Industry leading MG Controls

Electrical Infrastructure – via Leading Business Model – P3

Seeking Channels and Alliances

Targeting NE Region
Schneider Electric, leading the digital transformation of Energy Management and Automation

€25.7 billion
FY 2018 revenues

~5%
of FY revenues devoted to R&D

145,000+
people in 100+ countries

Our Products & Solutions
– FY 2018 revenues

<table>
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<tr>
<th>Medium Voltage</th>
<th>Low Voltage</th>
<th>Secure Power</th>
<th>Industrial Automation</th>
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<td>18%</td>
<td>43%</td>
<td>15%</td>
<td>24%</td>
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Balanced geographies – FY 2018 revenues

- 28% North America
- 26% Western Europe
- 29% Asia Pacific
- 17% Rest of World
EcoStruxure: 3 Innovation Layers, 4 End Markets, 6 Architectures
MacroGrid or Regional Grid
- large interconnected energy system, supports our Modern Energy Economy

Mini Grid
- small “off-grid” system usually found on islands or remote locations without Macrogrid interconnection.

MicroGrid – Focus
- Interactive with the macrogrid, a localized energy system supporting campuses, buildings or subdivisions
**New Energy Landscape in 2018 – “Size and Scale”**

**JFK Airport Terminal One Redevelopment**: will leverage Schneider Electric’s solutions to improve the sustainability of the terminal and enhance the reliability of the airport’s energy supply through a state-of-the-art microgrid.

**Bowery Farming will use Solar Microgrid to Support Uninterrupted Farming**

**Schneider Electric Building Microgrid at Port of Long Beach**

Schneider Electric announced Wednesday that it has a $5.2 million contract to design, engineer and build a new microgrid at the Port of Long Beach in southern California. The port also is going to get ...

**Lone Star Ports Harbor Island Crude Export Terminal**: SE providing prime power and sustainable energy in a unique public-private partnership.

**Successful microgrid activation showcases innovation; supports reliable, efficient, clean energy at Montgomery County, Md., critical facilities**
INNOVATION: The stationary battery energy storage system is DC-coupled which reduces power loss from traditional DC-to-AC inversion, eliminates some equipment costs, and provides the opportunity to feed future DC loads. A bi-directional inverter allows the battery to accept electrons from both the solar panels and the grid.

Mobile-BESS 250kW / 500kWh

Stationary Battery 330 kW / 670 kWh

PV Carport 300 kW

Electrical Conduit Approx. 500 ft

Electrical Room

JCCC
Resilience for Critical Facilities
Port of Long Beach Microgrid — EPC-17-031
Contract Term: April 23, 2018 to March 31, 2023

mobile-BESS plugging in at a container yard

mobile-BESS plugging into a pump station

INNOVATION: Our project features a microgrid-extending, chassis-mounted mobile energy storage system (mobile-BESS). This 250kW/500kWh battery array will typically be plugged into the JCCC, but can be driven to other locations that are compatible with its 480V inverter. It’s also quiet and emissions-free. We’ll demonstrate the mobile-BESS at a pump station and a refrigerated container yard.
SE provides a wide range of offers for the MG projects as well as upgrades to existing infrastructure – SOFTWARE – HARDWARE -SERVICES
EcoStruxure Power for Advanced Microgrid Solutions

Grid & onsite production integrated management for savings & uptime

Services Applications

EcoStruxure Microgrid Advisor (EMA)

Edge Control

EcoStruxure Microgrid Operation (EMO)

Power Monitoring Expert

MV Smart Panel

Main LV Smart Panel

Energy Control Center

Power SCADA Operation

Connected Product

LV Final Distribution Smart Panel

Confidential Property of Schneider Electric
Energy Control Center –
Engineered for Microgrid Solutions

CTO - Configured to Order
ETO - Engineered to Order

“Microgrid in a Box”
Customer Challenge
Schneider Electric's new headquarters experienced utility-related outages.

The Solution
Pre-configured microgrid solutions with site optimization platform owned and operated by third-party capital partners.

Customer Benefits
Greater electrical reliability, resiliency, demand-side efficiency, and sustainability at no upfront cost.

The Results: Life is On with...
When we collaborate with partners to develop real-world solutions that enhance the electric reliability, boost use of clean energy, and manage energy economically—all while sparing customers from paying any upfront capital costs.

“The sustainability aspects of the microgrid create savings, and equipment upgrades can be funded by those savings."
Mark Feasel, Vice President Smart Grid, Schneider Electric

In partnership with Duke Energy Renewables and REC Solar, the Schneider Electric built a microgrid to power critical operations.

www.schneider-electric.us/microgrid
EcoStruxure Microgrid Advisor
Optimization Software for Site Managers

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
Battery Energy Storage System (BESS)

Schneider Electric’s **BESS** hardware solution is best-in-class in terms of energy density, footprint and efficiency.

