

October 2015

THE NAVY YARD: The Campus. The Energy. The Opportunity.

PIDC: A Public-Private Partnership

Our mission is to **spur investments, support business growth, and foster developments to create jobs, revitalize neighborhoods, and drive growth** to every corner of Philadelphia.

To achieve our mission we **attract, manage, and invest** public and private resources in the clients, communities, and markets that energize Philadelphia's economy.

We offer **flexible financing tools**, a targeted portfolio of **industrial and commercial real estate** and decades of Philadelphia based knowledge to help our clients, invest, develop and grow.

Over the past 56 years, PIDC has settled over 6,300 transactions – including \$11.8 billion of financing and 3,000 acres of land sales – which have leveraged over \$22 billion in total investment and assisted in retaining and creating hundreds of thousands of jobs in Philadelphia.

The Navy Yard Today



- More than 11,500 employees
- 145 companies; 3 Navy activities
- In excess of 7.0 million SF occupied
- \$750+ million of private investment
- \$150+ million of publicly-funded infrastructure improvements
- Office, R&D, and industrial campus



Smart & Sustainable Infrastructure



A Smart Energy Campus

- Unregulated Electric Microgrid
- Collaborative R&D and Deployment:
 - Headquarters of Penn State's CBEI
 - Smart Grid Technologies
 - Progressive Tariff Structures
 - Creative Financing Opportunities
 - Distributed Generation Campus
- Energy Master Plan focus on EE in The Navy Yard's portfolio of buildings
- Opportunities for entrepreneurship, technology commercialization and product deployment
- Business Development Tool



A Center for R&D

CORPORATE



ACADEMIC & GOVERNMENT



PARTNERSHIPS



Driving growth to every corner of Philadelphia

The Navy Yard Energy Master Plan and Grid Modernization

- Navy Yard Energy Master Plan - 2013
- Grid Modernization Plan (2014 – 2016)
 - approximate \$33 million
 - public and private investments
 - smart meters, communications, NOC controller
- On-site Generation
 - 6 MW natural gas peak shaver/back up power
 - 1 MW on-site solar generation
 - 10 MW substation with PECO tie-ins



THE
NAVY YARD
ELECTRIC UTILITY



Driving growth to every corner of Philadelphia

The Navy Yard Energy Master Plan

The Five Point Action Plan

- **Infrastructure:** Capacity, Generation/Supply, Technology –
Microgrid strategies
- **Business Model:** Forecasts, Tariffs, Procurement, O & M, Capital
- **Building Owner Opportunities:** DG, EE, DR – Programs &
Partnership
- **Test Bedding Outreach and Protocols:** Energy Innovation
Campus
- **Carbon Reduction and Sustainability:** Reduce Carbon Intensity

The Navy Yard 6 MW Peak Shaver Business Proposition

- Cost effective solution for one of our capacity challenges
- Economics of avoided “business as usual” construction and “avoided external supply costs” justify investment
- additional value from PJM ancillary market makes the difference
- Additional business marketing advantage:
 - external power loss resilience
- Brings private sector to the table
- Economics: **3-year payback compared to “business as usual” scenario**
- schedule:
 - pre-construction, underway
 - final PPA: Nov 2015
 - in service: Oct 2016



The Navy Yard Solar

- 750 kW generation consisting of two arrays:
 - a) GSK canopy parking and
 - b) PAID industrial building roof
- business model: community solar
- unique alternative energy option benefiting business development value proposition
- again, brings private sector to the table
- economics: TNYEU commits to \$0.12/kwh w/ 1.5% fixed annual inflator thus **hedging against energy market fluctuations**
- schedule:
 - due diligence, underway
 - final PPA: Nov 2015
 - in service: Apr 2016



The Navy Yard Energy Storage

- existing frequency regulation 250 kW battery in service since 2013
- two new batteries being considered with backing of Sun Edison
- creating integration strategy that:
 - integrates with NY microgrid controller
 - matches one of batteries w/ demand-fluctuating NY customer
- demonstrates business model for commercialized energy storage
- other projects such as community solar to include storage components
- schedule for two new facilities:
 - due diligence, underway
 - final PPA: Nov 2015
 - in service – 2nd Q, 2016



