



Agenda Date: 6/30/17

Agenda Item: 9B

STATE OF NEW JERSEY
Board of Public Utilities
44 South Clinton Avenue, 3rd Floor, Suite 314
Post Office Box 350
Trenton, New Jersey 08625-0350
www.nj.gov/bpu/

MISCELLANEOUS

IN THE MATTER OF THE TOWN CENTER DER)
MICROGRID INCENTIVE PROGRAM AUTHORIZATION) ORDER
OF INCENTIVE FUNDING TO CAMDEN COUNTY FOR)
PHASE I FEASIBILITY STUDY) DOCKET NO. QO17060630

Party of Record:

Andy Kricun, Camden County

BY THE BOARD:

The 2015 New Jersey Energy Master Plan Update (EMP Update) established a new overarching goal to "Improve Energy Infrastructure Resiliency & Emergency Preparedness and Response" in response to several extreme weather events that left many people and businesses without power for extended periods of time. These new policy recommendations included the following:

1. Increase the use of microgrid technologies and applications for Distributed Energy Resources ("DER") to improve the grid's resiliency and reliability in the event of a major storm; and
2. The State should continue its work with the USDOE, the utilities, local and state governments and other strategic partners to identify, design and implement Town Center DER ("TC DER") microgrids to power critical facilities and services across the State.

At its November 30, 2016 agenda meeting Docket number QO16100967, the Board authorized the release of staff's Microgrid Report ("Report"). The following recommendations in the Report specifically address the development of a TC DER microgrid feasibility study incentive program and pilot:

1. Develop and implement a TC DER microgrid feasibility study incentive program as part of the current New Jersey Clean Energy Program ("NJCEP") budget. This TC DER microgrid feasibility study incentive program should provide funding for the upfront feasibility and engineering evaluation project development costs of

a Town Center TC DER microgrid at the local level. This incentive should be a phased approach beginning with an initial feasibility study, followed by detailed engineering design phase. Staff should implement a stakeholder process to determine the terms and conditions of the TC DER microgrid feasibility study incentive program. This incentive should be provided through an MOU structure.

2. Initiate a TC DER microgrid pilot within each electric distribution company ("EDC") service territory. This should initially be limited to the municipalities within the 9 Federal Emergency Management Agency ("FEMA") designated counties or municipalities that meet the same criteria identified in the New Jersey Institute of Technology ("NJIT") report. These pilots should include, at a minimum, an initial feasibility study of the TC DER microgrid. This process should assist in the development of a TC DER microgrid tariff.

On August 5, Board staff issued a TC DER microgrid feasibility study draft application for public comment. On August 23, 2016, a public meeting was held to discuss the draft application and written comments were received and considered in the final application. Board staff's responses to the comments were published as part of the release of final application.

At its January 25, 2017 agenda meeting Docket number QO16100967 the Board authorized the release of TC DER microgrid feasibility study application. Incentive funding was capped at \$200,000 per feasibility study. The Board directed staff to release the application and to open a 60-day application submission window. Applications submitted during that period would be reviewed by Staff and selected on a competitive basis. Any application submitted after this time period would be accepted on a first-come-first-served basis subject to available fund. The 60 day period ended on March 27, 2017

Prior to March 27, 2017, Camden County submitted an application to the Board.

Camden County along with the critical facility, Camden County Municipal Utilities Authority ("CCMUA"), looks to establish a community microgrid in the Camden Region. The project envisions connecting CCMUA with Covanta to allow the two facilities to exchange electrical and thermal energy during emergency and non-emergency times based on the needs of CCMUA and its connected microgrid community partners. The interconnection of the two facilities will allow Covanta to replace its use of potable water with treated wastewater for its power production operations, as part of a sustainability loop that would be created. This treated wastewater supply is expected to reduce stress on the local aquifer system which is in distress. Other facilities that will benefit from the microgrid include Camden Housing Authority, Riletta/H.B. Wilson Elementary Schools, New Village Supermarket, Fellowship House, Fortunas, and Citgo Gas. The project is 21MW of production and 1,578,000 therms over 420,000 square feet ("sqft"). The project team members will evaluate most commercially-viable technologies for use within the microgrid including but not limited to fuel cells, battery energy storage systems, solar photovoltaics, combined-heat and power (CHP) systems, thermal loops, and water exchange systems. The microgrid feasibility study will evaluate the technical and financial viability of providing DER to most if not all of the study areas' electrical needs while using excess heat from the Covanta WTE facility to offset thermal loads of the CCMUA. In turn, water from CCMUA could be used to decrease Covanta's potable water use. This self-

sustainable system would also provide continuity of operations to critical public safety infrastructure (shelters, police, fire, medical) during times of natural or man-made disasters. The microgrid control system that will be specified would be able to connect directly to PSE&G resources and telecommunication/IT systems using software adapters and standard semantic models and protocols over internet provider ("IP") networks. The estimated time to complete the feasibility study is twelve to fifteen months. The total project cost estimate will be developed during the feasibility study phase.

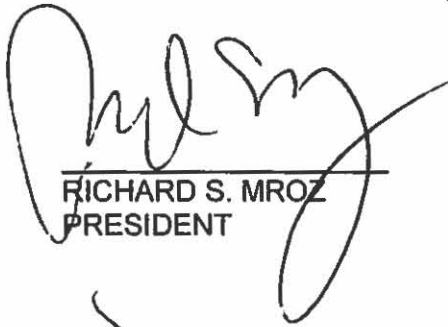
After review of the application Board Staff recommends that the Board approve the above-referenced application.

The Board **HEREBY ORDERS** the approval of the aforementioned application for the total incentive amount of \$150,000 for Camden County and **AUTHORIZES** the President of the Board to sign and execute the MOU attached hereto which sets forth the terms and conditions of the commitment of these funds.

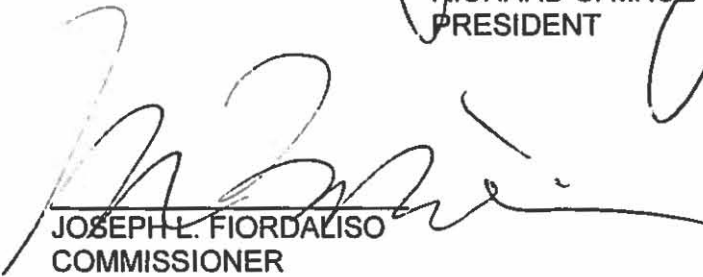
This effective date of this order is July 10, 2017.

DATED: 6/30/17

BOARD OF PUBLIC UTILITIES
BY:



RICHARD S. MROZ
PRESIDENT



JOSEPH L. FIORDALISO
COMMISSIONER



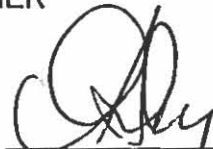
MARY-ANNA HOLDEN
COMMISSIONER



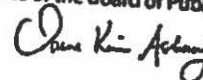
DIANNE SOLOMON
COMMISSIONER



UPENDRA J. CHIVUKULA
COMMISSIONER

ATTEST: 
IRENE KIM ASBURY
SECRETARY

I HEREBY CERTIFY that the within document is a true copy of the original in the files of the Board of Public Utilities



IN THE MATTER OF THE TOWN CENTER DER MICROGRID INCENTIVE PROGRAM
AUTHORIZATION OF INCENTIVE FUNDING TO CAMDEN COUNTY FOR PHASE I
FEASIBILITY STUDY

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Camden County Resiliency Energy Hub Microgrid Application

Submitted by:
Camden County
Camden County Municipal Utilities Authority
Covanta Energy

Contact:
Freeholder Jeffrey Nash
Andy Kricun
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andy@ccmua.org
(856)583-1223

Prepared by:
Greener by Design
& Hitachi

Camden County Resiliency Energy Hub Microgrid Application.

Program Technical Requirements

1. Project Name;

Camden Microgrid

2. Project Description including all potential critical facilities with a description of why they are critical facilities within the proposed TC DER Microgrid. This should include the following:

- i. approximate size of the project in energy (electrical and thermal);**
- ii. approximate electric and thermal load of each building;**
- iii. estimated square footage of each building and the total project;**
- iv. overall boundaries of the proposed project and distance between critical facilities;**
- v. FEMA Category Classification of each building; and**
- vi. any previously installed EE or energy conservation measure (ECM).**

Introduction:

Camden County, CCMUA and Covanta have developed a unique concept for a microgrid that envisions supporting the Camden waterfront community with the traditional benefits of a Microgrid while providing for the full time use of wastewater to produce power for the Camden area. Today, Covanta Inc. takes in trash and turns it into energy via a steam turbine that uses potable water. Less than 7000 feet away, CCMUA processes almost 60 million gallons of wastewater per day and its operations are critical to area water quality, businesses and residents. In addition, CCMUA has an existing right of way that connects to a large number of critical community assets and large energy users that have agreed to participate in this community microgrid plan.

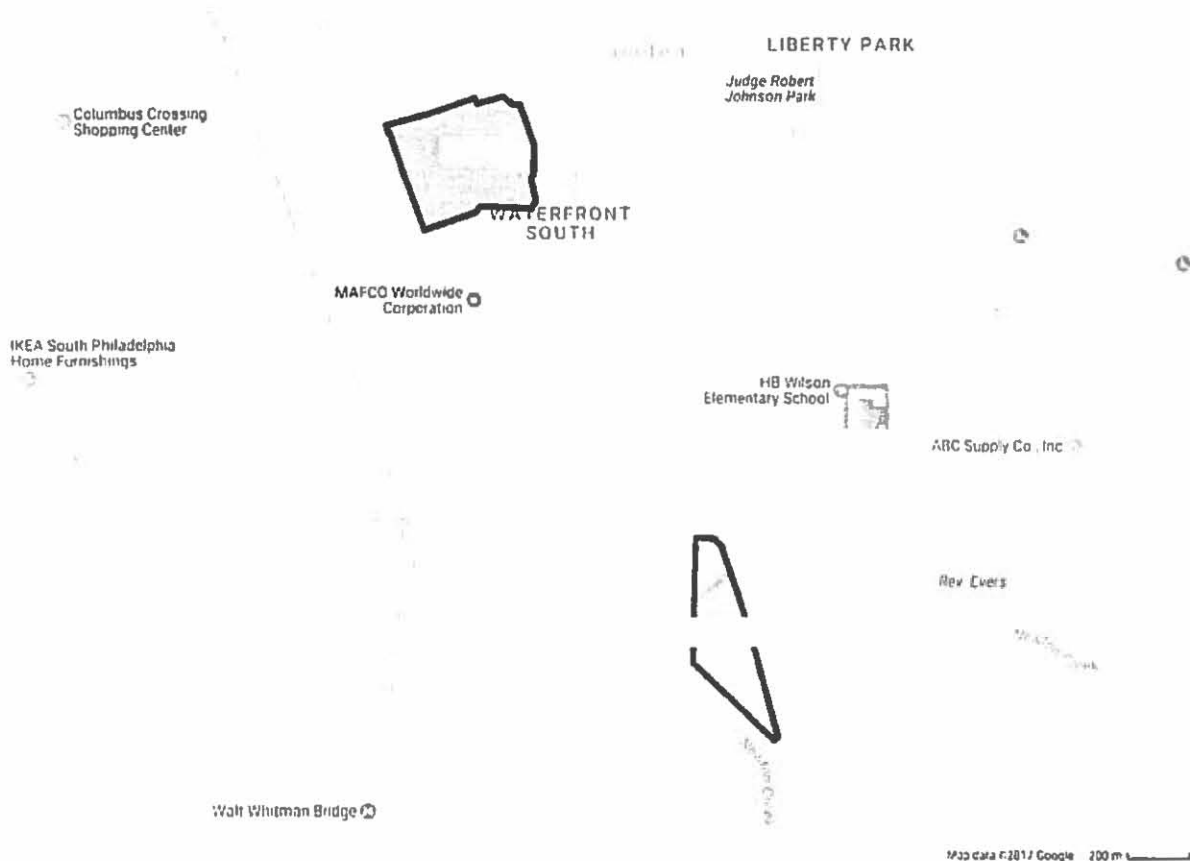
This proposal will examine the possibility of using existing rights of ways to connect Covanta with CCMUA and allow the two entities to exchange electrical and thermal energy during emergency and non-emergency times based on the needs of CCMUA and its connected microgrid community partners. In addition, the interconnection of the two facilities will allow for Covanta to replace its use of potable water with treated wastewater for its power production operations, as part of a sustainability loop that would be created. This full-time supply of treated wastewater is expected to reduce stress on the local aquifer system, which is already considered by NJ DEP to be a system in distress. A total win for the community and the environment.

This proposal, if chosen, could set a precedent for how facilities like Covanta would be able to provide electrical and thermal energy to critical community assets in a variety of cities here in New Jersey. This innovative plan would also help provide a critical source of existing power to CCMUA, especially during times of emergency, provide power to other essential users as

identified through this study and help use existing thermal energy that is currently going to waste and to save millions of gallons of potable water in a water deprived area.

The following information contains the address, contact for the facility, type of facilities and its FEMA Category Classification, hours of operation, approximate annual electric and thermal loads, approximate square footage, and if any energy efficiency and/or energy conservations measures were implemented. The total project is approximately 33,067,089 kWh of usage, 21MW of production, and 1,578,000 therms over 420,000 square feet.

