

# RESILIENT

## Microgrid Solutions

### IDEA Campus Energy 2019

Rich Hepp  
Director  
Microgrid Competency Center



Eliminate risk while maximizing your resiliency, efficiency, and sustainability  
Learn more at <http://microgrids.schneider-electric.us>

Confidential Property of Schneider Electric

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# Schneider Electric, the Global Specialist in Energy Management and Automation

**\$30 billion**

FY 2016 revenues

**~5%**

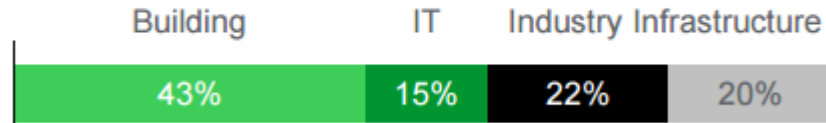
of FY revenues devoted to R&D

**160,000+**

people in 100+ countries

## Four integrated and synergetic businesses

– FY 2016 revenues



**Ranked #1**

Microgrid Control Solutions  
by Navigant



**Transformative**

OPEX Biz Model



**250+**

Professional Engineers  
Licensed in All 50 States

**300+**

Successful Control and Microgrid  
Projects Completed in North America



**Ranked #1**

Low and Medium voltage  
Distribution Worldwide

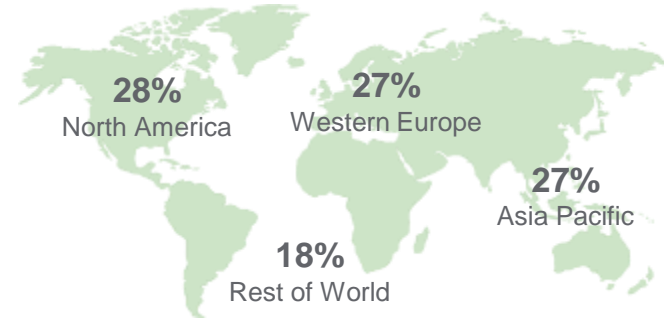


**1,500+**

Low and Field  
Services Technicians



## Balanced geographies – FY 2016 revenues



- 100-year legacy in the power distribution and energy management business
- Innovative, modular microgrid solutions allow electrical distribution systems to evolve with technology and regulatory structures – all while supporting locally with responsive operations, maintenance and optimization services.

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# We have an opportunity to co-create the future

## More ELECTRIC

**2X** faster growth of electricity demand compared to energy demand by 2040

Source : IEA WEO 2014

## More DIGITIZED

**10X** more incremental connected devices than connected people by 2020

Source : Cisco, Internet World Statistics

## More DECARBONIZED

**82%** of the economic potential of energy efficiency in buildings and more than half in industry, remains untapped

Source : World Energy Outlook 2012, Internal Analysis

## More DECENTRALIZED

**70%** of new capacity additions will be in Renewables by 2040

Source : BNEF

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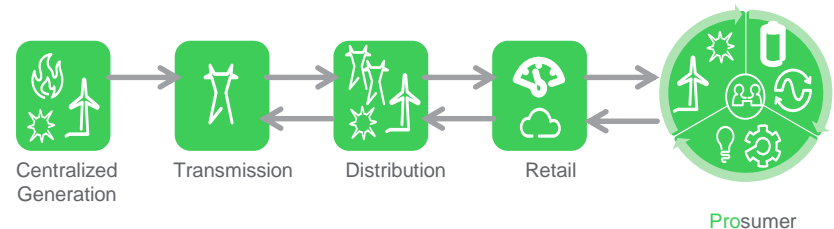
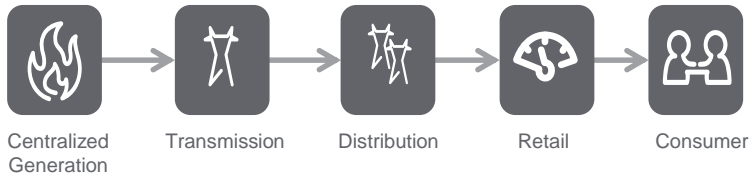
# On the brink of disruption

“The electricity system that has served us well for 100 years is facing a fundamental threat to its existence.”

We have an opportunity to co-create the future  
as *The New Energy Landscape* becomes...



