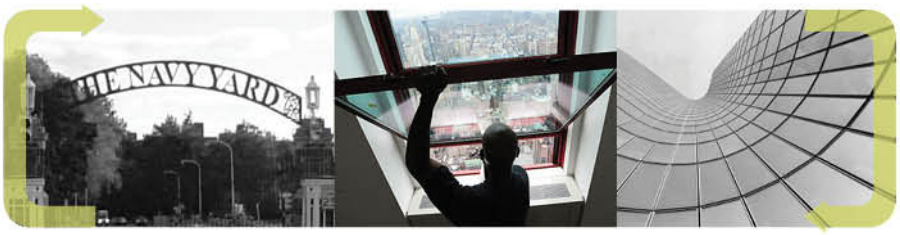
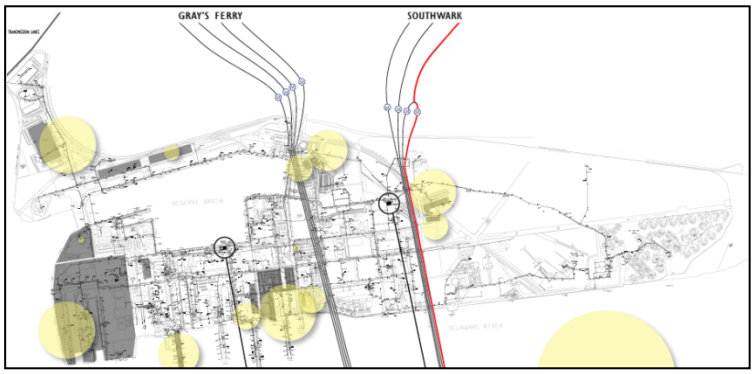


District Energy and Smart Grid Demonstration

EEB Hub is participating in the planning process that will chart the path for the first major growth and upgrade of the Navy Yard independent unregulated electric grid in many decades. Beginning in early January, the Philadelphia Industrial Development Corporation (PIDC) embarked on an effort to create a 10-year Energy Master Plan for its independent electrical distribution grid. As an urban redevelopment site that is attracting new businesses at a rapid pace, the Navy Yard is focusing on competitive energy costs, sustainable growth, customer collaboration and dependable service. In essence, this is a smart grid planning initiative, intent on leveraging the best in micro-grid design and operations.

Navy Yard Micro-Grid Background



The electric grid at the Navy Yard was originally built by the Navy primarily to meet its fluctuating military ship building needs over the past century. With the Philadelphia Naval Base closure in the late 1990's, the site was officially transferred to the City of Philadelphia in 2000. One year later, the remaining Navy civilian operations transferred ownership and control of the site's utilities as well. PIDC, as the City's operating entity for the Navy Yard, took over operations and management of the electrical grid, water and steam systems. Shortly thereafter, the Pennsylvania Public Utilities Commission (PUC) determined the Navy Yard to be a private facility and thus, declared the Navy Yard electrical grid to be independent of state PUC regulation. This independence allows PIDC the freedom to restructure tariffs, supply contracts and make major system improvements without having to obtain PUC approval.

In the year 2000, there were approximately 2000 people working at the Navy Yard, mostly for the Navy. Today, there is a thriving, diverse and growing community of over 8000 workers and 115 business entities. PIDC currently purchases all of the electricity for the Navy Yard from PECO and the facility is a top-ten customer in the PECO region. From two main substations within the Navy Yard, the underground grid supports 26 megawatts (MW) of peak demand, and annually distributes 130 million kilowatt hours (KWh) of electric energy to Navy Yard customers, the largest of which is still the Navy.

From Burden to Opportunity

With the award of the EEB Hub at the Navy Yard in fall 2010, PIDC undertook a major effort with Penn State as its lead technical advisor to work to develop the electric grid at the Navy Yard as a demonstration site for smart grid technologies. Shortly after the EEB Hub set up operations at the Navy Yard and embarked on its research, development, demonstration, and deployment mandate, PIDC issued a Request for Proposals (RFP) for a 10-year Energy Master Plan at the Navy Yard. After an arduous multi-step review process, the Burns Engineering consulting team was chosen for the project.

The team includes nationally and globally recognized industry leaders such as Alstom, ICF International and Viridity Energy.

The planning project started in early January of 2012 with a kickoff meeting involving over 25 experts and stakeholders. Now out of the gate, the integrated planning team has set a time horizon of six weeks to organize content applicable to the Navy Yard for each of the major subject areas including: smart grid technology, distributed generation, grid scale storage, demand side programs, supply alternatives, wholesale and ancillary markets, financing strategies, regulatory matters, tariff structures, growth projections, baseline business case projections, renewables, energy efficiency programs, and more.

The Smart Micro-Grid

The smart micro-grid concept is an energy ecosystem comprised of diverse and dispersed energy resources, some of which belong to customers and third parties, and all of which must interoperate in a coordinated, efficient and reliable way. The Navy Yard micro-grid will ultimately consist of an automated distribution system that orchestrates multiple, diverse, distributed energy sources, a portion of which are behind the customers' meter. These energy sources include renewables, such as wind and solar, which are intermittent in nature. The micro-grid will manage curtailment and economic load reduction programs, and a myriad of ancillary services. It will coordinate the dispatch of local energy sources including large scale batteries. Most importantly, smart grid technology will protect the grid and customers from power flow anomalies, overloads, transients and single feeder failures.

Distributed power production and management, district energy, and smart micro-grids are all closely related to energy efficiency of buildings. Hence, the EEB Hub has been continuously involved in the PIDC Energy Master Plan project. In addition, a related DOE center operated by Penn State at the Navy Yard, the GridSTAR Smart Grid Training Center, is functioning as a working microcosm and test bed for the micro-grid environment envisioned for the entire Navy Yard. The collaboration between the teams involved in the DOE EEB Hub, the DOE GridSTAR Center, and the PIDC Energy Master Plan project has led to a very productive sharing of ideas that have furthered each cause while integrating the efforts toward the common goal of building energy efficiency, sustainability and reliability.