

**Project of the Year Submissions**

Date Received

12/9/2021

Files submitted

Score: \_\_\_\_\_

**Title:** Allegheny Health Network Wexford Hospital Combined Cooling, Heat, and Power Plant

**Company / Owner:** Allegheny Health Network/Peoples Gas

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**Category**

Commercial

Education

Energy

Environment

Industrial

Innovation

Medical

Modernization

Sustainable

Transportation

Water / Wastewater

Other:

**Lead Agents**

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**Technical Affiliation:**

# Allegheny Health Network Wexford Hospital Combined Cooling, Heat, and Power (CCHP) Plant



## Project Description

Peoples Gas, with technical assistance from LLI Engineering and 20/20 Capital Group, approached Allegheny Health Network (AHN) about a new “model” where Peoples Gas would provide all of the energy utilities for the new hospital campus in Wexford, PA. Peoples Gas would build-own-operate the central utility plant and AHN Wexford would pay for their energy use. Because of the “Combined Heat/Power Cycle” used, the energy saved could offset the initial capital expense required for the CCHP plant, ultimately saving AHN significant money.

PJ Dick provided general contractor services for the construction of the new 18,000-sf, pre-cast building. The CCHP (Combined Cooling, Heat, and Power) project included the supply and installation of fire protection, plumbing, heating, air conditioning, ventilation and electrical work, a continuous duty 2-MegaWatt generator and two emergency duty 1.75-MegaWatt diesel backup generators.

A partnership between Allegheny Health Network and Peoples put a high-tech, sustainable gas-fired power generating station at AHN Wexford Hospital, which opened to patients in September of 2021. In order for the new hospital to be built and commissioned, the new CCHP plant had to be partially functional in June 2020, and complete in December 2020. The CCHP system, contained within a two-story, 18,000-square-foot building, provides up to 2MW of electricity plus hot water, chilled water, and steam, enough electricity to meet the needs of not only the hospital but also most of the AHN Health+Wellness Pavilion.

The CCHP unit creates power and the other heating and cooling needs for the hospital, which will have about 160 beds plus operating rooms and a full maternity unit. Also included is Peoples’ expertise in developing CCHP system. The energy and carbon reduction saved by this plant is the equivalent of removing 3,500 cars from the highways per year.



