District Energy

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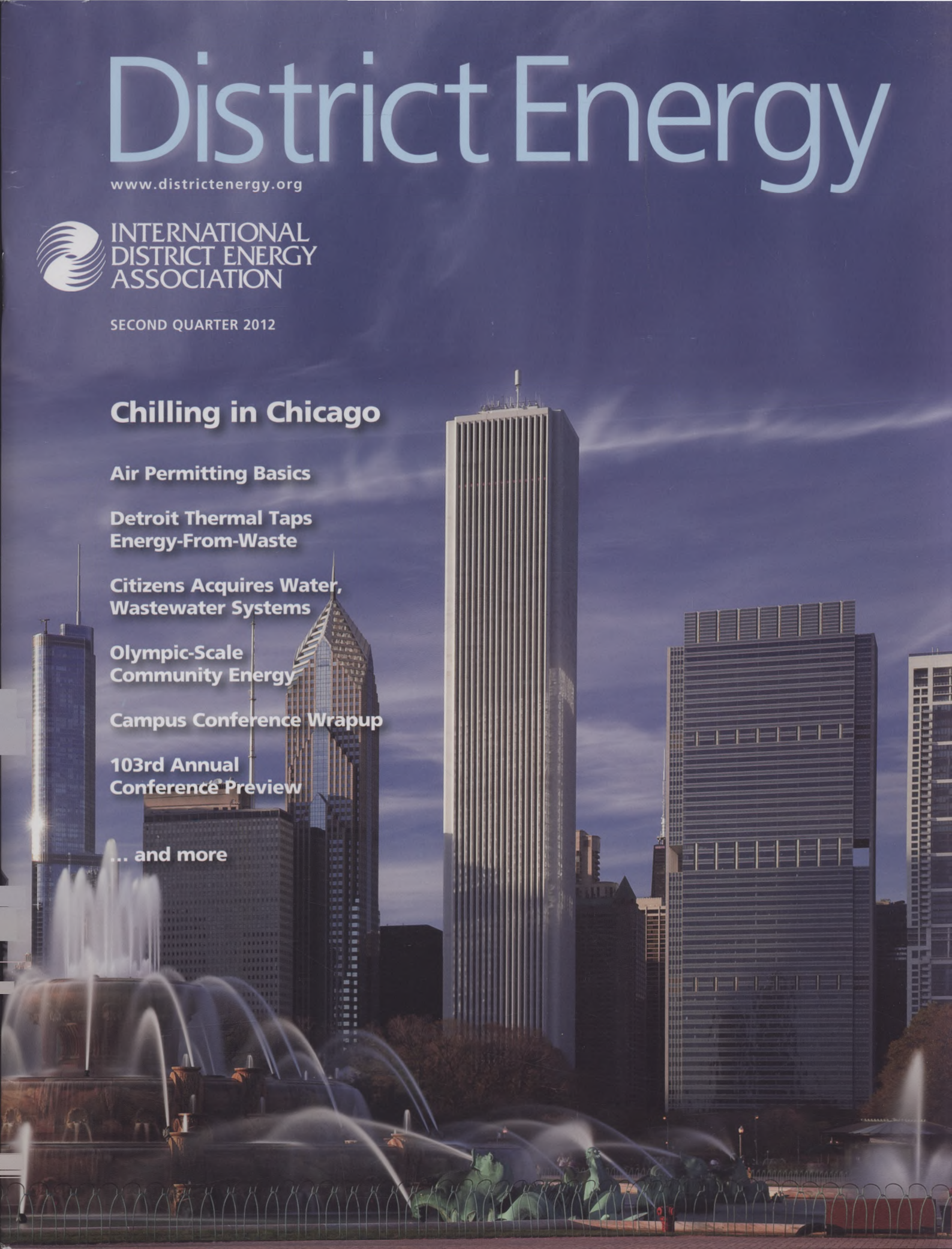
INTERNATIONAL DISTRICT ENERGY ASSOCIATION

SECOND QUARTER 2012



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Feature Story

New Energy in the Motor City:

Detroit legacy steam system helps renew city growth

Steven A. White, Chairman, Detroit Renewable Energy LLC

The great city of Detroit is slowly but steadily working on a comeback, despite a U.S. economy that continues to struggle. A famous industrial legacy, proud citizenry, committed government and an optimistic private sector lead this revival. The creation of thousands of new jobs has resurrected morale of the downtown worker and renewed pride in local arts and culture, professional sports and opportunities for career growth. Defying a lingering urban decay, workers are once again happy to be in "the D," inspiring employers to take advantage of low rents and private incentives to continue expanding into renovated central business district buildings.

