National Aquarium Nets Improved Sustainability With Efficiency Upgrades

Baltimore’s National Aquarium works with Constellation on Energy Efficiency Project

Distributed Energy

Challenge

Where can you find two-toed sloths and Black Tip reef sharks in one place? At National Aquarium in Baltimore, there are more than 20,000 animals from over 13 habitats, as far ranging as the deep ocean to tropical rain forests.

Maintaining these extremely diverse habitats is a challenge – lighting and temperature, both critical to the health and well-being of the animals, must mimic natural habitats. As part of that, over 2.2 million gallons of water are circulated and treated through a closed system requiring energy intensive pumps and motors with precise temperature control.

Because of the high consumption of energy necessary to maintain the exhibits, National Aquarium sought ways to improve its energy efficiency as well as increase its use of renewable energy.

The Solution

To reduce energy consumption, the Aquarium implemented $3.7 million in energy and water conservation measures through a 15-year energy performance contract (EPC) with Constellation. The water conservation and energy efficiency improvements required no upfront capital from National Aquarium and are guaranteed to provide approximately $235,000 in cost savings in the first year of the term, which escalates annually thereafter. The Aquarium will use the guaranteed savings and utility rebates to fund the efficiency upgrades.

The most significant savings came from upgrading the boilers that provide heat for the facilities, tanks and exhibits. Five modular condensing boilers replaced three 20-year-old cast iron hot water boilers to improve efficiency by capturing the heat in the exhaust, and exhausting cool air. High “turn down ratios” accommodate lower heating loads while maintaining efficiency.

National Aquarium knows at any given time exactly how many tons of cooling that it needs. New chillers enable the Aquarium to precisely match its operational requirements with chiller output. Constant-speed chillers and pumps were replaced with new, high efficiency equipment with integral variable frequency drives (VFDs). These chillers have a high turn-down capacity allowing them to be efficient over a wide range of output levels. These upgrades gave National Aquarium new flexibility to efficiently run one to four chillers as needed.

In addition to the boiler and chiller upgrades, other energy and water conservation measures included lighting upgrades and controls, building envelope improvements, and updated water fixtures and controls as well as transformer replacements. By reducing consumption, these energy conservation measures are expected to avoid the creation of more than 12,300 metric tons of carbon dioxide annually, based on emission rates provided by the U.S. Department of Energy.
National Aquarium also redistributed the mix of its energy sources to include renewables: nearly half of the electricity required is designed to come from solar power. To achieve this, Constellation funded, constructed and operates a 4.3-megawatt (DC) grid-connected solar generation project in Cambridge, Maryland, developed in conjunction with OneEnergy Renewables. Just in its first year, the system generated almost 5.8 million kilowatt hours – more than 40 percent of the Aquarium’s first year electricity needs. Also, for a portion of the term of the contract, the Aquarium will receive solar renewable energy certificates equal to the amount of solar power produced by the solar power system as well.

With all these changes, National Aquarium can focus more on maintaining the 13 habitats for its more than 20,000 inhabitants, ensuring a captivating experience for its more than 1.4 million annual visitors.

**Work With a Trusted Energy Solutions Provider**

Constellation tailors its integrated energy solutions to its customers’ unique needs, providing them with the flexibility to choose how to cost-effectively buy, manage and use energy to meet their business goals. Along with expertise, Constellation offers a wide range of innovative and integrated distributed energy products—including solar, energy efficiency, cogeneration, backup generation, fuel cells, CNG fueling stations and battery storage—as well as the reach of one of the nation’s leading competitive suppliers of power, natural gas, renewable energy and energy management products. With more than 30 years of experience and over $1 billion in energy-related projects financed and built, Constellation helps business, nonprofit and public sector customers achieve sustainability goals, develop energy resiliency, manage costs and capital needs, and mitigate risk.

**Start the Conversation Today**

For information on any of our distributed energy solutions—contact us today at distributedenergy@constellation.com or visit www.constellation.com/distributedenergy

Constellation is a leading competitive retail and wholesale supplier of power, natural gas and energy products and services across the continental United States. Constellation’s family of retail businesses serves residential, public sector and business customers, including more than two-thirds of the Fortune 100. Learn more at www.constellation.com.

© 2016 Constellation Energy Resources, LLC. The offerings described herein are those of either Constellation NewEnergy-Gas Division, LLC, Constellation NewEnergy, Inc., Constellation Energy Services - Natural Gas, LLC, Constellation Energy Services, Inc., Constellation Energy Services of New York, Inc. or Constellation CNG, LLC, affiliates of each other and ultimate subsidiaries of Exelon Corporation. Brand names and product names are trademarks or service marks of their respective holders. All rights reserved. Errors and omissions excepted.