RESILIENT

New Energy Landscape
Technology + Business Model Transforms Energy

#Microgrid #EcoStruxure
Schneider Electric in the US

Leading the digital transformation of energy management and automation in homes, buildings, data centers, infrastructure, and industries.

Schneider Electric USA Headquarters
800 Federal St, Boston ONE Campus
Andover, MA 01810  se.com/us

$7.7B in revenues, 2018 ~19,000 employees

Major U.S. sites
Dallas, TX (2223 Employees) Boston, MA; Nashville, TN; West Kingston, RI; Lake Forest, CA;

300+ microgrids in the U.S.

#24 of companies that are changing the world,
Fortune 2016

#12 of Global 100 Most Sustainable Corporations

Acknowledged in CDP’s “Global Climate 500 Performance Leadership Index” and “Dow Jones Sustainability Index”
Solving for Integrated Outcomes
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
What is a Microgrid?

An integrated energy system consisting of interconnected loads and distributed energy resources…

…which as an integrated system can be controlled as a single entity and operate in parallel with the grid or in an intentional islanded mode.
Key technology considerations for microgrid

**Integration**
Architectures and systems that ease integration of energy assets

**Resilience**
Edge automation that makes microgrids more resilient than the grid

**Orchestration / Analytics**
Best-in-class algorithms that make the most of local energy assets

- **Energy Control Center**
- **EcoStruxure Microgrid Operation**
- **EcoStruxure Microgrid Advisor**
Energy in an Unpredictable World

In our connected and urbanizing world, the ramifications of energy disruptions are much different than a decade ago:

- Cellphone towers lost during California Public Safety Shutoffs impede ability of safety workers to collaborate
- The transition of healthcare to the home left many vulnerable during recent outages
- Food supply chains are threatened giving rise to indoor agriculture

Our approach to critical infrastructure must pivot to a new reality in which lower energy-intensity loads must be addressed (shopping centers, elder care, food processing, banks etc.):

- The custom engineered, highly bespoke solutions to hardening energy infrastructure of the past will not work
- Capital-intense solutions will not work for these types of consumers
The offer required to cross the chasm:

- Allows consumers to co-optimize for energy and process
- Aligns ownership of assets to those with a prospectus based upon long term stable returns.
- Delivers an enduring outcome for the economic useful life of the asset
- Shields consumers from technical risk of emerging technology

Early market participants are advanced energy prosumers who can quantify the value of improved reliability, flexibility, sustainability, and security to their corporate mission.

Reaching the larger market now requires overcoming high barriers to entry:

- Technology
- Regulatory
- Financial
Leader in advanced energy and sustainability

11 megawatts of solar across 18 sites
- More than 430,000,000 kWh of clean energy annually
- Procure 100% clean energy for County facilities
- U.S. DOE’s Combined Heat and Power for Resiliency Accelerator
### Situation

After a series of wide-spread grid outages, Montgomery County set out to find partners to help mitigate the impact of future disasters to its over 1M residents.

The community is committed to decreasing carbon footprint

The electrical infrastructure at the public safety headquarters was old, and needed to be replaced before failure.

The County has tight budget controls and access to capital is difficult

### Approach

- Delivered via innovative, public-private Energy-as-a-Service model eliminating up-front costs
- Infrastructure upgrades (low- and medium-voltage gear)
- Integration of existing generation assets.
- New Solar and Gas CHP generation
- Advanced controls and monitoring
- Advanced cybersecurity

### Outcomes

- Improved resiliency of county operations by upgrading existing aging electrical distribution infrastructure
- Provide the ability to island operations for >7 days without grid support
- Mitigated risk of escalating energy price over 15 years.
- Upgrade infrastructure including new electric vehicle charging without capex
- Reduce greenhouse gas and other emissions
Montgomery County Microgrid

Business Model Evolution

**Value Proposition**
- Avoided Capex for repairing existing substation
- Reduced operating costs
- PEPCO and MEA CHP energy efficiency grants
- Increased sustainability
- Infrastructure Improvements
- More predictable longterm energy costs

**Lead Project Developer**
- Technology Provider
- System Integration
- Specify prime movers

**Prime Movers**

**Key Stake Holders**
- County Personnel
- PEPCO utility
- MD Energy Association

**Investor / Owner**

**Master PPA**

**Monthly payments**

**PSHQ Host Site**
A new breed of buildings with disruptive system impact!

The buildings of the future need to be reinvented--fostering 3 main transformations

✓ Designed from the start as zero-carbon all-electric, equipped with local generation, storage, and controllable loads.

✓ Designed for the entire lifecycle: as they are built for lifetimes exceeding 40 years, they must be adaptative over time to new use patterns at minimum cost.

✓ Designed for optimal use: traditionally heavily underutilized, a greater recourse to digital technologies will enable new modes of interactions, downsizing footprints as a result.

Greatest potential of zero-carbon buildings lies in how they interact with the power system

✓ They represent nearly half of energy demand, if we account for the construction industry.

✓ They represent the largest number of touchpoints of the energy system.

Barriers and what will expedite transformation

✓ Siloed regulatory and 1970’s era energy efficiency programs that treat devices individually and not as system.

✓ Lack of a transparent technology neutral outcome-based retail market that lets customers interact with utility.
San Diego Gas and Electric (SDG&E) has digitized their distribution system and can see the value for microgrids and DERs at locations on circuits used in their “Power Your Drive” demand pricing pilot. CEC workshop 1/14/2020

Circuits below substations are unique, do not align with overall capacity issues on distribution system and offer more value than wholesale markets.
Policy Considerations for Removing Barriers to Transformation

✓ Create a technology neutral and transparent outcome-based retail market outside of PUC for all customers DERS to interact with utility in the top 200 hours of peak demand or hosting.

✓ Outcomes within 200 hours should be 1) Providing capacity 2) Taking capacity & 3) Ancillary services

✓ Be agnostic on relationship structures behind meters. PUC focus needs to be on rate basing two-way communication capabilities to allow utilities to leverage DERs to keep rates low.

✓ Allow ownership & operation of third party microgrids and Energy as a Service (EaaS) or public private partnerships (P3) for microgrids, EVs or Grid interactive Efficient Building (GIEBs).

✓ For utility built DERs have clear transparent procurement processes that are technology neutral but aligned with State policy goals. Require a comparison to be done on cost between rate of return-based facilities and third party built.

✓ Modernize 19070s era departing load and stand-by charges to support community resilience and unleash dynamic microgrid/DER services and energy efficiency programs. Adopt CTA-2045 standard.

✓ Direct executive branch to create rules for right of way access. (Only utility can access right of way)
Policy Considerations for removing barriers to Microgrid

- Direct all utilities to have established public diagrams for interconnection of microgrids and other DERs. Standard transparent process and design will accelerate economic growth.

- Many utilities are conducting DER planning by choice, rule or law. DER plans should clearly identify where any microgrid can improve the hosting or peaking capacity on a circuit.

- Remove Departing Load Charges (DLC) from Microgrids. The customer investment in microgrids will cause avoided CAPEX at substations which will cost ratepayers as EVs drive peak demand and PVs congest peak hosting capacity at circuits below substations.

- Modernize outdated energy efficiency rebate programs for equipment/appliances that can communicate as system with microgrid platforms in the form of Grid interactive Efficient Buildings.

- Washington, California and Oregon moving to CTA-2045 communications port for large demand generating appliances/equipment. Water tanks now but EV charging, HVAC, heat pumps, large discretionary electric motors, freezers/refrigeration. Energy Star is last century's solution.
Thank you!

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