Among the many forces rekindling the city are prominent institutions such as Wayne State University, the Henry Ford Health System and the Detroit Medical Center, all of which have recommitted to the downtown area. Financial incentives have made it more attractive for employees to live downtown, while new energy conservation programs have encouraged businesses and landlords to upgrade lighting, insulation, windows and other amenities. Making these buildings modern, cost-effective and comfortable – while meeting a growing public demand for sustainable and environmental initiatives – is being accomplished by a combination of public and private partnerships. Central to this effort is the robust reinvestment in Detroit Thermal, the city's century-old, 39-mile district energy system that derives most of its energy from municipal waste.

Founded in 1903 as the Central Heating Company, Detroit Thermal serves approximately 150 buildings including General Motors' Renaissance Center, the Coleman A. Young Municipal Center, the Detroit Medical Center, Cobo Center and numerous other commercial and government properties. The system is capable of producing 2.2 million lb of steam per hour of thermal energy for more than 30 million sq ft of commercial space, of which nearly 1 million sq ft were added in 2010. Renewed contracts represent 2 million additional sq ft (fig. 1). Thanks to the system's legacy of customer service and a decade of renewable energy use, its customers have been able to steadily reduce their carbon footprints.

While the engineering model behind this system is timeless, Detroit's energy investment thesis warrants study in other major cities across the U.S.

The Detroit Renewable Energy Family

- **Detroit Renewable Energy LLC**
  Renewable energy holding company
  www.detroitrenewable.com
- **Detroit Renewable Power**
  Detroit's energy-from-waste facility
  www.detroitrenewablepower.com
- **Detroit Thermal**
  Detroit's district energy steam system
  www.detroitthermal.com
- **Hamtramck Energy Services**
  A preferred General Motors provider for powerhouse and wastewater services at seven GM plants
  www.hamtramckenergy.com

Renewable Energy, Renewed Investment

The first phase in the revitalization of Detroit Thermal can be traced back to 2003 when Youngstown, Ohio-based Thermal Ventures II LP acquired the system and renamed it Detroit Thermal, subsequently spending $35 million on upgrades and switching to natural gas-fired boilers and a new source of clean power – municipal solid waste. Detroit Thermal contracted 75 percent of its steam from Detroit's privately operated energy-from-waste (EFW) plant, augmenting three other generating facilities and a total of 20 boilers around the city.

The second major advance came in 2010 when an innovative renewable energy consortium, financially backed by Connecticut-based Atlas Holdings and organized as Detroit Renewable Energy (DRE), brought a new, integrated energy model to the Motor City. DRE acquired three entities with the intent of integrating their operations. The first acquisition was the city's aging EFW facility, now Detroit Renewable Power, which had recently been shut down by its previous owners. DRE then acquired Detroit Thermal and finally the assets of Hamtramck Energy Services, a manager of corporate power generation and a key energy services provider for a number of General Motors plants.

> In its first year, DRE invested more than $50 million in the EFW facility to improve this connected energy enterprise.

Through these acquisitions, DRE focused its investment strategy on enhancing the city's energy security, long-term economic development and environmental stewardship. Detroit Thermal's legacy steam system and the performance of other U.S. steam networks had demonstrated district energy's ability to increase energy security, cut regional greenhouse gas emissions, strengthen local and regional electric grids, and increase the value of customer buildings with critical year-round heating and cooling.

Central to DRE's long-term strategy was the acquisition of the Detroit Renewable Power EFW facility, which since 1991 has generated more than 9 billion kWh of electricity, managed 18 million tons of municipal solid waste and routinely improved the city's greenhouse gas emission profile. While EFW offered a redundant source of fuel and power for Detroit Thermal's steam system, municipal solid waste also proved to be the most stable, cost-effective and environmentally friendly long-term fuel option for the network. The DRE consortium has quickly moved to optimize these renewable energy benefits for Detroit residents. In just its first year, DRE invested more than $50 million in industrial and technology upgrades to improve the operating efficiency, reli-

