
IDEA2022
Building Connections
June 6-9 | Sheraton Centre Toronto Hotel | Toronto, ON
INTERNATIONAL
DISTRICT ENERGY
ASSOCIATION

AtlantiCare to Connect to MTCC for Steam, CHW and Electric – Precursor to Microgrid

Jonathan Wohl

Kyle Gandy, P.E.

Who is DCO?

Founded in 2000

Strong relationships with utility partners – Exelon, PSEG, South Jersey Industries – led to development, operation and/or ownership of over $1 billion in distributed energy plants across North America

Partner-driven culture, focused on long-term client success –
Resiliency, Sustainability and Cost Reduction

Extensive experience in large-scale energy construction, operation and design-build-own-operate projects

Nationally-ranked EPC contractor servicing power, industrial, healthcare, higher education and gaming clientele across North America, with $2 billion in performance bonding capacity with Liberty Mutual

Industry leader in safety and quality assurance/quality control

Problem

Superstorm Sandy and its impact on Atlantic City

- Late October 2012 Atlantic City like many other cities and towns on the eastern seaboard was affected by Superstorm Sandy. Its ability to provide critical health care services, public shelter and maintain police and fire services during – and after – the storm for an extended period of time. Key factors:
  - Atlantic City is a low to moderate income area
  - Mandatory evacuation ordered during the storm – yet 20,000 residents lacked transportation to leave and sheltered in place
  - Flooding lasted over a week and lack of access to services continued
  - Atlantic City is a barrier island with no on-island utility electric generation
  - Electric power serving the city relies on radial utility subtransmission circuit system connecting the island remotely from the mainland electric transmission grid
  - A number of central energy centers/CHP facilities tied to district energy systems continue to operate and generate power during the storm, including Midtown Thermal Control Center

Solutions (Case Study)

Midtown Thermal Control Center (MTCC)

Capacity: 17,000 tons of Chilled Water; 207,000 lbs/hr Steam; 5.4 MW of electric generation