## Historical Energy Value Chain vs. “The New Energy Landscape”



# Users Taking Control of Energy

WASHINGTON BUSINESS JOURNAL  
481.116.21.41  
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From the Washington Business Journal:  
<http://www.bizjournals.com/washington/news/2017/02/10/montgomery-county-is-taking-two-large-buildings.html>

## Montgomery County is taking two large buildings off the energy grid

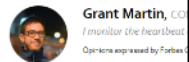
Feb 10, 2017, 1:49pm EST

Montgomery County is taking its correctional facility and public safety buildings off the grid.

## Ohio State's Endowment Gets \$1 Billion With Campus Energy Deal

by Janet Lorin and Brian Eckhouse  
April 07, 2017 11:58 AM

## Electrical Problem At Atlanta Airport Stymies Weekend And Pre-Holiday Air Traffic



Grant Martin, COO  
Monitor the Heartbeat  
Opinions expressed by Forbes

A power outage at Hartsfield Atlanta has brought traffic to a halt. The outage started on Saturday and was suddenly fixed. Alive News, posted a photo of power out.



HUFFPOST

U.S. NEWS 12/27/2017 05:04 pm ET Updated Dec 27, 2017

## Disneyland Theme Park Loses Power On One Of The Busiest Days Of The Year

The Anaheim park had an issue with a transformer that caused several rides to break down.

By Doha Madani

A power outage at Disneyland took some of the magic out of the day for thousands of guests on Wednesday.

The theme park in Anaheim, California, lost power during one of the busiest weeks of the year at about 11 a.m. local time. [KABC reports](#) that the park was near capacity when the outage occurred in both Fantasyland and Toontown.

"We've determined that the issue is with a Disneyland Resort transformer and our team is currently assessing and working to restore power," the park said in a statement to KABC.

A spokesperson for the park [told KGTV](#) that the "majority of power" was restored to the park at around noon local time.

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## How MGM Prepared Itself to Leave Nevada's Biggest Utility



Photo Credit: NRG Energy

The casino conglomerate expects to double its use of renewable energy and earn payback within 7 years.

by Julian Spector  
September 16, 2016

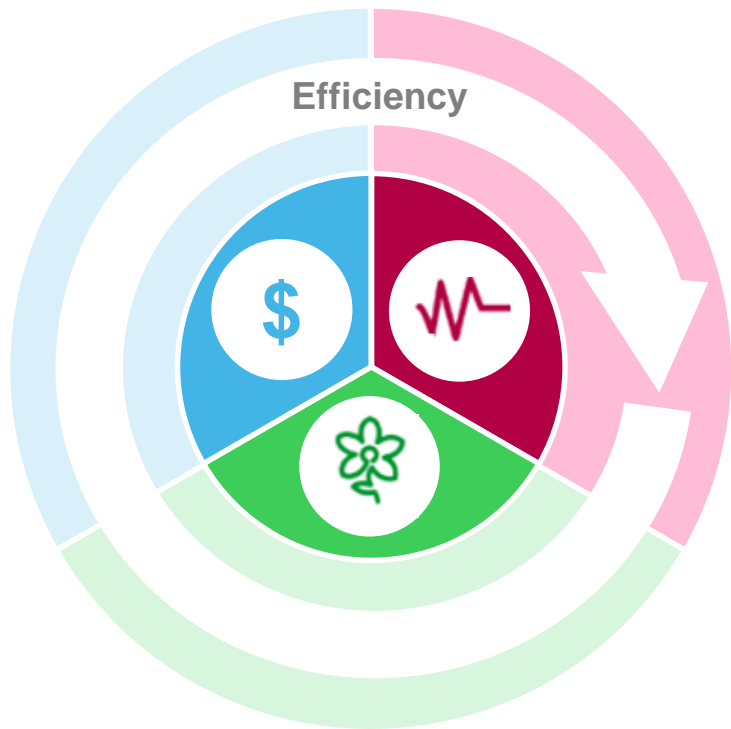
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# Integrated Energy Outcomes

