ENengineering

Contact: Patrick Carr

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REQUEST FOR INFORMATION

Prepared for: Cuyahoga County Department of Sustainability
2022 Microgrids

June 29, 2022

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Mike Foley
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Dear Mike Foley:

Thank you for allowing EN Engineering, LLC (EN) the opportunity to present you with this request for information regarding EN Engineering's capabilities to support the development of municipal electric utility and multiple microgrids throughout Cuyahoga County. EN can support the following roles:

- Design and Construction Team (Engineering, Procurement, Construction) of Distribution Infrastructure, Distributed Generation, and/or Microgrids:
    - Design (Engineering and Other)
    - Procurement of equipment / materials
    - Construct distribution infrastructure, distributed generation, and/or microgrids
    - Support distributed generation and microgrid operations in conjunction with, or on behalf of the County Utility and/or its manager or operator.

EN has significant experience preparing comprehensive planning studies for electric systems to facilitate decision making. EN's Shaun Moran has led multiple major utilities & large customers in distributed energy master plan projects. Meagan Lesher works hand in hand with Duke Energy and other local major industrial and commercial customers on infrastructure modernization programs. Rob Stewart has 20+ years of commercial renewable operations and economics experience. Amy Rainwater is currently implementing uniquely challenging micro-grid projects and can offer lessons learned and operational implementation perspective. Alan Burck is a 30-year experienced utility automation engineer whose expertise in providing system architecture gives operators the right system for their application to maximize effectiveness.

We believe that the combination of our local presence, depth of experience of the team highlighted above, and familiarity with the challenges associated with economics for microgrid and other DER type applications makes us an ideal fit to support your team. EN has extensive engineering, owner's engineering, and design experience working with major electric utilities. Our experience encompasses the full power delivery system, transmission and distribution, with an emphasis on system expansion, reinforcement, repair, and modernization. We work seamlessly alongside our utility clients' in-house teams, extending and enhancing their capabilities and working with their standards, work management systems, and design software. We also can develop project-specific standards packages and prepare designs using our own in-house software.

Sincerely,

Patrick Carr
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PROJECT APPROACH

The keys to a successful microgrid project are the following:

1. We are the goals of the owner of this project? Below are just a few examples of different reasons a utility such as Cuyahoga County could be pursuing a microgrid installation. Understanding this helps level set the initial approach to the project
    a. Peak load management
    b. Frequency response support
    c. Emergency backup power support
    d. Pilot program showcase

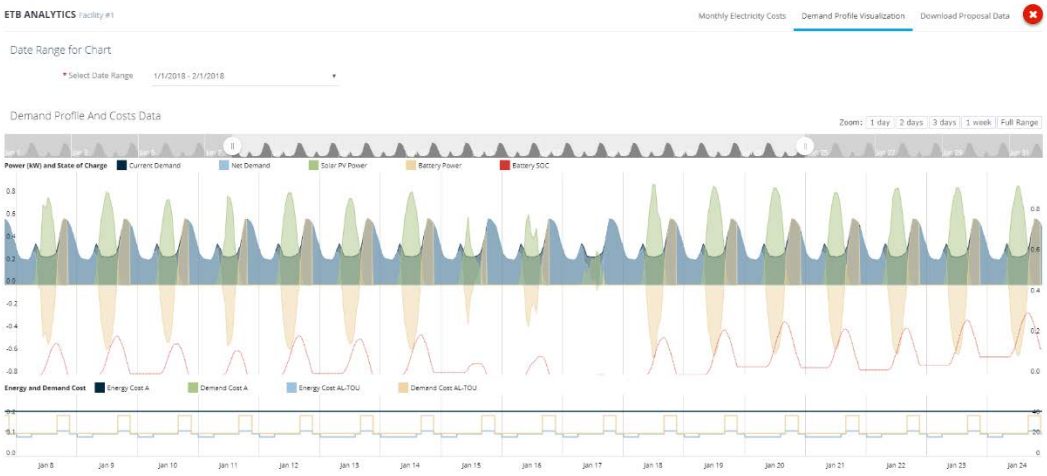
2. What size of a microgrid is appropriate? What does that mean?
    a. Does the utility intend to install solar that they will own?
    b. Does the utility intend to own battery energy storage that they will own?
    c. Does the utility intend to own reciprocal engines or rotating generation that they will own?