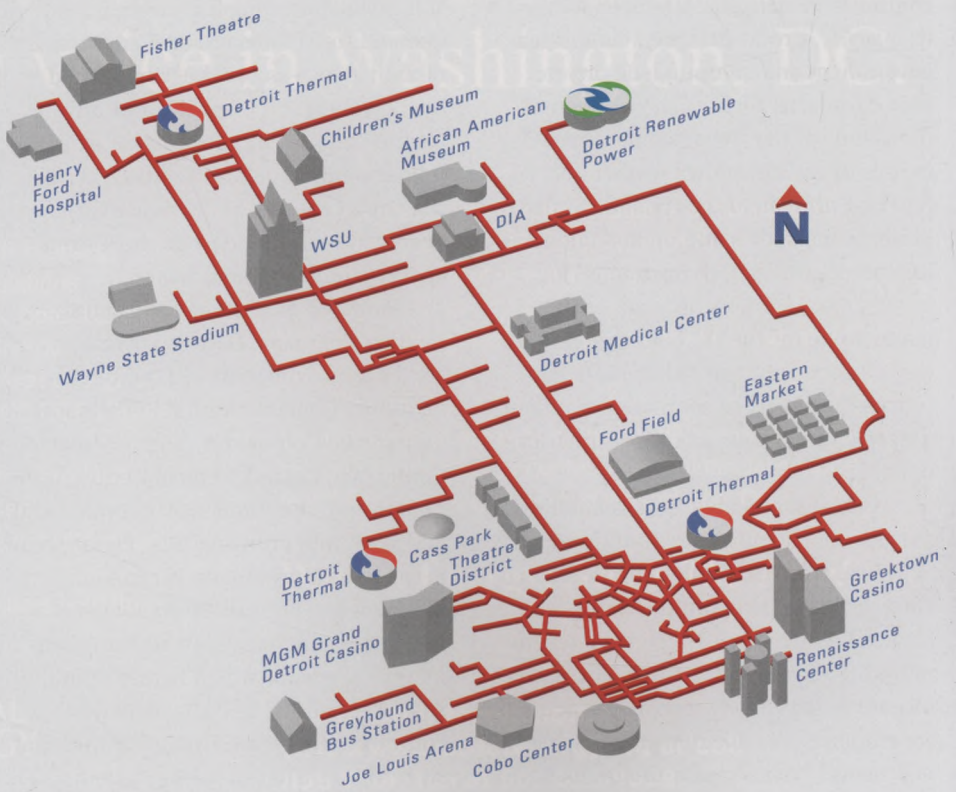
Energy From Waste:
A modern, sophisticated technology

The U.S. energy-from-waste industry has spent billions of dollars over the past two decades to upgrade combustion and environmental control technologies and become one of the most heavily regulated power generators in the country.

Today, in plants such as Detroit Renewable Power, high-temperature, high-pressure refuse furnaces and boilers convert municipal solid waste to clean, renewable energy under highly controlled conditions. Advanced computers and continuous emission monitors track operations 24/7/365. Scrubbers and fabric filters ensure high-level removal of acid gases, trace pollutants and fine particles.

Metals and other materials are also recovered and recycled. Detroit Renewable Power alone recycles an average of 37,000 tons of ferrous and nonferrous metal every year. Further, communities with EFW plants have a 26 percent local recycling rate – 5 percent higher than the national average.

Figure 1. The Detroit Renewable Energy-Detroit Thermal District Energy System.



Source: Detroit Renewable Energy LLC.

ability and local impacts of this connected energy enterprise.

Meeting Facility, Technology Challenges

The combined purchase by Atlas Holdings of Detroit Thermal and the EFW facility and the formation of DRE tightened both the economics and operating infrastructure of Detroit's downtown steam system. At the same time, it opened a wide door of opportunity for the city's renewable energy future. But first, the new owners faced aging facility infrastructure and persistent community complaints about odors at the EFW facility.

DRE tackled these and other challenges, launching a continuous improvement program and new employee policies and procedures to ensure cleanliness, appearance and daily odor control at the EFW plant. The company also improved fire control and waste-processing systems, replaced tipping room doors, repaired entrances to suppress odors and installed state-of-the-art continuous emissions monitors to ensure compliance with strict new U.S. Environmental Protection Agency standards.

The integration of Detroit Renewable Power and Detroit Thermal also fueled long-term options that support Detroit's economic resurgence. First, renewable power gives Detroit Thermal the ability to reduce the use of expensive fossil fuels and control pass-through costs to current and prospective commercial customers. Second, it offers downtown businesses and institutions confidence in a reliable, long-term energy source from a local fuel. Third, businesses can avoid the intense capital and maintenance expenses of installing complex in-house boilers. Last but not least, the city of Detroit is better able to manage the highly variable economic and environmental costs of increasingly distant landfill operations.

Detroit is responding to this synergy. The Detroit Medical Center signed a 10-year contract with Detroit Thermal in February 2009, electing to invest capital in core health care missions rather than a major heating plant. After a two-year internal study, Blue Cross Blue Shield

Figure 2. Synergy Between District Energy and Energy From Waste.

Source: Detroit Renewable Energy LLC.