Historically Passive Consumers are Thinking About Energy in a New Way



## Cost/Savings



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

## Resilience



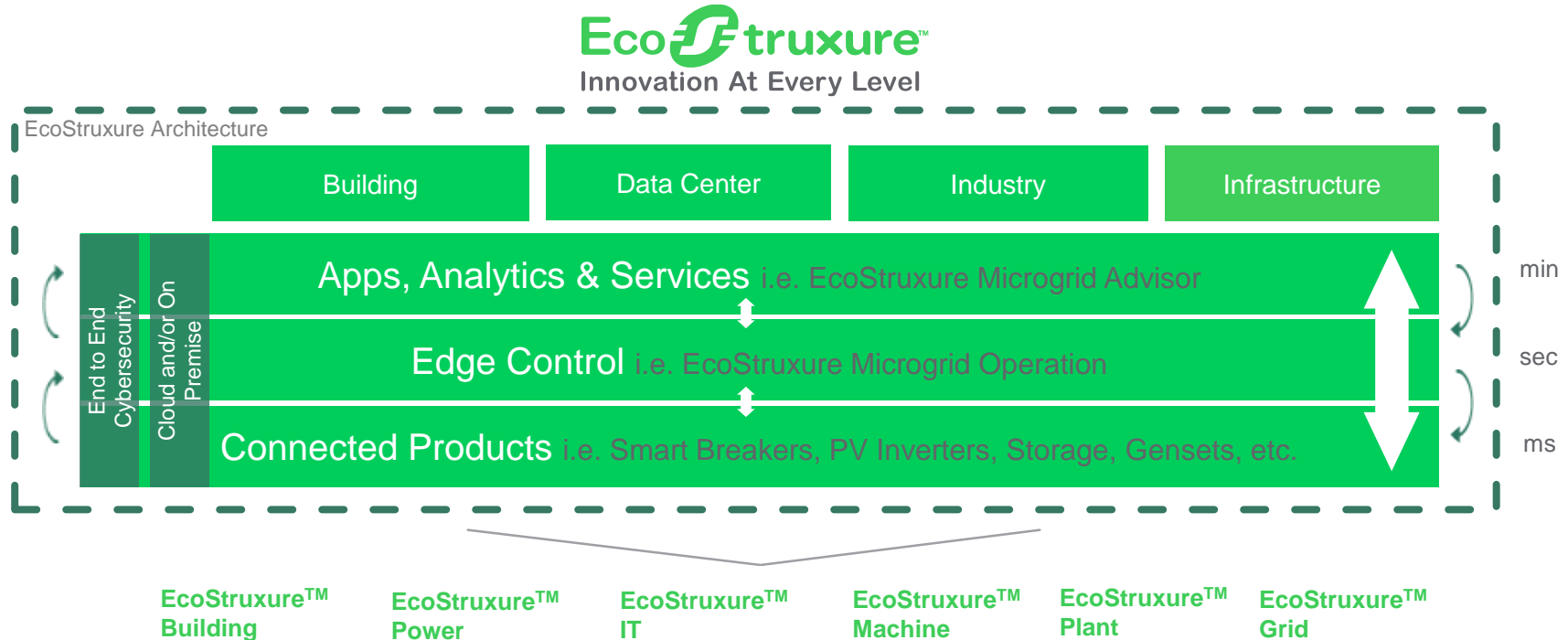
- Serve loads during times of grid instability
- Oasis for employees / customers – shelter in place
- Protect power sensitive / critical assets from poor power quality