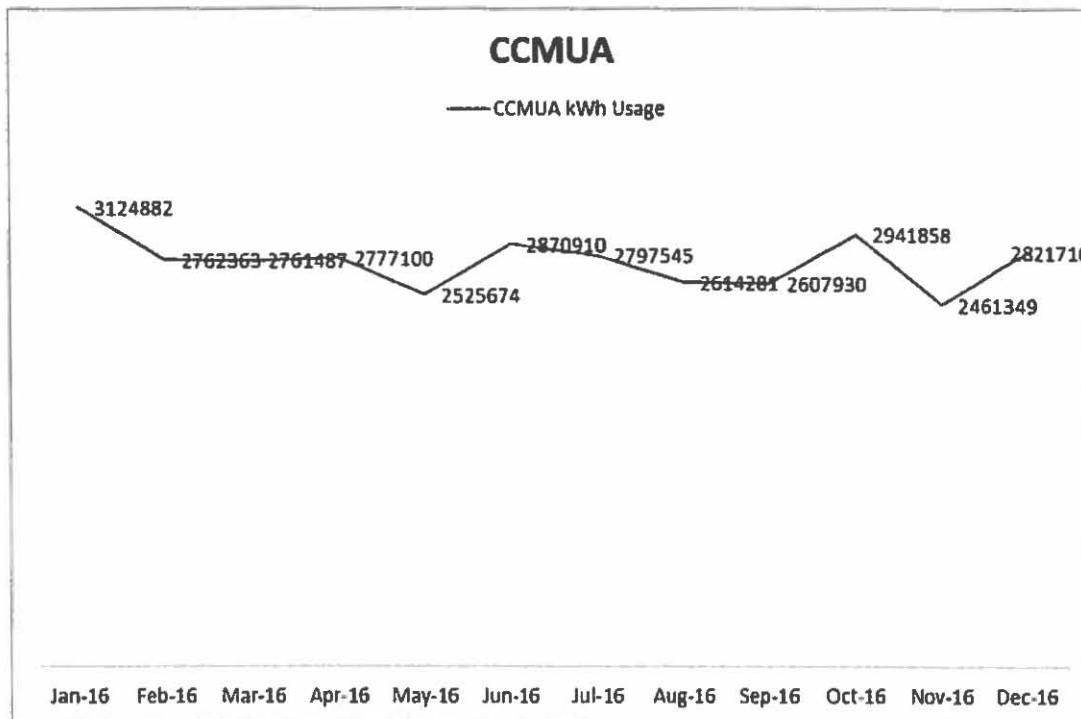
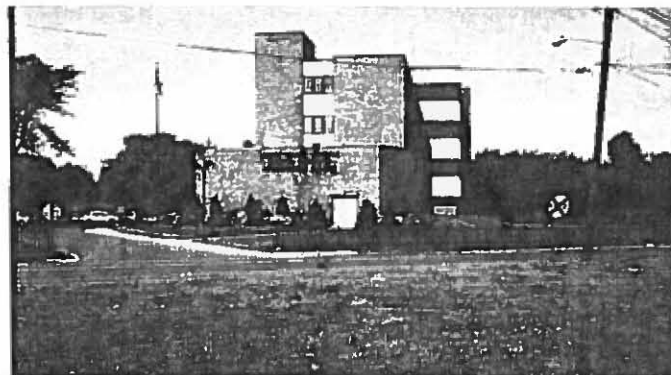
The area for the Camden Microgrid stretches approximately 0.75 miles between CCMUA and Covanta and covers a distance of approximately 1.2 miles via local roadways. Within this area, several opportunities have initially been identified including schools (Camden City Transitional Academy, H. B. Wilson Elementary School, The Creative Arts Morgan Village Academy, et al.), religious institutions (Sacred Heart Church and School, Holy Bethel Pentecostal Temple, Antioch Baptist Church, Ferry Ave United Methodist Church, Mount Olivet Seventh-day Adventist Church, Harris Temple AME Zion Church, et. Al), several non-profit organizations, several local markets, and numerous large energy users. These facilities are valuable to the community as a whole, but also present an opportunity to expand the economic viability of the project and the area.



Camden County Municipal Authority	
Address: 1645 Ferry Ave, Camden, NJ 08104	
Facility Type: Water Pollution Control Plant	FEMA Category: Risk Category III

Contact Information: Andy Kricun	
(856) 583-1223	andy@ccmua.org

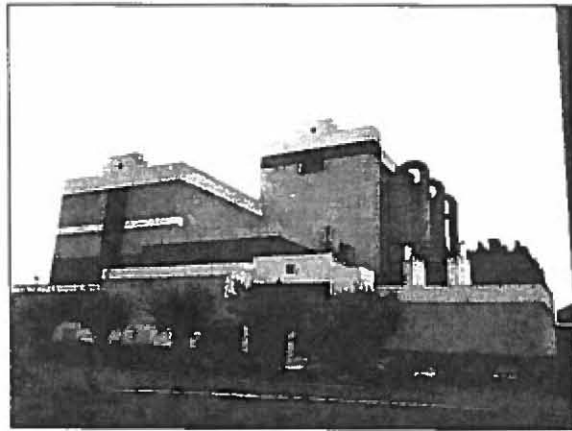
Hours of Operation: 24/7	Total Sq Footage: 300,000
Electric Load: 33,067,089 kWh, 4800 kW peak	Gas Load: 1,260,000 Therms Sludge Drying + 300,000 Therms Heating + 18,000 Therms miscellaneous = 1,578,000 Therms
Energy Efficiency/Energy Conservation Measures: No	



Covanta Camden Energy Recovery Center	
Address: 600 Morgan St, Camden, NJ 08104	
Facility Type: Recycling Center	FEMA Category: Risk Category III

Contact Information: Rick Sandner	
	RSandner@covanta.com

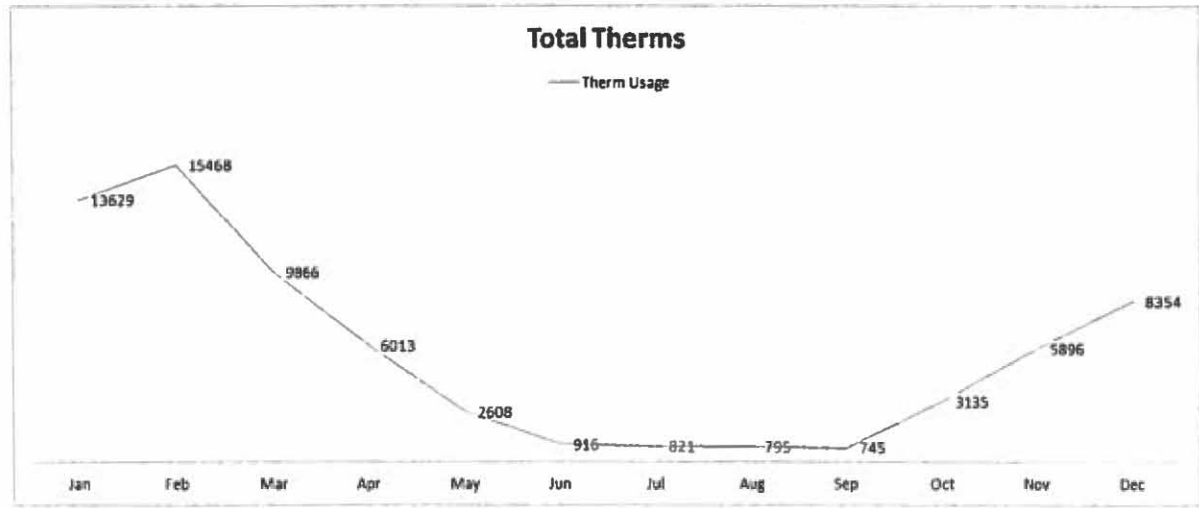
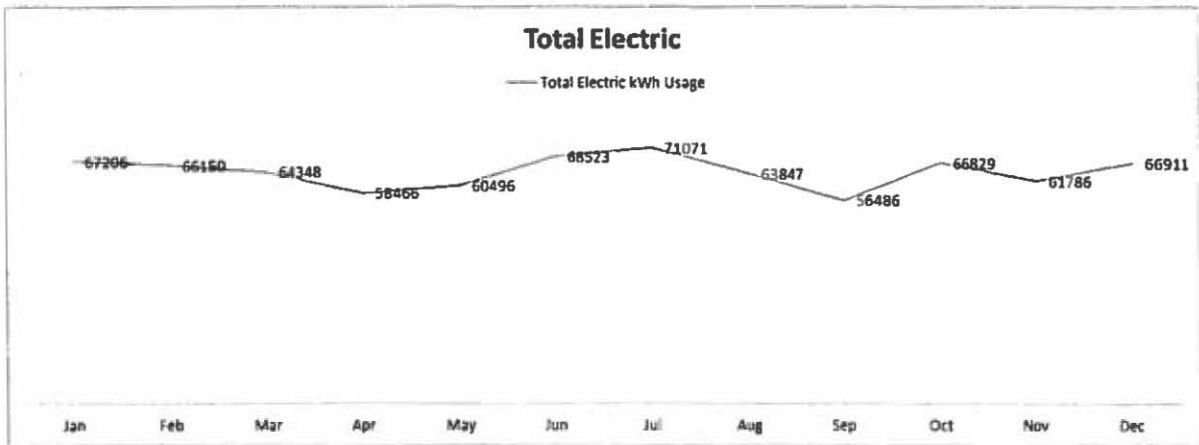
Hours of Operation: 24/7	Total Sq Footage: 120,000
Electric Load: 21 MW net output	Gas Load:
Energy Efficiency/Energy Conservation Measures: No	

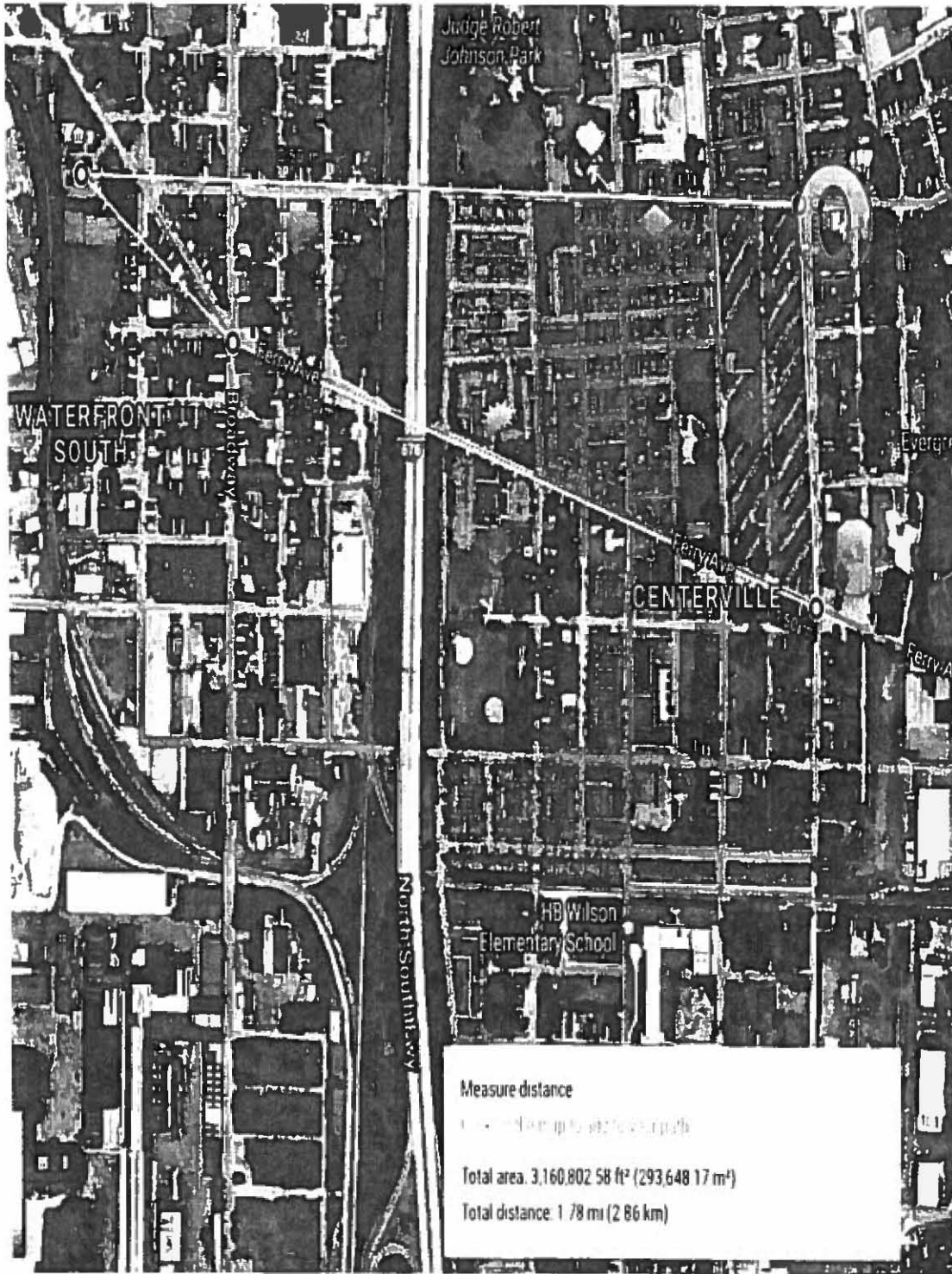


Camden County Surrounding Community Assets (Sample) Fellowship House, New Village Supermarket, Fortunas, Citgo Gas, Camden Housing Authority, Riletta Elementary School, H. B. Wilson Elementary School	
Address: Carl Miller Boulevard to Ferry Ave, Camden, NJ 08104	
Facility Type: Shelter, Supermarket, Gas, Senior Center	FEMA Category: Risk Category I, II

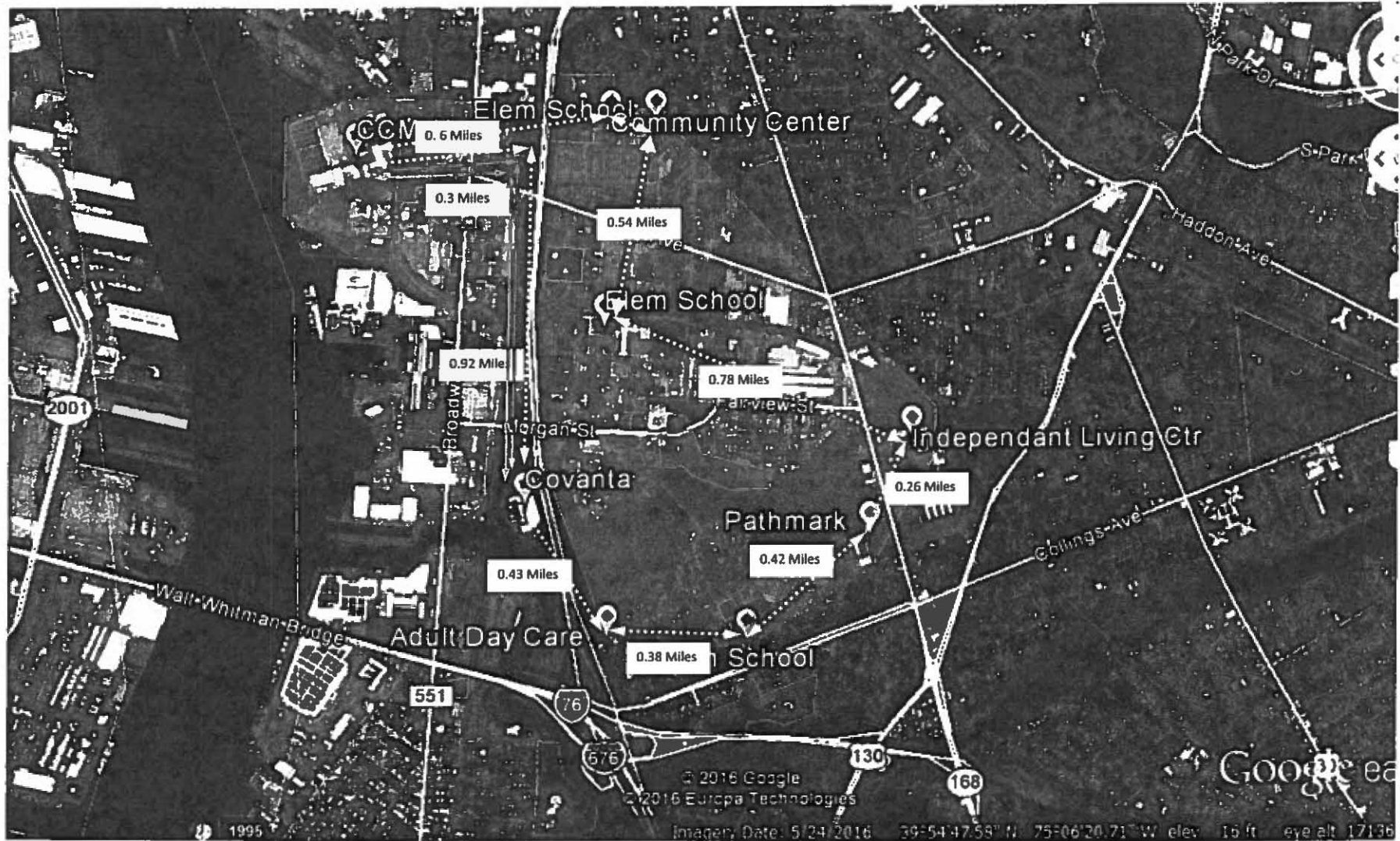
Contact Information:	
(856) 583-1223	andy@ccmua.org

Hours of Operation: Multiple. 8 hours, 14 hour	Total Sq Footage: 120,000
Approximate Electric Load: 770,000 kWh, 800 kW peak	Gas Load: 70,000 Therms
Energy Efficiency/Energy Conservation Measures: Some	





CAMDEN



Greener by Design, LLC. (GbD)
94 Church Street, Suite #402
New Brunswick, NJ 08901

Camden Advanced Microgrid Town Center Feasibility Study Concept Cluster

Camden Microgrid Concept
Served by dedicated "Blue Sky"
Electric and Thermal Energy

- 3. If the applicant is not a Town Center identified in the NJIT Report, documentation indicating that it satisfies the screening criteria set forth in the NJIT Report is required. Criteria in the NJIT Report were based on a cluster of critical facilities and their building energy usage that included the following ranking:**
 - i. Criticality based on the FEMA Category Classification of Facilities.**
 - ii. Total electric and thermal loads based on Btu's per square foot.**
 - iii. A TC DER Microgrid should have at least two (2) Category III or IV facilities within 0.5 miles and a facility with an energy usage of approximately 90 M Btus per square foot.**

While this area was not affected by Hurricane Sandy outlined in the NJIT Report, this area has been greatly impacted by other storms including Hurricane Irene. Both facilities are Category III facilities, and while they are approximately 0.75 miles from each other, the study will explore further opportunities within a ½ mile radius such as schools, hospitals and other critical facilities. The CCMUA uses approximately 33,067,089 kWh and 1,578,000 therms over 300,000 square feet of indoor and outdoor space, calculating to 902 MBTUs per square foot. As an energy producer, Covanta does not specify an energy load usage.