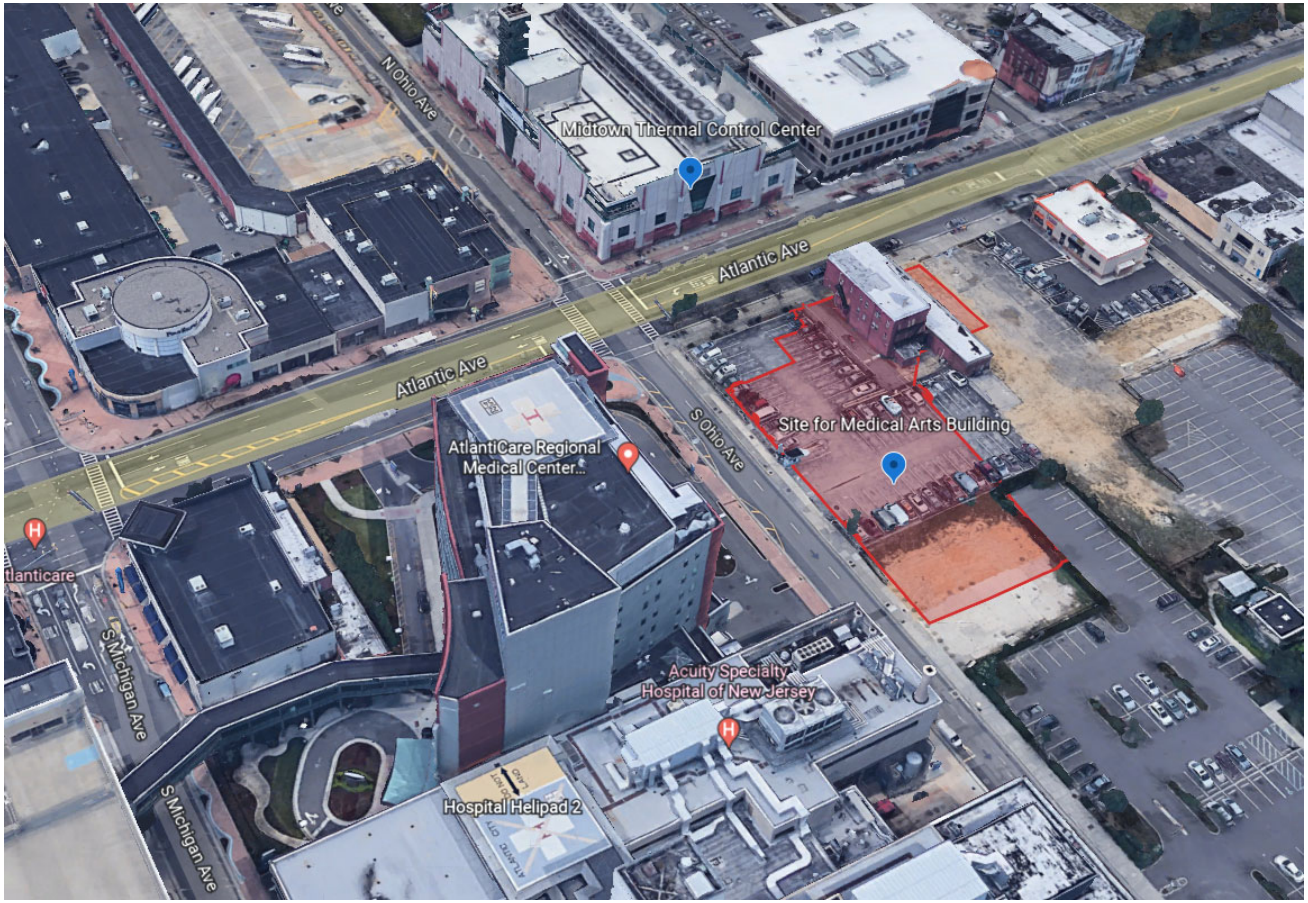
- Downtown Atlantic City district energy system consisting of centralized chilled water and steam production and distribution piping in midtown portion of Atlantic City. Customers on the MTCC system include:
  - Caesars Atlantic City
  - Bally's Atlantic City Hotel & Casino
  - Wild Wild West
  - Claridge Hotel
  - Pier Shops at Caesars
  - Boardwalk Hall
  - Rain Forest Café
  - AtlantiCare in process of connecting to system
- System commenced as central steam and chilled water system with distribution to customers. System utilizes production capabilities of two of customer's – integrating distributed equipment into the system.
- In 2012, a CHP, consisting of Solar Taurus 60 (5.4 MW), HRSG were installed at MTCC.
- In 2016, acquired by ACM Energy Partners, LLC (owned by Basalt Energy Infrastructure Partners and DCO Energy). In 2022, acquired by Vauban Infrastructure Partners, O&M by DCO.

Solutions (Case Study)

AtlantiCare Regional Medical Center and Medical Arts Building

- AtlantiCare Regional Medical Center (ACRMC) in Atlantic City, is a 276-bed teaching hospital, as well as the region's only Level II Trauma Center.
    - The facility has a central boiler and chiller plant and purchase electric from the local utility.
- AtlantiCare's Medical Arts Building, is under construction, and will include medical education classrooms, the maternal/fetal medicine program, an urgent care facility, and a kidney/dialysis care center.
- Both facilities are being connected to the ACM district energy system – for steam and chilled water. Completion at end of 2022.
- In addition, electric to each facility from the ACM facility (CHP) will be provided. DCO filed an application and was successful with the NJBPU that a diagonal crossing to serve the facilities was considered contiguous property and a single customer is defined as a campus in order to provide electric service.

