**ATTACHMENT C – Phase 1**

**MICROGRID GRANT AND LOAN PILOT PROGRAM TECHNICAL FEASIBILITY CRITERIA AND SUBMISSION REQUIREMENTS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Evaluation Criteria** | **Information Required** | **Submission** | **TO Southbury Responses** |
| 1. | Include a minimum of 2 or more  critical facilities, not served by a common electrical service entrance, located in proximity to each other | Provide number of critical facilities  with owner, name, address, load size, account number. | Layout Diagram  and the following :  Number of Critical Facilities  Aggregate total load (kW) of all  Critical Facilities  For each Critical Facility, indicate: Facility Name:  Address:  Account Number: Total Load:  Critical Load included in  Microgrid (kW):  Distance in feet from generator: | Attached  Two: Town Hall, Senior Center, with possible expansion to include elementary school, middle school, police, and fire stations in a future phase  Total connected load of the two “Critical Facilities” is  144 kW  See attached matrix sheet “Response to Item 1”  The Town Hall would serve as a mission critical command center for all town management in the event of an emergency and the Senior Center would serve as an emergency shelter. |
| 2. | Number of people likely to be served  or benefit from the Microgrid | Provide number of people likely to be  served or benefit by Critical Facility | Written Description | The population of the Town of Southbury, CT, approximately 20,000 people |
| 3. | kW Rating of Microgrid generation | Provide aggregate Microgrid  generation size, identify each generation resource size separately; kW Rating must be 24/7 Continuous Duty Rating, NOT “standby rated” | Written Description  Include:  Aggregate kW rating of all generation sources  For each generation source, include:  Type: (gas Turbine, Recip Engines, Fuel cell etc...)  Fuel: (Natural gas, oil, others)  kW: | Initial phase of program would consist of underground microgrid installation.  Standby rated generator with a 250 kW capacity will be re-configured for parallel operation (whereas it is on an automatic transfer switch today).  Type: Reciprocating engine  Fuel: Diesel (to be converted to bi-fuel, burning both natural gas and diesel to extend run-time and lower fuel costs)  kW: 250 kW |
| 4. | Microgrid generation to load ratio | Provide ratio and explain critical  facility load coverage and configuration during island mode if not all loads are covered by the Microgrid | Written Description, including:  Ratio of Aggregate Generation/ Aggregate Load: | Generation to load ratio is 1.74. |
| 5. | Generation in close proximity to the  loads it is serving | Provide distances between generation  and loads on layout diagram, take into account voltage quality associated with increased distance | Layout Diagram | Attached site plan indicated layout. Distance between buildings is roughly 500 feet, but using CL&P primary line to distribute power at 13.8 kV voltage drop is minimal. |
| 6. | Demonstrate the ability to form an  intentional island upon **local EDC**  **or MEU request** (e.g. prior to major storms, testing, and maintenance  etc.) | Provide a summary of sequence of  operations to form an intentional island including involved equipment and controls | One Line Diagram  And  Written Description | See one line diagram  Sequence of operations:   1. Utility sends signal to generator control system to initiate island mode operation. 2. Genset starts, comes up to speed, and parallels with the grid. 3. Control system sends signal to underground switchgear to open up utility feed, creating island. |
| 7. | Demonstrate ability to form an  intentional island, **automatically,** during loss of grid supply and a method to return to grid Parallel Mode when the grid is restored in compliance with IEEE 1547-2003 and the UI/CL&P  Generator Interconnection  Guidelines | Provide a summary of sequence of  operations to form an intentional island including involved equipment. In a grid connect mode, the  Microgrid will be in compliance with  IEEE 1547-2003 and the UI/CL&P Generator Interconnection  Guidelines. | One Line Diagram  and  Written Description | See one line diagram  Sequence of operations:   1. Generator control system relays sense loss of utility feed as voltage drops to zero. 2. Control system sends signal to underground switchgear to force open up utility feed, creating island and preventing system from backfeeding the utility grid. 3. Genset starts, comes up to speed, and picks up load of senior center and town hall. 4. Control system relays senses return of available power from utility as voltage returns to normal. 5. Genset parallels with the utility feed, and signal is sent to underground switchgear to close utility feed. 6. Once operating in parallel, genset reduces output and begins cooldown cycle. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Evaluation Criteria** | **Information Required** | **Submission** | **TO Southbury Responses** |
| 8. | Demonstrate the ability of the  Microgrid’s Interconnection Facilities to continuously operate during an extreme weather event; identify the types of weather conditions during which proposed Microgrid Interconnection Facilities are capable of continuously operating | Provide description and technical  characteristics of Interconnection Facilities construction and its ability to withstand extreme weather events, taking into account that incorporating undergrounded Interconnection Facilities will ensure highest reliability for the Microgrid. Communication lines and phone lines should also be considered and addressed i.e. wireless or hard wired. | Check all that apply:   Tropical Storm   Hurricane Category 1   Hurricane Category 2   Hurricane Category 3   Other | All equipment being installed is underground, weatherproof, and rated for operation in the most severe weather conditions. |