- 4. A list of all potential partners to be included in the TC DER Microgrid MOU. This should include a general description of any/all procurement issues between the various local government partners and a general mechanism to consolidate these requirements.**

Camden County will be working closely with Camden County Municipal Utility Authority and Covanta as the critical facilities, while leaving the option open for adding additional facilities. CCMUA and Camden County have an extensive cooperative history through their share services, which will continue to thrive under this project.

- 5. A general description of the technology to be developed and the general location within the TC DER Microgrid. This should include a description of the proposed connections (electric, gas and/or thermal) of the critical facilities and the DER technologies. This should also include a location of the electrical connections to the EDC's facilities/equipment and a description of the type of system the TC DER would be interconnecting into (radial or network).**

The County of Camden along with the critical facility, Camden County Municipal Utility Authority, looks to establish a community microgrid in the Camden region. This concept will utilize electrical, thermal, and water connections in order to create a sustainable energy hub with neighboring facilities. The first phase of the concept will incorporate Covanta's waste to energy plant as well as additional critical community facilities such as hospitals, schools, and public safety departments. Project team members will evaluate most commercially-viable technologies for use within the microgrid including but not limited to fuel cells, battery energy storage systems, solar photovoltaics, combined-heat and power (CHP) systems, thermal loops, and water exchange systems. The microgrid feasibility study will evaluate the technical and financial viability of providing distributed energy resources to provide most if not all of the study areas' electrical needs while using excess heat from the Covanta WTE facility to offset

thermal loads of the Camden County Municipal Utility Authority. In turn, water from CCMUA could be used to decrease Covanta's potable water use. This self-sustainable system would also provide continuity of operations to critical public safety infrastructure (shelters, police, fire, medical) during times of natural or man-made disasters.

These three systems - electrical power, thermal power, and water reuse – and their benefits to the community are described below.



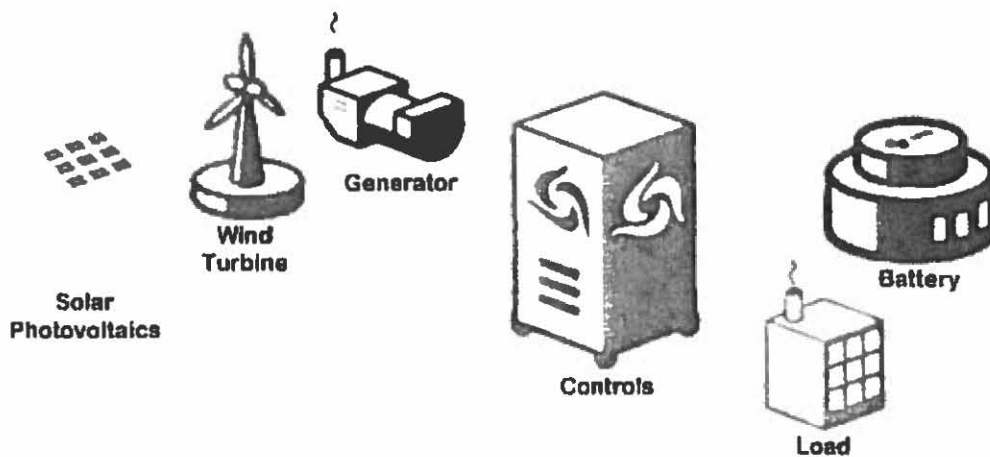
Phase I



Electric.

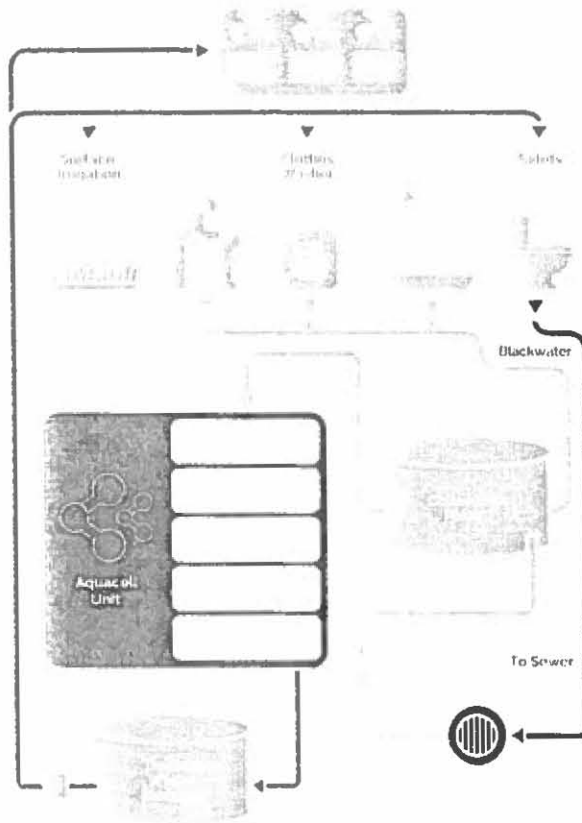
Similar to traditional utility grid, a microgrid will connect energy generating sources with the end users. A parallel distribution system will be designed to provide redundancy to the utility grid in order to alleviate any breaks in the traditional grid and to provide instant back-up when the grid does fail. This also provides an opportunity to incorporate locally produced renewable energy and sustainable technology such as wind, solar, storage, and efficient natural gas generators.

The power sources will work both during times of emergencies as well as times of non-emergency, or “blue sky” days. When operating during blue sky days, the microgrid will provide power to the local facilities on the microgrid and send excess power back to the grid at marketable rates. During a utility grid outage, the microgrid will “island” and continue to operate while isolating itself from the utility grid to allow utility workers to safely restore their distribution system.



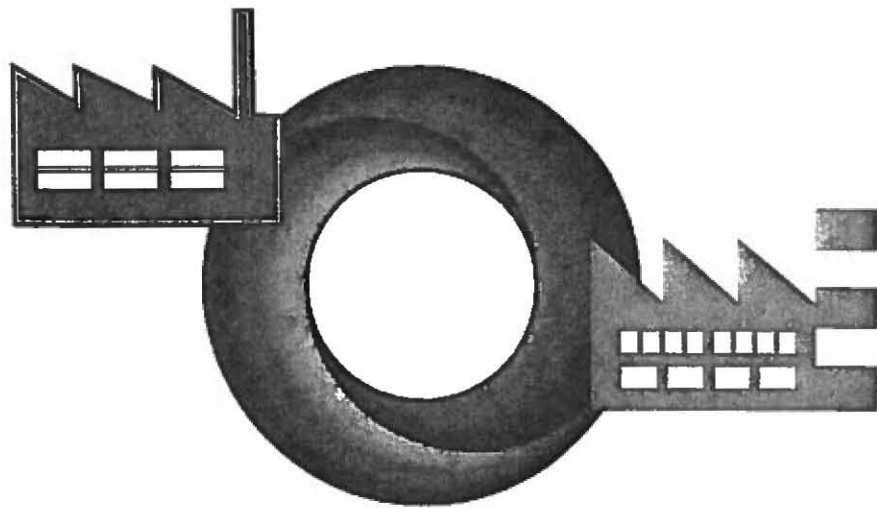
Wastewater.

Treated wastewater utilization allows CCMUA to deliver treated wastewater to the energy producer to help decrease pressure on water systems. The use of treated wastewater reduces the demand for fresh clean water, which is either drawn from local waterways or systematically cleaned, and alleviates pressure on the sewer system, all of which requires energy. The exchange of water helps with cooling and heating during the energy creation process and will work with thermal exchange loop by piping water between one or more facilities.



Thermal Loop.

A thermal loop is the movement of heat from one place to another with the use of air and/or liquids. A system can incorporate the use of steam, hot water, and chilled water for the use in another facility or process. In practice, this means any waste heat produced through normal operations can be transferred to a neighboring facility to be used within their own operations. This greatly reduces the need for individual energy intensive equipment such as boilers, furnaces, chillers or air conditioners. The piping will connect several facilities in order to exchange heat through the system.



Controls and Security.

Modern control technologies allow the microgrid systems to optimize operation for economics or uptime as well as fully island itself from the main grid. This means that, once the power from the grid is cut off, the microgrid will continue to operate independently. Once the grid is operational again, the microgrid will be able to sync up and either draw power from both systems. During times of non-emergencies, the control system can blend energy from the microgrid and utility grid to continually deliver the lowest cost energy to system off-takers. While emergency power is expensive, the concept of distributed energy will provide an additional revenue and cost savings to help fund the system.

In addition to energy surety, a microgrid system will include additional cybersecurity measures to prevent cyber-attacks, an increasingly frequent occurrence at utility systems. To the microgrid, a cyber-attack on the main grid is seen just like any other outage and the microgrid simply goes into "island" mode to provide continuous power.



Hitachi Energy Solutions Division approaches each feasibility assessment using our own proven and comprehensive methodology. In order to determine if a microgrid project is feasible given the constraints of the project, we gather data, run models and simulations, determine the preliminary budgets and perceived benefits for the project, and ultimately provide a report to the customer to help facilitate a decision about moving forward with a project. As needed, we adjust our feasibility approach to accommodate the specific needs and constraints of the project.

A typical feasibility assessment takes 8-12 weeks to complete and is dependent upon availability of data and the customer to resolve questions.

1. Technical Approach

Camden County is prepared to complete this work using a team of highly experienced energy engineers and microgrid professionals to conduct the necessary analysis, modeling and simulations over a 12-18 months period. The team will complete the following high-level tasks:

- Task 1 – Data Collection
- Task 2 – Modeling and Analysis
- Task 3 – Conceptual Design

Task 1 – Data Collection

The team will immediately begin working with Camden County, CCMUA, and Covanta to gather the information required for the feasibility assessment. Our team uses a data collection form to guide and facilitate collection of all relevant information for conducting a comprehensive feasibility assessment. While the list below is high-level, it provides a sense for the data we may request from prospective stakeholders. We recognize that not all data may be available, and will discuss with you the impacts and risks to the assessment should data not be available. Upon start of the project, we may request the following:

- Building plans or as-built drawings - Including schedule of equipment
 - Construction (building envelope)
 - Civil
 - Electrical
 - Mechanical
- Site Plans
- Site development growth plan (if any)
- Electric Usage Data
 - Three years of electrical interval data
 - Three years of electric utility bills
- Natural Gas Usage Data
 - Three years gas utility bills
- Existing Distributed Energy Resources (DER) with unit names and numbers
 - Solar Photovoltaic or other renewable energy

- Energy Storage Systems, e.g. Battery Systems and Thermal Storage
- Generators
- Cooling Equipment (make, model, and additional details)
- Heating Systems (make, model, and additional details)
- Controls Systems (including building management systems and device-level controls)
- Lighting Systems (lighting type, controls, sensors)
- Resiliency requirements
- Building Use Type – how is (or will) the building being used
- Climate data

Task 2 – Modeling and Analysis

The Hitachi team will utilize the data provided to develop load profiles and projections of energy usage intensity for CCMUA, Covanta, and potential additional buildings.

The team will then utilize modeling software, trending analysis and/or regression techniques to develop three long term (15, 20, or 25-year) cumulative scenarios (low, expected and high) for the total load for Camden for the tariff scenario. The output of this analysis will include:

1. Annual power and energy forecast data for each building, per scenario
2. Number of customers per customer class/block of consumption, per scenario
3. Customer load shapes, including the following cumulative system outputs:
 - a. Typical monthly load profile (hourly)
 - b. Seasonal variations in the load profile
 - c. Load profile of seven days, including Peak day load profile (hourly)
 - d. Load profile of seven days, including Minimum day load profile (hourly)
 - e. Percent of Load Served, by Resource
 - f. Monthly Load Served by Resource
4. Analysis of the impact of Distributed Generation additions to the system

In certain cases, if sufficient data cannot be gathered for a particular site, we will use specialized modeling techniques to create estimated load profiles. This analysis will be very similar to work the Hitachi team conducted for multiple communities in New York State when data was not available for certain facilities, included in the analysis of community-wide microgrids. The Hitachi team utilized our understanding of the operational profile of each building and gathered load profile data from similar facilities in the region in order to make effective, forward-looking assumptions about system performance.

The analysis will include the estimated impact on load profiles of rooftop solar PV, battery storage, natural gas combined heat and power, and any other feasible technology.

Hitachi will provide this analysis in a draft final report approximately 12 months after the project is initiated. Once critical stakeholders have had a chance to review this analysis and provide input, Hitachi will take 30 days to revise the analysis and update the report. The final report will be delivered after

feedback is provided and will be accompanied by an Excel tool that Hitachi develops as the basis of the analysis.

Task 3 – Conceptual Design

The conceptual design will take into account technical factors, costs and benefits to the CCMUA and Covanta, and other qualitative considerations important to the stakeholders. The conceptual design will include the following preliminary design elements:

- An optimal site and equipment layout and configuration analysis;
- A load profile analysis including description and location of electrical and thermal load profiles, being served by the microgrids. The data for multiple facilities will be aggregated as applicable based on the microgrid configuration;
- DER and thermal resource characterization including resource type, capacity factors, efficiency, and fuel management;
- An electrical and thermal infrastructure characterization including analysis of resiliency to forces of nature and other emergency situations;
- A microgrid control architecture design including, controller hardware/software specifications, integration with BMS and AEMS, and configuration;
- IT and telecommunications infrastructure design

6. A general description of the overall cost and potential financing that may be available.

As part of the feasibility analysis process, Greener by Design and Hitachi will analyze the financial performance of the microgrid concept, and will hone the design to maximize both technical and financial performance. The results of the final financial analysis will help determine which ownership and financing model is best for the project.

