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 …

Centralized Generation  Transmission  Distribution  Retail  Consumer

Consumers evolve into Prosumers

… 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

Utility Connection
- PV Solar
- Combined Heat & Power
- Managed Loads
- Unmanaged Loads
- Electric Vehicle
- Battery Energy Storage
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 it's 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

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DC Peak shaving
BESS Charging
TM Discharging
Smart Switchgear
The Distributed Energy Resource Command Center

Utility

Wind

Genset(s) & CHP

Covered Parking PV Or Ground Mount

Rooftop PV

Battery Energy Storage

Supply, Demand, & Process Management

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

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

Cost savings and stability

Resilience and reliability

Sustainability

GHG
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.

| 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. |
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

 Apps, analytics, and services

EcoStruxure ADMS

OsSys SCADA

Edge control

Power Control System
Microgrid Control

Connected products

12Kv MV Metal Clad Switchgear

Storage

Power Logic Meters

MCAS Miramar
Innovative Resiliency Solution
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
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
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

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

First US GCI PEER Certified Campus microgrid

Montgomery County, Maryland
Innovative Resiliency solution for Public Facilities

Apps, analytics, and services

EcoStruxure Microgrid Advisor

Edge control

EcoStruxure Microgrid Controller

Connected products

Smart LV/MV Switchgear

Inverters

Download Link
Video Link
Stakeholder Video Link
www.schneider-electric.us/microgrid
Learn more about Microgrids and Energy-as-a-Service at se.com

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