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THE DES REPORT

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GM's Corner

Gas Curtailment

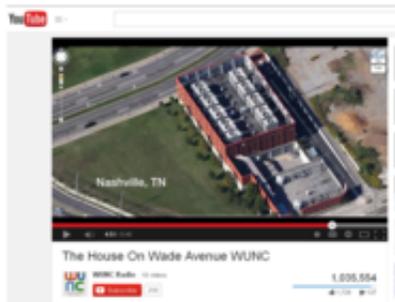
by Tim Hestle

It's no secret that natural gas is on the rise in America's energy landscape. Natural gas is clean-burning, generally abundant and easy to transport. Add in the fact that natural gas is now so much cheaper than other fuels, and it becomes clear why

so many industries are buying into this fuel. The boiler industry has taken advantage of the benefits of natural gas for over half a century, making gas-fired boilers a common sight in today's market.

Unfortunately, there is a negative consequence to using natural gas. Until this past winter, the country had not seen a widespread gas curtailment in several years. For those who do not know what a "Curtailment" is, the simple explanation is a reduction in the amount of gas that a utility company can deliver to a customer due to a supply shortage or because the overall demand exceeds the pipeline's normal capacity.

The way the system works is this: There are "firm" gas customers and "interruptible" load customers. Firm customers are those who cannot afford to have their gas supplies interrupted, such as residential customers who depend on gas furnaces to heat their homes or industrial customers who have processes that rely on burning gas to produce their products. Interruptible customers are those who can afford to cut back or eliminate



Metro DES Featured in a Viral YouTube Video

This YouTube video with more than a million views sheds light on a number of pump stations and other government businesses across the U.S. that are disguised in nontraditional infrastructures. Metro DES is featured at 4:50 in the video.

their gas consumption because they have an alternative fuel source. These customers are rewarded for this flexibility with lower gas prices from their utility company.

The majority of the time, the existing pipelines can supply enough fuel to cover the nation's demand for gas; but when temperatures dip below 10°F for extended periods and more heating is required, or if there is a hurricane that requires wells, pumping stations, etc. to be evacuated or temporarily shut down, utilities cannot deliver enough gas at the proper pressure for everyone's needs. This is when the gas companies notify their interruptible customers to reduce, or curtail, their gas usage.

With the exceptionally low temperatures seen in the winter of 2013-2014, many interruptible service customers who run their steam boilers off natural gas have quickly found themselves with less fuel supply than they needed to operate their processes. Luckily, most boiler manufacturers have designed their boilers to run off multiple forms of fuel, so propane, #2 fuel oil and other fuel sources were used while curtailments were in effect.

The primary fuel for the Nashville District Energy System boilers is natural gas, and the plant is considered an interruptible gas customer. Winters in middle Tennessee are generally very mild; however, our local gas supplier requested we curtail our use of gas on five separate occasions during the month of January 2014 when temperatures plummeted into the single digits. This is the first time we have ever been required to comply with a curtailment.

The energy generation facility's backup fuel is propane. During the hurricane season, propane is generally plentiful and transportation is not an issue; but in the middle of an extremely cold winter, propane becomes scarcer, and if roads are icy, delivery can become a problem. During the recent curtailment periods, propane was purchased from several local vendors in an attempt to secure the volume required to keep our heating plant online. Prolonged freezing temperatures across the country caused a national propane shortage, so our vendors were forced to bring in propane from neighboring states like Alabama, Georgia and Kentucky when it was available.

Due to fuel delivery schedules, sometimes it is not possible to be totally off natural gas. If a company has opted in to interruptible service, failure to comply with a curtailment request usually results in a penalty, either in the form of a fine, increased fuel prices or both. DES representatives are currently investigating additional backup fuel storage and the possibility of alternative fuels to reduce or avoid penalties should the plant be requested to participate in another curtailment.

During the recent curtailment periods, the cost for burning propane was approximately five times greater than the normal price of natural gas. Even though this seems extremely high, it was still less than the price of gas if one were assessed curtailment noncompliance penalties. Additionally, according to Metro representatives, over the past decade DES customers have enjoyed a savings of nearly \$1 million per year by the Nashville DES' being able to take advantage of the interruptible natural gas rates.



MNDES Celebrating 10th Anniversary at Upcoming Customer Meeting

Metro Nashville District Energy System (DES) is celebrating its 10th year of operation! DES' sustained success would not be possible without loyal customers and dedicated employees.

To celebrate the milestone, the annual customer meeting will be held at the Downtown Partnership headquarters on May 22, from 11:30 a.m. until 1:00 p.m., and will include a special anniversary presentation. Metro DES officials will also present a recognition plaque for Constellation NewEnergy, Inc. (CNE), and box lunches will be provided to all attendees.

In order to ensure that we have sufficient food and drinks, please RSVP to Harry Ragsdale at hagsdale@thermalegi.com or (615) 264-2611.