In particular, Hitachi will determine the rate at which the offtakers would be able to purchase energy from the microgrid under a power purchase agreement. Under this model, sometimes known as “microgrid as a service,” a third party would own all microgrid assets, and cover all capital costs associated with the project. The offtakers would purchase energy from the microgrid directly from this third party at a set rate. Hitachi will evaluate whether this rate would be lower than the current cost of energy for these customers. If not, the financial analysis will also indicate the costs and benefits associated with the County purchasing and owning the microgrid outright.

- #### **7. A general description of the benefits of the proposed Town Center DER Microgrid as well as the need for the proposed project. This should include a brief discussion of the potential revenue markets for any ancillary services, demand response including EE, capacity or energy markets. Both 7 and 8 should be detailed with any available microgrid modeling efforts that have been performed. Applicants must also demonstrate that their proposed project is consistent with the use of the Societal Benefit Charge as set forth in N.J.S.A. 48:3-60(a)(3).**

The need for microgrids is ever increasing with volatile weather conditions such as Hurricane Sandy and Polar Vortexes as well as constraints on our aging electrical distribution infrastructure and cyber-attacks on our electrical supply chain. Microgrids provide a reliable backbone to local resiliency, while also providing the opportunity for locally produced clean energy and a secure energy supply. A microgrid is an integrated energy system consisting of interconnected loads and distributed energy resources (DER) with the ability to connect and disconnect from the main utility grid. Simply put, microgrids are modern, small-scale versions of the traditional utility system. The advantages of a microgrid system include reliability, redundancy, fuel flexibility, energy efficiency, a cleaner environment, locally and regionally, reductions of energy transmission loss, and improved grid security.

Microgrids incorporate locally produced energy sources such as solar photovoltaic arrays and combined heat and power generators, and connects this power to critical facilities within a defined region. This system is paired with current technology which has the ability to send power back into the traditional grid during normal hours, but also can isolate itself during blackouts and times of emergency. Microgrids provide benefit by not relying on a fragile distribution system that moves powers across great distances, which not only allows for redundancies, but provides cost savings through efficiencies and clean energy. Finally, microgrids can provide ancillary services to the primary utility grid via load reduction during peak usage periods, as well as voltage and frequency regulation.

While this concept is not new and has been seen on military bases and single ownership campuses, the idea of community- and city-based microgrids is an emerging field. Cities and local communities are taking steps to improve their energy security and resiliency, which appeals to residents, business, and local government.

Additionally, Hitachi's experience with microgrid designs will ensure the maximization of benefits for resilience, sustainability, and cost savings based on their individual needs and priorities. Hitachi has worked with several communities to design microgrids that would aid in economic development such as such Syracuse's Near Westside neighborhood. The team conducted a feasibility study for a highly economically depressed area with a mixture of residential, small commercial and education facilities with a situation similar to City of Camden.

Finally, as a large ratepayer, CCMUA contributes to societal benefits charge and incorporating the concepts and renewable technology stated above would be consistent with the Societal Benefit Charge under N.J.S.A. 48:3-60(a)(3) and further the objectives of the Department of Environmental Protection and Board of Public Utilities. For these reasons, Camden County is eager to apply for the Board of Public Utilities' Town Center Distributed Energy Resource Microgrid Feasibility Study.

- 8. A general description of the communication system between the TC DER Microgrid and the EDC's system. This should include a general description of distribution management systems and controls.**

The microgrid control system we would specify would be able to connect directly to PSE&G resources and telecommunication/IT systems using software adapters and standard semantic models and protocols (e.g., Modbus, DNP3, BACnet, CANbus) over IP networks. The microgrid control software asset catalog enables a mapping from asset capabilities to the controller's Energy Resource (ER) and Energy Resource Managers (ERMS). The ERMS send commands and setpoints directly to the PSE&G's SCADA system, if available at the proposed feeders, to allow the utility to monitor the microgrid and the point of common coupling. PSE&G would always have the ability to disconnect the microgrid from the point of common coupling to ensure the safety of their crews and their system.

We will work closely with PSE&G to ensure that we understand their current and planned smart grid telecommunications plans so they can be incorporated into our microgrid feasibility study for Camden County.

9. Timeframe for the completion of the feasibility study.

12-15 months upon the reward of the grant:

- **Initial Data Collection:** Broad range of data collection aimed at understanding all the possible places and categories of facilities that may require power during a blackout. (2 months)
- **Ranking data:** Ranking initial data into tiers such as 1. Highest ranking – police, fire, pumps, repeaters, hospital, etc.; 2. Middle ranking – gas stations, pharmacy, elder care, and supermarket; 3. Lower ranking – gathering places, buildings with elevators, etc. (less than 1 month)
- **Mapping:** Map via GIS system the locations of each of the ranking properties including information such as location, height of location, flood plain mapping, right of ways, vulnerability, and clusters. Next, working with the GIS data and other data, begin to pare down the site list based on the information and feasibility of location. Then assess varying strategies to have these sites islandable during a storm; cluster of sites can support microgrid, individual buildings stand alone. (2-3 month)
- **Site Visit and Stakeholder Meeting:** Meet with all the Tier 1 stakeholders to confirm support on participation. Visit each location to understand location of power distribution system, potential types of power match (e.g. cogen vs solar at a site) and any other on site details necessary for the microgrid or standalone islandable power. (2 months)
- **Engineering:** Analysis of the generation and distribution costs to fund the microgrid build-out. Work with Utility to have them price the distribution system. (2-3 months)

- **Board of Public Utilities Approval:** Once the Utility has completed its cost assumptions for the distribution system, have BPU approve the rate basing of the distribution system. (1 month)
- **Develop and Issue Bid:** Once a cost outline has been completed and the Utility has agreed to build the distribution system, create a RFP for the construction of the generation, security and associated controls to build out the microgrid. (3-6 months)

10. The specific microgrid modeling to be used in the overall feasibility study.

Hitachi and Greener by Design will use HOMER Pro, Rutgers' cost/benefit analysis (CBA) model and their own proprietary toolkits and modeling.

11. The requested funding amount.

Camden County and its partners anticipate using of \$150,000 to complete this study.

12. Any cost share by the Lead Government Entity or any of the stakeholder partners.

Camden County, CCMUA and Covanta can contribute services in kind as well as staff time from all partners.

13. A listing of all consultants as prime or subs that will perform work on the feasibility study and the level of expertise in this area of microgrid development.



ADAM ZELLNER, PRESIDENT

Finance, Government and Community Relations Expert

Overview and Areas of Expertise

Mr. Zellner has served as President of Greener by Design since its inception, responsible for all aspects of its operations including client and partner relationships. He also serves as the company's lead on government and finance-related work. Previously, Mr. Zellner served as Policy Director to a former Governor of New Jersey, overseeing the development of a variety of policies, including energy, land use and environment. Prior to joining the Governor's staff, he served as the Deputy Commissioner of the New Jersey Department of Environmental Protection (NJDEP) and the former Executive Director of the New Jersey Office of Smart Growth. He served in Washington and New Jersey for several members of congress and has worked for a variety of elected and appointed officials throughout his career. Mr. Zellner attended Rowan University and currently teaches at Rutgers University.

Mr. Zellner's areas of expertise include:

- Economic and financial analysis
- Land use planning and redevelopment
- Government relations and policy analysis
- Regulatory review and grant writing
- Community engagement

Significant Accomplishments

- Hoboken MicroGrid Concept Plan and Rocky Mountain Institute Attendee 2015
- Maher Elizabeth Terminal Master Plan, 2014
- Woodbridge Sustainable Jersey Champions, 2009-2016
- Co-authored NJ Energy Master Plan, NJ Global Warming Response Act and Economic Stimulus Plan, 2007
- NJ/Israel energy forum. Keynote Eilat, Israel Annual Conference. 2008
- TEDX-Hoboken-Is your cell phone charged? America's Addiction to Energy -2013

Representative Project Experience

Government Relations, Energy Policy and Strategic Advisory

- Municipal and county energy policy advisor for the Township of Woodbridge, Cities of Linden, Hoboken, Newark and Hudson County. Specific services include reviewing energy efficiency and renewable energy plans and projects. Working with a variety of Stakeholders to assist in communicating metrics and progress related to the implementation of various projects of policies.
- *Maher Terminals, Elizabeth NJ.* Serve as energy, and sustainable policy consultant, including coordination of the implementation of a multimillion-dollar site wide sustainability plan. GbD coordinates meetings and updates at the local, state and national level with various elected officials and community representatives. Worked with a variety of regulators including City of Elizabeth, Newark, ICC, NJ DEP, US ACE, US EPA R2 and the PA of NJ/NY on the implementation of several high-profile projects supporting the 'Greening' of the Port.
- *City of Hoboken.* Serves as strategic planning advisor assisting with post Sandy recovery and planning for the cities electrical systems. Created stakeholder engagement process and conducted several high-profile forums on the creation and cost-benefit analysis of the construction of the Nation's first Community Based MicroGrid (CBMG). Worked with Sandia National Labs, PSE&G, NJ BPU, HUD/Hoboken Housing Authority and Community and Religious organizations throughout the City of Hoboken.

Renewable Energy Implementation and Regulatory Policy Support

- Team lead for the development of many of New Jersey's most significant campus-based solar projects including the Atalanta projects based in Elizabeth, NJ totaling 1.5 MW, the McGraw Hill East Windsor Campus solar project of 14.1 MW, and various projects for the Newark Archdiocese, Hartz Mountain Industries, and The County of Hudson.
- *Waste-to-Energy.* Organic Diversion, Waste Management, Covanta: Serve as Policy and Financial consultant in the permitting, site selection and financing of various technologies including anaerobic digestion and cogeneration. Specific tasks include development of stakeholders and partners, and identification and security of local, state, and federal incentives.
- *Community Redevelopment and Policy.* Municipal and county redevelopment and energy policy advisor for a variety of towns throughout New Jersey, including Camden, Newark, Linden, Galloway and Neptune Twp. Specific services include reviewing energy efficiency and renewable energy plans, strategic redevelopment and overall energy management and sustainability objectives; execution of grants and supporting documents.

Financial Services.

- Strategic advisor for evaluation of projected project budgets, grants, incentives and overall proforma of a variety of public and private sector clients. SANDIA National Labs, City of Hoboken, Empire State Development, SIEDC, MEPT and a variety of other clients have engaged GbD to develop overall project budgets and to assist in closing any capital gaps that might remain in the project. In addition, private placement and utility financing programs are an integral part of many of the projects managed by GbD.



BEN SPINELLI, Esq. PRINCIPAL Land Use and Policy Consultant

Overview and Areas of Expertise

Ben Spinelli is a principal of Greener by Design and an expert in land use issues. His career spans over 20 years holding positions as the executive director of a major state agency, the executive director of a respected non-profit, an elected municipal official, a senior advisor for a major state policy office, a trial attorney & a big city prosecutor. He has held both private and public sector jobs with increasing responsibilities and increasing influence as my experience has grown. He was able to complement his professional career with involvement in government and public service.

Mr. Spinelli's areas of expertise include:

- Land use and strategic planning
- Government relations and public policy
- Regulatory review and grant writing

Education

Juris Doctorate, Seton Hall University- School of Law, Newark, NJ
B.A., History & Political Science, Muhlenberg College, Allentown, PA

Public Positions

- Chairman, Chester Township Environmental Commission 1991-98
- Chairman, Morris County Open Space & Farmland Preservation Trust 1997-99
- Member Chester Township Planning Board 1999-2007
- Mayor, Chester Township 1999-2007
- Original Member, Highlands Council 2004-06
- Founding Member & President Raritan-Highlands Compact 2005-2007
- President, Morris County League of Municipalities 2003-2005
- United States of America-Presidential Task Force, *Senior Policy Adviser* 2013
- Member, NJ SADC, ex officio representative of Department of Community Affairs

Additional Experience

- Senior Fellow-Environmental Leadership Program, National Fellowship Class
- Board of Trustees, Highlands Coalition
- Adjunct Professor, Environmental Law & Policy, NJIT & Kean University 2010-Present
- Award, "Champion of the Highlands", NJ Highlands Coalition
- Board of Directors, Morris Tomorrow
- Member 2002 U.S. Forest Service Highlands Regional Study Work Group

Representative Projects

2013-Present Kean University Highland Campus, NJ, *Senior Consultant*
Providing development assistance for a local overlay in the town master plan to identify the new Kean Highlands Campus as an educational opportunity zone in the preservation area. Outlined the various approaches and potential professional services required to achieve development and complete applications and filing of all the required permits.

Experience

2013 United States of America-Presidential Task Force, *Senior Policy Adviser*

President's Task Force on Disaster Recovery, focused on issues of land use, environment, local government and capacity building. Task Force was charged with reporting to the White House on issues related to climate change, storm preparedness, recovery, coastal land use, infrastructure, housing and other issues relating to how to reduce vulnerability to storm damage and sea-level rise, how to best rebuild following disasters and how to adjust to increasing threats posed by increased risks of storm surge, flooding and other damage. Particular focus is on the unique challenges facing urban coastal areas of the northeast and the population, property and infrastructure that are threatened in these areas.

2010-Present *Independent Consultant* Chester, NJ

Providing independent consulting services to non-profit organizations and government entities on matters of public policy, strategic planning, open space and environmental planning issues and organizational management. Assignments have included non-profit start-up, regional planning conformance, grant writing and communications strategies. Responsible for providing services in conformance with grant agreements and reporting requirements. Services can be provided with access to a network of planning, design, real estate and environmental professionals to assist in fulfilling client's goals.

2009-2010 Westchester Land Trust, *Executive Director* Bedford Hills, NY

Executive Director of an established and respected regional land trust. Responsible for overall organizational management and operations as well as providing leadership and vision for the land trust. Continued successful existing land preservation programs while expanding the reach of the land trust into urban communities and sustainable agricultural programs as part of an innovative strategy to make WLT relevant and effective on a regional basis for the foreseeable future.

2007-2009 State of New Jersey-Office of Smart Growth *Executive Director*

Executive Director of major state policy office charged with the coordination of state policies, programs, goals and financial investments with statewide land use planning. Responsible for drafting and adoption of the 2008 New Jersey State Development & Redevelopment Plan.

2006-2007 State of New Jersey-Office of Smart Growth Trenton, NJ

Chief Counsel & Director of Policy Senior policy advisor and Chief Counsel for the State of New Jersey, Office of Smart Growth and for the New Jersey State Planning Commission. Responsible for formulating and implementing sustainable and coordinated policies at the state, regional and local levels.

1996-2005 Chubb Group of Insurance Companies Florham Park, NJ

Partner/Managing Attorney/Senior Trial Attorney Partner and supervising attorney in 17-member law firm providing in-house legal services to the Chubb Group of Insurance Companies. Trial attorney specializing in general commercial litigation.

1986-1996 Wald & Del Vento, P.A. West Orange, NJ

Trial Attorney

Associate attorney at small general practice firm. Tried over 30 matters to conclusion and handled a broad range of matters including general litigation, real estate transactions, land use applications and estate matters.