Pictorial View of ACRMC and MTCC



AtlantiCare Medical Arts Building Rendition

Atlantic City Microgrid

- The addition of AtlantiCare (Regional Medical Center and Medical Arts Building) are seen as precursors to the development of the Atlantic City Microgrid.
  - NJBPU developed program for community microgrids TCDER (Town Center Distributed Energy Resources) for municipalities affected by Superstorm Sandy
    - The TCDER program wanted to "improve energy infrastructure resiliency and emergency preparedness and response“
    - Promote microgrid services to facilities designated by Federal Emergency Management Agency (FEMA) as Category III and Category IV (in terms of the consequences and risks to building occupants in the event of a building failure).
  - ACM (through City of Atlantic City) submitted application for Feasibility Study Funding, which was granted
  - Phase Two Incentive Funding was awarded to this project (partial funding for up to 30% design of microgrid) to include participants:
    - Bally’s Atlantic City Hotel & Casino
    - Wild Wild West
    - Caesars Atlantic City
    - AtlantiCare Regional Medical Center and Medical Arts Building
    - Boardwalk Hall

Atlantic City Microgrid

- The development of the Atlantic City Microgrid will provide many benefits to the customer's participating in it, including:
  - Increase electric generation capabilities at MTCC up to 20 MW to provide electric power for all customers. In addition, waste heat from additional generation will be used for non-electric cooling and to offset steam boiler production.
    - Chilled water capacity will include hybrid cooling
  - For off-site customers purchasing thermal energy from a CHP system (MTCC), an exemption from NJ State sales and use tax attributable to electric purchases, currently 6.625%.
  - Resiliency and redundancy of thermal and electric service to customers. Microgrid will provide on island generation source and have "islanding" and black start capabilities.
  - Emissions reduction. Microgrid is estimated to reduce greenhouse gas emissions by 76,034 tons per year (41 percent) based on avoided emissions for electric generation, boilers and use of CHP.
  - Local utility load reduction by using steam based chillers at MTCC. Significant impact on energy efficiency and peak load for region.

Microgrid Technology

The Microgrid is based upon installing additional electric generation to the facility.

- Conceptual design includes a Solar Titan 130 combustion turbine
- Heat Recovery Steam Generator
- Two (2) 2900 ton steam turbine drive chillers using waste steam from combustion turbine.
  - Steam turbine drive chillers will replace existing aging electric chillers and provide the plant with hybrid cooling which will reduce MTCC's electric demand