## Sustainability



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

# One EcoStruxure architecture, serving 4 End Markets with 6 Domains of Expertise





# Apps, Analytics & Services: EcoStruxure Microgrid Advisor

Forecast and optimize when to consume, produce, store, or sell energy

## DER Monitoring & Autonomous Optimization

- Web accessible multi-stakeholder dashboards

## Tariff Management

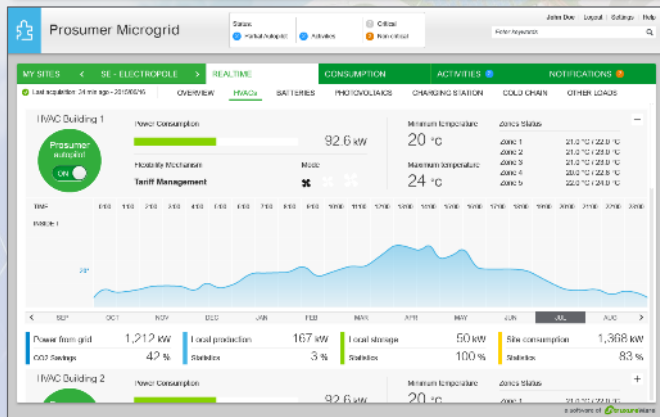
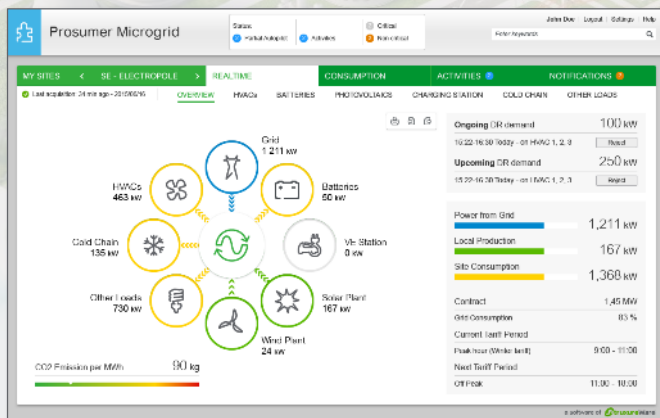
- Consume or produce energy at the most advantageous time based on variable utility rates

## 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 resilience storm mode



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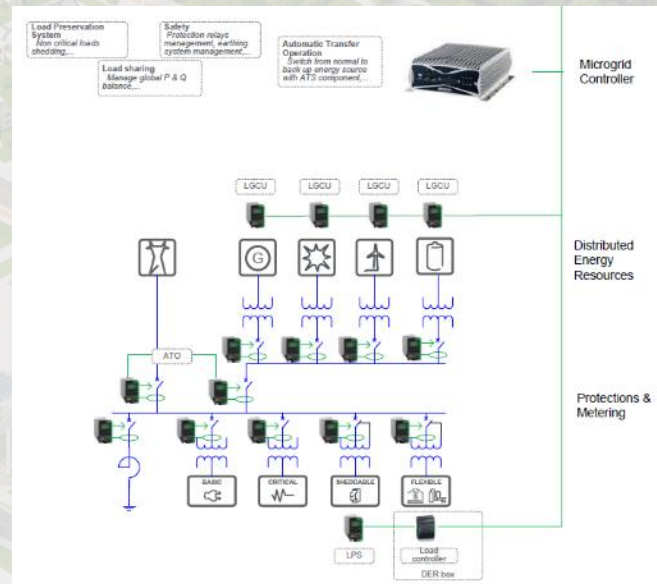
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# Microgrid Controller: EcoStruxure Microgrid Operation