3. What is the financial model for executing this project?
    a. Is the utility looking for a PPA for any of the generation?
    b. Is the utility looking to lease the operations/maintenance of the system to a third party?
    c. Are there rate payer implications associated with the system that should be considered?

4. How will the utility operate the system?
    a. Passive (Potentially through third party or “set it and forget it”)
    b. Day to day operations oversite & focus

Once the details of some of these key items has been developed on the front end of the project, we can pursue the appropriate technology providers, financiers, and other key stakeholders to ensure a successful project.

A microgrid’s financial model should always be modeled through a tool such as HOMER Grid or EnergyToolbase. Understanding the short-term and long-term financial performance of the system is critical to the success of the project. Below is a small example of the type of performance data that can be driven for such a modeling tool.



CONCEPTUAL ENGINEERING & DETAILED DESIGN

Below is a summary of various services that we can offer associated with a microgrid concept and detailed design. Depending on the application, any of these could or could not be required. However, EN feels that it was important to outline our background for Cuyahoga County to fully understand the breadth of capability we can provide.

Inspection Services:

- **Manhole/Duct Bank/Vault Inspection:** EN partners with local construction contractors to complete manhole and vault inspections. We utilize 360° cameras to create complete images and videos of the inside of the structures. Inside we look at structural integrity, identifying cable types, investigating the conditions of splices, and inspecting the ducts utilization and condition. Underground records are often outdated, meaning the data collected during inspections are the best source of up-to-date information.
- **Cable Testing Services:** EN oversees inspection of failing cabling within duct bank systems. We can write a specification for a testing company, hire, and oversee the testing and develop a long-term replacement plan.
- **Switchgear Inspection Services:** EN inspects live front and dead front switchgear that is both pad-mount and vaulted scenarios. It is critical to have experience in understanding the common weak points in these gear that need to be identified within these inspections to determine if true replacement or just shell repair may be required.

Microgrid/Utility System Strategy and Planning:

- Utility-scale transmission and distribution planning studies
    - Experience using CYME, Synergi or other distribution specific modeling software for Distributed Energy Resources including Microgrids, Solar Farms, Battery Energy Storage and Natural Gas Peaking Facilities
- Large generator and merchant transmission interconnection studies
- Renewable resource and energy storage interconnection studies
    - NERC compliance, PSSE modeling, Utility interconnect agreement coordination and management
- Project feasibility and screening studies
    - Review potential need for Microgrid, solar farm, natural gas reciprocating engine and provide recommendation on most economical and long-term operational approach to utility upgrade project
- Cost allocation studies and methodologies
- Business model feasibility and development
- Economic decision-making analyses
- Understanding electric markets and commercial aspects of power systems

Microgrid/Utility System Conception and Development:

- Project scope development and refinement
    - Experience in writing equipment specifications for Microgrid Controllers, Solar Farm EPC contracts, rooftop solar, battery energy storage, and natural gas peaking facilities
- Conceptual design development
    - Operating mode selection
    - Reliability expectations
    - Islanding operations philosophy development
- Stakeholder identification and strategies
    - Power supply agreement development & execution
- Comprehensive economic evaluations
    - KT analysis development, oversite and recommendation reporting for client and all associated stakeholders tied into the project success plan
- Regulatory process preparation, testimony, and support
- Site investigations and evaluations
- Technical and commercial contract development and negotiation

Reciprocating Engine Detailed Engineering:

Our team has designed a variety of compressor station projects ranging from small-packaged compressor skids to large multi-unit compressor stations. We apply our expertise to a range of compressor and driver configurations, including natural gas turbine driven centrifugal compressors, natural gas engine driven reciprocating compressors, and electric motor driven compressors.