MICHAEL F. DUFFY, J.D.

Director of Energy and Sustainable Development

Overview and Areas of Expertise

Michael Duffy serves as the Director of Energy and Sustainable Development for Greener by Design. He oversees project management and client services across cross-functional teams to ensure timely and effective completion of projects for GbD's portfolio of private and public clientele. Prior to joining GbD, he attended Rutgers University – School of Law, Camden and received his Juris Doctor. While at Rutgers Law, Michael focused on environmental law and served as the President of the Environmental Law Society his third year. He also developed his advocacy skills and client relationship through the Moot Court competition and Pro Bono clinic.

His areas of expertise relevant to the present project include:

- Energy and Corporate Sustainability consulting.
- Land Use and Permitting issues.
- Manage the implementation of energy savings projects and sustainability initiatives, including: Corporate Sustainability Master Planning, carbon footprint analysis and greenhouse gas emissions inventories (GHG), renewable energy project development, and energy procurement.

Education

Juris Doctor, Rutgers University – Camden, 2014

B.A. Economics, School of Arts and Sciences, Rutgers University, 2010

Bar Admission

New Jersey

Representative Project Experience

The Shoppes at Old Bridge, Old Bridge, NJ. Serves as client liaison between The Shoppes, the town of Old Bridge, and NJDEP.

The Shoppes at Old Bridge intends to create a recreational park in the wooded wetlands in front of their development.

- This will attract more customers to the retail and amenities available, as well as provide valuable park space for the community.
- With the support of Old Bridge Township and other groups they plan to relocate the current basin to a wooded area and create a more natural and appealing pond, while maintaining wetland habitat.
- They are considering installing approximately 4,000 feet of walking paths through the wooded area for park space for the residents and visitors of Old Bridge.

Greenhouse Gas Analysis and Carbon Footprint, Jersey City, NJ. Organized and lead data analysis and quantified each sector using available and city data to produce strategies to reduce energy, carbon and GhG emissions.

January 2014 – May 2014 *Immigrant Justice Clinic & Small Business Clinic*

- Interviewed and counseled clients regarding immigration and small business issues
- Filed for the formation of a Limited Liability Company in New Jersey
- Spoke to government agents, officers, and in court on clients' behalf
- Conducted discovery and investigatory work on clients' cases

2013 Summer *Blue Sky Power, LLC*

- Drafted instructional memorandum on obtaining permits for combined heat and power generators in New Jersey
- Researched and solicited potential clients to generate new business
- Participated in and took notes on business meetings with officers and other key employees

2012 Summer *Superior Court of New Jersey, Judge Richard Wells III*

- Drafted memos on motions to be reviewed by judicial clerk and submitted to Judge Wells
- Drafted memo on a complex statute of limitation issue
- Participated in discussions reviewing oral arguments, settlement conferences, and plenary hearings

2012 Summer *New Jersey Department of Environmental Protection*

- Researched land compensation for New Jersey's Green Acre Program, economic consideration of environmental action
- Prepared memos based on case law, regulations, and statutes on a variety of legal aspects relating to environmental issues
- Researched options for applying to comments submitted by citizens



THOMAS BRYs, CEP, CEM, CDSM, CSDP Energy Engineer

Overview and Areas of Expertise

Tom Brys has 20 years of diverse experience in the identification, development and implementation of energy management technology projects. In addition, Mr. Brys has served hundreds of clients ranging from municipal energy aggregations and cooperatives to large Fortune 100 Pharmaceutical companies. Mr. Brys has managed and authored multiple Sustainable Energy Master Plans and has provided technical consulting for over 300 Mega-watts of photovoltaic projects in New Jersey and Pennsylvania. Mr. Brys serves as past president of the New Jersey Association of Energy Engineer and currently serves on the Board of Directors.

Education

B.A. Business Administration, Middlesex County College / Canterbury University

Professional Registrations and Certifications

- CEP—Certified Energy Procurement Professional
- CEM – Certified Energy Manager
- CDSM – Certified Demand Side Management Professional
- CSDP – Certified Sustainable Development Professional
- IQ/OQ/PQ Validation Training for Pharmaceutical Applications
- Technical Writing
- High Performance Team Building for Project Managers
- Geothermal Technology II

Professional Affiliations

- Board of Directors – New Jersey Association of Energy Engineers
- President – New Jersey Association of Energy Engineers (2010 - 2012)
- Chairman – North Brunswick Environmental Commission
- Member – Association of Energy Engineers, National

Representative Experience

Morris County Improvement Authority County Solar Program II

Energy Consultant responsible for evaluating and ranking project development sites. Provided technical review and guidance for the solicitation and selection of the contractor using a competitive RFP. Provided technical oversight for the design, permitting, interconnection and construction of (9) sites totaling 3 MW within Morris County. Managed the inclusion of pre-purchased 1603 Grant Safe Harbored equipment.

Brick Township Landfill Solar Project

Energy Consultant responsible for determining the economic and practical feasibility of implementing a 6MW PV project on a closed landfill using Township financing in a Public Private Partnership through redevelopment. Prepared technical contract documents and provide oversight during design, interconnection and construction.

Brick Township Solar and Wind Project

Energy Consultant responsible for determining the economic and practical feasibility of implementing a .15 MW PV project at the Township Municipal Complex and a 10 Kw wind turbine project at the Drum Point Sports Complex using Township financing and grant funding through a competitive RFP. Prepared technical contract documents and provide oversight during design, interconnection and construction. Performed post-construction performance monitoring and SREC management.

Pocono Raceway Solar Project

Acted as the owner's representative in the development, evaluation and selection of equipment and contractors for the implementation of the Raceway's 3 MW photovoltaic system. Provided post-construction performance monitoring and SREC management.

Woodbridge Township Solar Project

Energy Consultant responsible for determining the economic and practical feasibility of implementing a .85 MW PV project on a (4) Township buildings using Township financing through a competitive RFP. Prepared technical contract documents and provide oversight during design, interconnection and construction. Performed post-construction performance monitoring and SREC management.

Ocean County Sustainable Energy Master Plan

Energy Consultant responsible for preparing a comprehensive plan to document the current status of the County's sustainability and energy management practices and to provide a road map for the County's future activities and projects as they relate to energy procurement, consumption and generation. Fifty percent of the recommendations have been implemented. The project cost was \$125,000.

Bergen County Sustainable Energy Master Plan

Energy Consultant responsible for preparing a comprehensive plan to document the current status of the County's sustainability and energy management practices and to provide a road map for the County's future activities and projects as they relate to energy procurement, consumption and generation. Fifty percent of the recommendations have been implemented.



Distributed Generation and MicroGrid Development

Greener by DesignSM (GbD) provides a comprehensive energy investment and environmental management platform that allows our multidisciplinary team of technical, financial, energy management, and environmental planning professionals to bring a thorough understanding of the still complex world of DG and MicroGrid development.

Greener by Design is uniquely qualified to assist in microgrid projects based on both its experience and relationships with the various utilities and state and federal regulators (NJ BPU, FERC, PJM, and Rate Counsel) that will be essential to a project's success. Working with experts from across the United States including Sandia National Lab, the Rocky Mountain Institute, the U.S. Department of Energy, and a host of utilities, regulators and universities, Greener by Design was engaged by a variety of public and private sector clients after Superstorm Sandy to assist in the design, financing and implementation of several MicroGrids from Washington DC to New York. Walter Reed Hospital, John Hopkins University / EBDI, Staten Island EDC, Cities of Hoboken, Seaside Heights, Woodbridge and a host of private sector portfolios began the process of designing 'islandable' systems that recognized the need for both emergency power and economic viability of a MicroGrid.

GbD has developed a unique understanding of the complexities that surround the evolving world of energy deregulation and market dynamics that make DG or MicroGrid's economically viable. This expertise extends to related emerging technologies such as vehicle-to-infrastructure and "virtual pipelines".

This comprehensive experience, combined with ongoing work with a host of federal, state and not for profit entities developing MicroGrids throughout the United States makes GbD unique among other firms. Our background in energy, environment, regulatory and utility work in the United States is unmatched.

Greener by Design Select Energy DG and MicroGrid Case Studies



CITY OF HOBOKEN, NJ

GbD was retained by Hoboken days after Hurricane Sandy devastated the infrastructure of the City.

- Working with our partners at Sandia National Labs, PSE&G, the City of Hoboken and the NJ BPU, GbD helped to create the concept paper for the development of the nation's first community scale MicroGrid.
- GbD was given full responsibility for the planning, regulatory, financial and operating construct of the project. As the only private firm in New Jersey to work with the stakeholders involved in this project, GbD developed a unique understanding of the challenges and opportunities a community based MicroGrid can bring and helped turn that into a tool kit for MicroGrid planning and design.
- This ongoing work has been nationally recognized for its innovative approach and for the cooperative agreements established between the various stakeholders, including the utility and regulatory community.



WALTER REED HOSPITAL AND EASTERN BALTIMORE REDEVELOPMENT, WASHINGTON DC & BALTIMORE, MD

These unique Northeast Corridor projects represent some of the highest profile redevelopment projects in the US looking at using DG and MicroGrid design as part of a comprehensive redevelopment planning effort.

- GbD worked with a variety of public and private stakeholders including the US Army, PJM, John Hopkins University, Forrest City, the PUC and various State regulators to develop the blue print for distributed energy as these two critical sites.
- Geothermal, CHP, Solar with storage were all analyzed as part of the creation of an energy master plan for both sites.
- GbD developed a variety of regulatory and incentive strategies that were used in the final master plans.
- Currently, both sites are in construction or final planning and are expected to be completed over the next several years.



MAHER TERMINALS, ELIZABETH, NJ

Working with Maher Terminals, the largest container terminal on the East Coast, GbD conducted a comprehensive analysis of energy use and environmental impacts from operations at this large intermodal facility.

- Worked with US EPA, NJ DEP to complete comprehensive audit of Maher's various consent orders, fines and other enforcement actions related to the operations of the facility.
- Developed Energy and Operations Master Plan aimed at reducing emissions and energy use for regulatory compliance and ROI.
- Implemented ECMs and facility wide upgrades on a variety of equipment including electric cranes, hybrid straddle and other equipment and installation of roof top solar, building controls and a various demand response and load shedding assets.
- Currently conducting MicroGrid study for the islanding and operations of the facility during emergent times. This 5 MW project will also include homeland security, cargo container monitoring and logistic operation.



WOODBRIIDGE TOWNSHIP, NJ - Community Based MicroGrid Development

GbD has been assisting Woodbridge Township for the last 8 years and has been recognized as the leader in sustainable development by the New Jersey League of Municipalities for each of those years.

- Working with the Township, GbD successfully obtained grant money for the development of a MicroGrid Feasibility Study. This study identified and ranked critical facilities and provided information on flood plain, traffic circulation and land use issues critical for emergency response.
- Presentations to stakeholders, utility data gathering, cost benefit analysis, partnership development and management and control of the MicroGrid were developed for final funding requests to the NJ BPU.
- GbD has management oversight of Woodbridge's Local Government Energy Audit program and implementation of recommended energy efficiency retrofits and renewable energy installations on municipal buildings. This also includes the preparation of Energy Efficiency and Conservation Strategy (EECS), Carbon Footprint Analysis, and Climate Action Plan.
- Sustainable Jersey Award Recipient (2009-2015)
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HUDSON COUNTY IMPROVEMENT AUTHORITY, JERSEY CITY, NJ

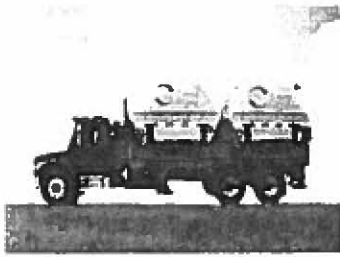
GbD is assisting the Hudson County Improvement Authority in a wide range of Energy Planning and funding activities including master planning for demand response and energy resiliency.

- Beginning with an outline of each facility, age, infrastructure, use and future use, GbD developed a procurement and energy efficiency strategy to create a true baseline of energy costs and consumption.
- Upon completion of the audits and reducing the overall energy commodity cost, GbD developed a cost benefit analysis for the implementation of the various ECM's identified.
- In addition, GbD analyzed the various opportunities for demand response.
- Working with EPA and NJ DEP, HCIA developed a spec for all generators that would allow for running on non-attainment days.
- Hudson County is in the process of installing those generators as part of their overall Energy Master Plan that will allow critical facilities to island themselves in times of emergency.

GBD MICROGRID EDUCATION AND SPEAKING

GbD is a policy leader in MicroGrid development and design. GbD has participated as an invited guest, in top think tanks and public and private sector programs on MicroGrid development including:

- **ROCKY MOUNTAIN INSTITUTE**
Invited to participate with the City of Hoboken Sundance, Utah for the e-Lab Accelerator on the development and implementations of the future of microgrids. Other members of our team were from Concord Engineering, NJ-BPU, PSE&G, and the City of Hoboken.
- **THE PEW CLEAN ENERGY INITIATIVE**
Featured in The PEW Clean Energy Initiative video, "How Microgrids Improve Resiliency in Power Outages", to view go to:
https://www.youtube.com/watch?feature=player_embedded&v=X5R17HhPskI
- **TED TALK**
Adam Zellner, GbD President, featured at TEDxHoboken: ["Is your cell phone charged? America's addiction to energy."](#)



VEHICLE TO GRID – EMERGENCY FUEL

MOBILE FUEL SOLUTIONS, Natural Gas Virtual Pipeline

- GbD is providing a full slate of regulatory and business development consulting to Mobile Fueling Solutions (MFS).
- In addition to serving locally based public and private fleet customers, MFS's Virtual Pipeline® uniquely allows compressed natural gas stations to serve geographically dispersed industrial, commercial or fleet customers without the need to develop additional costly pipeline or other infrastructure, effectively turning existing stations into super-regional fueling center.
- MFS delivers CNG to customer locations in modular containers transported on specially designed. This transport capability also provides resilient emergency services in that it provides backup to other natural gas users in the event of a supply disruption.



Initiative for Resiliency in Energy Through Vehicles, National Association of State Energy Officials

- Under contract to the non-profit NJ Clean Cities Coalition, GbD is an integral partner in this national effort to catalyze state and local acceptance and deployment of alternative fuel vehicles and infrastructure in preparing for and responding to man-made and natural disasters and emergency situations.
- In support of NASEO's transportation program and resiliency planning efforts, GbD staff serves as national strategic advisor and as the NJ lead, and participate on the national Steering Committee for the development and dissemination of information to support state and local decision making regarding the use of alternative fuels in emergency response and preparedness operations.



John F. Westerman
Vice President
Hitachi Energy Solutions

Mr. Westerman has 30 years of experience in the development, evaluation, and application of emerging energy technologies and systems. He has supported energy-related activities for the California Energy Commission (CEC), the California Public Utilities Commission (CPUC), the Electric Power Research Institute (EPRI), the U.S. Army Construction Engineering Research Laboratory (a division of the U.S. Army Corps of Engineers), U.S. Department of Energy (DOE), New York State Energy Research and Development Authority (NYSERDA), the County of Los Angeles, and numerous utility companies (electric, natural gas and water). Mr. Westerman also holds a patent on a thermal energy storage system. He has conducted more than 50 Microgrid assessments and initial designs. Mr. Westerman holds an MBA from the University of San Diego and a BS in Physics from the University of California, San Diego.

