The Philadelphia Navy Yard
A Window to the Energy Infrastructure of the Future
INTRODUCTION

• Welcome

• Philadelphia Navy Yard Smart Microgrid

• The Role of “Micro” District Energy

• Conclusion
TOMORROW LAND FOR ENERGY GEEKS
THE NAVY YARD TODAY

- Over 120 companies and 3 Navy activities
- More than 10,000 employees
- In excess of 6.6 million SF occupied/in development
- $700+ million of private investment
- Industrial, Office and R&D campus
PHILADELPHIA NAVY YARD GRID

- Independent, Unregulated, Constrained, and Antiquated (100 y.o)
- Dynamic Growth: 30 MW to 70 MW and 6 msf to 12 msf by 2022
- Vision: “Smart Energy Campus”, Reduced Carbon, Low Energy Costs, Resilience
- The Owner - Philadelphia Industrial Development Corp (PIDC) - needed a plan
MACRO ENERGY TRENDS

• Distributed Energy (Generation & Resources)

• Natural Gas – Predictable Supply, Stable Price

• Cost of Transmission & Distribution Increasing

• Growing Importance of Reliability & Resilience

• Smart Grids
MICRO ENERGY TRENDS

- Smart Systems
- Smart Buildings
- The Prosumer
- Net Positive Buildings
- Microgrids
- Transactive Energy
SYSTEMS APPROACH
TOOLS TO LEVERAGE

• What’s In Your Toolkit?
  – Distributed Energy Resources
  – Micro District Energy
  – Automatic Demand Response
  – Innovative Tariffs
  – New Business Models
  – Third Party Capital
  – Energy Markets (PJM)
LEVERAGING ENERGY MARKETS

- Energy Markets
  - Day-Ahead
  - Real-Time
- Ancillary Services
  - Synchronized Reserves
  - Regulation
  - Black Start Service
- Demand Response
  - Emergency
  - Economic
NOT BUSINESS AS USUAL

Demand Growth Breakdown (MW)

- Business As Usual - 100% External Supply
- On-Site DG and Storage
- Grid and Building Energy Efficiency
PHILADELPHIA NAVY YARD GRID

• Plan Implementation Underway - Phase 1
  • Meters, Communications, NOC
  • Distributed Energy Resources
    – 6 MW Peaker (Recips)
    – Renewables (PV)
    – Micro District Energy
  • Evaluating/Testing Battery Storage (GridStar)
KEEPING BUILDINGS IN LINE

- Monitoring-Based Commissioning (MBCx)
  - Aka Fault Detections & Diagnostics (FDD) or Continuous Commissioning
  - More mature, new entrants

- Automated Demand Response
  - “Jace” based, multi-year single-site track record
  - Software technology embedded in off the shelf BMS controllers; uses Artificial Intelligence, local weather data

- Building Operating Systems: The “next level”
GENERATION AND STORAGE

- Peak Power
- CHP
- Renewables
  - Community Solar
- Fuel Cells
- Energy Storage
  - Batteries
  - Thermal
MICRO DISTRICT ENERGY

- CHP serving a small group of buildings
- Opens up possibilities and applications for CHP
- Urban Outfitter Campus within the Navy Yard
- System could provide thermal energy and backup power to URBN and others while also alleviating electrically constrained substation in the Navy Yard
- Economic justification aided by avoided CAP-EX for substation expansion as well as market plays
- Could play significant role as build out occurs
CONCLUSION

A Window to the Energy Infrastructure of the Future

- Technology innovation
- Machine to machine and the “internet of things”
- Microgrids, multi-directional energy flows and “prices to devices”
- New markets, business models and paradigms

The lesson? Embrace change…it’s coming to a neighborhood near you!