- Complete engineering studies
    - Hydraulic analyses
    - Sound studies
    - Pulsation analyses
    - Stress analyses
- Full-service engineering design packages
    - Mechanical piping and process equipment
    - Civil grading plans and building foundations
    - Structural package including piping support systems, walkway designs, and access points
    - Electric sub-station and utility interface
    - Design auxiliary system requirements for air, fuel, ESD, and power
    - PLC integration
    - Corrosion control and cathodic protection designs
- Procurement and construction management support
    - Develop specifications
    - Obtain and analyze material, equipment, and service quotations

Electric Transmission & Substation Engineering & Design

EN's services run the full gamut of the electric transmission & distribution space, with an emphasis on system expansion, reinforcement, repair, and modernization. We develop project-specific standards packages and prepare designs using our own in-house software. Ancillary services are also available, including land surveying, property acquisition

assistance, geotechnical engineering, environmental/jurisdictional permitting, facility inspection, construction inspection, and construction management.

SCADA, RTU & Other Automation Solution Integrations

EN offers a full capability to integrate a microgrid solution into utilities exiting SCADA control system for monitoring. We feel that a focus on understanding the exact data and metrics that a utility wants to observe and/or control from their system is critical. Some of the items we typically provide on projects such as this would be the following:

- Network Diagram & associated bill of material not provided by technology solutions provider
- Fiber or Telecommunication Conceptual & Detailed Design
- RTU / SCADA or other detailed panel design and manufacturing capabilities
- RTU / SCADA programming / commissioning & startup services

PROCUREMENT & TECHNOLOGY PROVIDER SELECTION/ IMPLEMENTATION

EN has a dedicated procurement department that can focus on ensuring an organized and consistent bid process for all equipment associated with a turnkey project such as this. They have a combined 30+ years of utility experience and understand who the *key players* are in each of the spaces in which we will be supporting equipment procurement.

Technology Evaluation

As outlined above, we must first work to determine the appropriate size of our microgrid application depending on the goals, budget, and other key items that Cuyahoga County may have. Once these goals are known, we can determine the right approach to the appropriate technology provider. Below are some details on considerations we have learned regarding potential technology providers specific to the microgrid controller and battery energy storage portion of this application. Additional detail can be provided once the conceptual design is complete.

Small Scale Microgrid Application (Commercial Application):

If Cuyahoga County decides to go with a small-scale application for its microgrid, we recommend looking at proven vendors within this space such as the following:

- **GoElectric (Saft):** They are a proven commercial technology provider built out of military applications that has shown a number of successful projects across the country

- **ELM Fieldsight:** They are an industry leader in this space with a clear track record and smooth user interface. Their ability to handle complex or unique designs should be a considered as well.

- **POWIN Stackstorage Solution**

Utility Scale Microgrid Application:

In general, the below vendors are proven technology providers in the microgrid space. Our experience has been that it is very important to understand what each of the technology providers "owns" or sources from others. Items such as inverters, batteries, and other critical components are generally sourced from a third party. This is acceptable, but it is important to understand the difference between a technology leader and a larger company with the ability to rebrand other vendors' equipment.

Understanding the vendor's ability to stand behind the maintenance and support of the system and what that will cost Cuyahoga County is very important. Also, where spare parts may be sourced from with supply chain issues is also very important.

- Siemens
- S&C
- Square D
- Emerson Automation
- Schneider Electric
- Fluence
- PowerSecure

CONSTRUCTION MANAGEMENT & CONSTRUCTION EXECUTION

EN has a dedicated construction management organization associated with turnkey type projects like this. Our approach is to leverage our nationwide network of large scale and/or local installation providers wherever possible.

Typical approach to the construction of projects such as a microgrid type installation would be as follows:

- Our construction management team will work hand in hand with the engineering organization to develop a scope of work outlining the required scope of work for civil, electrical, mechanical, and all other construction disciplines.

- Once the construction scope of work is completed, we will work hand in hand with Cuyahoga County to identify a key list of potential installation contractors that we would like to solicit a bid event. We have key partners in Ohio we can trigger depending on the size of the scope of work, but we will ensure we have all stakeholders aligned to whom we solicit the bid event.

- Our procurement manager will then facilitate a bid event, ideally with no more than 5 potential construction vendors for this type of project. They will host a pre-bid meeting outlining the key requirements including schedule, location of the work, and any other pertinent items.