| 9. | Demonstrate the ability to  continuously operate with no planned outage or down time for maintenance while in Island Mode 24x7, despite extreme weather event, for a  minimum of four consecutive weeks utilizing Microgrid combined generation resources | Provide detailed description of all  generation resources available and the appropriate technical specifications to demonstrate this requirement.  Indicate mean time between failure  (MTBF). | Written Description | Existing diesel fuel storage is 1,500 gallons. Natural gas is available within 10 feet of the genset. The project will involve converting the genset to operate in a ‘bi-fuel’ mode which utilizes natural gas as well as diesel fuel thus extending potential run-time.  Within the property boundary of the Town of Southbury there is additional underground diesel storage that can be used to replenish the existing diesel fuel tanks dedicated to this project.  Enhanced building controls will be installed to implement load shedding through temperature set-point changes and similar mechanisms.  Mean time behavior for equipment involved with the project exceeds 30,000 hours. |
| 10. | Locate generation in proximity to an  uninterruptable fuel source capable of sustaining the Microgrid for a minimum of two weeks and describe a plan to secure additional fuel resources beyond two weeks as part of storm preparation and storm management | a. Provide description and location of  incoming fuel source as well as maximum duration of operation possible.  b. Explain how you will expand the fuel source beyond two weeks | Layout Diagram  and  Written Description | Layout diagram is attached.  In addition to the existing diesel fuel tanks, the genset will use natural gas which is currently located 10 feet from the genset.  Beyond on-site storage for the EDG’s, additional fuel sources exist in close proximity to the municipal campus including fuel storage of 8,000 gals of diesel at Public Works and supplies at local service stations. |
| 11. | Project must pass all associated  Interconnection Guideline screens per the respective EDC or MEU | Respondents are encouraged to  discuss project configuration with EDC or MEU prior to submitting their proposal utilizing, Attachment D, Information Request Form | Written Description | Design of system will fully comply with interconnection guidelines from CL&P. |
| 12. | Possess black start capability during  Island Mode | Provide description of black start  sequence of operation and generation resources technical information and specification demonstrating this capability | Written Description | Existing genset has full black start capability which will not be impacted during project.  Sequence of operations:   1. Generator control system relays sense loss of utility feed as voltage drops to zero. 2. Control system sends signal to underground switchgear to force open up utility feed, creating island and preventing system from backfeeding the utility grid. 3. Genset starts, comes up to speed, and picks up load of senior center and town hall. |
| 13. | Demonstrate the ability to improve  the reliability for Microgrid customers and not adversely impact customers outside of the Microgrid electric boundary and the ability to  not inhibit or delay system restoration | Provide description of sequence of  operation for disconnect and return to grid connect that is not adversely impacting either customers | Written Description | Genset control system will be programmed to automatically separate the microgrid from the utility grid in cases where there is a grid outage,. Ensuring a physical separation between the two to assure system functionality without the potential for dangerous and impactful backfeeding of the utility grid. Town Hall computers and servers may also be configured with battery backup as needed for “ride through” during microgrid and grid switching to avoid loss of data and communications.  Sequence of operations:   1. Generator control system relays sense loss of utility feed as voltage drops to zero. 2. Control system sends signal to underground switchgear to force open up utility feed, creating island and preventing system from backfeeding the utility grid. 3. Genset starts, comes up to speed, and picks up load of senior center and town hall. 4. Control system relays senses return of available power from utility as voltage returns to normal. 5. Genset parallels with the utility feed, and signal is sent to underground switchgear to close utility feed. 6. Once operating in parallel, genset reduces output and begins cooldown cycle. |
| 14. | Demonstrate the ability to support  and manage existing Microgrid loads and describe techniques and equipment designed to manage future added Microgrid loads in Island Mode. Minimum generation capacity shall be no less than 120% of Critical Facility load. | Provide description of system  configuration, operation and management to address this requirement | Written Description | Capacity of the genset is currently calculated in excess of 170% of the maximum load served by the system. As part of the project, additional building controls will be installed that enable potential load reductions through setpoint changes and other innovative algorithms.  Sequence of Operation   1. Generator control system relays sense loss of utility feed as voltage drops to zero. 2. Control system sends signal to underground switchgear to force open up utility feed, creating island and preventing system from backfeeding the utility grid. 3. Genset starts, comes up to speed, and picks up load of senior center and town hall. 4. Generator control system monitors output of generator and voltage quality. If load increases above generator output, voltage quality will diminish. In this case, signal sent to building control systems to modify setpoints and perform other algorithms to reduce load. 5. Control system relays senses return of available power from utility as voltage returns to normal. 6. Genset parallels with the utility feed, and signal is sent to underground switchgear to close utility feed. 7. Once operating in parallel, genset reduces output and begins cooldown cycle. |