Mr. Westerman has managed many energy, generation and Microgrid projects. Examples include the following:

- SDG&E/DOE Borrego Springs Microgrid Demonstration Project (4.5 MW Utility Microgrid)
- SDG&E/DOE Community Energy Storage Demonstration Project
- California State University Campus Microgrid Feasibility Study (2 MW)
- SDG&E / CEC Community Energy Storage Demonstration Project
- Horizon Microgrid Solutions Low Income Housing Microgrid Project – San Diego
- San Bernardino Community College District Energy Efficiency and Renewable Energy Strategy (2 MW)
- Distributed Renewable Energy Operating Impacts and Valuation Study for Arizona Public Service Company
- Pechanga Casino Combined Heat and Power Installation and Commissioning (5 MW Solar Turbine)
- US Army Corps of Engineers Alaska Army Base Coal-fired Combined Heat and Power Assessment and Base Energy Strategy (20 MW)
- Department of Veteran's Affairs Comprehensive California Energy Strategy (6 facilities) including Combined Heat and Power Opportunities (36 MW)
- US Army Corps of Engineers 200 kW Fuel Cell Demonstration Project (30 sites at 200 kW each)

Expertise

Microgrids
Energy Storage
Fuel Cells
Renewable Energy Technologies
Energy Strategies
Feasibility Studies
Economic Analysis

Credentials

MBA, University of San Diego
B.S. Physics, University of California, San Diego

Miscellaneous:

Patent: #4,821,794
Clathrate Thermal Storage System
Award of Excellence: US Army Corps of Engineers



Steve Pullins
Vice President
Hitachi Energy Solutions

Steve Pullins has more than 35 years of utility industry experience in operations, maintenance, engineering, and renewables project development. He previously led the nation's Modern Grid Strategy for DOE's National Energy Technology Laboratory. He has worked with more than 20 utilities in Smart Grid strategies, renewables strategies, power system optimization, and microgrids. He has designed more than 50 microgrids.

Mr. Pullins is the past Chair of the IEEE PES Intelligent Grid Coordinating Committee, a member of the Transactive Energy Association, an Advisor to the Microgrid Institute, and a member of the World Alliance for Decentralized Energy. He has advised several international utility and government organizations on Smart Grid technologies and operations, microgrid development, integrating intelligence, new power generation, and waste to energy issues. He holds a BS and MS in Engineering.

With Hitachi Energy Solutions, Mr. Pullins provides thought leadership and contributes to strategic direction of Hitachi's Microgrid and DER business in North America. He serves as Technical Advisor to Program/Project Managers and Engineers to define scope, budget, schedule and quality of deliverables for microgrid projects.

- Designed more than 50 microgrids for utilities, commercial clients, and municipal clients
- Designed SDG&E/DOE Borrego Springs Microgrid Demonstration Project (4.5 MW Utility Microgrid), the nation's first community microgrid
- Technical lead, US / Russia Smart Grid Deployment Impediments, Obama / Medvedev Joint Presidential Commission on Energy
- California State University Campus Microgrid Feasibility Study (2 MW)
- Lead developer on Hamden CT Microgrid Development
- Hawaiian Electric Owner's Engineer for Smart Grid Deployment Plan
- Developer for Horizon Microgrid Solutions Low Income Housing Microgrid Project - San Diego
- San Clemente Island Microgrid Project
- Leader, State of West Virginia Smart Grid Implementation Plan
- Leader, San Diego Smart Grid Study
- Leader, Puget Sound Energy Green Grid Study
- Advisor, North Carolina State University Smart Microgrid committee

Mr. Pullins is also a US Navy veteran - Qualified Nuclear Submarine Officer and Chief Nuclear Engineer.

Mr. Pullins is the author of more than 30 papers on Smart Grid and microgrid issues, and a frequent speaker on the new energy frontier

Expertise

Microgrid Design

Microgrid Project Development

Energy Storage

Renewable Energy Technologies

Smart Grid Strategies

Credentials

M.S. Nuclear Engineering,
University of Wisconsin

B.S. Engineering Physics
(Materials Engineering),
Wright State University

Miscellaneous:

Top 100 Movers & Shakers
in the Smart Grid
Movement, GreenTech
Media, 2009 - 2012

Chair, Intelligent Grid
Coordinating Committee,
IEEE Power & Energy
Society

Advisor, Microgrid Institute

Member, Transactive
Energy Association

Co-Editor, Electrification
Magazine

Representative, Microgrid
Alliance



Brian Levite, CEM, CDSM
Senior Manager
Hitachi Energy Solutions

Mr. Levite is responsible for Business Development and Customer Engagement for Hitachi's Energy Solutions Division. Mr. Levite has more than 16 years of experience in project management for energy efficiency and renewable energy programs. He is an Association of Energy Engineers Certified Energy Manager and Certified Demand Side Manager. Mr. Levite is the co-author of Energy Resilient Buildings and Communities: A Practical Guide, which provides decision makers with strategies to understand and improve their organization's energy resilience.

Expertise

Energy Efficiency

Microgrids

Business Development

Strategic Planning

Credentials

M.A., Public Policy, American University

B.A. Environmental Policy and Political Science, American University

Mr. Levite has managed many energy projects, including:

- Multiple microgrid feasibility assessments for communities through NYSERDA's NYPrize program, helping those communities to understand the technical, economic, resilience and sustainability factors in a potential community-wide microgrid.
- An energy management program for the National Park Service including strategic energy planning, portfolio analysis and on-site energy audits of national parks.
- Design of and instruction for a community energy strategic planning academy where local government planners could learn about strategic energy planning.
- \$1.2 Million in annual analysis grants for the Department of Energy's office of Budget and Analysis to better understand how market and technological developments would impact energy policy and research foci.
- Multiple analysis white papers of Federal energy policy to determine the impacts and optimal designs of proposed energy programs.
- Design and implementation of a holistic energy management program for the Maryland school system – including both energy efficiency improvements and classroom engagement.
- Engagement of commercial office and healthcare partners in the EPA ENERGY STAR program – assisting them with strategic energy planning, portfolio analysis and energy education efforts.

**Michael S. Uhl, CEM, CDSM, LEED AP
Manager
Hitachi Energy Solutions**

Expertise

Energy Efficiency

Microgrids

Sustainability

Process Improvement

Mr. Uhl is responsible for microgrid design and development for Hitachi's Energy Solutions Division. Mr. Uhl has more than 10 years of experience as a technical leader, project manager and systems thinker. He provided energy assessments and sustainable solutions to public and private clients in hundreds of buildings and millions of square feet of space. Mr. Uhl modeled more than 100 microgrids across North America. His customers include IBM, AT&T, NBC Universal, US DOE, US Navy, NYC Housing Authority, Department of Health and Human Services, National Park Service, and more.

Mr. Uhl has strategized and managed many technology solutions. Examples involving energy projects include the following:

- Design and technical evaluation of 12 NYPrize projects across New York.
- Led and managed project deliverables and technical direction of microgrid design and resiliency services, with total value of \$35M for a major manufacturing facility in Oklahoma.
- Delivered solution development and technical direction of energy savings performance contracting projects for a Fortune 100 telecommunications company, in excess of \$6M project revenue annually. Developed energy and cost savings models and audits for specific technology applications, including variable frequency drives, light emitting diodes (LED) luminaires, wireless networked motion-sensors, electric power metering, automated demand response control, photovoltaics, envelope weatherization, and all-variable speed cooling plant optimization.
- Conducted ASHRAE Level II audits for a range of facilities across the US (Alaska to Florida) including office spaces, national landmarks, amusement parks, restaurants, retail spaces, and historic buildings. Led and managed project deliverables, staff training, and technical recommendations.
- Conducted ASHRAE Level II audits for healthcare facilities, including more than 2 million square feet of building space. Assessed client's energy savings opportunities, compliance with mandates, and identified \$1.4M of annual cost savings with a payback of 2.5 year payback.
- Presented investment scenarios to decision makers including options that provided lowest costs, largest utility savings, and greatest environmental benefit with life cycle analysis. Achieved financial returns of \$1M investments in facility upgrades.

Credentials

M.S. Environmental Planning
& Management, Johns
Hopkins University

B.S. Mechanical Engineering,
Pennsylvania State University



Alex Rakow
Senior Project Manager
Hitachi Energy Solutions

Mr. Rakow has six years of experience working on energy resilience, sustainability, and climate adaptation projects for public and private clients. As a project manager for Hitachi Energy Solutions, he is focused on the design and deployment of microgrids for communities and other institutions. He is the author the book "Energy Resilient Buildings and Communities," from Fairmont Press. In 2013, Mr. Rakow developed an award winning energy microgrid solution with colleagues at Hitachi Consulting.

Mr. Rakow has managed many microgrid, energy management, and climate change adaptation projects. Examples include the following:

- Served as project manager for Hitachi's participation in Stage 1 of the New York Prize microgrid program, including completion 12 feasibility assessments for community scale microgrids.
- Served as project manager for in-depth resiliency assessment of all properties managed by the Philadelphia Housing Authority.
- Led the development of climate change mitigation and adaptation plans the National Park Service, for parks across the country.
- Created system for rating the environmental sustainability performance of national parks in the Southeast Region of the National Park Service.
- Created mobile software system for the National Park Service for the gathering of environmental and energy performance data in the field.

Expertise

Energy Resilience

Microgrids

Feasibility Studies

Project Management

Credentials

M.A., Development
Economics, Johns Hopkins
University

B.S. Applied Ecology, Cornell
University

Certified Building Operator,
Northwest Energy Efficiency
Council

Miscellaneous:

Author of book: *Energy Resilient Buildings and Communities, A Practical Guide*, 2015, from the Freemont Press.



Scott Almond, PE, CxA
LEED AP
Senior Manager, Engineer
Hitachi Energy Solutions

Mr. Almond is responsible for Management of design for Microgrid and power plant projects for Hitachi's Energy Solutions Division. Other responsibilities include detail construction budgets and quality control of the feasibility studies. Mr. Almond has more than 30 years of experience in design, maintenance, and construction of commercial/industrial utility systems. He is a licensed Professional Engineer and certified commissioning agent. He has managed and designed energy-related projects ranging from high performance facilities to large utility plants to high security BSL laboratories. He has also designed and managed construction of large steam and chilled water plants for the federal government. Experienced also in power generation utilizing Combined Heat Power gas turbines for both the universities and the federal government.

Mr. Almond has designed and managed many projects. Examples involving energy projects include the following:

- Modeling and design of Microgrids for Canada and in the US.
- Energy modeling and assessment for commercial and industrial facilities.
- Engineered financial model development for an online remote microgrid modeling tool being developed by Oak Ridge National Laboratories for the Department of Energy.
- Lead Project Engineer for Pentagon DOD utility plant revitalization projects which included redesign of plant controls and energy conservation measures for the steam plant.
- Redesign project for the turbo charger on combined heat and power generators for utility company in Connecticut.
- Feasibility Assessments for several community microgrid projects in Ontario, Canada.
- Energy assessments for implementation of conservation measures for Data centers, academic facilities, industrial facilities and various commercial facilities.
- Lead commissioning agent for Data centers, academic facilities, industrial facilities and various commercial facilities.
- Lead design engineer for a high temperature high pressure hot water plant for Adelphi Army Research lab in Maryland.

Expertise

Project Management

Microgrids

Mechanical Design
Engineering

Electrical Design Engineering

Utility Plant design

Credentials

B.S. Mechanical Engineering,
North Carolina State
University, NC

Professional Engineering
License, PE

Certified Commissioning
Agent, CxA

LEED Accredited



Iris Lin
Manager, Finance
Hitachi Energy Solutions

Ms. Lin has over 9 years of renewable energy investment evaluation and portfolio management experience. Her primary areas of expertise are financial modeling and analysis, investment due diligence and evaluation, and portfolio monitoring and valuations. She has evaluated more than 30 clean energy projects and worked closely with project developers, development banks, financial institutions and institutional investors on financing and structuring investments globally. Ms. Lin has extensive experience on project finance for clean energy projects, investor reporting and relations. Her finance and accounting background allows her to identify and manage key risks to ensure investment performance in line with stakeholders' expectations.

Ms. Lin holds an MBA from University of Washington and a BBA in Accounting from National Taiwan University.

Ms. Lin has been involved in various clean energy investment projects. Example of her project experience includes the following:

- Provided modeling, due diligence, and analysis support for fund manager and developers on the financing of clean energy projects in Asia, Eastern Europe, and Latin America.
- Performed market analyses and formulated exit strategies for Chinese hydro projects totaling more than 150MW.
- Prepared life cycle cost analyses including tax credits, depreciations, financing costs, equipment costs, and O&M cost components for ethanol, solar, hydro, and wind projects.
- Created the financial model for the online remote microgrid modeling tool being developed by Oak Ridge National Laboratories for the Department of Energy.
- Developed and delivered forecasting and budgeting tools.
- Overseen portfolio performance and investor reporting for \$200 million funds.

Expertise

Renewable Energy

Project Finance

Financial Modeling

Financial Analysis and
Reporting

Portfolio Management

Credentials

MBA, University of
Washington

B.B.A. Accounting, National
Taiwan University

Certified Public Accountant,
Taiwan

HITACHI

Inspire the Next

Hitachi, founded in Japan in 1910, is a global leader in technology solutions, with nearly \$90B in worldwide sales. Hitachi has established itself as a global leader in distributed generation and microgrid technology. By leveraging its experience in software, energy generation, energy storage, and distribution hardware, Hitachi is able to bring an industry-leading understanding of microgrid systems to bear on new projects. Hitachi has been using its experience with on-site generation and electric utility infrastructure to deploy microgrids for many years in Japan and Southeast Asia. This microgrid work took on greater urgency after the Fukushima disaster of 2011. This led not only to Hitachi's increased focus on energy resilience and microgrid capabilities, but also to a broader look at the microgrid market and how Hitachi can engage its customers with these solutions. Hitachi is delivering a unique approach to microgrid development in three ways.

1. A technology and vendor-neutral approach – Hitachi works with each client to understand their energy needs and design the best system to meet those needs. Unlike many other microgrid developers in the market, Hitachi does not insist on using our own products and technology in the systems – instead, selecting the best solution and vendor for each project.
2. Lifecycle cost design approach – Our engineers do not attempt to over-design systems focusing only on the annual peak demand that typically occurs only a few hours out of the year. Instead, our systems are designed to address the annual energy usage over the year, leveraging the existing grid for additional power during peak times. When in island mode, our system leverages energy storage and integrated demand response capabilities to meet power needs 24/7.
3. Multiple ownership options – Hitachi can design, develop and build a system for clients interested in ownership. However, for the many clients that aren't interested in owning the equipment, Hitachi is prepared to finance the entire project as well as provide operation and maintenance services, providing the energy to the client via a long-term energy services agreement.

As microgrid developers, the Hitachi America Ltd. Energy Solutions Division has deep experience assessing the technical and financial feasibility of potential microgrid projects. To date we have conducted over 20 feasibility assessments in North America as a Hitachi Team with individual team members conducting dozens more prior to joining Hitachi. Our team's direct experience with projects like New York Prize (12 community microgrid feasibility studies), JumpSMART Maui, and Borrego Springs (the first community microgrid in North America) provide applicable insight into the evaluation of a variety of microgrid models, including multi-building and clustered microgrids.

