Cuyahoga County RFI Response

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www.schneider-electric.us/microgrid

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Schneider Electric is pleased to submit our qualifications related to our experience delivering microgrid solutions. We are looking forward to developing a solution with this team to deliver not only a project but lay the foundation to improve resilience, reduce carbon emissions as well as demonstrate your leadership in energy innovation.

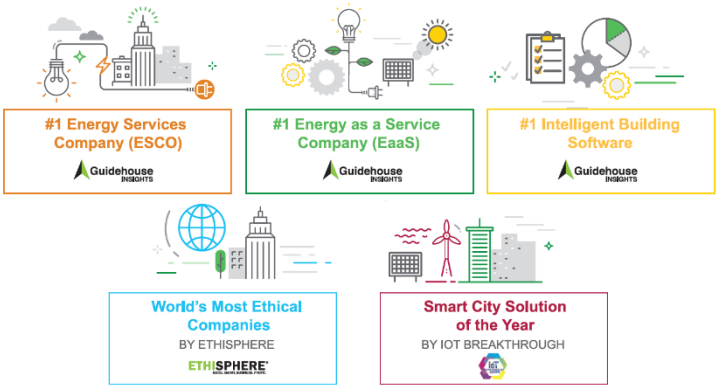
This is not a project, it is the legacy of your community.
This solicitation represents the platform for your first steps to a new energy future. A future that is focused on distributed generation, optimizing energy use and improved reliability for decades to come.

A Holistic Approach to Energy
At Schneider Electric we understand your goals and focused on three areas:

- **Resilience** – Distributed on-site generation eliminates single points of failure and allows for continuous operation through power outages from the grid all while deploying the latest cybersecurity standards.
- **Decarbonization** – A greener sustainable energy future is achieved through many interconnected efforts. This project focuses on integrating of ultra-low carbon emission generation and carbon free solar technology.
- **Energy Efficiency** — Schneider Electric will work with your team to implement the Microgrid Control System which will dispatch and optimize the energy assets.

Choosing the right firm is critical, this is a long-term partnership
This is not a wedding, this is a marriage. We do not view this solicitation as a single event like a wedding, but rather a long-term commitment; like a marriage. If Schneider Electric is a part of the team selected, we expect to bring to bear the resources which uniquely qualify Schneider Electric to implement the project, provide capital if needed, and deliver outstanding value. Schneider Electric will enhance the existing foundation of quality and excellence by providing:

- **Future Vision** – Schneider Electric applies our experience from designing and deploying over 350 microgrids and distributed energy resource projects. This means we have an eye towards scalability and design systems that are ready for future growth.
- **Agnostic to Generation Technology** – Schneider Electric does not produce any devices that generate electrons, we efficiently control those devices. Being agnostic to generation assets allow us to provide the best in class technology



- **Seasoned Financing** – Schneider Electric was recognized by Guidehouse Insights, formerly Navigant Research, as the #1 provider in North America for Energy Services and Energy-as-a-Service (EaaS). Schneider Electric provides comprehensive EaaS solutions delivered through subscription services, leases, power purchase agreements (PPAs) and energy savings performance contracts. We will help to guide you through this process and provide you options for the solution that best fits your needs.

Our intent will be to support you through this project lifecycle. We are confident that our proposal and experience working together will demonstrate that Schneider Electric is an experienced company with impeccable integrity. Our goal is to enable your vision and mission and we hope the information outlined herein lay the groundwork for an exciting partnership. We look forward to serving you with excellence.

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Company Information

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General information about Schneider Electric

Life Is On | Schneider Electric

1.0 Company Information

1.1 Company Purpose

At Schneider Electric our purpose is very simple: it is to empower all to make the most of our energy and resources. We believe that **technology allows us to bridge progress and sustainability** for all. At Schneider we call this Life Is On. We have to bring energy to all the people who don't have access to it, while at the same time, we have to make sure the carbon footprint of energy and resources will be halved in the next 20 years. In fulfilling this purpose, we see our mission in a very clear manner: we want to be your digital partner in Sustainability and Efficiency.

Schneider Electric at a Glance

Founding Year:	**1836**
Total Revenue in 2020:	**$25.35 Billion USD**
Employees:	**Over 135,000**
Total Microgrids Implemented:	**350+**

We are very proud to be a growing **technology company, providing energy and automation digital solutions for efficiency and sustainability** for our customers around the world, while continuing our strong commitment to innovation. We are the most local of global companies. Our unmatched proximity to customers, enables us to better understand, anticipate and adapt with agility to support business continuity. Our strategic partnerships and open standards make us stand out – we work together with our 600,000+ partners, 45,000 developers working on our platforms, and 3,000 electrical companies every day to efficiently to provide solutions for our customers.

We strive to be a leader in sustainability, corporate social responsibility, diversity and inclusion, and innovation. We are proud to have our efforts recognized with some of the following awards:

GLOBAL100	**Listed #1 Most Sustainable Company by Corporate Knights 2021** Schneider Electric has earned a spot on **Global 100 Most Sustainable Corporations in the World** every year since 2012, and we were listed as #1 in 2021. The top 100 corporations are selected from a pool of nearly 6,000 companies around the world.
WORLD'S MOST ETHICAL COMPANIES	**Demonstrated Reliability Earns World's Most Ethical Company Designation Nine Years Running** Ethics and responsibility are foundational to our relationships with all customers, partners, suppliers, and communities in which we work. And it shows: Schneider Electric has been recognized every year since 2011 as a **World's Most Ethical Company Honouree.**
FORTUNE THE WORLD'S MOST ADMIRED COMPANIES	**Fortune's World Most Admired Companies** Schneider Electric has been named Fortune's World's Most Admired Companies for the fourth year in a row, number 3 in Electronics industry. Fortune's annual ranking of the "World's Most Admired Companies" is based on a survey of U.S. and global Fortune 500 companies posting the highest revenues in their respective industries.