- Once the KT analysis has been done, we will then select the appropriate construction vendor. We will hold a pre-construction site walk to review the detailed engineering design and ensure all scope is captured and everyone is aligned with the budget and schedule.

- Our project manager will have weekly updates with our contractor to monitor CPI and SPI progress on all ongoing work. This detailed information will be provided to Cuyahoga County for visibility and alignment on project progress.

- When appropriate, the project manager will align the correct team for commissioning and startup support. This is likely to be a combination of EN staff, Cuyahoga County staff, the technology provider, and the construction firm associated with the project.

PROJECT & CLIENT REFERENCES

Below are some sample projects that EN has completed around microgrid and systems engineering, among others. If Cuyahoga County would like to contact a reference for any of these projects, please let us know.

Microgrid Project Experience:

1. Cincinnati Zoo Microgrid Project
Client: Cincinnati Zoo & Botanical Garden
Scope of Work: EN was hired by the Cincinnati Zoo to evaluate and engineer a microgrid on their property. The work is ongoing and comprises of upgrading 7 feeders, modernization of a utility substation, engineering & installation of a 4MW solar canopy, engineering & installation of a 2mW / mWh battery energy storage system, engineering & installation of a microgrid controller for future islanding and other operational benefit purposes. EN has been involved with all aspects of the project and was heavily involved with specification development, engineering, technology investigation and selection, and implementation.

2. Interconnect Facilities and Multi-source Microgrid
Client: Fort Wayne City Utilities & American Electric Power
Scope of Work: Oversite of engineering associated with various aspect of microgrid being designed in partnership with the City of Fort Wayne & American Electric Power. Scope included detailed electrical engineering including protection & controls, technology selection / procurement support & construction management & oversite

3. Bronzeville Community Chicago Microgrid (BCM)
Client: ComEd
Project Location: Bronzeville Neighborhood, Chicago, IL

Scope of Work: ComEd was ordered in 2018 to install the first utility-operated microgrid cluster (the BCM). The BCM will serve residences, businesses, and public institutions, including the headquarters of the Chicago Fire and Police Departments, and demonstrate technologies that will support the integration of DERs (distributed energy resource) and provide further resilience capabilities when they are needed the most.
To power this microgrid, DERs including a battery energy storage system (BESS), solar PV (photo voltaic), and controllable generation will be used. ComEd purchased and installed 500 kW/2 MWh of BESS. Factory acceptance testing (FAT) was performed prior to deploying the asset in the microgrid footprint where extensive site acceptance testing was completed. Though ComEd does not own the solar or controllable generation, they requested proposals to purchase the distribution capacity. For the purposes of the solar RFP (request for proposal), the distribution capacity was defined as the right to use the generation during periods in which the microgrid is islanded whether as part of testing, or due to a disruptive system event. ComEd purchased the capacity for the solar PV, which has been installed on the rooftops of the Dearborn Homes, a facility of the Chicago Housing Authority and part of the BCM. The responses to the controllable generation RFP were received in March 2020 and are being evaluated for engineering viability.

Once the project is completed, it will serve as the flagship of the Bronzeville Community of the Future, where ComEd is collaborating with the community to identify opportunities to leverage smart grid and emerging energy technologies to enhance everyday life. Pilot projects include: an electric vehicle (EV) transportation service for seniors; off-grid wind and solar LED streetlights; a community energy storage charging network; a smart interactive kiosk that provides real-time information along with emergency alerts, wayfinding, and public Wi-Fi; and sensor-based technologies that are being piloted in conjunction with the Illinois Institute of Technology, a longtime ComEd collaborator widely known for its strong engineering curriculum. Several STEM (science, technology, engineering, and math) education programs are also underway to engage area high school students and expose them to emerging energy technologies and related career paths.

EN provided complete business transformation practices for the Bronzeville Community Microgrid. With the execution of a utility microgrid, business processes had to be created in order to effectively operate and maintain the new technologies in the field. As microgrids are new to a utility, “business as usual” had to change in order to accommodate the autonomous nature of the technologies. EN provided processes, procedures, tools and training for operational readiness of the Bronzeville Microgrid. This included monitoring and visualization requirements in operations centers, equipment maintenance procedures for increased safety and isolation requirements, and training for automatic DER operations and synchronization onto the grid.