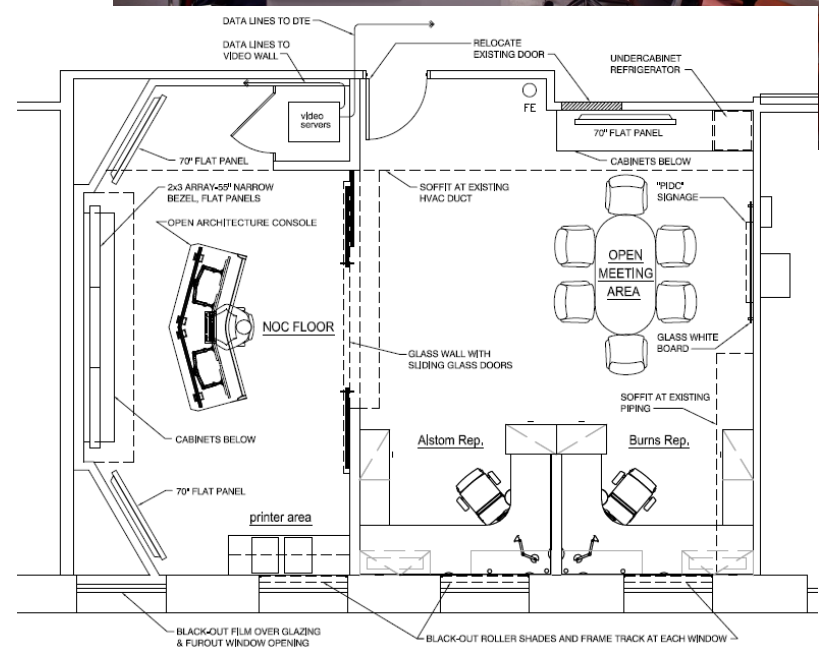
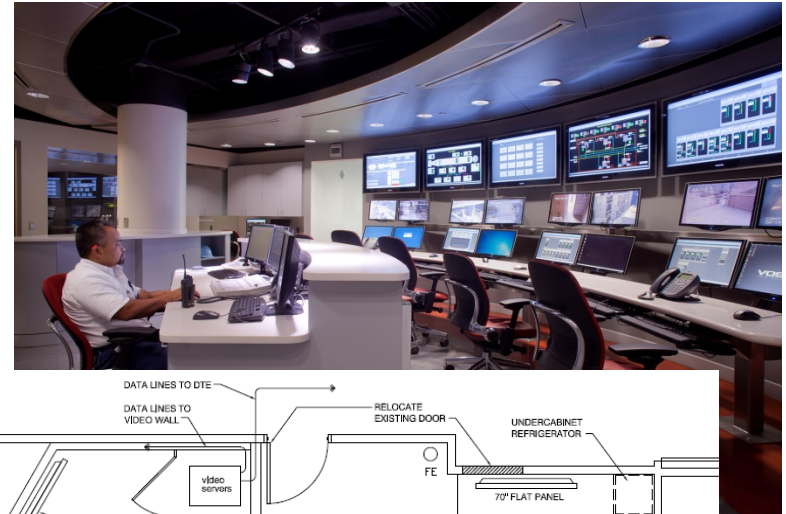
Energy Master Plan #3 – Leveraging the Individual Business Participation

- **Understand and Educate Each Navy Yard Business:** understand and communicate the significant revenue and cost avoidance opportunity
- **Design EE Incentives with Alternative Customer Tariff to Incent Good Practices:** offer choice that results in profit to our customers (key customers first)
- **Include Infrastructure (e.g.: design of NOC) to Support Good Practices:** Be sure to include the necessary “bells and whistles” to show off customer revenues and savings
- **Achievable results – vastly leveraged capacity:** Each business privately justifies additional energy efficiency, generation, and storage capacities that the microgrid operator can inventory for broader deployment
- **Achievable results – the happy Navy Yard customer:** increased profitability, sustainability and energy choice – something they cannot get elsewhere



MicroGrid Controller and NOC

- integrating on-site generation and storage with external supply
- new 4-year contract with Constellation Energy that includes block and index procurement strategies that utilize on-site resources
- DOE MicroGrid controller funding and participation
- providing **electric customer participation** and **economic benefits**
- results: **significant energy efficiency (EE)** and **demand response participation by the end-user customer**
- schedule:
 - project underway, 50% complete
 - in service: 1st Q, 2016



Alstom Vision - ALSTOM Microgrid Center of Excellence at The Navy Yard



ISO MARKET



DISTRIBUTION UTILITY



Microgrid Controller Initiative



The Navy Yard (TNY) Microgrid (Approx. 15% Solar-Storage)



Invention of GridSTAR EC
A Micro Grid Test Bed

Research & Development of Smart Grids & Power System Technology

Work Force Training



Micro Grid Control Room Technology Platform

Smart Digital Substation Platform

Microgrid Systems Design

Grid Modernization Architect



Program Management of TNY Grid Modernization



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Types of Microgrid by Size

Megagrid:

- Microgrid at transmission level serving 100s of MVA (above 120-kV)
 - Ex: Large windfarm with storage

Minigrid or Milligrid:

- Microgrid at primary or medium voltage distribution level serving 10 to 100 MVA (15 to 35 kV)
 - Ex: Large Distribution substation

Microgrid:

- Microgrid at primary voltage level serving 1 to 10 MVA
 - Ex: Small Distribution substation

Nanogrid:

- Microgrid at primary and/or secondary (low) voltage level serving 100 kVA to 1 MVA
 - Ex: Distribution transformer serving a group of commercial and/or industrial customers

Picogrid:

- Microgrid at secondary or low voltage level: 100 KVA or less
 - Ex: Distribution transformer serving a small group of residential customers

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Demonstrating value via the MicroGrid business model

- PIDC preparing an O&M microgrid solicitation with two phased response:
 - Expression of Interest – Oct '15
 - RFP (incorporating types of interest and ideas from E of I) – Jan '16
- to include balanced approach to microgrid profitability and economic development objectives
- providing ***flexibility based on goals of each microgrid community objectives***
- microgrid owner functions as local unregulated PUC
- ***creating economic value for the local microgrid and more control in local communities***

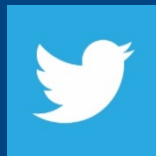




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