## Real time control of DER and islanding management

### Features:

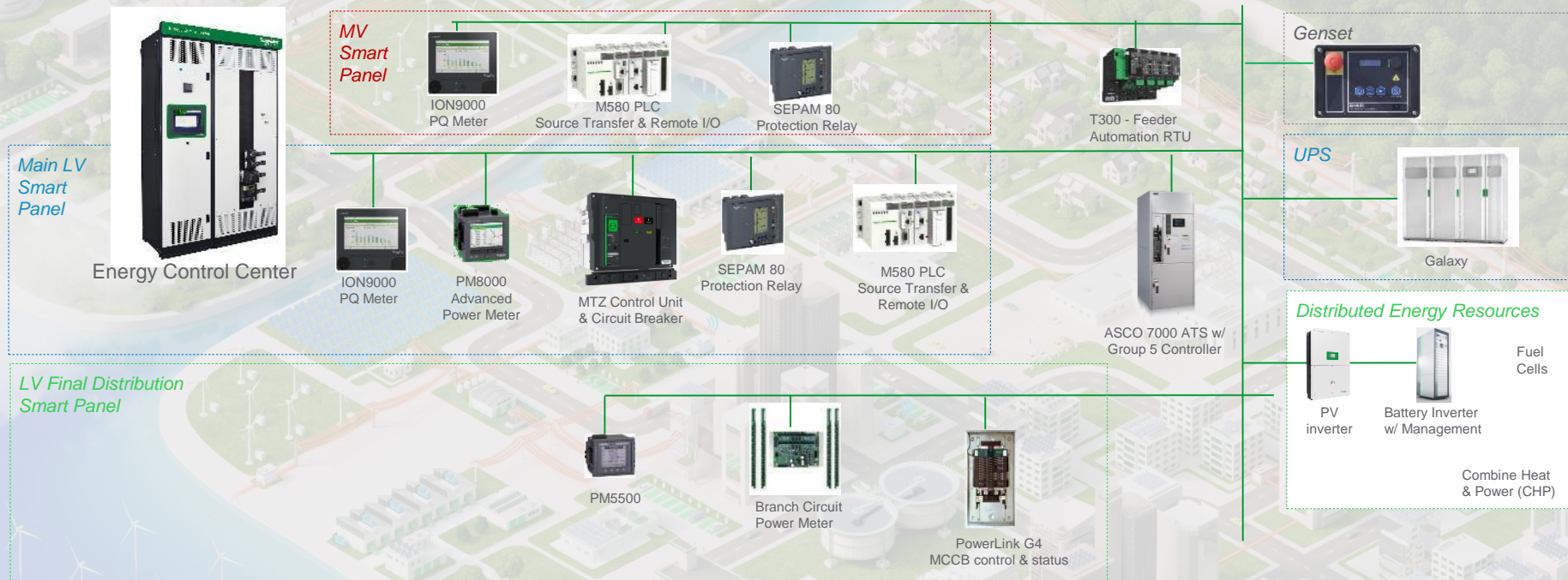
- **PLC or Industrial PC based solution, usually with a Load Generation Control Unit (LGCU) for each grid forming DER**
- **System stability**
- **Load sharing**
- **Load preservation system**
- **Performs Automatic Transfer Operation (on grid to off grid, off grid to on grid)**
- **Ensure the safety and security of the microgrid (grounding, changing settings of protection devices, etc.)**
- **Can be connected to an EMS (Schneider, 3rd party)**
- **DER agnostic**
- **Connectivity: Modbus IP, IEC 61850**





# Connected Products

Devices that are able to be monitored and/or controlled by Edge Controller



# The Energy Control Center implements all 3 layers of EcoStruxure



**EcoStruxure™**  
Innovation At Every Level

EcoStruxure Architecture



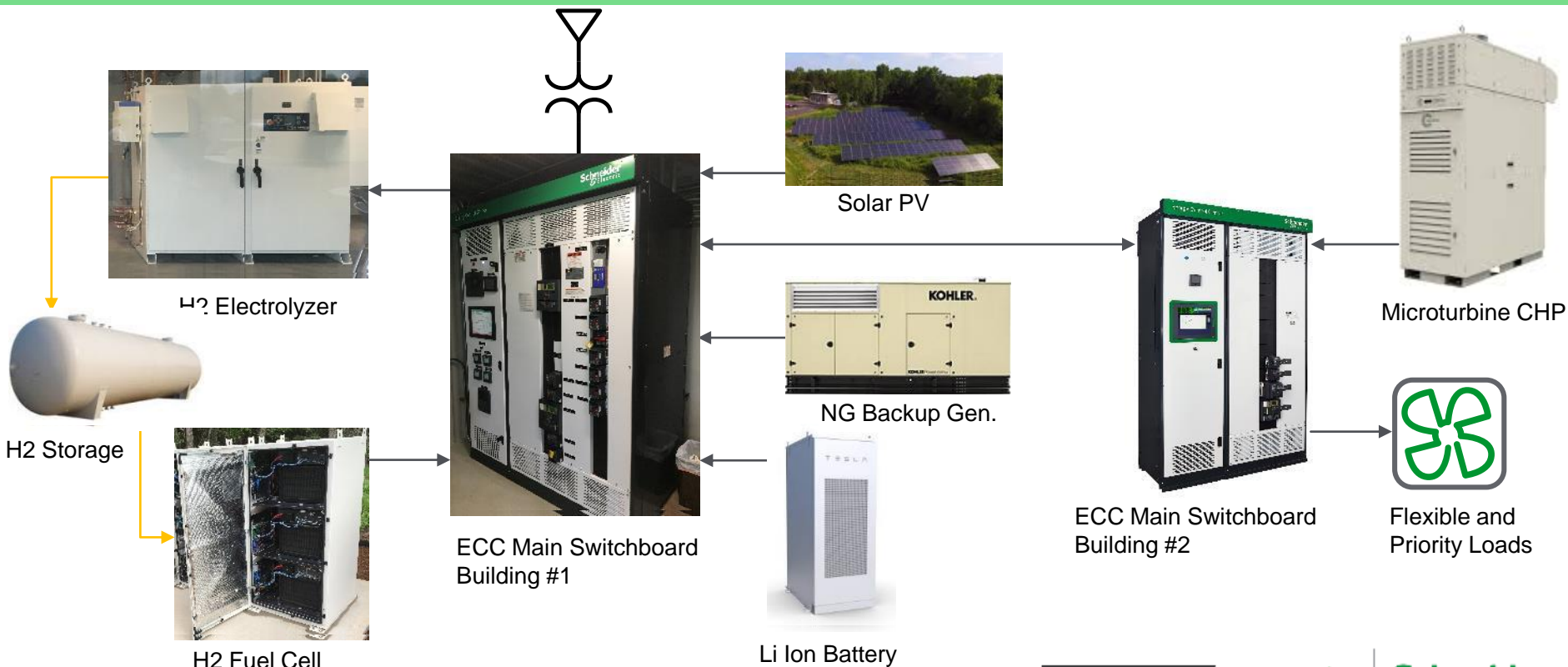
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# Energy Control Center in Campus Microgrids