Electrical Master Plan Experience:

1. Client: Tampa Electric Company

Scope of Work: Conduct an analysis of an existing downtown distribution network including the following:

- Assess adequacy of existing equipment and reliability of supplies
- Assess ability to serve new loads associated with anticipated dense commercial and residential development
- Determine a preferred plan for reinforcing supplies associated with several existing substations

- Develop a strategy for continued use of PILC (Paper Insulated, Lead Covered) medium voltage cable

EN provided recommendations for extending existing substation network feeders for serving new loads; using bridge attachment (vs directional drilling under a waterway) for providing additional exit capability from an existing substation into the network; and a replacement strategy for PILC cable.

2. South Meadow Network Master Plan
Client: Eversource Energy
Scope of Work: Conduct an analysis of the existing downtown distribution network including the following:
- Assess network loads where supplies do not meet new reliability criteria
- Assess switchgear, transformers, and cables and identify overloaded elements
- Recommend changes or reconfiguration of network feeds to remedy the situation
- Consider use of generators or storage systems in lieu of network buildout to cover extreme reliability scenarios
- Provide cost estimates and comparisons of alternatives to assist decision making and justification of final recommendations

Economic Analysis Experience:

1. Ivorydale Manufacturing Campus Conversion
Client: Procter & Gamble (P&G)
Scope of Work: The Ivorydale Campus located in St. Bernard, Ohio is a large manufacturing area that comprises 3 separate companies that manufacture food & soap products worldwide. P&G contracted Cinergy Solutions to update the utility supply of infrastructure in order to improve electrical, steam & mechanical systems efficiencies. New steam system, water treatment & substation/distribution components were added or updated in 2004, 2009 & 2012. The $11 million total project payback was based on reducing the campus 20 MVA peak demand as well as electrical & coal/NG usage cost savings over 20 years. Rob Stewart was the site manager over the projects & operation of the Boiler House.

2. Cincinnati Convention Center Water Supply
Client: Cincinnati Central Cooling
Scope of Work: COOLCO supplies cooling water throughout the downtown Cincinnati, Ohio business loop to 20+ customers that includes the federal courthouse & convention center. COOLCO customers purchase chilled water for HVAC components usage rather than installing/replacing self-owned chillers. New Chillers, supply piping & controls were installed at the Cincinnati Convention Center to increase and balance chilled water supply capacity to 2 new customers in 2010. Rob Stewart provided the justification for the project as well as manage the installation project of new components at the Convention Center.

3. Duke Energy Renewables Development Solar Site in Conetoe, NC
Client: Duke Energy
Scope of Work: The 80 MW Conetoe, NC Solar Site was constructed in 2016 to provide clean renewable solar electrical energy to Industrial customers such as Corning & Lockheed Martin by way of Power Purchase Agreement (PPA). Rob Stewart was on the development team as operations lead that worked on justifying the $200+ million capital funding for the site. The funding was approved by Duke's Transaction Review Committee in

2015. SunEnergy1 constructed the site that went operational in 2016. Rob Stewart also oversaw the commissioning work to integrate the sites compliance control in the Renewables Control Center in Charlotte, NC.

Dist. Energy Resource, Battery Storage (BESS) & Sys Architecture Experience:

1. SCE Center Peaker Generation Station and Grapeland Peaker Generation Station
Client: Southern California Edison
Scope of Work: Southern California Edison had existing LM6000 gas turbines built to operate at peak power of 50 megawatts. Their goal was to integrate a 10 megawatt Battery Energy Storage System (BESS) and allow the turbine to operate from 2 megawatts to 50 megawatts. The existing turbine, emissions system, and compressor system were designed to run at full load, so changes in communications and sequencing were required for the equipment to run at variable load. The system had to be integrated into the state power grid while still maintaining current and legacy control. Due to its location, the facility required extremely stringent emissions standards while testing and operating the new system.

EN retrofitted two SCE Peaker generating stations with GE LM6000 50 megawatts each, to integrate a GE 10 megawatt Battery Energy Storage System (BESS) and allow the turbine to operate from 2 megawatts to 50 megawatts.

