Biogas Cogeneration Facility

PWD's Energy Plan Progress

In alignment with the City's Greenworks Philadelphia Initiative, the Philadelphia Water Department (PWD) developed a Utility-Wide Strategic Energy Plan, establishing energy conservation and generation objectives for the Department. This is one of a series of reports on PWD's progress in achieving its strategic energy objectives.

PWD's Biogas Cogeneration facility

On December 23, 2011, the Philadelphia Water Department finalized an agreement that will bring green power to the Northeast Water Pollution Control Plant. As a result of this agreement, a new facility was constructed to capture methane generated from the existing sewage treatment process. The captured biogas will be used to meet all of the process heat needs and eighty-five percent of the electrical requirements for plant operations.

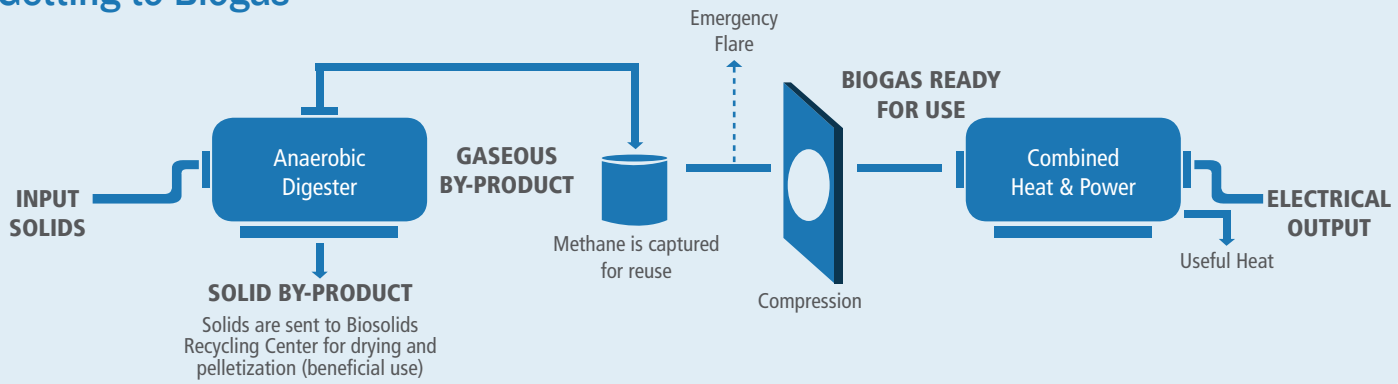
How Biogas Cogeneration works

Biogas is produced by the anaerobic decomposition of organic matter in a wastewater treatment plant's sludge digesters. Digester biogas must be pre-treated prior to utilization in a cogeneration facility. The pre-treatment process involves the removal of the following:

- Water vapor,
- Hydrogen sulfide, &
- Siloxane gas.

Siloxanes result from the decomposition of personal care products and are of special interest to the biogas cogeneration industry. When burned they form sand that can possibly destroy the internal parts of the engines and render the pollution control equipment useless.

Getting to Biogas



Important Facts

1. Energy production

- 43 million kWh per year
- Enough energy to power over 4,000 Pennsylvania homes annually. (2010 basis, US Energy Information Administration data)

2. Facility Equipment

- Four 1.4 MW reciprocating engines
- Gas cleaning equipment
- State-of-the-art air pollution control equipment
- Power and heat distribution system

3. Biogas cogeneration is highly efficient

- The generator engines burn the biogas, converting 38% of the energy to electricity and recapturing 44% of the waste heat. This results in a highly efficient capture of over 80% of the available energy.
- In contrast, a coal-fired electrical generation station is about 33 to 35% efficient based on the energy content of its fuel.

Triple Bottom Line - Plus Analysis of the Biogas Cogeneration Facility

Our **Triple Bottom Line - Plus Analysis** measures our impact on the community using the following five categories:

- Social Equality
- Environmental Benefits
- Economic Gains
- Technological Innovation
- Leadership

- Raises public awareness about alternative energy sources and sustainability
- Aids the City in meeting its Greenworks Philadelphia goals
- Fosters the development of local businesses and a non-discriminatory workforce
- Moves the plant closer to its ultimate "Net Neutrality" in energy use
- Reduces the City's use of non-renewable energy sources
- Diversifies the City's bank of available energy sources
- Achieves compliance with the Clean Air Act through the use of best available technology (BAT) for pollution control
- Constructed to meet ambient sound criteria reducing potential stress on neighbors
- Reduces the amount of energy the City purchases from commercial providers
- Reduces the City's exposure to volatile energy prices
- Eligible for 30% ITC funding worth approximately $14 million due to project business structure
- Eligible for $3.9 million rebate under ACT 129 due to construction timeline
- Reduces cost of overall energy supply to the Water Department by reducing overall demand, and specifically, peak load contribution (PLC)
- Utilizes an existing wastewater treatment by-product (biogas) to efficiently generate usable energy for plant operations
- Utilizes a combination of lean burn energy technology and selective catalytic reducer technology

Philadelphia Water Department