	Financial Times' Top Diversity Leaders Schneider Electric was recognized by the Financial Times Diversity Leaders 2021. The company's ranking is 27th overall and 2nd in its industry category, out of 850 companies included in the annual ranking.
	Innovation for Cool Earth Forum (ICEF) Schneider Electric was named in the top 10 Global Innovations by its Innovation for Cool Earth Forum (ICEF) for new SM AirSeT switchgear, a green and digital medium voltage technology. ICEF brings the world's best minds together to solve the 21st century's greatest environmental challenges through technological innovation. Its Top 10 Innovations highlights the most notable among recent innovative developments in energy and climate change mitigation.
	Commitment to Customers Earns #1 ESCO Rank from Navigant Research Schneider Electric will help you to address your needs far beyond energy. In fact, our commitment to our customers earned us the #1 spot on Navigant Research's 2017 ESCO Leaderboard Grid. The assessment ranked 14 leading ESCOs based on their strategy and execution.
	Emphasis on Jobsite Safety Nets More Than 200 Safety Awards Schneider Electric's focus on prevention saves lives, reduces injuries, and protects our customers from legal liability and negative public relations. The National Safety Council has recognized Schneider Electric with more than 200 awards since 2016, including the Industry Leader Award in 2018. Schneider is also 1 of 3 to simultaneously hold the Robert W. Campbell Award and the Green Cross Award for safety excellence.

1.1.1 Leader in Electrical Equipment and Energy Automation

As the global specialist in Power and Energy Management – Medium Voltage, Low Voltage, Secure Power and Automation Systems – **we provide technology as well as integrated solutions**. We drive digital transformation by integrating world-leading process and energy technologies to realize the full efficiency and sustainability opportunities for your business. We provide end-point to cloud integration connecting products, controls, software and services. We enable lifecycle solutions from design and build to operate and maintain phases through a digital twin. We deliver capabilities to transform from site-to-site to an integrated company management. Our integrated solutions are built with safety, reliability and cybersecurity for your homes, buildings, data centers, infrastructure and industries. Microgrids are a natural extension of our 100-year legacy in the power distribution and energy management business.

1.1.2 Dedicated Microgrid Team

The North American Microgrid Competency Center within Schneider Electric was created to bring together digital solutions and energy technology from across the organization. The team develops cross-Business Unit solutions to meet the needs of our customers. Our unique expertise in energy modeling, electrical hardware and protection, controls schemes, and renewable energy technology enables us to be industry experts and deliver innovative,

safe, and reliable solutions to projects large and small. Customer's count on our team's demonstrated experience and expertise to increase energy resilience, integrate renewable energy and enable economic optimization at their sites.

In the microgrid market space, Schneider Electric operates in multiple capacities ranging from the simple, acting as a project equipment provider, to the complex, providing full, turn-key engineer, procure, and construct (EPC) solutions. **We offer a full suite of engineering services, project management, financing, and multiple hardware and software solutions for all types and sizes of microgrids.** Our controllers, SCADA systems, DMS systems, electrical infrastructure equipment, and intelligent forecasting and optimization solutions have the ability to work with nearly any third-party equipment.

Recognized as the industry leader by Guidehouse for best-in-class microgrid technology and solutions, Schneider Electric has successfully designed, built and maintains over 350 advanced microgrid and controls projects in North America alone. Schneider Electric partners with customers to formulate energy strategies that accelerate their business performance. Customers rely on our innovative, modular microgrid solutions that allow electrical distribution systems to evolve with technology and regulatory structures – all while supporting locally with responsive operations, maintenance and optimization services.

Our rich microgrid and distributed energy resource project experience has allowed us to form long standing partnerships covering virtually every aspect of these complex projects and enables us to be the best teammate for any project.

1.2 Holistic Process for Decarbonization

As the leader in the digital transformation of energy management and industrial automation, we've helped thousands of organizations to decarbonize and reach their climate action goals. Our four-stage, holistic, and iterative process can help any organization to progressively move towards their ambitions. It is important to note that Schneider Electric can provide all of these services or just individual parts as desired.

Stage 1 – Define Success

The expression, "What gets measured gets managed" is as true for decarbonization as any other organizational metric. Organizations must understand, from the beginning, where they are today on the decarbonization pathway what it is they aspire to achieve. Schneider Electric can help by providing:

- Market Intelligence and Trends
- Benchmarking and footprint assessment
- Stakeholder engagement and journey mapping
- Digital solutions - energy management software and services give access to real-time data that enhances decision-making

Stage 2 – Set Targets

The type of decarbonization targets an organization sets, and the timeline to achieve those targets, is crucial to the overall success of any decarbonization program. It is essential for organizations to publicly announce their decarbonization and energy targets. Schneider Electric can help by:

- Analyzing risks and opportunities
- Emissions roadmap development and design
- Amplifying and validating public target setting

Stage 3 – Deploy Programs

Once an organization understands where it is and where it's going, the essential next stage is to deploy a developed program. Schneider Electric can help deploy programs through:

- Energy Management and Procurement - as the largest and most experienced global energy manager, we support our clients in procuring, managing, and balancing their energy and carbon portfolios.
- Efficiency
  - Energy performance contracting with guaranteed savings
  - Efficiency software and services
- Onsite Energy Generation
  - Acquiring and deploying clean and distributed technologies and microgrids, including combined heat and power (CHP), renewable gas, renewable thermal heat, fuel cells, biofuels / biomass, green hydrogen, and battery storage
  - E-mobility solutions
- Offsets
  - Sourcing and management of global energy attribute certificates (EACs), green electricity, green tariffs, and carbon offsets

Stage 4 – Sustain Results

Organizations must consistently monitor, measure, adjust, and optimize to sustain their decarbonization efforts. Market forces, legislation, regulation, technological advancements, organizational growth or contraction, and financial changes can impact these programs. Schneider Electric can provide:

- Performance tracking and analytics
- Internal and external reporting and communications

1.3 EcoStruxure Architecture – Connecting Hardware & Software

EcoStruxure is Schneider Electric's digital backbone connecting best-in-class operational technology (OT) solutions with the latest in IT technology to unlock trapped value in your operations and leverage the true potential of the Internet of Things.

Schneider Electric's revolutionary platform, EcoStruxure, delivers innovation at every level, serving our clients by meeting their energy management needs. It gathers – in one fully integrated and proven platform – all the technologies that have traditionally operated separately and previously in an uncoordinated fashion to achieve a single, interoperable architecture. It delivers more value by providing readily accessible information and by enabling real-time control based on intelligent analytics.

The EcoStruxure platform, encompassing the entire range of Schneider Electric as well as third-party products, is customized to meet each end-user's specific requirements while simultaneously increasing safety, reliability, efficiency, sustainability, and connectivity. Tested and validated, future-proof Reference Architectures enable the design of end-to-end, open, interoperable, and connected systems. The EcoStruxure platform is inherently flexible, modular, and scalable ensuring that as the campus expands its operations, the platform will grow with it, safeguarding investments long-term.

EcoStruxure is the industry-leading Technology Stack consisting of connected products, edge control, and applications, analytics, and services.

Connected Products: Our first conviction is innovating at our core to produce great connected products. Because the Internet of Things starts with things, it is intelligent products like connected breakers, sensors, actuators and motor drives that serve as the foundation of smarter operations.

Edge Control: We enable our customers to have real-time solutions for control at the Edge of the IoT network. For mission critical scenarios, not all control decisions can be made remotely and overridable control of devices at the Edge of the network of things is a must.

Applications, Analytics, & Services: Our customers come with a variety of hardware and systems. EcoStruxure enables the most extensive breadth of agnostic Applications, Services, and Analytics working with any hardware, any systems, and any control.

Case Studies & Additional Information

II

Case studies and marketing material

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2.0 Additional Information

2.1 Case Studies

2.1.1 Montgomery County Maryland

Location	Montgomery County, Maryland
Size	5MW
Contract Value	Energy as a Service (25 years)

Goal

The Montgomery County government serves the most populous county in the state of Maryland. The County needed to upgrade the electrical infrastructure of two critical facilities, the Public Safety Headquarters (PSHQ) and Montgomery County Correctional Facilities (MCCF), to increase resilience and sustainability. With 9,000 employees, the Maryland country was looking at an innovative solution that would not only improve the county's power resilience, but also fit in with their budget constraints.

Solution

Schneider Electric partnered with Duke Energy Renewables to offer a solution that enabled the county to install two advanced microgrids without any upfront investment. Our role was to bring comprehensive design and implementation of the solution using Schneider Electric and third-party equipment and software. We provided distributed energy resource management and optimization software and controls, engineering services, protection control and optimization, electrical equipment, electrical design services, cybersecurity, and network design. The 25-year Energy-as-a-Service (EaaS) agreement offered by Duke Energy Renewable removes the burden of ownership and operations from the County.

On-site Generation

- PSHQ Facility (4.8MW total) – 800kW CHP, (2) 1MW natural gas standby gensets, 2MW PV
- MCCF (2.7MW total) – 220kW CHP, (2) 1.3MW natural gas diesel standby gensets, shares access to PSHQ PV systems

Montgomery County's Public Safety Headquarters produces **3.3 million kWh of solar per year**, reducing greenhouse gas emissions by nearly **6,000 metric tons annually**

Use Cases

- Backup Power/Resilience
- Metering and monitoring of CHP, Solar PV, Backup Generators, Utility Feeders and Electrical Distribution

Key Benefits

Montgomery County set out to solve its problems involving energy resilience and an aging electrical infrastructure. But what the forward-thinking county achieved has implications far beyond its own borders. It has offered up a model that could bring microgrid benefits to many other communities nationwide.