| 15. | Demonstrate the ability to perform  load shedding in case of a shortage in generation in Island Mode | Provide description of system  configuration and operation to address this requirement | Written Description | The project will include the installation of improved building controls that will enable each building to enter a ‘demand response’ mode whereby temperature setpoints are changed, and fans duty cycles can be modified, in order to reduce load.  These will be commercial, off-the-shelf building control components with wired and/ or wireless communications that have been tested and pre-configured to allow for automatic operation. |
| 16. | Demonstrate the ability to  communicate with the local EDC or MEU via Supervisory Control and Data Acquisition (SCADA) and other  communication devices during  parallel and Island Modes, while maintaining Cyber Security as required by interconnecting EDC or MEU. Operation of the Microgrid shall not be degraded by loss of communications between SCADA equipment. SCADA hardware and protocols to be compatible with utility requirements. | Provide description of SCADA type,  configuration, protocols and operation to address this requirement | Written Description | Generator control system will include CL&P-defined SCADA communications module that will be able to both send and receive signals from the utility as well as all critical project components including the underground switchgear. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Evaluation Criteria** | **Information Required** | **Submission** | **TO Southbury Responses** |
|  |  |  |  |  |
| 17. | Demonstrate the ability to maintain  acceptable voltage and frequency levels per the local or regional regulations and standards **in Island Mode** | Describe compliance with prevailing  standards including PURA  regulations, and ANSI 84-1 | Written Description | Generator control system will be fully compliant with ANSI 84-1 and any and all PURA requirements. |
| 18. | Demonstrate the ability to meet the  requirements of IEEE 1547-2003 while operating **in Parallel Mode** with the local EDC or MEU | Describe compliance with prevailing  standards including PURA  regulations, IEEE 1547-2003 | Written Description | As part of the project the existing automatic transfer switch will be replaced by parallel switchgear, including the installation of all the necessary relay components necessary to meet the requirements of IEEE 1547. |
| 19. | Demonstrate the design of protection  and control schemes while  functioning in Island and grid Parallel  Modes. Utilize utility grade protective equipment in design | Provide description indicating  equipment and logic, conceptually, for Microgrid protection and control in Island mode and in coordinated with utility in Parallel mode. | One-line Diagram  and  Written Description | See attached one-line diagram for indication of equipment interconnection.  Generator control system will include complete relaying package to interface and control utility feed as well as generator parallel switchgear. This will allow successful operation in both island mode as well as parallel mode. |
| 20. | Demonstrate the ability to operate  and maintain the Microgrid and all Interconnected Facilities in Island and Grid Parallel Modes in accordance with prevailing electrical safety and reliability standards | Demonstrate the resources,  knowledge, experience and capabilities available  Provide description of safety mechanisms embedded in the Microgrid configuration to ensure safe and reliable operation | Written Description | Generator control system will be developed and engineered by a local engineering firm in conjunction with a large project development firm that has years of experience with the development, engineering, installation, operation and maintenance of onsite generation systems. |
| 21. | Evidence of experience in distributed  generation and Microgrid design, build and operation | Provide description of developer’s  experience and capabilities with similar successful projects which integrate the operational characteristics of the proposed mix of generation sources, especially if inverter based generation is proposed. | Written Description | The Town of Southbury has been discussing the project and received input from Honeywell, a large project development firm that has years of experience with the development, engineering, installation, operation and maintenance of onsite generation systems.  The system will not include inverter based generation, but Honeywell has years of successful microgrid system operation at such diverse locations as suburban Washington, DC as well as Honolulu, Hawaii. |
| 22. | Demonstrate the ability and means to  secure funding to reach project completion in specified time schedule | Provide sources of funding other than  the DEEP Grant and Loan program that will be available to the project during design, engineering and construction, taking into account information provided in “Microgrid Funding section” under RFP Guidance, in the PFA | Written Description  Specify available funding sources:  1.  2.  3. | The Town of Southbury has already set aside roughly $100,000 for the provisioning of a system to provide backup power to Town Hall, which currently does not have the ability to operate as a command center during grid outages.  Additional funding for the project will be explored including participation in CL&P and NE-ISO demand response programs. |
| 23. | Demonstrate the respondent’s ability  to implement the project in expected  Program timeframe |  | Project Milestone Schedule | See attached project Gantt chart. |
| 24. | Past performance of projects for  which respondent has previously received state funding | Operating statistics of state funded  projects | Written Description | The Town of Southbury has participated successfully in a number of State Funding Projects, among the most recent:   * The EECBG grant was funneled through the State from ARRA. The Town spent approximately $82,000 to upgrade to more efficient boilers and install more energy efficient garage doors at the Dept. of Public Works. * The Town has participated in DEEP Open Space Acquisition grants. * A new Police communications system was installed using a LoCIP grant. * ARRA funds have been used for improvements to Main St. South. * A State Library grant was used to construct our new Library both on time and under budget. |