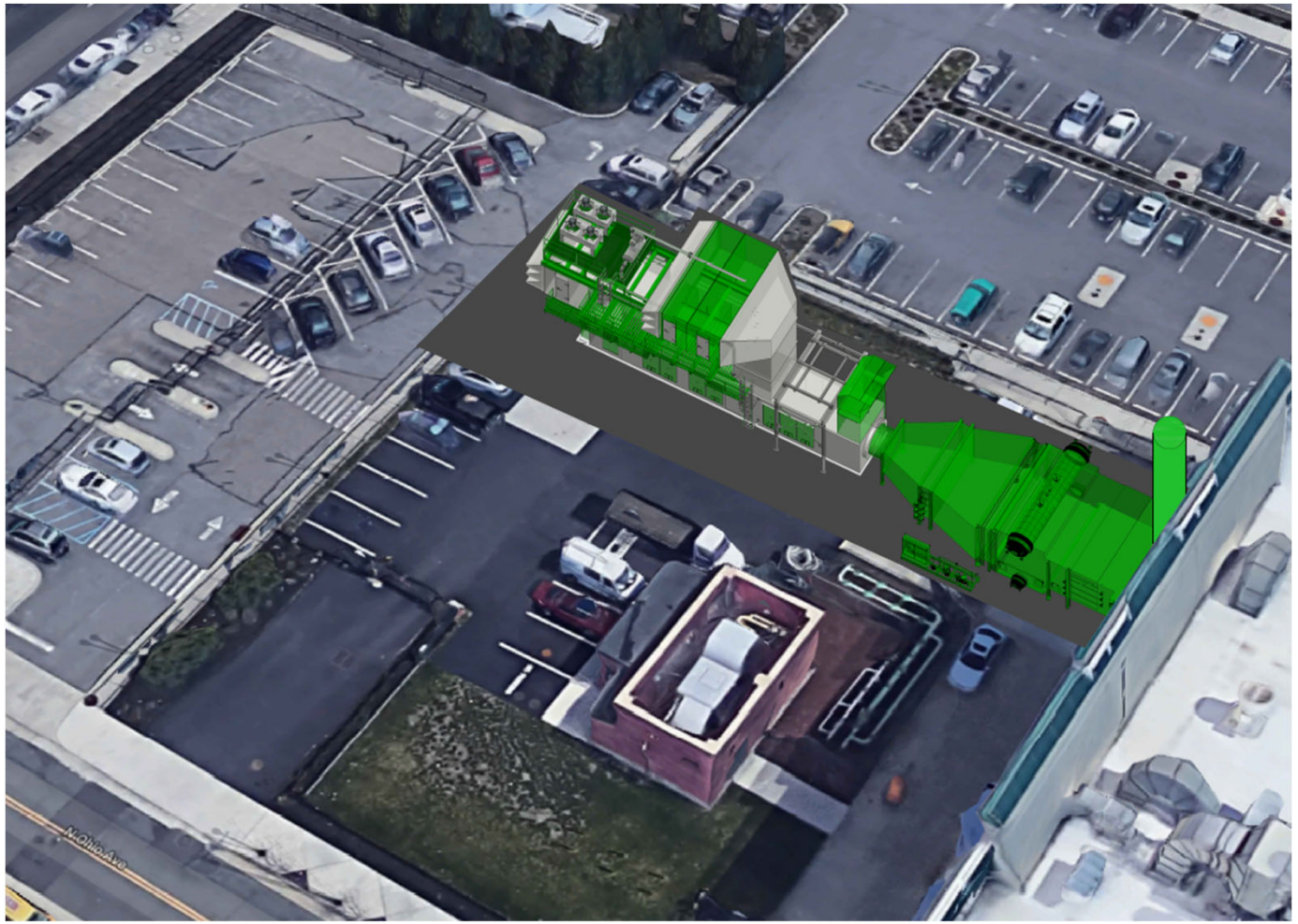
Proposed Hybrid Ownership

- 23 kV Distribution will remain Utility property

- Generating assets will be private property

- Microgrid controller – proposed shared ownership local and remote

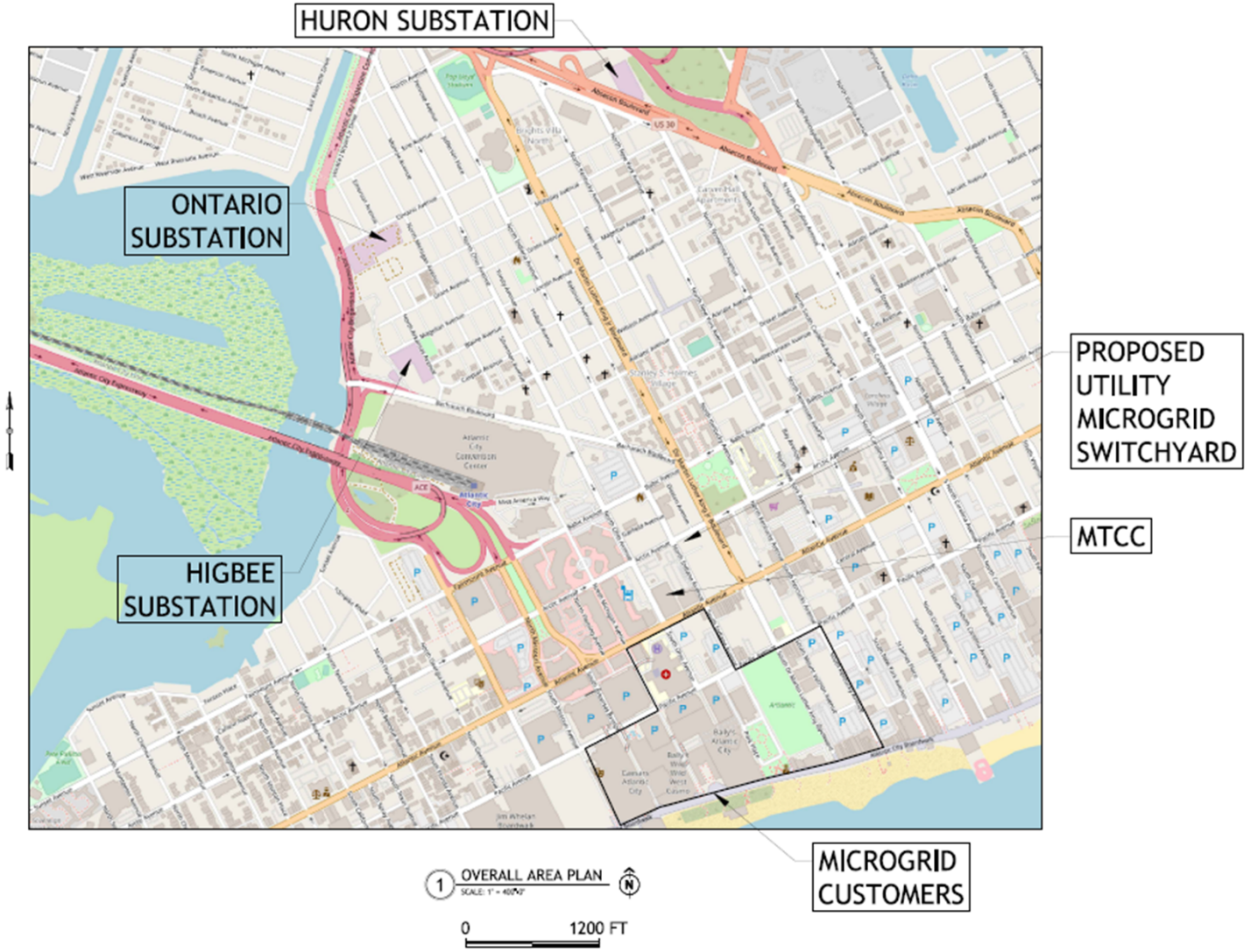
3D Rendering



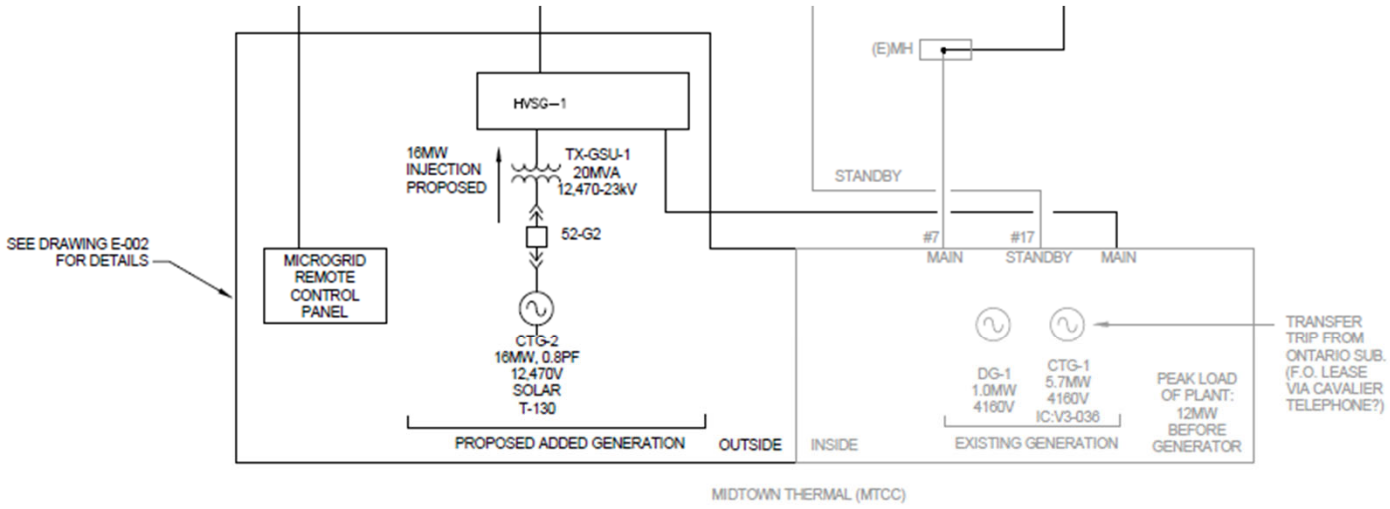
Proposed Microgrid Components

- The Microgrid concept is expected to include several other facilities in the area and involves the local Utility distribution company to continue serving the customer base with 23kV power as a unique Public/Private Microgrid supported by the NJ BPU and local government.
- In order to do so, the project will include:
  - a new Microgrid Switching Station adjacent to the MTCC plant
  - power generated from the MTCC energy efficient combined heat and power facility will be routed to customers via the new Switchyard.
  - a state-of-the-art Microgrid Control System utilizing high speed communication protocols.

Site Plan


HURON SUBSTATION
ONTARIO SUBSTATION
HIGBEE SUBSTATION
PROPOSED UTILITY MICROGRID SWITCHYARD
MTCC
MICROGRID CUSTOMERS
1 OVERALL AREA PLAN
0
1200 FT

Concept Partial Oneline



PROPOSED NEW - ONELINE DIAGRAM

Microgrid Technology

Microgrid Controller will:

- Manage Tie-Flow Control (KW and KVAR)
- Monitor real time power generation (KW and KVAR)
- Manage Utility Line Sensing for seamless islanding during an event.
- Manage Load Shed via contingency-based load shedding with UF backup.
- Manage Load Restoration.
- Manage re-sync to utility for seamless transition.
- Black Start

Microgrid Technology

Tie Flow Control – Typical Control HMI

Tie-Line Control								
Description	Megawatt						Power Factor	
Bus Connection	CSA Mode Disable	Mode Status	Manual Setpoint	Auto Setpoint (from CSA)	Tie-Line Import MIN	Tie-Line Import MAX	PF Setpoint	Lead / Lag Set
A	DISABLED	SEL Manual	0.00	0.00	0.00	1.00	0.95	LEAD
B	DISABLED	SEL Manual	0.00	0.00	0.00	1.00	0.95	LEAD

Microgrid Technology

Generation Control – Typical Control HMI

Automatic Generation Control (AGC)