- Resilience: The CHP and solar production will both be utilized in both grid- paralleled and islanded mode The requirement from the county was to run entirely grid disconnected, for a minimum of 7 days, powering the entire facility (PSHQ). Our system will in fact run much longer than this requirement
- Energy Savings: Utilization of on-site resources reduces demand from local utility The microgrids produce approximately 3.3 million kWh of solar energy each year
- No upfront investment: Energy-as-a-Service model allowed upgrades to be financed through low monthly energy bills like a solar PV Power Purchase Agreement (PPA).
- Sustainability**:** The systems produce 7.4 million kilowatt hours of combined heat and power each year, which saves energy by using waste heat from on-site power generation to heat and cool the buildings. Combined, the on-site power generation at these two facilities is anticipated to reduce greenhouse gas emissions by 3,629 metric tons each year

2.1.2 Bubolz Nature Preserve

Location	Appleton, Wisconsin
Size	4MW
Contract Value	$800k

Goal

Gordon Bubolz Nature Preserve is the nature center near Appleton, a 775-acre chunk of white cedar swamp dedicated to educational programming and recreational opportunities. The Fox Cities Environmental Learning Centre at the Preserve wanted to create a new state-of-the-art, energy-efficient research and development facility to showcase for its 100,000+ expected visitors. This included schools to come in to learn about their energy future. Their vision was to develop one of the world's most advanced microgrid systems that offered both economic and environmental sustainability, turning it into a learning lab.

Solution

Very few microgrids today operate with five distributed energy resources (DERs) due to its complexity and system integration. Installed by Faith Technologies, the five DERs are managed by Schneider Electric's Control Center, an intelligent, pre-engineered power control center. The optimization was delivered by Schneider Electric's EcoStruxure Microgrid Advisor, a cloud-connected software platform. The sophisticated tool can autonomously configure the DER into a range of different permutations to produce the most efficient, clean, and cost-effective combination of energy resources available at any given time.

On-site Generation

- 200 kW solar photovoltaics
- 100 kW lithium-ion battery energy storage system
- 30 kW fuel cell
- 65 kW microturbine
- 60 kW natural gas generator

Award Winning Project

Named first Distributed Energy Resource **Project of the Year** from POWER Magazine

Use Cases

- Off-site control and monitoring: over the years, the system will continue to grow in sophistication without the need for any on-site visits or physical changes
- Live data feeds: performance is displayed at Faith Technologies' Innovation Center which displays a clear view of Bubolz Preserve's systems performances

Key Benefits

The Fox Cities Environmental Learning Center at Bubolz Nature Preserve stands out on the global microgrid map as an energy innovator and educator. They have also won first DER Project of the Year from POWER Magazine in 2018.

As a result of the advanced microgrid implementation, the Preserve has achieved:

- Net zero energy consumption facility, generating net positive clean energy to the site
- End to paying utility electricity bills with 100% savings in the utility energy cost
- Electric reliability and has reduced storm related outages by 100% (normally six per year)
- A new education platform in keeping with the mission of the nature preserve, acting as a test lab and provides a learning opportunity for other microgrid customers

2.1.3 MCAS Miramar

Location	San Diego, California
Size	7MW
Contract Value	Monitoring-based Commissioning

Goal

The Marine Corps Air Station (MCAS) Miramar is a part of the United States Marine Corps, home to more than 15,000 service members and their families. The base serves marines and sailors from the 3rd Marine Aircraft Wing where their task is to provide combat ready expeditionary aviation forces capable of short notice worldwide deployment to Marine Air Ground Task Force (MAGTF) fleet and united commanders.

After being impacted by the largest power outage in California's history on September 8th, 2011, MCAS Miramar installation leaders experienced the fragility of their power system and immediately began exploring options for adding an onsite, large-scale renewable energy system to power its 100 mission-critical facilities in an event of an outage.

Solution

The Department of Defense (DoD) selected Schneider Electric and Black & Veatch (via a project-specific joint venture) to develop a microgrid to ensure power to 100% of MCAS Miramar's flight line and support facilities (more than 100 buildings representing approximately 60% of the total military base) in islanded mode. The microgrid will incorporate renewable resources and advanced smart grid control systems.

The second phase of this project utilizes CEC grant funds to implement a Schneider Electric 1.5 MW / 2.56 MWh lithium ion Battery Energy Storage System (BESS), switchgear, and associated controls to achieve high reliability with renewable resources instead of relying on the fossil fuel combustion engines or diesel gensets that are part

of the DoD-funded microgrid. The microgrid controls are configured for demand response, peak shaving, ride-through capabilities, and islanded operations. The DERs, electrical equipment, and controls will provide significant operational and environmental benefits to MCAS Miramar.
Schneider Electric was the project prime contractor, had full EPC responsibility for the microgrid controls and associated balance of plant equipment vendor, and partial O&M service provider

On-site Generation

- 3.2 MW of existing onsite landfill gas generators (LFG)
- 1.5 MW / 2.56 MWh Battery Energy Storage System (BESS) used to backup LFG in islanded conditions, facilitate islanding transition, peak shaving, and demand response participation
- 1.3 MW existing network of onsite solar photovoltaic (PV) generation
- 3.6 MW of new Tier 4 Final diesel generators
- 2.8 MW of Best Available Control Technology (BACT) natural gas generators
- Building specific Thermal Energy Storage systems (ice plant) that can reduce microgrid load ~157 kW in island mode
- 12 EV charging stations with V1G vehicle-to-grid functionality for demand response and 6 V2G vans
- 1,600 kW load shed capability though SDG&E's Demand Response programs via the BESS, EVs, and the building energy management system

Use Cases

- Islanding
- Demand response program participation
- Reduce demand charges
- Load management
- On-site/Renewable Energy Firming

Proven and Tested Solution

As a mission-critical facility, MCAS Miramar can run for 2 whole weeks if the power goes out