As DES looks forward to another successful decade of operations, it's interesting to look back at the first 10 years to get a better perspective of the plant's role in supporting downtown businesses and developments.

EGF Boiler Plant

Over the past 10 years, the Metro Nashville Energy Generating Facility (EGF) has sold approximately 2.89 billion pounds of steam to provide heating to 36 downtown buildings having a total heating area of approximately 9.411 million square feet.

This steam displaced the potential use of in-house electricity, providing customers with

more space and domestic water heating. This substitution of the use of electricity for heating by employing the use of steam from the district heating system has resulted in an avoidance of the release of approximately 667,300 tons of CO₂ in the air over Middle Tennessee.

Most boiler plants tend to experience a decrease in efficiency as they age, or at best, the efficiency remains relatively constant. The operational procedures and the preventive maintenance programs implemented by CNE have enabled the MNDES steam production equipment to retain reasonably high efficiency. When combined with Metro's investment in rebuilding the condensate return system to recover in excess of 80 percent of the condensate, MNDES has achieved a 6.4 percent increase in the seasonal thermal efficiency of the EGF boiler plant, as we compare fuel consumption to steam send-out over the past 10 years.

EGF Chiller Plant

Over the past 10 years, the EGF chiller plant has produced and sold approximately 523 million ton-hours of chilled water to provide cooling to 40 downtown buildings with a total cooling area of approximately 10.473 million square feet. This massive amount of cooling is equivalent in energy to the melting of a volume of ice covering 1 square mile of downtown Nashville at a depth of within 10 feet of the height of the AT&T Tower.

The annual average chiller plant energy efficiency has increased approximately 7 percent over the past 10 years. Here again, with age, the chiller plant efficiency might be expected to decrease, or at best, stay the same.

Modifications to the cooling towers and CNE's efforts have resulted in an efficiency gain each year. The chilled water sold has been produced with an average 10-year system efficiency of 0.850 kW per ton.

This relatively high system efficiency has contributed to a net environmental benefit by the eliminating less efficient electric in-building cooling systems, which are typically found in buildings of the age and configuration the MNDES serves.

It is estimated that approximately 131 million kW-hours of electricity use has been avoided, representing a reduction of approximately 106,850 tons of CO₂ to the atmosphere. The combined carbon footprint reduction associated with the use of DES in Nashville represents approximately 774,150 tons of CO₂.

EDS

The Nashville District Energy Distribution System extends nearly 23,000 feet and is composed of steam, condensate and chilled water piping, all direct-buried and contained in more than 8,720 feet of tunnels and 54 underground vaults.

Customer Spotlight:

Justice A.A. Birch Criminal Justice Building



The Justice A.A. Birch criminal justice building was built in 2006 in honor of Tennessee

Supreme Court Justice Adolpho A. Birch Jr., the first African-American elected to serve as chief justice in the state. He provided 37 years of judicial service at every level in the court system before retiring in 2006. Birch passed away five years later, but the building still stands in his honor.

The six-story criminal justice building is located on Second Avenue, and it houses general sessions and criminal courts for the 20th Judicial District. This state-of-the-art complex includes a compact entry plaza, main lobby and courtrooms. The courtroom floors were designed with a four-courts-per-floor layout that was intended to facilitate the use of the building by the public, while being equipped with dedicated prisoner access. The basement level of the building provides secure parking for judges, a controlled entryway for prisoners and holding cells.

Glenn Mohan has been involved in the HVAC management at the A.A. Birch Building since 2008, and he shared some insight with us about the building and why its partnership with Metro DES is important.

Q: When the A.A. Birch Building opened in 2006, it was dubbed a “state-of-the-art” criminal justice building. Tell us about the technology in the building that brought Nashville’s criminal justice center into the 21st century.

A: The building was designed with technological advances that make energy savings easier, like the centrally controlled lighting system with zoned occupancy. We have also converted 90 percent of the indoor and outdoor lighting to LED. The A.A. Birch building is served by DES, which delivers both chilled water and steam centrally to the building. This energy is transformed to heating and cooling for our customers via a state-of-the-art JCI building automation system, mechanical plant, and a GovernAir rooftop heating/cooling unit.

Q: How big a concern is security at a criminal justice building? Were some of the technology upgrades to the new building made to ensure a high level of security?

A: Security at the A.A. Birch Building is not an issue because all building controls and controllers are inside areas that are behind both card access and keyed doors. Building thermostats are a sensor-only/non-tamperproof type.

Q: Some buildings, such as theaters and hospitals, maintain a cooler temperature than most homes and businesses. Does your staff keep the building cooler due to frequent large crowds in the courtrooms?

A: We do try to keep the courtrooms pre-cooled to a lower temperature to compensate for the irregular crowds. Courts and attendees are very unpredictable, and rooms full of people are easier to warm up than cool down, so we run the rooms a little cool.

Q: What benefits do you see with the building's being on the Metro DES system?