CCHP 2.75 MW Jenbacher Generator

## Project Complexities

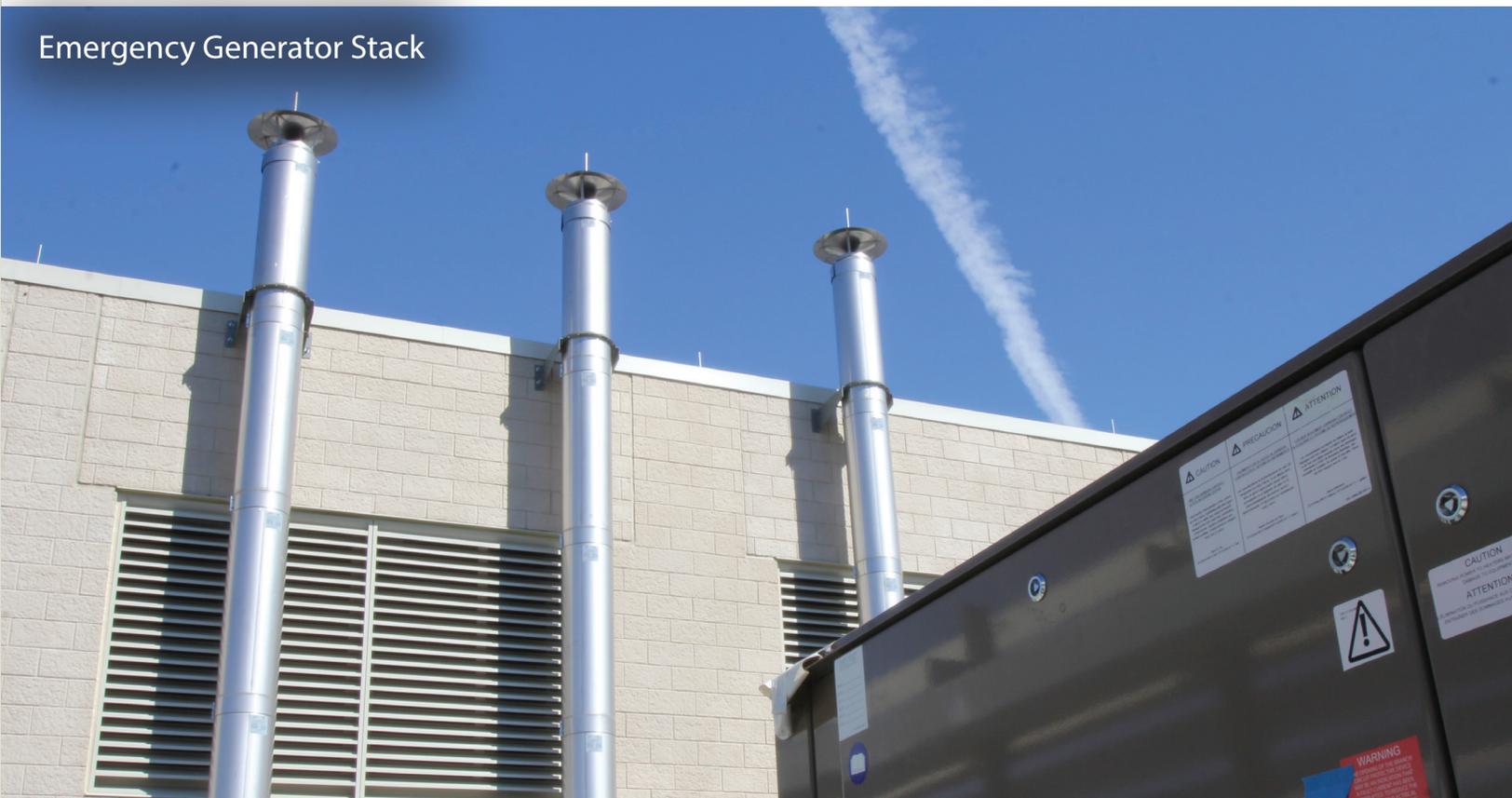
The CCHP facility provides a unique power opportunity for the AHN Wexford Hospital. This plant provides one complete and integrated power source to the hospital. It supply's all heating, cooling, steam and electric to the hospital integrated with the local electric power grid. Should the local grid fail, the system can provide all electric power to the hospital.

The construction of the CCHP provided the following to the Wexford Hospital:

- Because the plant is so complex, the piping system was designed to be color-coded, so it is easy to maintain and monitor the system daily.
- Elimination of transmission losses –When electricity is generated at a large Utility Generating Station such as the nearby Beaver Valley Power Station, approximately one third (35%) of the electric energy is lost through the transmission lines and transformers. By generating the electric power next to the hospital in the CCHP plant, those losses are eliminated. The electric power is generated right at the CCHP, utilizing the natural gas from this region which is piped via Peoples Gas Service line into the Wexford plant.

- The waste heat (normally expelled into the atmosphere at the Beaver Valley Power Station) when power is generated at CCHP plant, is used to heat the hot water distribution system for the hospital. Thus the dramatic reduction in carbon emissions in the region.
- Using a Net Metering System and Virtual Meter Aggregation, the CCHP system at times generates excess electricity which is transmitted to the local electric grid. At other times when the CCHP generator is down for maintenance, the grid transmits power to the CCHP plant. 2 MW Jenbacher generator – provides power for the entire AHN Wexford campus (Hospital and Wellness Pavilion) over the course of a year.
- Because of the small site, delivery of materials and equipment to the site had to be carefully coordinated and scheduled, as there was not on-site storage location. Parking for workers was off-site and also coordinated.
- Two, Diesel fuel, on-site fuel storage, emergency generators; 1.75 MW each; starts up six seconds after outage
- Three hot water boilers
- On-site Control Room for entire Utility Plant
- Hospital Clean Steam Boilers – used for humidification and to decontaminate equipment, when needed
- First CCHP System for People’s Gas, in region, introducing combined heat and power to AHN

Emergency Generator Stack



## Schedule

The project was completed on time and to the client's satisfaction, during the height of COVID. The construction team met the project milestones by working collaboratively with AHN, People's, LLI, and the other main subcontractors, Tomko Construction, and Lighthouse Electric to bring all the pieces of this utility plant together.

