



JUNE 27, 2017

Resiliency, Reliability, and Risk *Leveraging New Energy Technologies*

Combined Heat & Power

In a New Era of Value and Opportunity

Agenda

- › **Introductions**
- › **CHP – Old Concept...New Value**
- › **Define What Matters Now**
 - Resiliency, Reliability & Risk Management
- › **Case Studies**
- › **Micro-Grid Integration**
- › **Questions & Answers**

CHP Evolves

1st ERA *PRIME POWER*

- › The only game in town

2ND ERA *COST SAVINGS*

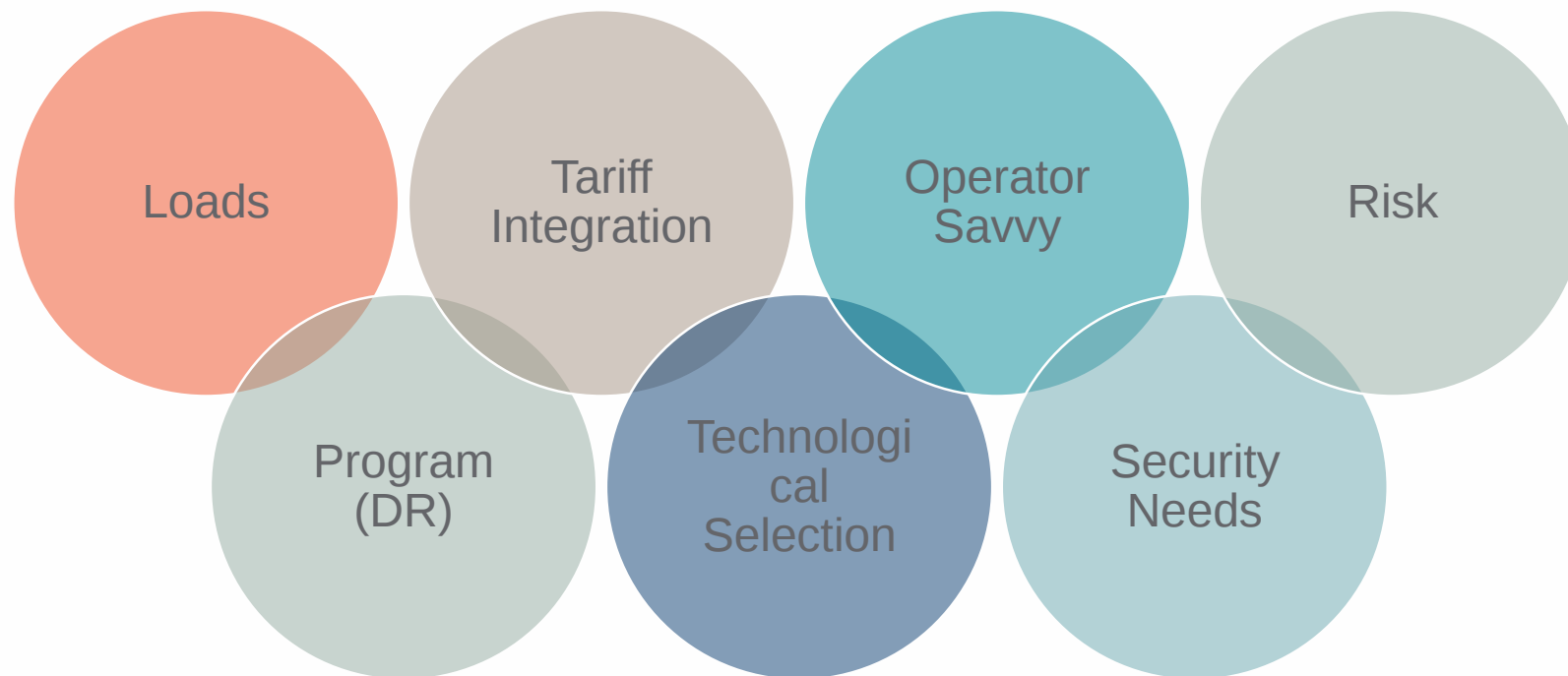
- › Alternative to Utility

3RD ERA *MULTI-DIMENSIONAL VALUE*

- › Cost
- › Resilience
- › Security
- › Arbitrage

Sizing of CHP

- › **2nd Era** – Sizing was About Thermal Balancing
- › **3rd Era** – Sizing considers the multidimensionality of:



Not Only Energy Cost Savings:

Resiliency... Reliability... Risk Management

Resiliency: “The ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents”

Reliability: “Refers to the ability of an energy production system to provide consistent and expected levels of energy under stated conditions for a specified period of time”

Risk Management: “A program to protect a facility from the negative financial and operational impacts of exposure to the energy markets”

*CHP and System Based Solutions (Micro-Grids, Renewables, Storage, etc.)
contributes to a fortified strategy to optimize the 3 R's of Energy Management*

Stresses on Central Generation – The Grid

- › **DOE** – currently funding a Grid Study
- › **Age** – major components designed and built to last 50 years, several sections are excess of 100 years old
- › **Hundreds of thousands of miles of wiring**, criss-crossing the country to provide power, installed over decades, added to and expanded on
- › **Coal and Nuclear are becoming less of an option** – other sources required
- › **Blackouts** impacting 50,000 or more have increased 124% over the past two decades
- › **Potential of Cyber Attacks**, everyday the grids' defenses are tested by hackers
- › **Increasing infrastructure subject to extreme weather**
 - February 25th, 2017 – high winds knocks out power for one day to 285,000 in and around Scranton, PA
 - March 1st, 2017 – Thunderstorms knocks out power for up to one day to 10,000,000 in parts of NY, NJ, NH, MD, VT and PA
 - March 8th, 2017 Severe winter storm knocks out power for one day to 1,000,000 in Michigan