Key Benefits

- All elements are designed and built in compliance with Department of Defense (DoD) security infrastructure and risk management requirements
- Ability to provide support services to the central grid
- Increased renewable penetration (over 75% of site served by renewables) and reduced reliance on fossil-fuel powered generators which leads to reduced greenhouse gas emissions
- Increased energy security, resiliency, and reliability for military operations
- Reduced energy costs by removing spikes in demand issues thereby lowering demand charges from SGE&E
- Providing ride-through capabilities in the event of a SDG&E outage
- Eliminating black-start of the microgrid after SDG&E outages using diesel generators

2.1.4 Bowery Farming

Location	Kearney, New Jersey
Size	1MW
Contract Value	Energy as a Service

Goal

Bowery Farming is committed to producing the purest product by controlling every aspect of the growing process, from seed to store. The energy-efficient plant facility uses automation and machine learning to grow vegetables year-round, without worrying about traditional farming challenges like weather and unwelcome animals. The goal was to integrate and easily manage multiple onsite distributed energy resources (DER) and increase site resilience for the vertical farming application.

Solution

Schneider Electric and our strategic partner, Scale Microgrid Solutions (SMS), completed the Bowery Farming Indoor Agriculture Microgrid to support the resiliency, energy savings and sustainability goals of the Bowery Farms Company. It has now become one of the most technologically-sophisticated commercial farms in the world.

- EcoStruxure Microgrid Advisor (EMA): a cloud-connected, demand-side energy management software platform, was integrated to optimize the system's performance. By leveraging machine learning and Model Predictive Control algorithms, EMA manages the production, storage and consumption of natural gas and renewable energy to control energy spend. The system is also equipped to operate in parallel with traditional utility electric services during normal operating conditions, and in "island mode" to ensure that the farm remains powered during unexpected outages.
- EcoStruxure Microgrid Operation (EMO): used to control islanding. EMO is a high performance, resilient, scalable solution for microgrids capable of providing advanced power control and management functionalities with a simple system structure based on a microgrid controller and a SCADA / Local HMI.
- Energy Control Center (ECC) was used to integrate the multiple electrical sources and loads as well as the controls into one piece of equipment. The system uses distributed energy resources (DER), including a rooftop solar array, a natural gas generator equipped with advanced emissions control technologies and controllable loads.
- Schneider Electric Lithium-ion battery energy storage system (BESS): interconnected in a behind-the-meter configuration performing frequency regulation service and frequency / watt support for the generator in case of an outage

On-site Generation

- Solar PV
- Battery Energy Storage System
- Natural Gas Generator with Advanced Emission Control

Developing the Future of Food

"Bowery is committed to growing food for a better future and we are excited to have found partners in Schneider Electric and Scale Microgrid Solutions who will help us achieve our mission. We look forward to providing consumers with access to local, high-quality produce and drive a more sustainable future."

- Brian Donato, SVP Operations, Bowery Farming

Use Cases

- Resilience – onsite microgrid controller and intelligent switchgear enable the site to disconnect and operate when the utility grid is off.
- Demand Charge Reduction – dispatch DERs to reduce monthly peak demand charges
- Peak Demand Management – reduce Peak Load Contribution by dispatching DERs during certain times
- Synchronous Reserves – Bowery Farming is a PJM Curtailment Service Provider which allows PJM to dispatch and curtail their load to deal with short term grid issues within 8 minutes
- Frequency Response – The on-site BESS participates in the PJM Frequency Response program by providing nearly instantaneous reaction to the power system's needs, either in the form of supply or demand. This requires extensive metering requirements which are met by EcoStruxure Microgrid Operation and PowerLogic Meters.
- Economic Demand Response – Bowery Farming is a PJM Curtailment Service Provider which allows PJM to dispatch Bowery's load against the day-ahead and real-time power markets

Key Benefits

- Energy savings by utilizing machine learning algorithms to optimize on site generating assets
- Reduce carbon emissions through utilization of Solar PV and Natural Gas Generation
- Prevent loss of leafy greens due to continuous power supply from the microgrid
- Electricity rate locked in for an extended period of time via Energy-as-a-Service
- Serves as microgrid educational demonstration facility to test and measure the impact of microgrid technologies in a real-world vertical farming environment
- Processes and solution can be replicated to other 20 plant facilities

2.1.5 Camuy Coop

Location	Puerto Rico
Size	112 kW(DC) PV, 61 kW storage, 250 kW diesel generator
Year Built	2019

Goal

The Camuy Cooperativa (Coop) is a credit union in Puerto Rico that had over 110 kW(DC) of Solar PV and a diesel generator-set. Following the devastation in Puerto Rico from hurricane Maria in 2017, the Coop could not

get enough diesel for continued off-grid operation, so clients could not access their funds. Going forward, Camuy Coop wants to ensure resiliency and the ability to continue serving the community despite a loss of utility power.

Solution

Schneider Electric, along with its partner, Genesis Green Systems, developed a solution that enables Camuy Coop to continue operations for an extended amount of time without the larger grid. When a hurricane or other event causes grid outages in the future, Camuy Coop will have the resiliency to serve its customers even if the electric utility is down and there is no diesel fuel available.

The microgrid was built by supplementing the existing primary switchboard, ATS, and UPS with a Schneider Electric Conext XW+ storage system and Energy Control Center (ECC) with integrated microgrid control system. The site's PV inverters were rewired into the ECC along with the critical and essential loads, which now receive power from any available source. When diesel fuel is available, the microgrid control system allows the entire site to receive power and uses the PV to save fuel.