During the selection process, PJ Dick discovered a potential savings using a pre-cast building, versus the originally proposed masonry building. Construction began in the fall of 2019 and steel was erected during that time, but had the team been planning to build a masonry building in the middle of wintertime in Pittsburgh, it would have been a tough, and possibly longer, schedule. So, the precast building yielded itself to both a schedule savings and a cost savings for the project.

Another factor for keeping the project moving was how the team packaged the procurement of all the pieces needed within the utility plant. PJ Dick was responsible for purchasing the Jenbacher generator; Tomko purchased the boilers, air cooled chillers, pumps and other major mechanical equipment, along with prefabricated all the piping systems needed; and Lighthouse Electric purchased the emergency generators, the electrical switchgear and other major electrical equipment for the plant. This allowed all the pieces to be ready once the walls were in place. The team coordinated the equipment deliveries and installation of all the piping around the placement of the equipment. All the scheduling and prefabrication beforehand proved to be an asset when constructing the inside of the plant and preventing schedule delays.

"Those are the synergies that you like to see in a job to help it move along. Both Tomco and Lighthouse did a great job with prefabrication. It would have been a good job to begin with, but it moved to great with a couple things like this all working together with the precast and prefabrication." Said Michael Roarty, PJ Dick, Project Executive.



Color-Coded Piping Throughout Entire Power Plant

## Unique Contractual Conditions

Essential/Peoples financed the project and will own and operate the CCHP facility at Wexford Hospital as part of a 20-year Energy Services Agreement (ESA) to provide electricity, steam, and chilled water to the hospital, thereby allowing AHN to avoid incurring the capital cost required for the energy facility.

Through the ESA agreement, Peoples will collect an annual fixed charge to allow for the cost of its capital, as well as passthrough charges for the operations and maintenance (parts and labor) and fuel (natural gas) for the plant. The total cost of the project was reduced by 10% through the receipt of a state-funded Alternative and Clean Energy (ACE) grant, from Pennsylvania Department of Community and Economic Development, in the amount of approximately \$1.8M.

Additionally, the owner installing the CCHP system is eligible to receive the Investment Tax Credit (a tax credit for 10% of the CCHP's cost) and accelerated depreciation tax benefits. By structuring the ESA agreement so that a tax paying entity owns the plant, these tax benefits can be utilized and shared between AHN Wexford (a not-for-profit entity) and Peoples.

In total, by entering into the ESA agreement with Peoples, AHN Wexford will save approximately \$15.8M (19.3%) on its energy costs over the next 20 years, which, for comparative purposes, is almost 6% of the entire hospital's total construction cost, of \$275M.

## Benefit to Society

The CCHP, utilizes a suite of technologies and natural gas, pulled right from under the Pittsburgh Region, to generate both electricity and heat. This energy-efficient technology captures heat that would otherwise be wasted to provide useful thermal energy for space heating, cooling, hot water, and decontamination services to the new hospital.

AHN Wexford was the perfect location to build a CCHP for because the facility is one that runs 24/7, and it needs all of these power sources around the clock. By being powered by the utility plant directly adjacent to the hospital, AHN is providing additional reassurance to their patients and their families that in the event of a power outage, the hospital will be fully supported, and their patients will continue to receive the care they are expecting from AHN.

The CCHP generates enough electricity and heat to be able to supply power back into Penn Power.

The Wexford Hospital power plant project was supported by a \$1.8 million grant from the Pennsylvania Department of Community and Economic Development and the Department of Environmental Protection as part of the Alternative and Clean Energy (ACE) program. The program

Environmental Protection as part of the Alternative and Clean Energy (ACE) program. The program provides financial assistance for utilization, development, and construction of alternative and clean energy projects in the commonwealth.