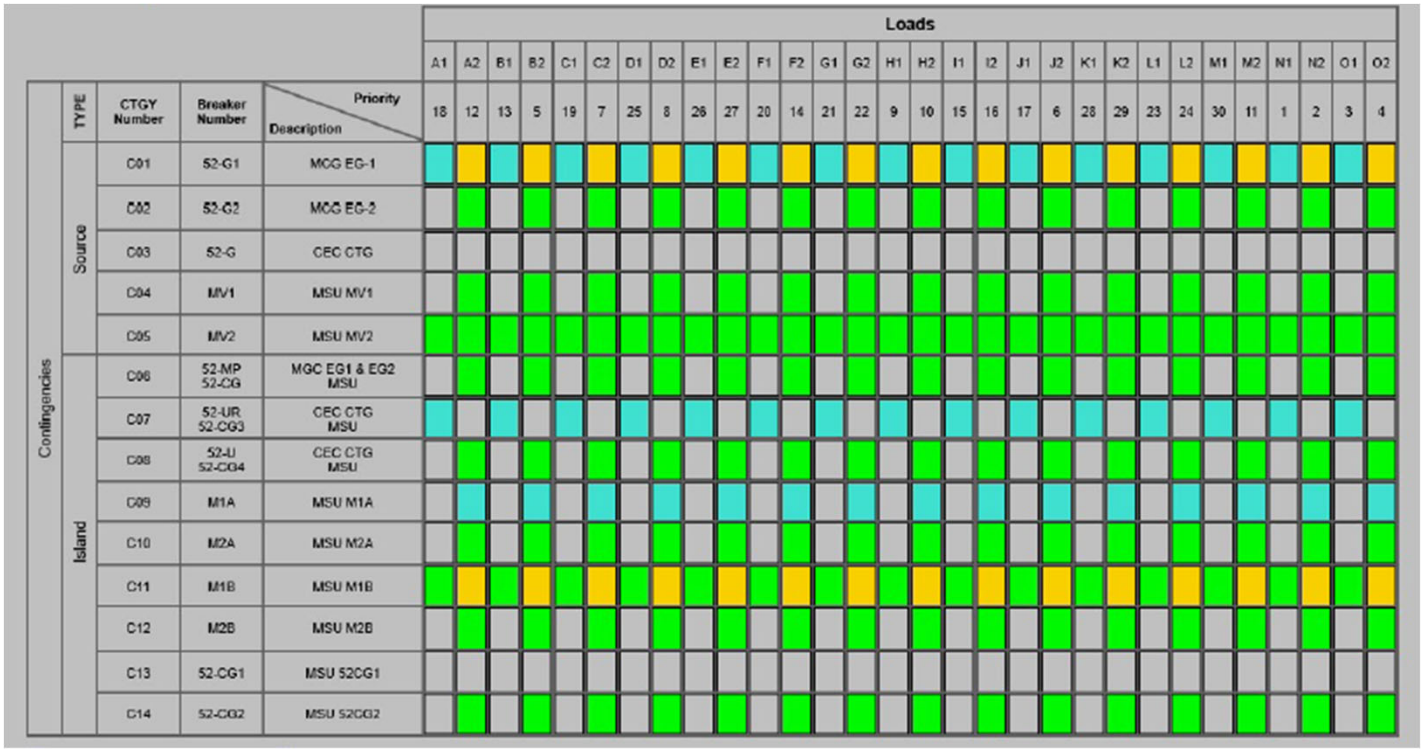
Description	Control / Status			Setpoints			Status					Alarms			
Generator	Present P (MW)	MW Enable Control	MW Control Mode	MW Maintained Setpoint	MW Lower Regulation Limit	MW Upper Regulation Limit	Generator Mode MW / Frequency	BKR Status	Requested Setpoint	Remote	Out of Band	At Maximum Capacity	Following Error	Governor Not Responding	No Run Permissive
CTG-1	1.00	ENABLED	MAINTAIN	1.10	0.95	1.15	MW	Closed	1.00						
EG-1	1.00	ENABLED	MAINTAIN	1.10	0.95	1.15	MW	Closed	1.00						
EG-2	0.00	DISABLED	MAINTAIN	0.00	0.00	0.00	MW	Open	0.00						

Voltage Control System (VCS)

Description	Control / Status			Setpoints			Status					Alarms			
Generator	Present Q (MVAR)	MVAR Enable Control	MVAR Control Mode	MVAR Maintained Setpoint	MVAR Lower Regulation Limit	MVAR Upper Regulation Limit	Generator Mode Voltage	BKR Status	Requested Setpoint	Remote	Out of Band	At Maximum Capacity	Following Error	Governor Not Responding	No Run Permissive
CTG-1	1.00	ENABLED	MAINTAIN	1.10	0.95	1.15	Volt	Closed	1.00						
EG-1	1.00	ENABLED	MAINTAIN	1.10	0.95	1.15	Volt	Closed	0.20						
EG-2	0.00	DISABLED	MAINTAIN	0.00	0.00	0.00	Volt	Open	0.00						