On-site Generation

- 112 kW(DC) Solar PV
- 250 kW Diesel Generator
- 61 kW Battery Storage
- Traditional VRLA Batteries

Reliable and Resilience Power

While this coop did have solar, the solar alone did not provide resilience. By updating the facility with a microgrid, it lessened the dependence of the diesel generator and furthered the benefits of the PV.

Use Cases

- Resilience – onsite microgrid controller and intelligent switchgear enable the site to disconnect and operate when the utility grid is off.
- Demand Charge Reduction – dispatch DERs to reduce monthly peak demand charges
- Peak Demand Management – reduce Peak Load Contribution by dispatching DERs during certain times
- Synchronous Reserves – Bowery Farming is a PJM Curtailment Service Provider which allows PJM to dispatch and curtail their load to deal with short term grid issues within 8 minutes
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Key Benefits:

- Energy savings by utilizing machine learning algorithms to optimize on site generating assets
- Reduce carbon emissions through utilization of Solar PV and Natural Gas Generation
- Prevent loss of leafy greens due to continuous power supply from the microgrid
- Electricity rate locked in for an extended period of time via Energy-as-a-Service
- Serves as microgrid educational demonstration facility to test and measure the impact of microgrid technologies in a real-world vertical farming environment
- Processes and solution can be replicated to other 20 plant facilities

2.1.6 Marian Heights

Location	Connecticut
Size	2MW
Year Built	2020

Goal

After a severe weather event in Connecticut in October 2011, including a hurricane and then a freak snowfall, the Department of Energy and Environmental protection (DEEP) initiated the first of four rounds of funding to develop microgrids for municipal critical facilities. This project was an awardee in Round 4 of the DEEP program.

Marian Heights was successful in securing a portion of this pioneering grant to support its mission to help the underserved population. Their four critical sites are 1) low-income elderly housing and administration 2) hospital for special care 3) battered women's shelter, and 4) residency for retired nuns.

The customer was excited to be able to add to their existing solar fields and integrate resiliency to keep their multi-use campus up and running. The aim of the project was to create a renewable, clean energy microgrid by adding solar PV, battery energy storage, a small amount of natural gas generation when necessary, as well as intelligent, adaptive microgrid control and management platforms, as per the funding requirements.

Solution

Schneider Electric, and partner Eco-Solar, developed a microgrid so that all four sites would be fully powered by renewable energy. At all times and especially when weather incidents occur, the four sites can run independently from the grid in islanded mode.

The existing solar included four solar arrays totaling 800 kW. The provision of equipment, software, engineering and long-term servicing was provided by Schneider Electric, whilst the solar and construction of solar services was provided by Eco-Solar. A portion of the funding for the BESS, new solar and natural gas generator was provided by Citizens Energy Corporation who will own and operate the equipment.

Schneider Electric designed and engineered its full Ecostruxure offering by providing a BESS that allows for the integration of all the solar on-site during island mode. Ecostruxure Microgrid Operation will ensure efficient and seamless operation of the DER mix while Ecostruxure Microgrid Advisor will optimize multiple use cases around revenue generation, site resiliency and self-production to the buildings on the property.

On-site Generation

- 1.2MW PV
  - Existing Solar: 800kW
  - Additional Solar: 400kW
- 4 x 125/250 kWh battery storage system
- 225kW natural gas generator

Grant Funded

Connecticut's pioneering grant program for municipal microgrids allowed Marian Heights to utilize a $3.7 million government grant.

Use Cases

- Remote monitoring and forecasting: monitoring power and energy for each Distributed Energy Resource using customer provided internet access
- Tariff Management: control BESS to consume, produce or store energy according to Customer entered variable electricity tariff rate
- Demand Charge reduction: control BESS to consume, produce or store energy for reducing site utility billing for yearly peak demand
- Demand Response: control BESS for participating in five programs available through C-Power curtailment service provider: OPHR-PV, OPHR-BESS-Summer, OHPR-BESS-Winter, Connected Solutions daily Dispatch-Summer and Connected Solutions Daily Dispatch-Winter through Customer entered schedule
- Off Grid mode preparation: charge the BESS in anticipation for future off grid events due to severe weather

Key Benefits

- Additional utility bill savings in addition to the microgrid use cases from Ecostruxure Microgrid Advisor
- Resiliency against grid outage
- Indefinite island mode operation

2.1.7 Fairfield Town Government

Location	Fairfield, Connecticut
Size	4MW (total between 2x microgrids)
Year Built	First one in 2015, second in 2018

Goal

In 2012, Superstorm Sandy pummeled Fairfield, causing power outages and severe flooding. From adversity came innovation: a catalyst from the town government to keep electricity flowing for critical services and resiliency plans to protect its citizens in a crisis. The town also had a goal to be a green community, to reach 50 percent renewable in the next five years.

The state of Connecticut was the first in the national to fund a microgrid development for its critical facilities. In fact, Fairfield was one of the first towns to receive a microgrid grant of $1.4 million from the Connecticut Department of Energy and Environmental Protection.

Solution

Schneider Electric, and partner Eco-Solar, developed a microgrid so that all four sites would be fully powered by renewable energy. At all times and especially when weather incidents occur, the four sites can run independently from the grid in islanded mode.