Case Studies



Case 1 – Healthcare (Critical Power Upgrade)

- › Currently implementing Phase I – an upgrade to the E-Power and associated gear for the central plant from **3.8MW** to **7.5MW**.
- › Phase II will be the implementation of **2.4MW CHP**
 - Replacement of **1,200 tons** of centrifugal chillers and the additional of **250 tons** of absorption chilling
- › Will provide heat from the jacket and exhaust to supplement heating hot water and steam loads
- › Eligible for up to a **\$1,840,000** PEPCO Incentive and a **\$495,000** MEA grant
- › Feasibility study and 50% design complete, contractor pricing secured



Case 2 – Hotel / Hospitality (Gramercy Park Hotel)

- › **250kW** CHP system
 - With **20-ton** absorption chiller
- › CHP would also provide Hotel base domestic hot water load as well
- › Eligible for up to **\$400,000** NYSERDA Rebates
- › 4.5-year payback
- › Feasibility Study and 100% engineering design completed to date



Case 3 – Hotel / Hospitality (Manhattan Times Square Hotel)

- › **250kW** CHP System
- › New condensing boilers
- › System sized for domestic hot water load and for winter preheat of new hot water boilers
- › Eligible for up to **\$385,000** NYSERDA Rebates
- › 3.7-year payback
- › Feasibility Study completed and 100% design and engineering also completed



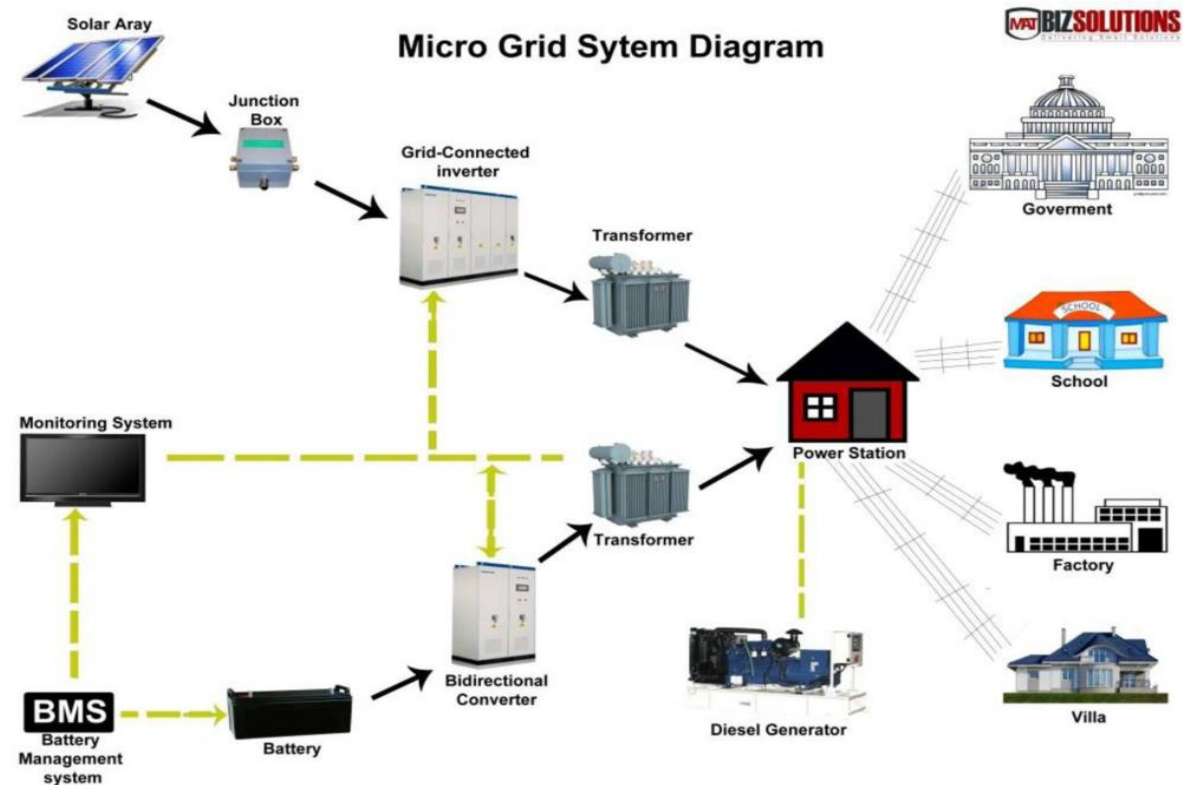
Case 4 – Hotel / Hospitality (Affinia Manhattan)

- › **250kW** CHP system
 - With **20-ton** absorption chiller
- › CHP would also provide Hotel base domestic hot water load as well
- › Eligible for up to **\$400,000** NYSERDA Rebates
- › 4.5-year payback
- › Feasibility Study and 100% engineering design completed to date



Micro Grid (4th Era for CHP?)

- › A discrete energy system for one or multiple adjacent facilities – consisting of distributed energy sources
- › Including demand management, electric storage and generation (fossil and renewable)
- › Can work in parallel or independently from the main electric grid



Conclusion

- › 3rd Generation of CHP Has Expanded Benefits and Corresponding Challenges
- › Can Be Very Impactful in Addressing Multiple Concerns for Facility / Performance Optimization
- › Can't Just Be Thrown In – Careful Due-Diligence – Not a Forced Fit
- › PPAs and Other Financing Options Make the Solution More Accessible
- › With Changes in Technology, Policy, and Markets – incorporating storage, renewables, and other energy supply technologies (with sophisticated control and monitoring) can evolve to a Micro-Grid solution with tremendous returns, reliability, and overall value.

Questions?



Thank you!

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ACTIONS.
RESULTS.