- Interface BOP to the new GE Battery system (BESS)
- Support new functionality to the GE LM6000 -- EGT (Enhanced Gas Turbine)
- Support new functionality into the Distributed Cimplicity HMI
- Support local operation as well as remote operation from both the main & backup control centers
- Add AGC operation
- Optimize SCR Ammonia Injection
- Optimize KOBLECO Gas compressor system
- Development of control algorithms

The design-build project involved the integration of a revolutionary power generation system into the current company power infrastructure, and then into the national grid system at two different locations. The revolutionary Hybrid Power Generation System maximizes the client's existing capital assets by enhancing them with modern technology. The expertise of EN's Automation team allowed the project to progress smoothly, remain on schedule, and produce a flexible and responsive system. With the addition of the BESS to the turbine, it moved the system into a different power assist model. The EN team worked with the turbine and BESS manufacturers to create a groundbreaking control system that would handle the communications and sequencing changes required for this new system. The control algorithms that were specially developed for the hybrid system will translate to other applications in the power generation industry. A major benefit of the new hybrid system is a substantial energy savings that is achieved from the BESS syncing with the grid and adding or shedding power as needed without starting the turbine. The turbine only needs to start if the demand exceeds the storage of the batteries.

- PLC and HMI programming for balance of plant systems and SCR
- Systems integration
- Testing and on-site commissioning

APPENDIX – OPTIONAL QUESTION RESPONSE

1. **Vision**
    a. **What is your vision as to how the County Utility could fit into the emerging energy ecosystem?**
    Cuyahoga County can lead the way in setting an example for the State of Ohio and Midwest on how to maximize both the environmental and economic benefits of emerging technologies. The critical measure of success will be the County's partnerships with local businesses, the utilities within the region and PJM. Understanding needs and limitations associated with each stakeholder will accelerate the success of these programs.
    b. **How might the County Utility improve services compared to traditional systems?**
    New microgrids will allow for more resiliency to the customer base within the County. There will also be opportunities to support the growth of electric vehicle implementation while potentially avoiding the substantial cost of distribution feeder upgrades by maximizing available solar, battery and other technology available. Demand response programs tied to these system can also be a way for the County to assist consumers in obtaining electrical savings and reducing load on the grid during peak periods.
    c. **How would you propose building a system in a manner that constrains costs based upon available loads, yet is flexible enough to adapt to new end users who are attracted to the system?**
    The technology solution selected must be a distributed type system that is modular. This will allow the County to leverage the benefits of a growing a microgrid while not constraining this to have to be implemented in a singular time period.
    d. **How might your approach be different for new developments, such as industrial or commercial parks, versus existing customers? Would you envision merging district energy or transportation or hydrogen into the development?**
    The County should develop "standard" packages to offer to subdivision developers so that they can be built into their pro-forma during the development stage. There can be a volume type cost saving offered depending on the size of the development. Existing customers should be offered a standard retrofit that fits "most" homes within your community. We noted above that electric vehicles solutions with a "microgrid" type application tied to them should be included as a standard option for commercial and residential customers. EN Engineering is a leader in the Hydrogen space and could continue to support the county in how that might be integrated into their green future.
    e. **How might you go about marketing your vision to end users?**
    Identify a handful of commercial and residential customers to "pilot" the program at a discount and leverage them as show pieces. Generally speaking making things a "template" will make marketing the product to the consumer much easier as well. If each system needs customized it will feel very unapproachable.
2. **Organization Models**
    a. **Would you be willing to contract directly with the County to be responsible for the full scope of this initiative?**
    EN is willing to contract with the county to engineer, procure and install microgrid applications. We may not agree to contract each and every job that the county may present depending on the risk or other factors associated.