Coupled with Schneider Electric’s intelligent and dynamic control system, **EcoStruxure Microgrid Advisor (EMA)**, Schneider Electric’s storage solution and power distribution can meet all your storage needs for commercial and industrial applications.
Dispatchable Uninterruptible Power Supply (UPS) provides Peak Shaving Capability – Galaxy VM/X

High performance UPS including Li-Ion storage and dispatch flexibility

• With the Right UPS…
  ➢ Software adjusts UPS input power limit to maximize ROI
  ➢ Load power beyond input power limit is drawn from batteries
  ➢ Only extended battery capacity is used for peak shaving to ensure reserve for full backup time

Higher resiliency ➔ Battery issues can be detected BEFORE backup needed
Demand Side Digitization

Historically passive consumers are thinking about energy in new ways

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

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

**Sustainability**
- Reduce carbon footprint
- Improve brand image
- Attract / Service carbon sensitive customers
“Best-in-Class” Alliances

- Utility Partnerships
- City
- Surrounding Venues
- Local EPC Partners

Investor / Owner

Host Site

Value Proposition

- Higher reliability and resilience
- Flexible Capital (No Capex)
- Increased sustainability
- Infrastructure Improvements
- More predictable energy costs
- PPP Business Model

Capital Availability
- The Carlyle Group’s stability ($205 billion AUM & 30 years) underpins the ability to provide strategic capital
- Willing to put significant capital at risk to fund energy infrastructure initiatives

Structuring Capabilities
- Complex deal structuring with long term view in mind
- Flexible, innovative structuring approaches to meet all stakeholder’s objectives

Performance Standards
- Features incorporated in funding programs to align interests of project participants while holding DEN and Schneider Electric accountable for performance

Industry Expertise
- Schneider’s experience and expertise facilitates a unique ability to understand the needs of all project constituents
Minimize Complexity
Solutions vs Projects
New Energy Landscape Business Models
Background:

• Electrical transmission and distribution infrastructure contributed to igniting California’s recent devastating wildfires.
• Over half of California citizens live or work in High Threat Fire Districts.
• As part of Wildfire Mitigation Plans, state utilities have proposed drastically increasing the quantity and duration of Public Safety Power Shutoffs.
• Outages are expected to last 2 - 5 days

Rapid Response Modular Microgrids (R2M2)

Commercial and Industrial Power Solutions

Resilient    Timely    Sustainable    Cost Effective

Remote Monitoring & Microgrid Controls

EcoStruxure Microgrid Advisor platform automatically optimizes the operation of distributed energy resources (DER).

Manufacturer(s):
Schneider Electric, Scale Microgrid Solutions, C-Power

Communication Protocol
Native OpenADR 2.0

Cyber Security Testing
NIKTOS, DRBUSTER, SQLMAP

Energy Control Center

Integrates DER into an intelligent, pre-engineered, and configurable power control center to easily optimize resources and maximize facility performance.

Manufacturer: Schneider Electric

800/1200: Typically used with 25 - 250 kW DERs
1600/2500: Typically used with 100 - 750 kW DERs

Engineered to Order: Used with any size and type of DERs

Battery Energy Storage System

Modular, scalable architecture with best-in-class power conversion and battery technologies.

Manufacturer: Schneider Electric

Chemistry: Li-Ion - NMC

125 kW/250 kWh
250 kW/500 kWh
500 kW/1000 kWh
1000 kW/2000 kWh

Solar PV

We work with the best local solar installation professionals to design, engineer, and construct custom rooftop, carport, and ground-mount solar arrays to meet the needs of your facility.

Dispatchable Generator

Provides on-site power that can be adjusted to the output needed.

Manufacturer: Mitsubishi

Fuel Options: NG, RNG, Propane

265 kW 1000 kW
380 kW 1200 kW
610 kW 1500 kW
815 kW

9 Months

65% faster installation. The typical development cycle for a microgrid is 18 – 36 months. The R2M2 process enables system commissioning within 9 months on average.

Up to 30%

Savings versus the industry standard. Using high-quality, standardized technology enables you to benefit from economies of scale and eliminate bespoke costs associated with traditional microgrid installations.

Scale Microgrid Solutions Energy Services Agreement eliminates up-front capital requirements via a fully-funded, pay for performance structure complete with risk mitigating guarantees. Availability is subject to credit review.
Schneider Electric – Microgrid Competency Center

For information and assistance:

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