A Downtown Ambient Geothermal Main
A small Iowa town trades natural gas for ground-source heat to fuel its district heating and cooling project.

Posted by Jay Egg, August 6, 2019

There is a six-block ambient geothermal pipeline running down Main Street alongside the water mains, electrical, drainage and other utilities in West Union, Iowa. The old water lines were more than 100 years old and the streetscape needed modernizing; the perfect time to put in district heating for the city’s downtown to use for heating and cooling its buildings. Geothermal pipes have been stubbed into 60 buildings.
Now, six years later, it’s ready for the next step. This is where the real work begins. It’s a little bit like looking a gift horse in the mouth. The city planners have a remarkable energy source, a geothermal main that provides unlimited energy for heating and cooling buildings. In an ambient loop, the water in the piping doesn’t take care of the heating or cooling; that job is done by heat pumps connecting to the ambient loop.

Still, people don’t get it, and it takes a tremendous amount of effort to help the adoption process along — workshops, visioning, policies, incentives and meetings to facilitate trust, understanding and adoption.

As part of the contributions needed to be made toward the elimination of combustion heating, “beneficial electrification” is becoming the clear choice. With proper education, consumers can come to see that it’s a significant step forward toward modernization to be “all electric.”

In 1958, the National Electric Manufacturers Association provided Gold Medallions for homes that transitioned from coal to using only electricity. Today, this effort could be renewed and for many of the same advantages cited for homes built between 1957 and the mid-1970s. An ad campaign similar to the 1950s publicity would be great, together with reliable and understandable information to show the public that the more “all-electric” homes there are, the less expensive electricity will become.

**Educating the Public**

In 2008, West Union realized it needed to upgrade its infrastructure, which would involve tearing up the streets. It took a lot of town meetings, a lot of coalitions and dealing with a lot of angry citizens spouting hurtful and difficult language before the project became a reality in 2013.

The community had a wonderful grand opening celebration in 2013, with 10 businesses hooked into the ambient geothermal main. Interest in the system continues with the two largest downtown buildings, including the county courthouse, connecting to the system in the last year bringing to 12 the total number of businesses using it.

Now, six years after the grand opening, the town is at the point where it can prove the effectiveness of the system. It is prepared to start the education process all over again.

Some of the hurdles before city leaders include: Understanding why current consumers use the geothermal system and what benefits and challenges they are seeing; Identifying what current users need help with or could have used help with; Targeting other consumers for the use of the district system including downtown property owners, local medical facilities, local educational facilities and residential properties adjacent to or near the district geothermal system.

Additional hurdles include: Deciding what steps might need to be taken or resources made available to get additional users on the system; and Updating approximately five previously conducted business cases for property owners interested in using the district system and developing business cases for five to 10 additional interested property owners.

This may be surprising, considering that users of the current system report near-flawless operation of the district system since coming online December 2013. System efficiency has
been fantastic. It appears the system has much greater capacity than initially estimated based on system performance and loads of the participating buildings.

**Electric vs. Gas Rates**
While overall system performance has been as good or better than expected, some challenges remain.

When the initial project pro forma and life-cycle cost analysis was completed in 2008-2009, an annual increase in gas costs was expected based on historical performance. However, gas prices today are approximately 40 percent less than they were when the community visioning process took place in 2008, while electric rates have gone up.

Evaluating system impact on building utility costs is difficult. Some buildings were previously unoccupied, some changed uses, some are cooling spaces that were not air conditioned before and collecting individual building energy use data is time-consuming.

When considering all this community has accomplished with creating a downtown district energy loop, subscribing 10 private consumers and adding two public buildings over the last six years, it should be the easiest task in the world to expand this loop to the other businesses. But it’s not that easy. There are 60 buildings into which the geothermal lines are piped, yet only 12 are using this renewable resource for clean heating and cooling.

Think about the attempt to adopt the beneficial electrification in the United States and beyond. We are all ruled by habit; when we get into a comfort zone, it’s extremely challenging to effect change. And with reduced natural gas prices, it’s even more difficult.

Fortunately, the United States and the world have come to a point where most see combustion of fossil fuels as unnecessary at the very least, and devastating at the worst. It’s enough to tip the balance and make this happen. But we need citizens and legislators as driven as this community is to help move it forward.

The late Merlin Dunt, West Union mayor from 1998-2011, said, “As long as we’re tearing up the streets and sidewalks to put in new water mains, we might as well improve the energy infrastructure at the same time.” From that came the downtown ambient geothermal loop. Consider the number of infrastructure projects taking place each year; this is a great model for our nation.

If we could do as good a job at marketing an ambient geothermal main as the natural gas companies do at marketing a new natural gas main, everyone would connect within a very brief period. We can do this.

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**Jay Egg**  
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