b. **What are the tradeoffs for one firm serving all roles versus separate firms serving separate roles?**
   There are very specific organizations that specialize in utility management, developing projects, and EPC implementation of a project. Going with any single firm that claims that they can do all of these tasks simultaneously does not make sense. If you think about the workflow you'll have the developer constantly identifying projects, the EPC constantly implementing projects and the utility management firm constantly implementing operations of new systems and assisting in operations of existing systems. Each of these will need separate focus to ensure success.
c. **How would you structure the relationship between yourself, the County, and other entities (if applicable)?**
   EN will be the overarching organization to contract with the County. We will have a subcontractor provide materials and execute construction for the project(s).
d. **What level of responsibility, if any, would you be willing to have for microgrid project identification and development, customer identification and selection, customer contract negotiations, etc.?**
   Not applicable for EN Engineering at this time.
e. **What level of pre-design and other information or assurances would you need to respond to an RFP/Q and engage in negotiations with the County?**
   EN Engineering would need a specific site, operational parameters and preliminary schedule for a project in order for us to quote in detail. Even this initial quotation, in our experience, will likely be +/-20%.
f. **What level of commitment would you need to have from potential County utility customers to respond to an RFP/Q and engage in negotiations with the County?**
   A signed agreement between the customer and the county would need to be in place for us to be willing to go through the effort to bid projects. Due to workload demand we cannot spend significant effort on "prospecting" work.

3. **Concession Agreement & Other Contracts**
   a. **What contracts will need to be in place and between what entities?**
      EN will need a contract directly with the County to proceed.
   b. **What critical terms and conditions need to be addressed?**
      Limitation of liability and liquidated damages will be the most critical factors regarding these contracts.
   c. **What term lengths would respondent be comfortable with for a distributed energy or microgrid PPA?**
      Typically PPA is over 5-10 years to allow for financing of projects to be spaced. Longer than 10 years can be a risk due to ever evolving market conditions.
   d. **What additional information would you need to sign a contract with the County for a scope of work?**
      See above.
4. **Initiative Timelines**
   a. **What is a typical turn-around time for you to sign a contract for your role(s)?**
      This depends on legal negotiations of commercial terms & conditions.
   b. **What impact on this initiative do you foresee, if any, from the current supply chain disruptions?**

Significant. Solar panels are hard to find. Battery lead times are in excess of 50 weeks in some instances right now. Relay protection devices are in short supply as well.

5. **Technology**
    a. **What technologies should the County consider to address power issues for commercial and industrial customers? (power quality issues vs. short power outages vs. long power outages)**
    Power quality can be a variable issue. Capacitor banks, variable frequency drives, inverters and many other technologies can be implemented to improve those types of issues. Short power outages are likely best addressed with either battery energy storage or UPS type systems. Long term outages can be more challenging and will likely need some sort of generator or other type of fossil fuel solution.
    b. **Can you provide high-level cost estimates for distribution infrastructure, distributed generation, and/or microgrid technologies across different sizes? (e.g. 14.4 kV feeder, 1 MW/1 MWh battery, 5 MW solar PV)**
    No
    c. **Are there ranges of economic feasibility that the County should be aware of when considering on-site generation, storage, etc. For example, do projects only over X MW prove to be economically feasible in your experience?**
    In our experience the most “bang for your buck” comes in solar. Right now larger battery storage systems and their associated cost tend to not to have very strong economics with long pay back periods (25+ years). Battery storage system value is more critical surrounding improvements in backup power, peak load shaving and potentially grid scale frequency response support.
    d. **How should cybersecurity of the utility, individual microgrids, customers, or other pertinent entities be ensured?**
    A dedicated hard wired fiber network must be in place for these microgrid systems to operate from a singular location. Leverage wi-fi or the internet is not recommend due to the sensitive nature of these systems. If this is not feasible then pods of controls fiber networks will have to be created to monitor different portions of the system.
    e. **What is your approach to managing: capacity and transmission peak load contributions? Energy market arbitrage? Frequency regulation?**
    These are all items that have to be negotiated and worked through PJM. Identifying developers who have experience in negotiating these types of agreements will be critical to their implementation. EN has a strong relationship with PJM and has done many generation interconnection request on behalf of developers.
6. **Diversity, Equity, and Inclusion**
    a. **How will you ensure Diverse, Equitable and Inclusive (DEI) partnership(s) throughout this Initiative?**
    EN has strong diverse subcontract partners that we will leverage throughout these projects. We strive to reach a goal of 30% diverse spend as a company on an annual basis. This could be up to $60M in revenue directed towards minority and women owned businesses. Each project we work on has a clearly defined DE&I plan that we share with our customer.