The Detroit Renewable Power facility has managed 18 million tons of municipal solid waste and generated more than 9 billion kWh of electricity since 1991.

of Michigan also decided in 2010 to use Detroit Thermal rather than replace its aging boilers. The owner-operator of the 745,000-sq-ft Coleman A. Young Municipal Center, which houses the city government and Wayne County court offices, has noted that its costs for steam have dropped by more than 50 percent – from nearly $1 million in 2005 to less than $500,000 annually. Testifying to the confidence of critical-care institutions, five Detroit hospitals currently contract with Detroit Thermal for steam to provide heating, sterilization and food processing; many of these hospitals don't have or require backup boiler systems. Their confidence is well founded: Since 2004, Detroit Thermal has achieved an average system reliability of 99.5 percent in serving commercial customers every day of the year.

RPS Legislation Is Key

Clearly, private initiative and winning technology can bring energy innovation to any community. However, without strong public and legislative support, market structures may not support these solutions. Michigan's renewable energy portfolio standard (RPS), signed into law by Gov. Jennifer Granholm in 2008, was pivotal to the success of the EFW facility. Known as the Clean, Renewable and Efficient Energy Act, Michigan's RPS required state electric providers to achieve retail supply portfolios with at least 10 percent renewable energy by 2015.

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The state's two largest investor-owned utilities – Detroit Edison and Consumers Energy – were mandated with an additional capacity requirement of 500 and 600 MW by 2015, respectively. Today, Detroit Edison, an operating subsidiary of holding company DTE Energy, purchases up to 68 MW of electric capacity generated at Detroit Renewable Power. At a more than 5 percent renewable generation level in September 2011, DTE is on track to meet the 2015 Michigan RPS goals – through new renewable projects and by purchasing renewable energy generation from third parties over the next 20 years.

As of 2010, more than 1,000 U.S. mayors had agreed that EFW technology is a clean, alternative energy source that can help reduce greenhouse gas emissions. Yet, while federal law recognizes it as renewable – along with the laws of 26 states, the District of Columbia and two territories – only 21 states and the District of Columbia have added EFW to their RPS definitions. The need to move states to formal RPS recognition is essential to achieving the progressive synergy of economic development and environmental leadership already happening in Detroit, Baltimore, Indianapolis and other American cities with combined district energy and EFW operations.

A 21st-Century Solution

While an estimated 2,500 district energy systems (of all sizes) operate in the U.S. today, serving approximately 12 percent of the country's commercial floor space, only 3 percent use biomass for fuel, and even fewer incorporate municipal solid waste. As cities continue to add and upgrade commercial buildings and more incentives for renewable fuels emerge, profiling the symbiotic connection between clean waste disposal and urban economic development, EFW-based district energy systems such as Detroit's will continue to emerge as an economic and environmental win.

The Case for EFW as Renewable

One ton of municipal solid waste equals

- 520 kWh of electricity,
- 500 lb of recyclable metal,
- 1 barrel of oil avoided,
- ¼ ton of domestic coal displaced,
- 1 ton of greenhouse gas emissions removed and
- air, water and trucking impacts of landfills eliminated.

According to the Energy Recovery Council, 87 EFW plants operate in the U.S. today, offering 2,700 MW of electric generating capacity and nearly 17 billion kWh of electricity per year – enough to power approximately 2 million American homes. Hindered here by plentiful land and high opportunity costs, this is a far cry from the acceptance and saturation of these plants in energy-strapped, landlocked, often subsidized foreign economies.

European countries, acknowledged to be many decades ahead of the U.S. in reducing their carbon footprints and reliance on fossil fuels, widely adopt EFW facilities and employ comprehensive recycling efforts in order to landfill as little waste as possible. Sweden, for example, sends 45 percent of its trash to EFW facilities, recycles 41 percent and has reduced the quantity of waste going to landfills by 50 percent since 1994. Across the European Union, according to Ramboll Denmark, 400 such plants process 52 million tons of trash per year.

In many of these places, district energy systems such as Detroit Thermal's rely on this affordable, sustainable waste power. Three EFW facilities, for example, supply more than 30 percent of the total district heating used in greater Copenhagen – a model solution for countless cities across Europe and here in the U.S. as well.

Steven A. White is chairman of Detroit Renewable Energy LLC. He oversees all facets of Detroit Renewable Energy, including Detroit Renewable Power, Detroit Thermal and Hamtramck Energy Services. White has more than 15 years' professional experience in the finance of infrastructure projects, most recently as a managing director for Morgan Stanley. He holds a bachelor's degree from Dartmouth College and a master's degree from the Kellogg School of Management at Northwestern University. White may be contacted at swhite@detroitrenewable.com.