A: A constant delivery of the same temperature and volume of chilled water and steam, no upkeep to mechanical equipment, and no utility bills.

Q: What makes the building unique compared to other criminal justice buildings?

A: This criminal justice building uses a single rooftop unit, the GovernAir unit, that supplies heating and cooling for the entire building, and this makes it unique. This unit is said to be the largest single unit of its type in the Eastern U.S.



Employee Spotlight:

Bob Lackey, Metro DES Liaison

Bob Lackey has worked for the Metro government for more than 40 years, and he has served as the Metro DES Liaison since 2010. He worked closely with DES from the time it began, and he was a part of every stage of the process, from the inception to the development and construction. Now, as DES Liaison, he works closely with the constellation and project administration to oversee plant operations, communicate with the Director of Finance, and

administer the contract with Constellation Thermal Energy Group.

Q: In addition to the DES Liaison position, what other responsibilities do you have with the Metro government?

A: In addition to serving as special project manager for District Energy System, I am also a part of the Sports Authority for LP Field and Convention Center Authority. I have a host of responsibilities with the Metro government, but I would estimate about 50 percent of my work is tied to my position as DES Liaison.

Q: What did you do before coming to DES? What brought you to DES?

A: My career has always been in the finance department of the Metro government, and I served as the chief accountant for about 20 years. This position gave me the opportunity to be more specialized, and my focus changed to overseeing and managing contracts of the Metro government. Both being involved in DES from beginning and my expertise in managing contracts led to the transitioning of my position as DES Liaison.

Q: How do the systems expansion projects work when new buildings are serviced by DES?

A: First, we must determine whether the DES system is capable of serving the new buildings. A big factor in this decision process is the location of the building and whether it is within reach of the DES system. Once we determine the DES system can serve the new building, the project administrator works with the building owner to develop a model for pricing. We then use this pricing model to propose a contract to serve the potential customer.

Q: What is the most challenging part of your job?

A: I would say the most challenging part is getting people to understand the true benefits of district energy. One of greatest benefits is that our customers receive a more economical value of energy while being able to maximize the use of their building space. To help others see the benefits, we often use recommendations from other customers. We also try to provide potential customers with information from their own building and plug it in to a model that demonstrates how the district energy system can be more advantageous for that building.

Q: What do you enjoy doing outside of work?

A: I enjoy singing gospel music, and I've been doing it my whole life.

Metro DES Advisory Board Welcomes Three New Members

Richard Fletcher is President of 511 Group, Inc., a commercial property management and leasing company. Current properties include Nashville City Center, Parkway Towers, L&C Tower and Washington Square. Nashville City Center and Parkway Towers are on the DES. He is a board member of both the Nashville Downtown Partnership and Central Business Improvement District. He was part of the original development team of Nashville City Center, and



has been active in the downtown business arena since 1988. Richard represented the private customers during the negotiations for the new DES and now represents them on the DES Advisory Board. He will be filling the spot vacated as a result of Tom Thompson's retirement.

Alan Robertson replaces Joy Harris as the State of Tennessee's representative on the DES Advisory Board. Alan, a Tennessee native, graduated from University of Tennessee in Knoxville in 1985 with Bachelor Degree in Architecture and has been a licensed architect since 1991. After working in private practice for a few years, and became a State employee in 2000. He currently serves as Assistant State Architect for the State of Tennessee. He is a member of U.S. Green Building Council and a member of First Baptist Church. He is also a member of both the Nashville and American Stock Horse Association.



Jim Harbison is a graduate of the United States Naval Academy. He has a Bachelor of Science Degree in Electrical Engineering. He served with distinction for 28 years as a Marine Corps Officer, retiring as Colonel. He holds a Masters Degree in International Public Policy from Johns Hopkins University and has an additional Masters from George Washington University in International Affairs. Jim returned to his Nashville home after his service in the Marine Corps. Prior to joining the Department of Housing and Urban Development as Director of the Nashville Multifamily Program Center in 2011, Jim held senior leadership positions in healthcare facility development and international real estate management.

On December 2, 2013, he was appointed the fifth Executive Director of Nashville's

Metropolitan Development and Housing Agency. Jim is replacing Phil Ryan as one of several Metro representatives on the DES Advisory Board.

Tom Thompson Retires After 34 Years with Marriott International

Tom Thompson, a graduate of Ohio University, served as director of engineering for several hotels and resorts throughout his lengthy career with Marriott International. He was at the Marco Island Resort for 10 years. He then was the regional director of engineering for Marriott's Courtyard, Fairfield Inn & Suites, Spring Hill Suites, and Residence Inn properties for the next nine years. Finally, he ended his career at the Nashville Renaissance Hotel and Convention Center.



During his tenure in Nashville, he served on the DES Advisory Board and was vice chairman the last five years. Brian Taylor has recently been appointed to replace Mr. Thompson as the new vice chairman.

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