

IDEA Global Award

Project Name: Veolia Philadelphia Green Steam Conversion

Written Description

Veolia Energy North America (Veolia Energy) develops and implements solutions designed to help customers to control costs, decrease fossil fuel and energy consumption, mitigate operating risk, extend the useful life of energy infrastructure, and reduce environmental impact. Veolia Energy operates and maintains the largest portfolio of district energy networks in North America. Veolia Energy Philadelphia's Green Steam Conversion reflects extensive infrastructure upgrades recently completed at the Philadelphia district network, which simultaneously increased our operating efficiency and reduced our environmental impact, benefiting the 500+ buildings (100 million sq. ft. of space) on Philadelphia's 41 miles of district energy network

In 2008, Veolia Energy faced a situation with financial implications for all of the clients who utilize the Philadelphia district energy network. The University of Pennsylvania (Penn), Veolia Energy's largest U.S. customer, was up for contract renewal. Critical to Penn was the issue of climate change. As one of the original signatories of the American College & University Presidents' Climate Commitment, Penn is a leader in driving improving the environmental footprint of campuses, including energy generation and procurement.

Veolia Energy and Penn sought to overcome the challenge of the high cost and environmental impact of burning #6 and #2 fuel oil in Veolia Energy's generating assets. In addition to fuel sourcing and pricing transparency, Penn also sought to maintain reliability by reducing the time to power back-up systems.

After an extensive technology, efficiency and operational review, Veolia Energy determined that it could accomplish Penn's goals through a change in equipment dispatch, which relied upon two significant capital investments:

- \$30 million investment in two 250,000 pph rapid-response boilers that can produce steam in 9 minutes, virtually eliminating the fuel consumption of stand-by assets.
- \$30 million investment in the expansion of a lateral in the TETCO natural gas pipeline that eliminated a restriction on firm gas supply.

Veolia Energy evaluated several possible alternatives that might have addressed Penn's reliability goals, but these did not sufficiently respond to the institution's vision for environmental leadership. Other alternatives could have included some combination of pricing, distribution changes, and modification to the operating protocols of other generating assets. The Green Steam conversion was identified only through lengthy deliberation and negotiation, as well as a significant corporate capital investment from Veolia Energy. Penn and all of Veolia Energy's customers will enjoy the tangible economic and environmental benefits.

Another key beneficiary is the City of Philadelphia, the fifth largest city in the US, which is on the vanguard of sustainability efforts. With its award winning Greenworks plan, site of the US Department of Energy's first Energy Efficiency Hub, and new benchmarking legislation, the City has been challenging its utilities to exceed what is required in the current regulatory environment.

These Green Steam improvements support achievement of the City's Greenworks emissions goals. The City of Philadelphia aims to reduce citywide GHG emissions by 4.2 million metric tons. Since 1998, Veolia Energy has reduced the Philadelphia area's GHG emissions by 428,025 metric tons, or 10% of the City's Greenworks reduction goal. This accomplishment has increased understanding of the irreplaceable value of the district energy infrastructure, particularly when combined with CHP.

This project is not only an innovative solution to Penn's current energy needs, but also incorporates the flexibility to expand by adding two more rapid-response boilers in the future. Penn, Wistar, Drexel University and other major institutional users are driving growth with highly specialized medical and R&D uses that require the multiple levels of redundancy that Veolia provides. These institutions now constitute 30% of Philadelphia's local employment, increasing 20% over the past decade. These innovative Green Steam upgrades literally fuel the City of Philadelphia's growth sectors.

The benefits of Veolia Energy's Green Steam conversion are not only economic and environmental, but also increased reliability for our customers. Firm gas supply provides Veolia Energy with sufficient natural gas to provide 100% of capacity during peak thermal demand in the winter months. This additional supply of natural gas also enables increased loading of the CHP, so that on most days, 100% of Veolia Energy's district energy can be fueled using our 163 MW cogeneration plant. The primary role of the rapid-response boilers is to reduce the need to idle to maintain standby steam pressure.

Veolia's \$60 million investment achieved the following result:

- Environmental Savings:
 - 70,000 annual MT GHG reduction (1.4 million MT GHG over the project life); from 2010 to 2012, 20% reduction in NOx, 90% reduction in SO2
- Energy Savings: 244,879 MMBTU annually (4.9 million over the project life)
- Increased reliability

Thanks to the solution developed, Penn signed a new 20-year contract with Veolia. All of Veolia Energy's Philadelphia customers now share the benefits of the investment made in response to client requirements. One additional element of the agreement was for Veolia Energy to lease and operate Penn's 11-mile distribution system. This improved operations for Penn, while providing Veolia Energy with the ability to connect to additional growth opportunities, such as the new 89,700 square foot 30,000 MLB Wistar building.