The existing solar included four solar arrays totaling 800 kW. The provision of equipment, software, engineering and long-term servicing was provided by Schneider Electric, whilst the solar and construction of solar services

was provided by Eco-Solar. A portion of the funding for the BESS, new solar and natural gas generator was provided by Citizens Energy Corporation who will own and operate the equipment.

Schneider Electric designed and engineered its full Ecostruxure offering by providing a BESS that allows for the integration of all of the solar on site during island mode. Ecostruxure Microgrid Operation will ensure efficient and seamless operation of the DER mix while Ecostruxure Microgrid Advisor will optimize multiple use cases around revenue generation, site resiliency and self-production to the buildings on the property.

On-site Generation

- Photovoltaic systems
  - 54 kW and 27 kW installations at the animal shelter
  - 13 kW installation at the fleet garage
  - 21 kW installation at the fire safety training building
  - 1.4 MW installation at the landfill
  - 42 kW installation at the compost facility
  - 47 kW solar PV array
- 400 kW fuel cell
- 1.3 MW natural gas generator
- 350kW natural gas generator
- 60 kW combined heat and power (CHP) system

Use Cases

- Clean Energy: The town swapped out diesel fuel for cleaner-burning natural gas at two large capacity generators.
- Reduce carbon emissions: The microgrids harness emissions-free solar energy by way of their solar PV panels
- The Town's number 1 priority was resiliency

Pioneering Project

The state of Connecticut was the first in the national to fund a microgrid development for its critical facilities. In fact, Fairfield was one of the first towns to receive a microgrid grant of $1.4 million from the Connecticut Department of Energy and Environmental Protection

Key Benefits

- Ability to provide critical municipal and emergency services during times of grid outages
- Enables Load Growth - Designed to supply 120%of the town's peak demand power for the buildings it serves
- Energy Savings from CHP - Natural gas-powered microgrid saves the town about $60,000 in electricity and $10,000 in heating costs annually. These savings directly stem from the installation of the 60 kW Tecogen natural gas CHP unit located at the police department.
- Utilized Grant Funding - Fairfield's public works department also teamed with Schneider Electric in submitting a winning proposal to Connecticut's microgrid program, as well as helping to secure the grant from HUD to fund the second microgrid.

2.1.8 City of Milford, Connecticut

Location	Milford, Connecticut
Size	525kW
Year Built	2018

Goal

The City of Milford looked to Schneider Electric to find a solution to provide resiliency and cost savings measures. A microgrid solution was proposed to meet Connecticut Department of Environmental Protection requirements and utility Virtual Net Metering to realize energy savings through surplus energy export.

Solution

Schneider Electric offered a solution that enabled the city to install an advanced microgrid. Our role was to bring comprehensive design and implementation of the solution using Schneider Electric and third-party equipment and software. We provided distributed energy resource management and optimization software and controls, engineering services, protection control and optimization, electrical equipment, electrical design services, cybersecurity, and network design.

On-site Generation

- Parsons Complex (525kW total)
  - 400kW CHP
  - 125kW Battery Energy Storage System (BESS)
  - Future PV Connectivity

Cost Optimization and Savings

15%-30% annual savings on energy spend

Use Cases

- Backup Power/Resilience
- Islandable
- Metering and monitoring of CHP, BESS, Utility Feeders and Electrical Distribution

Key Benefits

The City of Milford set out to solve its problems involving energy resilience and an aging electrical infrastructure. But what the forward-thinking city achieved has implications far beyond its own borders. It has offered up a model that could bring microgrid benefits to many other communities nationwide.

- Resilience: The CHP and solar production will both be utilized in both grid- paralleled and islanded mode The requirement from the county was to run entirely grid disconnected, for a minimum of 7 days, powering the entire facility (PSHQ). Our system will in fact run much longer than this requirement
- Energy Savings: Utilization of on-site resources reduces demand from local utility. The microgrids is capable of demand response through the BESS and can deliver 112kWh.

2.1.9 MCLB Albany

Location	Albany, GA
Size	3,300+ acres, and 400+ facilities
Year Built	2017

Project Scope

Schneider Electric was awarded a subcontract from Constellation, a subsidiary of Exelon Corp., to support the development of smart controls as part of an energy savings performance contract at the U.S. Marine Corps Logistics Base (MCLB) in Albany, Georgia. In late 2016, Constellation was selected by Naval Facilities Engineering Command (NAVFAC) to implement a $170 million, 23-year energy savings performance contract, providing energy conservation measures and distributed generation for MCLB. The project included the installation of an 8.5-megawatt biomass-fueled, steam-to-electricity (STE) generator, high-efficiency transformers, lighting and boiler upgrades, as well as system controls for a landfill gas electricity generator and centralized monitoring and operation of electricity generation and distribution for the base.

Under the Constellation contract, innovative controls, designed and installed by Schneider Electric, was the backbone of the system controls to reduce energy use, increase energy security and meet energy demand from renewable sources at MCLB. These controls will manage the base's Distributed Energy Resources (DER) as well as optimize energy efficiency and "Net Zero" resiliency at the base. Schneider Electric also provided cybersecurity, ongoing system maintenance and energy optimization services.