Microgrid Technology

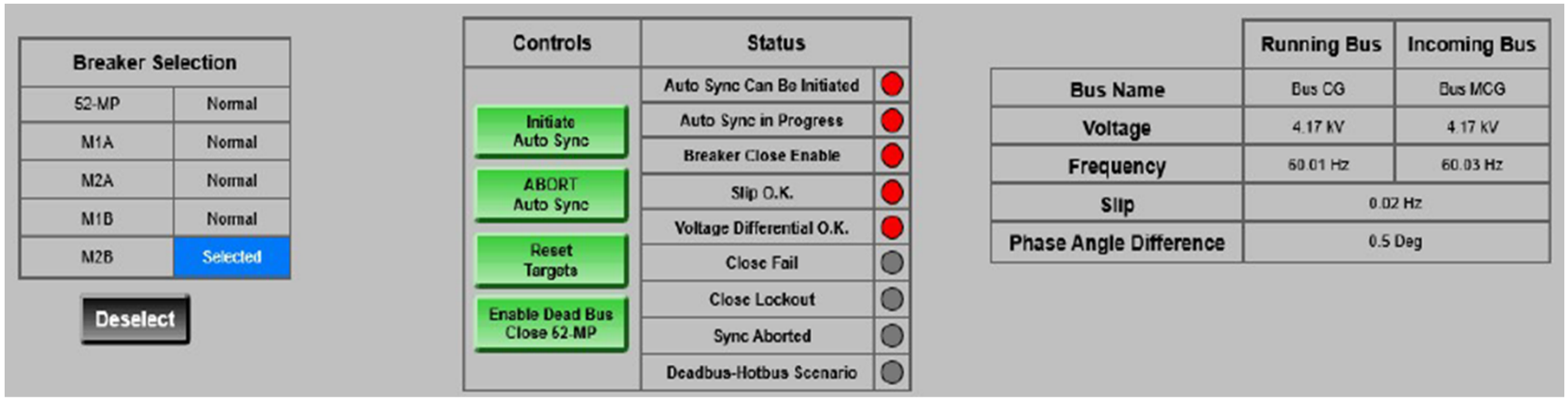
Contingency Based Load Shed – Typical Active Matrix



Contingencies	TYPE	CTGY Number	Breaker Number	Description \ Priority	Loads																																			
					A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	F1	F2	G1	G2	H1	H2	I1	I2	J1	J2	K1	K2	L1	L2	M1	M2	N1	N2	O1	O2
					18	12	13	5	19	7	25	8	26	27	20	14	21	22	9	10	15	16	17	6	28	29	23	24	30	11	1	2	3	4
	Source	C01	52-G1	MCG EG-1																																						
	Source	C02	52-G2	MCG EG-2																																						
	Source	C03	52-G	CEC CTG																																						
	Source	C04	MV1	MSU MV1																																						
	Source	C05	MV2	MSU MV2																																						
	Island	C06	52-MP 52-CG	MGC EG1 & EG2 MSU																																						
	Island	C07	52-UR 52-CG3	CEC CTG MSU																																						
	Island	C08	52-U 52-CG4	CEC CTG MSU																																						
	Island	C09	M1A	MSU M1A																																						
	Island	C10	M2A	MSU M2A																																						
	Island	C11	M1B	MSU M1B																																						
	Island	C12	M2B	MSU M2B																																						
	Island	C13	52-CG1	MSU 52CG1																																						
	Island	C14	52-CG2	MSU 52CG2																																						

Microgrid Technology

Seamless Re-Sync to Utility – Typical Control HMI



Summary of Benefits

Summary Benefits of Microgrid for Costumers and Atlantic City Community

- Cost savings for district energy customers from reduced sales and use tax
- Reduced emissions compared to current generation of thermal and electric services
- Improved electric generation efficiency leading to reduction of local electric generation for community
- Improved resiliency for electrical supply
- Improved resiliency for thermal energy supply
- Microgrid will provide power to facilities that provide shelter, food service, and heathcare services during prolonged utility outage

Q&A

DCO Energy

5429 Harding Hwy, Building 500, Mays Landing, NJ 08330 | 866-614-6575 | dcoenergy.com

Thank You!

Jonathan Wohl

Kyle Gandy

DCO *Energy*