The NJ BPU Town Center Microgrid program aligns perfectly with Hitachi's "Social Innovation" strategy. Social Innovation at Hitachi is the imperative to develop and implement technological solutions to create positive social outcomes.

New York Prize Feasibility Studies (12 Total)

Approx. value of contracts (in current US\$):
\$727,000

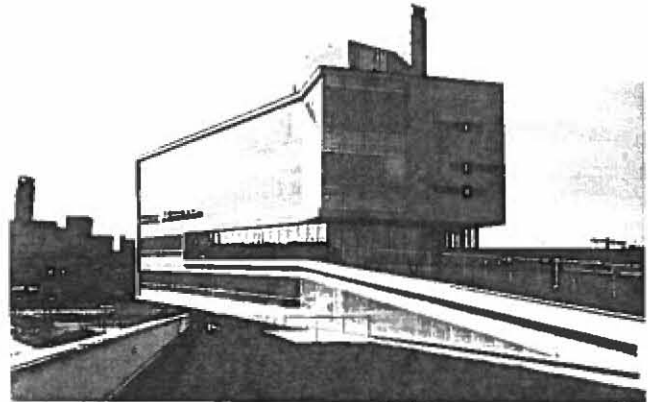
Country: USA

Location within country: New York State

Duration of assignment (months): 14

Name of Clients:

- Tompkins County
- Syracuse University Center of Excellence
- Village of Canton
- Albany County
- City of White Plains
- Village of Croton-on-Hudson
- Village of Irvington
- Village of Ossining
- Village of Warwick
- Village of New Paltz
- Hamlet of Port Washington
- Village of East Hampton
- New York State Energy Research and Development Authority (NYSERDA)



Total No of staff-months of the assignments: 80

Address/email/phone number of example client (info for other NY Prize clients available upon request):

Ed Bogucz
Director, Syracuse Center of Excellence
727 East Washington Street, Syracuse, NY 13244
Phone: (315) 443-4815
Email: ebogucz@syracusecoe.org

Approx. value of the services provided by our firm under the contract (in current US\$ or Euro):
\$425,000

Start date (month/year): 6/2015

Completion date (month/year): 8/2016

Narrative description of Project:

As part of the NY Prize program, NYSERDA provided grants up to \$100,000 to New York communities to conduct feasibility studies for multi-stakeholder microgrids. These systems needed to include both government and non-governmental off-takers and cover critical infrastructure. Hitachi developed proposals for eight New York communities to apply for these funds, and was awarded funding for all

eight. In addition, Hitachi won bids with four other communities to perform their feasibility studies after they had been awarded funding.

Hitachi designed microgrid concepts for each community based on their individual needs and priorities, ensuring in all cases that the proposed microgrid would maximize benefits for resilience, sustainability, and cost savings. We also worked with several communities to design microgrids that would aid in economic development.

As an example, Hitachi teamed with the Syracuse Center of Excellence to conduct a feasibility study for Syracuse's Near Westside neighborhood – a highly economically depressed area with a mixture of residential, small commercial and education facilities. The Hitachi design focused on placing distributed energy resources right at the site of the local sub-station to allow the entire neighborhood to island as a single node.

Services provided by Hitachi staff:

In all twelve projects, Hitachi designed the microgrid concept to be evaluated in the study, conducted all technical and economic modeling, drafted report language for NYSERDA, and evaluated the ownership and financing options for a potential system. Hitachi also did stakeholder management and organizing throughout each project to educate community members about the potential benefits of the microgrid project, and their role in the feasibility process.

JUMPSmartMaui

Approx. value of the contract (in current US\$): \$30M

Country: US

Location within country: Maui Island, HI

Duration of assignment (months): 47 months

Name of Client: New Energy and Industrial Technology Development Organization (Japanese Government Organization)

Total No of staff-months of the assignment: Over 500 staff-months

Address/email/phone number of Client:

Mr. Kazuyuki Takada,

New Energy and Industrial Technology Development Organization (Japanese Government Organization)

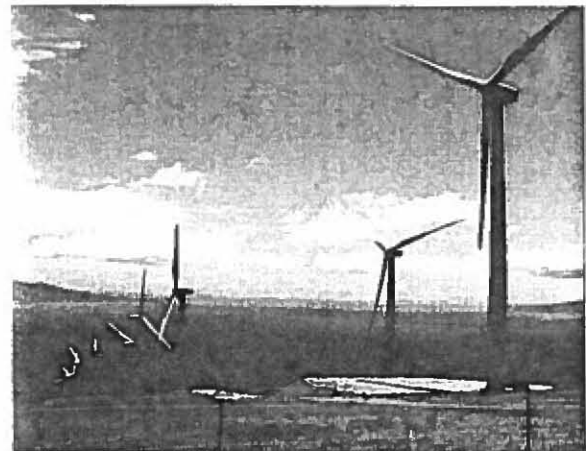
Tel : +81- 44-520-5269

E-mail : Takadakzy@nedo.go.jp

Approx. value of the services provided by your firm under the contract (in current US\$ or Euro):

Start date (month/year): May /2011

Completion date (month/year): March/2015



No of professional staff-months provided by associated Consultants: 0

Narrative description of Project:

The JUMPSmartMaui project, a joint undertaking by the U.S. and Japan, will be aimed at demonstrating a world-leading smart grid on Maui, a Hawaiian island. The Project is supported by NEDO, in cooperate with the U.S. State of Hawaii, Hawaiian Electric Company, Inc., the University of Hawaii, and Pacific Northwest National Laboratory, whose involvement is based on the Japan-U.S. Clean Energy Technologies Action Plan, which was agreed to following the Japan-U.S. heads of state summit held in November 2009. On the island of Maui, 15% of the electricity supply is already generated by renewable energy, and there are plans to increase this percentage going forward. The goal of the Project is to verify cutting-edge technologies in a smart grid under the use of large volumes of renewable energy already in place, contribute to smart grid standards, and implement a low-carbon social infrastructure system that efficiently uses renewable energy on a remote island where electricity costs are relatively high. Hitachi built and tested a system that applies the latest technologies that include: power distribution control, demand side load control, IT/OT platform & communications, electric vehicles (EVs) operation and charging control, EV DC Fast chargers. One main focus of the project was to leverage EVs for energy management and distribution grid reliability on the island, that is, to mitigate the excess wind generation and the fluctuations in power frequency and voltage when large volumes of renewable energy with weather-dependent are added to a power grid.

Services provided by Hitachi staff:

Hitachi provided the following services as part of the JUMPSmartMaui project:

- Project feasibility study
- Products: Battery energy storage system, EV DC-Fast Charger and low-voltage monitoring & control devices
- Software and system integration: residential demand response, EV charging station and services, battery energy storage system and distribution management system.

EPC: Battery energy storage system and EV charging stations

Customer engagement for EVs and households

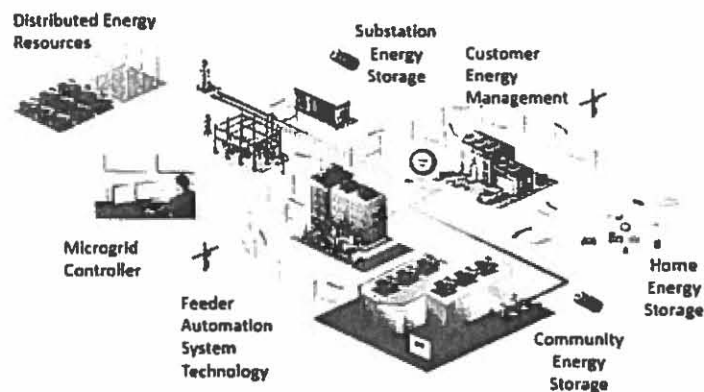
Operation & Maintenance

Additional Team Experience:

Borrego Springs Microgrid, California

The project leader for this proposal, John Westerman, led the project to design, install, and operate the first community scale microgrid in the U.S., at Borrego Springs, CA. The microgrid was located on an existing utility circuit with a peak load of 4.6 MW, serving 615 customers, with a significant installed base of PV (800 kW), in a remote area of the service territory.

The Borrego Springs project was a first test for many of the technologies and practices that now form the basis of modern community microgrids, and Mr. Westerman's experience developing these applications. The Borrego Springs microgrid project was based on detailed load studies and projections, so DER could be carefully sized to run continuously and meet loads without exporting to the grid.



This project differed from previous efforts and has extended the knowledge base as follows:

- The microgrid supported actual customers in a real operating environment.
- The project is at significant scale (>4MW).
- The microgrid design incorporates both reliability and economic-oriented operations.
- Microgrid operations investigate the technical and economic interactions of multiple resources.
- The project used pricing signals to guide operations.

The project focused on the installation, integration and operation of the following key technologies:

- Distributed Energy Resources (Diesel Generators, DG)
- Advanced Energy Storage (grid-scale, community-scale, and residential-scale)
- Feeder Automation System Technologies
- Price-Driven Load Management
- Integration with DMS/OMS and Microgrid Controls

14. An EDC and GDC LOS.

Camden County is served by PSE&G which has submitted a letter of support for this project. Please see the attached.



March 16, 2017

The Honorable Jeffrey Nash, Camden County Freeholder
520 Market Street 8th Floor,
Camden, NJ 08102

Dear Mr. Nash:

This correspondence will serve to demonstrate PSE&G's support of your application to the Town Center Distributed Energy Resource Feasibility Study Incentive program. PSE&G will work with Camden county officials and its consultant to develop and submit your feasibility study, if selected for funding.

PSE&G will support your study in the following ways:

- PSE&G will provide building load data for all buildings included in your microgrid feasibility study, contingent on receiving approval from the owners of each of the buildings to release its electric and gas load data to the community or its consultant.
- PSE&G will provide technical support to the community's consultant in the development of your feasibility study. Release of any confidential or proprietary technical information will require the execution of a Non-Disclosure Agreement between all parties.

Mr. Michael Coyle will continue to be the primary point of contact for PSE&G to coordinate our efforts with your team. Please feel free to reach out to me at 856-778-6705 if you have any technical questions.

Sincerely,

A handwritten signature in black ink that reads "Michael Henry". The signature is written in a cursive, flowing style.

Michael Henry
Distribution Business Team Leader



State of New Jersey
BOARD OF PUBLIC UTILITIES
44 SO. CLINTON AVENUE
THIRD FLOOR, SUITE 314 - P.O. BOX 350
TRENTON, NEW JERSEY 08625-0350

CHRIS CHRISTIE
GOVERNOR

KIM GUADAGNO
LT. GOVERNOR

RICHARD S. MROZ
PRESIDENT
TEL: (609) 777-3310
FAX: (609) 292-2264

April 17, 2017

Freeholder Jeffrey Nash
Mr. Andy Kricun
1645 Ferry Avenue
Camden, NJ 08104

Dear Messrs. Nash and Kricun:

The NJBPU Town Center DER Microgrid Evaluation Team (Evaluation Team) has received your application for a TC DER microgrid feasibility study incentive. While this application was accepted for evaluation, there are a number of items that are required to be submitted in order to complete that evaluation. These items are listed below:

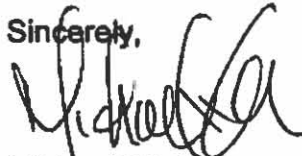
1. A general description of the overall cost

BPU has received 13 proposals for feasibility study incentives. The Board's approved DER microgrid line item budget is \$1 million. The 13 proposals significantly exceed that budget. The TC DER evaluation team is requiring that you submit a best and final offer (BAFO) for your proposal. This BAFO should include your estimated breakdown of the budget for the prime investigator and all subcontracts including any estimated fees to be paid to the EDC/GDC. The above noted items, the BAFO and the budget breakdown of the prime investigator and subcontractors should be submitted to TCDERmicrogrid@bpu.nj.gov by close of business (COB) 5:00 p.m. on May 1, 2017. Non-submittal of the additional items, the BAFO and budget breakdown will result in a non-completeness determination of the proposal.

April 17, 2017
Page 2

As noted in the TC DER microgrid feasibility study application, the Board has the sole discretion over the approval of projects and awards of incentives, and may change criteria or available funding at any point during the duration of the program.

Sincerely,

A handwritten signature in black ink, appearing to read "Michael Winka", written over the printed name below.

Michael Winka
Senior Policy Advisor



THE CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

1645 Ferry Avenue • Camden, NJ 08104
Phone (856) 541-3700 • Fax (856) 964-1829
www.ccmua.org

May 1, 2017

Mr. Michael Winka, Sr. Policy Advisor
NJ Board of Public Utilities
44 S Clinton Avenue
Trenton, NJ 08625

April 27, 2017

RE: Town Center MG Grant Application

To Whom It May Concern,

Camden County in conjuncture with Camden County Municipal Utility Authority and Covanta, is pleased to submit the requested general description of the overall cost information for the NJBPU Town Center DER Microgrid Grant Program.

The following is a breakdown of the Best and Final Offer for our proposal:

Lead Investigator –	Greener by Design	\$75,000
Sub-Consultant –	Hitachi	<u>\$75,000</u>
Total Request -		\$150,000

Sincerely,

A handwritten signature in black ink, appearing to read "Andrew Kricun".

Andrew Kricun, P.E., BCEE
Executive Director/Chief Engineer

Cc: General Files



Making It Better, Together.

www.camdencounty.com

Town Center Distributed Energy Resources Microgrid Feasibility Study Report Requirements

As set forth in the MOU the Town Center (TC) Distributed Energy Resource (DER) Microgrid Feasibility Study Report should be of sufficient detail to demonstrate how the TC DER Microgrid's functional and technical requirements will be executed, the proposed approach to solve technical problems, and how project goals will be accomplished.

The TC DER Microgrid Feasibility Study Report should include an Executive Summary including all project definitions and special terms used in the Report.

The full report must include, but is not necessarily limited to, the following

1. Table of Contents
2. Project Name
3. Project Applicant – This should be the local government or state agency that is the MOU signatory.
4. Project Partners – This should include any agreements entered into by the partners.
5. Project location – This should include a detailed mapping of the boundaries on the TC DER microgrid within the municipality.
6. Project Description including a detailed description of all included critical facilities with a description of why they are critical facilities within the proposed TC DER Microgrid. The Project Description should include the following:¹
 - i. The electrical and thermal loads for each critical facility over the month and year. This should include a description and illustration of any variability in loads including daily, weekend or seasonal loads that impact on the peak, minimum and average loads.
 - ii. The electric and thermal load of the total microgrid project over the month and year. This should include a description and illustration of any variability in loads including daily, weekend and seasonal loads that impact on the peak, minimum and average loads as well as the coincident loads of the overall system.

¹ The energy data in this section and the full report should be provided through metered data were available but may also be provided through simulated data from models such as EnergyPlus. If the data is simulated the specific software and model should be identified and available.