According to PNG, the combined heat and power system offers a number of benefits compared to conventional electricity and thermal energy production, including increased efficiency achieved from the onsite generation which eliminates wasted energy during typical transmission and distribution. The system also reduces emissions of greenhouses gases and air pollutants.

*"The Township of Pine is excited that AHN and Highmark Health have made a significant investment in transforming health care in this region and is doing so in a way that also prioritizes the health and wellbeing of the environment,"* said Larry Kurpakus, Director of Code Administration and Land Development, Township of Pine.



Michael Roarty, P.E. - Project Executive, PJ Dick, inside the Fire Pump Room at CCHP

Jamie White, P.E. - President, LLI Engineering, and Jeffrey Nehr, VP of Business Development at Peoples, discussing the Jenbacher generator.

## Impact on Safety, Health and Environment for Workers and for the Outside General Public

Construction of the natural gas-fired electric power generation, heating, and cooling facility on the campus of AHN Wexford provides a combined heat and power (CHP) system within the 18,000 square-foot, two-story power plant. The facility simultaneously produces up to two megawatts of electricity and thermal energy onsite to meet all of the facility's energy needs including electricity, heat, chilled water, hot water and steam.

"At AHN, we strive to be good corporate citizens in every endeavor we take to invest in our facilities and expand access to care in the communities we serve," said Allan Klapper, MD, president, Wexford Hospital. "As we open a world-class hospital in Pine Township, we are extremely pleased to partner with Peoples Natural Gas to power the facility with an environmentally responsible energy solution that will greatly benefit the region and its many residents."

In the event of a grid disruption, the system will provide a redundant source of power to the hospital, supporting continuous operations and maximizing patient safety.



### News/Public Relations Pieces for AHN Wexford CCHP Project

[Let's Talk CHP: Tour of AHN Wexford Facility](#)

<https://www.bizjournals.com/pittsburgh/news/2020/02/17/ahn-wexford-hospital-to-get-state-of-the-art.html>

<https://www.peoples-gas.com/news/archive/2020/02/ahn-chp.php>

[https://www.prweb.com/releases/ahn\\_peoples\\_natural\\_gas\\_announce\\_plans\\_for\\_innovative\\_green\\_energy\\_solution\\_to\\_power\\_new\\_wexford\\_hospital/prweb16908941.htm](https://www.prweb.com/releases/ahn_peoples_natural_gas_announce_plans_for_innovative_green_energy_solution_to_power_new_wexford_hospital/prweb16908941.htm)

## Project Team and Contact Details

### Owner:

People's Natural Gas Company LLC

### Primary User:

Allegheny Health Network

### Address:

12351 Perry Hwy, Wexford, PA 15090

### Identify Lead Agents (engineer of record, architect, construction manager, etc.):

- Building and Systems: LLI Engineering
- Site: Gateway Engineers
- General Contractor: PJ Dick Construction
- Mechanical Contractor: Tomko Construction
- Electrical Contractor: Lighthouse Electric
- Architect: LLI Engineering (has architects in house)

AHN Wexford Hospital CCHP Plant



## Emergency Generator Stack



### Project Facts

- \$20 million
- 18,000sf, pre-cast building
- Extremely tight construction site with very little laydown area; new AHN Wexford Hospital and Parking Garage was being built right beside the CCHP by different construction team
- Onsite energy plant will supply hospital's energy needs while reducing the facility's carbon footprint and increasing patient safety
- Provides 2MW of electricity, plus hot water, chilled water, and steam to the hospital
- 5 air cool chillers for all AHN Wexford's cold-water needs
- 2 MW Jenbacher generator – can provide power for the entire AHN Wexford campus over the course of a year
- Two, Diesel fuel, on-site, emergency generators; 1.75 MW each; starts up six seconds after outage
- Three hot water boilers
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- Because construction for the CCHP was finished before the AHN Wexford Hospital was complete, the plant used the chillers to supply water to the construction team for the Hospital.
- Producing electricity on site and recycling waste heat, the CCHP system can be up to twice as efficient as conventional heat and power generation