Gordon Bubolz Nature Center, Appleton, WI



# Energy Control Center

Integrates distributed energy resources into an intelligent, pre-engineered power control center



## Customer Challenge

Integrate and easily manage multiple onsite distributed energy resources (DER) at the Bubolz Nature Preserve.

## The Solution

- Configurable microgrid equipment combined with
- autonomous and dynamic platform
- provides real-time tariff management
- demand response requests,
- peak shaving
- CO2 tracking and
- storm hardening across numerous generation assets.

## Customer Benefits

Bubolz Nature Center will easily optimize resources and maximize facility performance.

## The Results: Life is On with...

- Potential for zero carbon emissions
- Up to 50 percent lifetime power savings
- Microgrid will provide power to Bubolz's main facility, as well as the smaller buildings on the property
- Net-zero grid energy consumption

*"This project represents a forward-looking use case of energy systems that aim to establish a more resilient, efficient, economic and cleaner grid. The advanced control features integrated with Bubolz Nature Preserve's microgrid will benefit the facility and local community, supporting the development of a more intelligent and sustainable energy system."*

*Mike Jansen, CEO of Faith Technologies*

[www.schneider-electric.us/microgrid](http://www.schneider-electric.us/microgrid)

One of the largest, most advanced microgrid in the Midwest

Project won DER Project of the Year from POWER Magazine

**EcoStruxure™**  
Innovation At Every Level

Apps,  
analytics,  
and services

EcoStruxure  
Microgrid  
Advisor



Edge  
control

EcoStruxure  
Microgrid  
Operation



Connected  
products

Energy  
Control  
Center



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# The Future of Microgrids.....

....Follows the trend of Distributed Generation

## Engineered Systems

- Project-specific spec of components to build system
- Highly flexible
- Tend to be most costly



*Engine gen. set  
in place at jobsite*

## Packaged Systems

- Pre-engineering of subsystems
- Some flexibility in subsystem components
- Tend to be highly cost effective



*CHP packaged at  
factory, some site  
assembly*

## Productized Systems

- Factory built and tested
- Minimal system flexibility
  - Based on product “options”
- Tend to be most cost effective



*Assembled CHP  
product ready  
for shipment*

## Energy Control Center

- Engineered-to-Order
- Standardized components, controller, etc.
- Standard service packages
- Site-specific control and automation schemes
- Flexibility to use many DERs



## ECC800/1200

- Configured-to-Order
- Standardized control and automation programs
- Standard service packages
- Limited use cases
- Flexibility to use some DERs
- Lowest cost



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- Custom design
- Custom service support
- High site-specific engineering
- “If you’ve seen one microgrid, you’ve seen one microgrid!”

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Jake Friedman  
Manager, Project Development & Engineering  
Microgrid Competency Center  
Schneider Electric  
[Jacob.friedman@se.com](mailto:Jacob.friedman@se.com)

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