This project was not only an innovative solution to Penn's current energy needs, but also designed flexibility for growth to add two more rapid start boilers in the future. The cornerstone in our Grays Ferry plant is from 1902, with additional build-out of the district energy network that continued through

the 1950s. Over 50 years later, we are able to re-power these old industrial assets to produce low-carbon, thermal energy that meets our customers' energy requirements.

The Green Steam project also included logistical and commissioning challenges. Manufactured in Oklahoma with dimensions as large as several Philadelphia rowhomes, the rapid-response boilers were shipped via barge and rail, and had to be trucked through residential neighborhoods in the middle of downtown Philadelphia. A police escort led the new boilers down narrow city blocks, with trees trimmed to accommodate their height. Design and commissioning was extremely complex.

Our customer base has responded with enthusiasm. On January 14, 2013, Mayor Michael A. Nutter led a ribbon cutting ceremony for the Green Steam conversion. He was joined by Pennsylvania Public Utilities Commission Chairman, Robert Powelson; Veolia Energy North America's President and CEO, Bill DiCroce; representatives from the University of Pennsylvania; and almost 100 customers, policymakers, and other stakeholders. We look forward to continued engagement with this group, and the new growth that will result.

1. Greenhouse Gas Emissions Reduction

Veolia Energy Philadelphia Green Steam conversion created energy savings of 244,900 MMBTU annually, or 4.9 million over the project life.

The methodology for this energy savings was as follows:

- Using the 2013 fuel forecast from Veolia's technical dispatch model, we are able to model the impact of eliminating past natural gas curtailment applying the new dispatch (which removes weather variation)
- Fuel savings from the fuel switching: + 162,500 MMBTUs.
- The new dispatch enables Veolia to more fully load the combustion turbine, increasing output and electric generation: + 82,400 MMBTUs

This is a total impact of 70,000 metric tons of carbon/year or 1.4 million MT GHG over the project life.

2. Other environmental benefits

As a result of the fuel switching, NOx and SO2 decreased by 20 percent and 93 percent, respectively.

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3. Innovation

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Veolia's vision for long-term growth of district energy systems includes operations and maintenance of energy plants and their associated distribution systems. This particular business element of the Green Steam project has replicability worldwide, and will be the growth driver in the US for the institutional market.

4. Impact on Community

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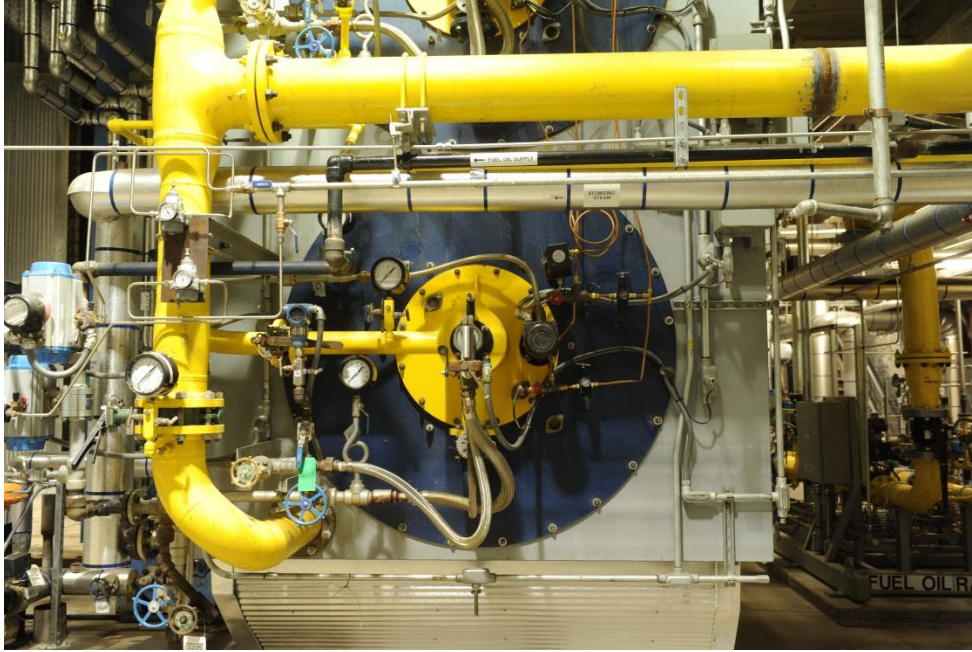


January 13, 2013: Ribbon Cutting for the Green Steam conversion

- Pennsylvania Public Utility Commission, Chairman, Robert Powelson
- Mike Smedley, Regional Vice President, Veolia Energy
- Bill DiCroce, President and CEO, Veolia Energy
- Mayor Michael A. Nutter
- Councilman Kenyatta Johnson
- Councilman David Oh



Craning in the Rapid Start Boilers: rigging from 2 levels



Installed Rapid Start Boiler