2.1.10 Andover R&D Center, Schneider Electric Headquarters

Location	Andover, MA
Size	400kW Solar/ 400kW natural gas generator
Year Built	2017

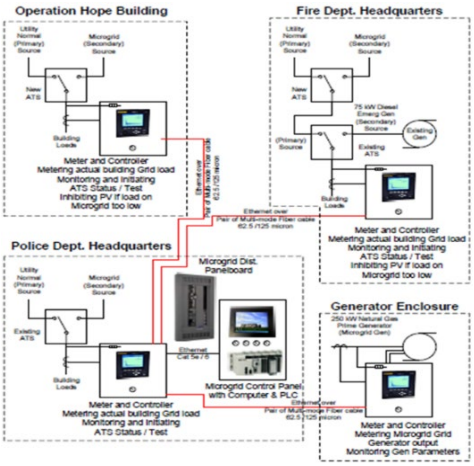
Project Scope

Valuing sustainability and environmental stewardship, Schneider Electric set out to create a microgrid on the campus of their national R & D center located in Andover, MA. The drivers behind the project were the need for resiliency at the site and to avoid any capital outlay as a proof of concept for the Microgrids-as-a-Service business model. Working in conjunction with Duke Energy as the financier and REC Solar as the solar developer, the team put together a fifteen-year financing package that provides Schneider Electric with stable energy prices and resiliency for critical labs, allowing the Company to shelter over 700 employees should the utility power be lost. Services provided by Schneider Electric included Engineering, Procurement, and Construction of the microgrid infrastructure. Also provided was a state-of-the-art cyber security and networking system, a transformer, switchgear, metering and an inverter skid for quick deployment and installation.

2.1.11 Town of Fairfield

Location	Fairfield, CT
Size	2x Microgrids
Year Built	2015 and 2018

Project Scope



The Connecticut Department of Energy and Environmental Protection (DEEP) awarded $3.3 million to Schneider Electric to develop multiple microgrids under the nation's first-ever microgrid grant program. Connecticut's Governor Dannel Malloy allocated $18 million to nine project sites across the state to support the first phase of an ongoing effort to harden energy infrastructure against severe weather and other threats. Widespread outages during storms in 2010, 2011, and 2012 underscored the legislation and the value of microgrids in protecting critical infrastructure during emergencies and mitigating the impact of natural disasters on local communities.

One of the awarded projects was Schneider Electric's Town of Fairfield critical infrastructure microgrid project. This community microgrid will serve the Town's Police and Fire Headquarters, emergency and cell communications towers, and the local homeless shelter. The Town of Fairfield microgrid will maintain power flow to these key facilities by controlling and distributing electricity in grid-dependent and in island mode, utilizing cogeneration, a natural gas generator, and a photovoltaic array. This microgrid was also the first in the DEEP round 1 program to go live and is currently in operation serving the town and its residents. As a result of the success of this project, the Town of Fairfield partnered with Schneider Electric on a second DEEP application for its Public Works facilities and was subsequently awarded funding.

To date **Schneider Electric has been awarded four (4) microgrid projects** under the DEEP funding, more than any other entity and our first Town of Fairfield project was completed on time and on budget. For a case study on the Town of Fairfield microgrid and other Schneider Electric case studies please visit here.

2.1.12 Bear Creek Mountain Resort

Location	Macungie, PA
Size	5 MW
Year Built	2016

Fairfield microgrid schematic diagram.

Project Scope

Bear Creek Mountain Resort and Conference Center is located on more than 330 acres in scenic Berks County, Pennsylvania. Its out-of-the-way beauty provides an idyllic destination for skiing, snowboarding, hiking, biking, fishing, and boating. The remote setting that makes the resort so attractive also poses tremendous challenges for Bear Creek's electrical system. The ski resort needs highly reliable power. Snow-guns, ski lifts, and other electrical equipment for its 21 trails, pools, hot tubs, restaurants, spas, and other amenities demand an always-on, year-round flow of electricity. But the resort's mountain top location makes it prone to lightning strikes that can cause power outages and voltage spikes. In addition, Bear Creek is situated at the end of a utility power line, which places severe limits on how much power the local utility can deliver. In fact, the resort found that its 7.2 MVA peak electric demand began to exceed the line's 5MVA capacity after it embarked on $100 million in improvements, including the addition of a 65-room hotel and expanded ski slopes.

The traditional costly solution was to upgrade the utility power line and add new electric infrastructure. However, with the help of Schneider Electric, Bear Creek found a less expensive alternative that made use of the resort's existing energy assets in a smarter way. Schneider Electric added new intelligence to the system in the form of its microgrid and advanced power control solution. The controller allowed the resort to configure existing generators into a grid-connected microgrid. The resort had been using the six diesel generators, varying in size from 125 kilowatts (kW) to 1600 kW, for emergency back-up power.

Schneider Electric's microgrid control and power monitoring systems benefited Bear Creek in several ways: they not only helped the resort delay a costly power line upgrade, but also helped the resort better understand and manage its power resources and allowed it to participate in a revenue-producing energy market.

All of this occurs without disrupting the comfort or activity of the resort's guests. There is no disruption in power as the microgrid controller does its work. And Schneider's microgrid solution goes a step further. It allows the resort to participate in the utility's demand response program. When the grid is under strain, the utility sends a signal to the resort's system, asking it to reduce demand. The microgrid controller shifts load over to the back-up generators. Bear Creek receives financial payment from the utility for its participation in the demand response program. Those payments have ranged from $40,000 to over $100,000 annually, and are made possible because of Schneider Electric's PowerLogic™ control system.

2.2 Marketing Material

A variety of marketing materials, including informational brochures and handouts on Schneider Electric's microgrid offers, can be found on our website here.

2.3 Detailed Company Profile Information

Our detailed company profile can be accessed on our website here.