- iii. The monthly and annual energy costs for each critical facility and the overall project including both energy and demand costs. This should include the monthly cost and any variations over the year that could impact demand costs.
- iv. The square footage of each building and the total project.
- v. The overall boundaries of the proposed project and distance between critical facilities should be provided. A map should be provided showing the locations of any Right of Way (ROW) crossings.
- vi. The size of the available emergency shelter facilities and for what periods they can serve during and after an emergency.
- vii. The specific FEMA Category Classification of each building and whether they are a state or federal designated critical or emergency facility.
- viii. A listing of all potential permits, permit issuing agency, and general timeframe for issuance.
- ix. Any previously installed EE or energy conservation measure (ECM) or currently implemented demand response (DR) measure.

6. A detailed description of the ownership/business model for the overall project including all procurement issues between the various local government and state government partners. This should include a detailed description of the statutory and regulatory provisions of proposed ownership models, EDC/GDC utility roles, as well as any billing systems for electricity and thermal energy.

7. A detailed description of the technology, business and operational protocol to be developed and/or utilized and the location within the TC DER Microgrid. This should include the following:

- i. A detailed description of the proposed connections (electric, gas and/or thermal) of the critical facilities and the DER technologies.
- ii. A one line diagram of the microgrid and location of the electrical connections to the EDC's facilities/equipment.
- iii. A detailed description of the type of distribution system the TC DER would be interconnecting into (radial or network) and the interconnection procedures and requirements.
- iv. A detailed description of how the TC DER will black start and operate and over what time period in island mode and in sync with the distribution system.

v. A detailed description of the NJBPU and EDC tariff requirements/issues including any smart grid or distribution automation upgrades proposed or under development by the EDC.

vi. A detailed description of the FERC and PJM tariff requirements/issues.

8. A detailed description of the overall cost including site prep, equipment and equipment installation, construction, operations and maintenance including a detailed construction schedule. This should include a detailed description of the overall energy costs for each critical facility and the overall project as well as any proposed ECM or DR measure to be constructed or operated within each critical facility and the overall project and its impact of the overall operation costs.

(Both 7 and 8 should be detailed through an available microgrid modeling efforts. Applicants must also demonstrate that their proposed project is consistent with the use of the Societal Benefit Charge as set forth in N.J.S.A. 48:3-60(a)(3)).

9. A detailed cash flow evaluation. This should also include a description of the potential revenue markets for any ancillary services, demand response including EE, capacity or energy markets and any available emission or energy certificate trading markets.

10. A detailed description of the potential financing of each location/critical facility and/or the overall project.

11. A detailed description of the benefits of the proposed Town Center DER Microgrid as well as the need for the proposed project. This should include an estimate of the value for reliability, resiliency, flexibility, sustainability including avoided environmental impacts such as air emissions, water usage, wastewater discharges, land use and waste generation, affordability and security.²

12. A general description of the communication system between the TC DER microgrid and the EDC's system. This should include a detailed description of distribution management systems and controls and all building controls.

13. The estimated timeframe for the completion of the construction and commencement of operations of the individual critical facilities and the overall project.

14. A description of the on-going work with the EDC and GDC.

The overall quality of the TC DER microgrid feasibility study report and the data provided will be one factor used by the Board to determine which projects proceed to a Phase 2 – Detailed Engineering Design and TC DER microgrid pilot.

² This valuation should follow the Grid Services and Technologies Valuation Framework developed by the USDOE in their Grid Modernization Initiative.

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MEMORANDUM OF UNDERSTANDING
BETWEEN AND AMONG
THE NEW JERSEY BOARD OF PUBLIC UTILITIES,
AND
CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY

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THIS MEMORANDUM OF UNDERSTANDING (“MOU”), is made this ____ day of _____, 2017, by and between The CAMDEN COUNTY MUNICIPAL UTILITIES AUTHORITY (“Recipient”) and The NEW JERSEY BOARD OF PUBLIC UTILITIES (“BPU” in general or “Board” when referring to Board of Commissioners) (collectively the “Parties”) setting forth the roles and responsibilities of the Parties in connection with the Town Center Distributed Energy Resource (TCDER) Microgrid Feasibility Study Incentive Program (“Program”).¹

WHEREAS, the BPU is charged with the authority to ensure that safe, adequate, and proper utility services are provided at reasonable, non-discriminatory rates to all members of the public who desire such services and to develop and regulate a competitive, economically cost effective energy policy that promotes responsible growth and clean renewable energy sources while maintaining a high quality of life in New Jersey; and

WHEREAS, as set forth in N.J.S.A. 48:2-13, BPU is responsible for regulatory oversight of all necessary services for transmission and distribution of electricity and natural gas including but not limited to safety, reliability, metering, meter reading and billing; and

WHEREAS, the BPU is chair of the Energy Master Plan Committee and is responsible for the preparation, adoption and revisions of the Energy Master Plan (EMP) regarding the production, distribution, and conservation of energy in this State; and

WHEREAS, the BPU 2015 Energy Master Plan Update (EMP Update) established a new overarching goal to “Improve Energy Infrastructure Resiliency & Emergency Preparedness and Response” in response to several extreme weather events that left many people and businesses without power for extended periods of time. One “Plan for Action” policy

¹ Acronyms related to this program are referred to herein are as follows: Town Center (TC); Disributed Energy Resource (DER);

31 recommendation included in the EMP Update is to “Increase the use of microgrid technologies
32 and applications for Distributed Energy Resources (DER) to improve the grid’s resiliency and
33 reliability in the event of a major storm.”; and

34 **WHEREAS**, specifically, this new policy recommends that:
35
36 “The State [of New Jersey] should continue its work with the [United States Department of
37 Energy], the utilities, local and state governments and other strategic partners to identify, design
38 and implement Town Center DER microgrids to power critical facilities and services across the
39 State.”; and

40 **WHEREAS**, The Board approved the FY17 Clean Energy Program Budget
41 which established as part of the Office of Clean Energy Distributed Resources Program, the
42 Town Center DER Microgrid Program and budget.; and

43 **WHEREAS**, The BPU staff has, under the direction and approval of the Board,
44 issued a full report and recommendations regarding the utilization of TCDER Microgrids and
45 subsequently issued an application for this Program; and

46 **WHEREAS**, the Recipients who are Parties to this MOU freely and voluntarily,
47 in full consideration of the costs and benefits incident hereto, submitted an application to
48 participate in the Program; and

49 **WHEREAS**, BPU Staff issued a draft application for public comment regarding
50 this Program on August 5, 2016, a public meeting to discuss the draft application on August 23,
51 2016, and written comments were received and considered and staff responses were published;
52 and

53 **WHEREAS**, the Board, by virtue of proper procedure, and execution of this
54 MOU, has determined that the Recipient’s application is approved and incentive funds will be
55 awarded to the Recipient, pursuant to the terms included herein;

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NOW THEREFORE, in consideration of the promises and mutual representations, warranties, and covenants herein contained, the receipt and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

I. INCORPORATION

All of the above recitals, the entirety of the TCDER Micrigrd Feasibility Study Incentive Program Application (attached hereto as Appendix A), the entirety of the Recipient’s submitted application (Sumbittal letter which references recipient’s application is attached hereto as Appendix B), The Best and Final Offer request letter and recipient’s response thereto (attached hereto as Appendix C), and final Feasability Study Report Requirements (attache hereto as Appendic D) are hereby incorporated by reference into this MOU as if set forth at length herein.

II. SCOPE OF THE AGREEMENT

This MOU applies only to the Feasibility Study phase of the Program which encompasses the incentive award funding for the satisfactory completion and submission of the Recipient’s TCDER Microgrid Feasibility Study only. Conformance to the terms of this MOU and timely completion of the Feasibility Study does not guarantee Recipient’s future participation in this Program or any other related programs. Furthermore, the terms and conditions included herein represent the entire scope of this agreement and supersede all former representations whether written or verbally communicated.

III. DUTIES OF THE PARTIES

A. The Recipient will submit a complete and final TCDER Microgrid Feasibility Study (The Study) in accordance with the terms and conditions of this MOU and incorporated documents.

80 B. The Recipient shall have one (1) year from the date that this MOU is executed to
81 complete The Study, unless a timely request for extension is submitted by the recipient for good
82 cause and is granted by Board Staff.

83 C. Recipient shall include in the Feasibility Study a Conceptual Design that should
84 be of sufficient detail to demonstrate how the TCDER Microgrid functional and technical
85 requirements will be executed, the proposed approach to solve technical problems, and how
86 project goals will be accomplished. The Recipient's Conceptual Design shall include at a
87 minimum: (1) Design Analysis including design narrative and design calculations for all
88 disciplines, an intended specifications list, environmental permitting memorandum that identifies
89 any and all required permits and the detailed outline of process required to obtain the identified
90 permits; (2) Schematic or one-line concept drawings; (3) Conceptual cost estimate; (4)
91 Preliminary construction schedule in bar chart format; and, (5) Project definitions and special
92 conditions.

93 D. Recipient shall report to Board Staff regarding the status and progress of The
94 Study upon request.

95 E. The Recipient is solely responsible for fully complying with the terms and
96 conditions of this MOU, the above-referenced incorporated documents, and any and all duly
97 executed subsequent agreements between the Parties.

98 F. Effective upon execution of this MOU, BPU agrees to firmly commit the sum of
99 \$150,000, to cover costs to be incurred by the Recipient to administer, complete, and deliver the
100 Feasibility Study.

101 G. All requisitions, pay applications, and invoices submitted for costs or expenses
102 associated with the Feasibility Study shall be subject to review and approval by Recipient
103 according to its standard procedures. Upon approval, Recipient shall promptly submit to BPU for

104 payment all such requisitions, pay applications and invoices. In reviewing, approving, submitting
105 and paying such requisitions, pay applications, Recipient and BPU shall be cognizant of and
106 shall comply with the requirements of the New Jersey Prompt Payment Act, N.J.S.A. 2A:30A-1
107 et seq.

108 H. Recipient shall submit all final invoices of expenditures and a final draft of the
109 Study within one year of the execution of this MOU or at the end of an approved extension
110 pursuant to Section III B of this MOU.

111 I. Upon receipt of the Study and final invoices of expenditures, BPU Staff shall
112 determine if the Study meets the requirements of the program and the MOU at Section III C. If
113 BPU Staff determines that the Study does not meet any requirement(s), BPU Staff shall provide
114 to Recipient a list of requested revisions which recipient shall forward to the consultant that
115 completed the Study. The consultant shall then be afforded a reasonable period of time to make
116 the requested revisions and will then resubmit the Study. Final payment shall be made upon
117 BPU Staff approval of the Study.

118 J. Incentive funds for this program may not be diverted to pay for any work
119 conducted prior to the date of execution of this MOU. Furthermore, Incentive funds must only
120 be used in furtherance of the completion of the Feasibility Study specifically.

121 K. Recipient shall procure the services necessary to complete the Feasibility Study in
122 compliance with N.J.S.A. 52:32-2, N.J.S.A. 52:34-9.1, et seq., and N.J.S.A. 52:35-1, et seq.,
123 and any and all applicable State and local procurement laws, rules, and procedures.

124 L. The BPU reserves the right to withhold or deny incentive funding for any invoice
125 items submitted by Recipient that BPU determines to be unlawful or otherwise inappropriate for
126 this Program.

127

128 **IV. DESIGNATED REPRESENTATIVES**

129 Written communication between the Parties for the purpose of this MOU as defined
130 above shall be delivered to the following representatives.

131 New Jersey Board of Public Utilities
132 Attn: Michael Winka Sr Policy Advisor
133 44 S. Clinton Ave, Trenton, NJ 08625
134 Michael.Winka @bpu.nj.gov

135
136 Local Gov
137 Attn:
138 Addresss
139 XXXX.YYY@abc.gov
140

141 **V. MISCELLANEOUS**

142 A. No Personal Liability. No official or employee of BPU shall be charged
143 personally by Recipient, its employees, agents, contractors, or subcontractors with any liability
144 or held liable to Recipient, its employees, agents, contractors, or subcontractors under any term
145 or provision of this MOU or because of its execution or attempted execution or because of any
146 breach or attempted or alleged breach of this MOU.

147 No official or employee of Recipient shall be charged personally by BPU, its employees,
148 agents, contractors, or subcontractors with any liability or held liable to BPU, its employees,
149 agents, contractors, or subcontractors under any term or provision of this MOU or because of its
150 execution or attempted execution or because of any breach or attempted or alleged breach of this
151 MOU.

152 C. Captions. The captions appearing in this MOU are inserted and included solely
153 for convenience and shall not be considered or given effect in construing this MOU, or its
154 provisions, in connection with the duties, obligations, or liabilities of the Parties or in
155 ascertaining intent, if a question of intent arises. The preambles are incorporated into this
156 paragraph as though set forth in verbatim.

157 D. Entirety of Agreement. This MOU and its attachments represent the entire and
158 integrated agreement between the Parties and supersedes any and all prior agreements or
159 understandings (whether or not in writing). No modification or termination hereof shall be
160 effective, unless in writing and approved as required by law.

161 E. Amendments. This MOU may be amended by the written request of any Party
162 and with the consent of the other Party. Any proposed amendment of this MOU shall be
163 submitted by one Party to the other Party at least five (5) business days prior to formal discussion
164 or negotiation of the issue. Any agreed amendment of this MOU shall be set forth in writing and
165 signed by an authorized representative of each Party in order to become effective.

166 F. No Third-Party Beneficiaries. This MOU does not create in any individual or
167 entity the status of third-party beneficiary, and this MOU shall not be construed to create such
168 status. The rights, duties, and obligations contained in this MOU shall operate only between the
169 Parties and shall inure solely to the benefit of the Parties. The provisions of this MOU are
170 intended only to assist the Parties in determining and performing their obligations under this
171 MOU. The Parties intend and expressly agree that only the Parties shall have any legal or
172 equitable right to enforce this MOU, to seek any remedy arising out of a Party's performance or
173 failure to perform any term or condition of this MOU, or to bring any action for breach of this
174 MOU.

175 G. No Assignment. This MOU shall not be assignable, but shall bind and inure to
176 the benefit of the Parties hereto and their respective successors.

177 H. Governing Law. This MOU and the rights and obligations of the Parties shall be
178 interpreted, construed, and enforced in accordance with the laws of the State of New Jersey.

179 I. Authority. By execution of this MOU, the Parties represent that they are duly
180 authorized and empowered to enter into this MOU and to perform all duties and responsibilities
181 established in this MOU.

182 J. Term. This MOU shall be effective as of the date hereinabove written and, unless
183 terminated sooner as set forth below, shall remain in effect until the completion of the Feasibility
184 Study and payment of funds as set forth in Section III.

185 K. Termination. Board Staff and the Recipient may terminate this contract in whole,
186 or in part, when both parties agree that the continuation of the project would not produce
187 beneficial results commensurate with the expenditure of funds. The two parties shall agree upon
188 the termination conditions including the date on which the termination shall take effect, and, in
189 case of partial terminations, the portion to be terminated.

190 K. Counterparts. This MOU may be executed in duplicate parts, each of which shall
191 be an original, but all of which shall together constitute one (1) and the same instrument.

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[SIGNATURE PAGE FOLLOWS]

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IN WITNESS WHEREOF, the parties have signed this Memorandum of Understanding the date first written above.

Witness: Camden County Municipal Utilities Authority

By: _____
.....

Dated: _____

Witness: New Jersey Board of Public Utilities

By: _____
Richard S. Mroz, President

Dated: _____

APPROVED AS TO FORM:
Andrew Kuntz
Attorney General, State of New Jersey

By: _____