload vs Backup vs Full Load must be understood
- Sizing/Mix of Generators, Solar and Storage will be driven by economics, load supply and management capabilities, plant location/real estate limitations and other factors

4 Design
- Develop SLD and network diagrams
- Power System Studies
- Brownfield -- space requirements and upgrade breakers and protections

5 Contracting
- Customer selects options and signs contracts

6 Purchase and Interconnect
- Customer procures components of microgrid
- Interconnect Application

7 Delivery, Installation, Commissioning and Maintenance
- EPC and other contractors as needed, deliver, install and commission the microgrid and provide maintenance of the defined system for the term of the contract
- Reporting and analytics

The business model solution: Energy as a Service

- Customers face accelerating energy challenges and often lack the resources to address these needs
- Energy as a Service delivers the energy outcomes customers need with no capital upfront or operational risks
- Accomplished through the design, build, ownership, operation, maintenance and financing of onsite microgrids

Energy as a Service: creating a **new category**

With Energy As A Service, you get the energy outcomes you need to run your business with cost-effective, resilient, and sustainable energy.

					
ENERGY AS A SERVICE					
You get the energy outcomes you need to run your business and a competitive advantage.	Capital is freed up for core business needs and priorities.	You get an energy partner that helps you take control of your energy – we work alongside you for the long-term to meet your goals.	You agree to the security of a long-term contract (15-25 years), allowing you to budget for electricity while adding protection from increasing electricity rates.	Our industry-leading experts design, build, own, operate and maintain the microgrid's power and operating systems.	We provide regular updates on your resilience, efficiency and sustainability metrics.

MCAS Miramar

Innovative Resiliency Solution

Customer Challenge

- Ensure resilient power at the base to support over 100 mission critical buildings and the flight line

The Solution

- Construct a system to power mission-critical and support facilities throughout Marine Corps Air Station Miramar in the event of an outage.
- Manage electricity use at the base during peak times when the system is connected to a utility grid thru use of diverse energy sources including 3.2MW landfill gas, 1.6 MW solar photovoltaic, and energy storage systems

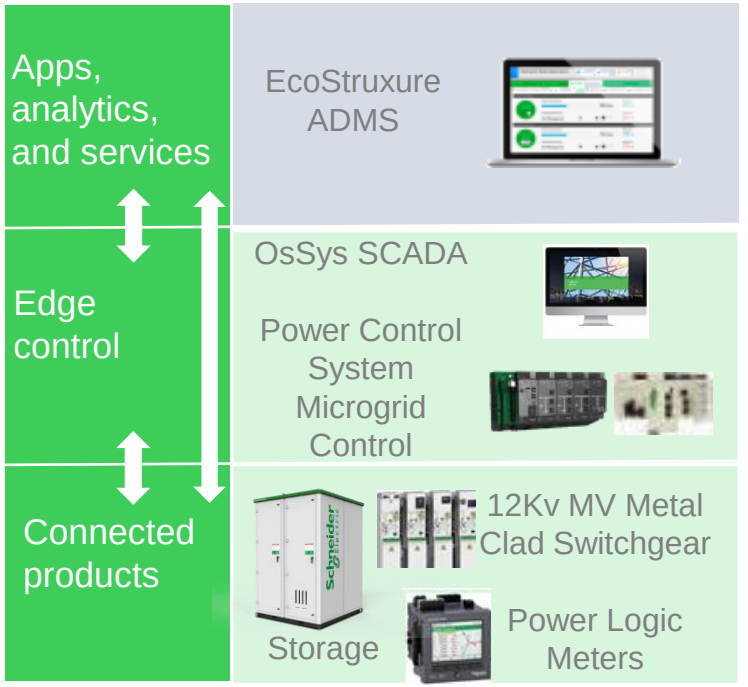
Customer Benefits

- Provide support services to the central grid
- Manage overall energy load
- Enhance renewable energy deployment
- Bolster cybersecurity practices base-wide
- Help the installation reduce its utility demand charges
- Facilitate demand response programs

""Partnering with Schneider Electric will help us deliver a sustainable energy solution to enhance energy security for MCAS Miramar mission." Bill Van Dyke, President of Special Projects for Black & Veatch

New system to **power mission-critical facilities** in the event of outage

EcoStruxure™
Innovation At Every Level



BLACK & VEATCH

Erlanger Hospital

Chattanooga, Tennessee

Customer Challenge

- Ensure resilient power at a Level-One Trauma Center
- The interconnection of the generation to the substation needed to be redesigned
- No mechanism to connect to the grid

The Solution

Schneider Electric assisted White Harvest Energy on the interconnection of the Microgrid to the grid. This was essential to power mission-critical and support facilities in an event of an outage. The hospital has four 2MW units, total of 8MW of generation.

Expertise provided included:

- Knowledge base around Power Systems, relay protection
- Engineer connection into the utility grid
- Combined Heat and Power System and Generator used

Customer Benefits

- Improved resilience
- Lower reliance upon the energy grid
- Energy savings
- Cleaner and more sustainable generation compared to the electric grid
- Improvement in power factor

The Hospital now generates:

- 52,000 MWh electricity annually
- 12,000 lb/hr 115ºF steam
- 14,000 MBtu/hr hot water

www.schneider-electric.us/microgrid

New system to power **mission critical facilities** in an event of an outage

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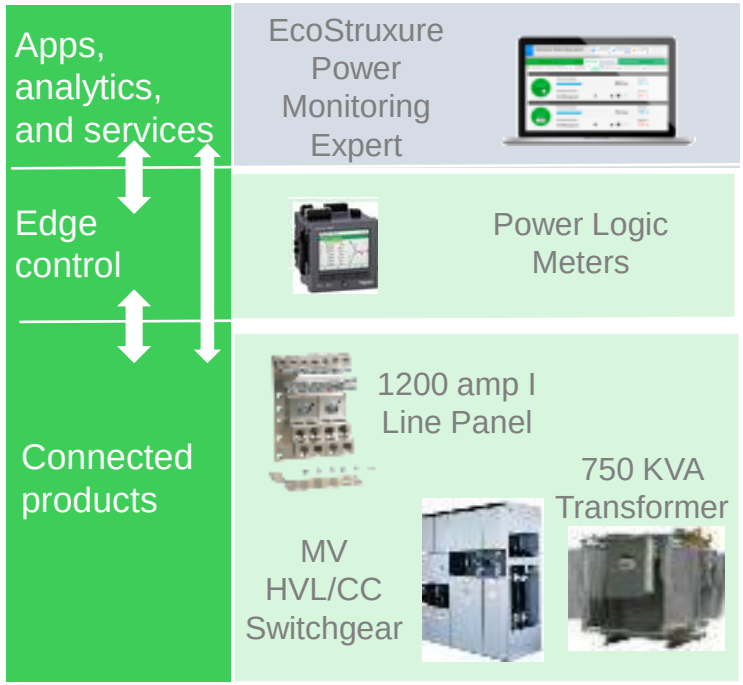

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Fifth Season

Customer Challenge

- Fifth Season has a 60,000 square-foot indoor vertical farm in Pittsburgh, PA
- The company needed a sustainable system to economically and environmentally produce 500,000 lbs. of local produce during the new facility's first year of full operation

Solutions

- Together with Scale Microgrid Solutions, Schneider Electric designed, built, owned and operated a microgrid system to deliver sustainable and dynamic energy management
- It includes a rooftop solar array, natural gas generator and a lithium-ion battery energy storage system
- Schneider Electric provided the battery storage, switchgear, EMA, EMO, and advanced controls technology.
- The microgrid is financed by Energy as a Service business model, helping Fifth Season save capital that can be used toward additional operational investments

Customer Benefits

- Fifth Season will cut greenhouse gas emissions by 470,000 pounds every year
- The vertical farm uses 95% less water than traditional agriculture, using zero pesticides and increased footprint productivity
- Improvement of energy resilience and cost through Demand Response, Peaking shaving , Time of Use pricing

"Our vertical farm in Pittsburgh is reconnecting consumers to locally grown fresh food. This microgrid enables our journey to create a sustainable system that delivers healthier, fresher greens to local communities through both economic and environmental efficiencies"

- Grant Vandenbussche, Chief Category Officer at Fifth Season

www.schneider-electric.us/microgrid

Fifth Seasons will cut greenhouse gas emissions by **470,000 pounds** every year

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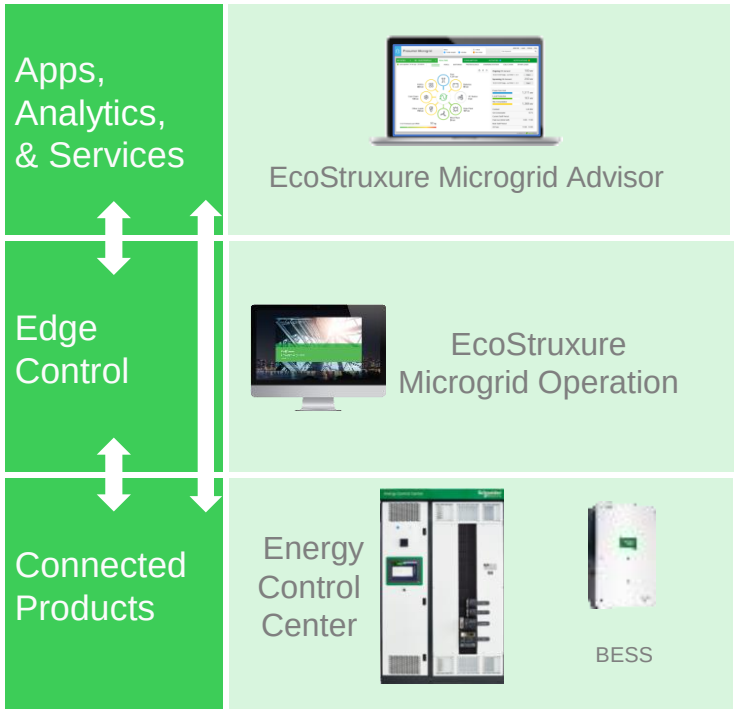

Montgomery County, Maryland

Innovative Resiliency solution for Public Facilities

Customer Challenge

Aging infrastructure, aggressive resiliency and sustainability goals.

The Solution

Microgrid-as-a-Service project at Duke Energy Renewables to improve reliable power supply for Montgomery County Public Safety HQ & Correction Facility.

Customer Benefits

- Secure resiliency of public services
- Infrastructure upgrade – reduced capex
- Protect critical operations during power outage
- Mitigate risk of escalating energy prices
- Reduce greenhouse gas and other emissions

The Results: Life is On with...

No-money down microgrid providing greater operational reliability and ensure resiliency during severe weather and other incidents.

"We're making significant strides in our key priorities—sustainability, safety and security. Upgrades to critical facilities improve the County's resiliency, so we can keep residents safe and provide needed services even in the event of prolonged power outages."

Isiah Leggett, MD County Executive, Montgomery County

Download Link
Video Link
Stakeholder Video Link
www.schneider-electric.us/microgrid

One of the first "No-Money Down" microgrids helping protecting Washington D.C. area citizens

First US GCI PEER Certified Campus microgrid

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Innovation At Every Level

Apps, analytics, and services	EcoStruxure Microgrid Advisor 
Edge control	EcoStruxure Microgrid Controller 
Connected products	Smart LV/MV Switchgear   Inverters

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