Methane and Cogeneration Technology:
Renewable Energy Opportunities for Erie County Wastewater Treatment Plants

Priscilla E. Hampton
University at Buffalo School of Law
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I. Introduction

For nearly two hundred years, the United States and other industrialized nations have benefited from cheap and plentiful fossil fuels. Oil, coal and natural gas have allowed us to become incredibly wealthy and prosperous, while the price of energy has remained comparatively low. However, the past few years have brought an awareness that our unchecked consumption of fossil fuels has contributed to global warming. That awareness is accompanied by another revelation: the "golden age" of cheap energy is coming to an end. Due to worldwide scarcity and inevitable emissions regulation, fossil fuels will continue to become increasingly expensive. Saving money on energy costs and saving the planet will require us to rethink our "business as usual" behavior and reduce our dependence on fossil fuels. We can begin by improving energy efficiency and incorporating renewable energy sources into our homes, businesses and municipalities.

Renewable energy comes in many forms, including wind, solar, hydro, geothermal, tidal, and biofuels. While "clean" energy sources such as wind, water and solar are preferred because they produce energy without consuming resources or generating pollution, they are not always practical or plentiful. Businesses and municipalities are beginning to adopt "renewable energy portfolios," including as many renewables as are feasible based on geography, climate, and available technology. One part of a renewable energy portfolio is biogas, and one such biogas is methane.

Methane, or CH_4, is created both in the natural environment and through various human activities. Derived from the decay of organic material, methane is easily produced and abundant. Unlike fossil fuels, which are formed deep underground after being subjected to high heat and pressure over millions of years, methane is “renewable” in the sense that it regenerates as quickly as organic matter decomposes: within years, days, or sometimes hours depending on the process employed. However, because methane is a powerful greenhouse gas and a volatile organic compound (VOC), releasing large amounts of unused methane into the atmosphere may be detrimental to both human safety and the earth’s atmosphere.

So what do we do with this renewable, energy-rich, unused greenhouse gas? One solution is to burn it. Similar to natural gas, methane has high energy content and is cleaner burning than coal or oil. In fact, many methane-producing facilities do burn their methane, using it to heat their operations and buildings. Once their heating needs are met, the remaining gas gets “flared” into the atmosphere. In the past decade, however, businesses and municipalities have begun to use methane more efficiently: they are harnessing the energy produced by burning methane to generate electricity, similar to coal-fired or natural-gas fired power plants. This process is called “Combined Heat and Power” (CHP) or “Cogeneration” (Cogen) and is now being utilized by landfills, wastewater treatment plants, dairies, and other facilities that produce methane by-products throughout the United States.

This proposal encourages the Erie County Division of Sewerage Management and the Buffalo Sewer Authority (BSA) to explore opportunities to invest in combined heat and power technology at their wastewater treatment facilities. As energy costs continue to rise, use of methane-fueled CHP systems will become more and more cost-effective. Furthermore, facilities will increase energy efficiency, utilize renewable biofuels, decrease utility costs over time, and limit our dependence on foreign oil. The City and County can pass those cost savings onto ratepayers or reinvest them in capital improvements, including rebuilding our decaying sewer infrastructure. Finally, by both decreasing its dependence on the electrical grid and consuming a powerful greenhouse gas, Erie County and the City of Buffalo will be taking significant steps toward reducing the area's carbon footprint, thereby mitigating its impact on global warming.[1]

II. Why Methane?

Methane is a colorless, odorless gas made up of hydrogen and carbon (CH_4).[2] It is the principal component of natural gas, a fuel that most of us already use in our homes. It is also a powerful greenhouse gas: one ton of methane is equivalent to twenty-one tons of carbon dioxide.[3] When burned, methane generates energy similar to natural gas, producing heat, carbon dioxide and water. Although methane is non-toxic, it is a volatile organic compound and may form explosive mixtures with air if allowed to accumulate (hence the "flaring" practice, which is done primarily for safety purposes). Methane is produced both naturally and via human activities. Naturally-occurring methane comes from the following sources:[4]

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[1] Former mayor Anthony Masiello is a signatory to the U.S. Mayor's Climate Protection Agreement. Under the agreement, the City of Buffalo has committed to taking the following actions:
- Strive to meet or beat the Kyoto Protocol targets in our own communities, through actions ranging from anti-sprawl land-use policies to urban forest restoration projects to public information campaigns;
- Urge New York State and the federal government to enact policies and programs to meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol -- 7% reduction from 1990 levels by 2012; and
- Urge Congress to pass bipartisan greenhouse gas reduction legislation that would establish a national emission trading system. U.S. Conference of Mayors Climate Protection Agreement, http://www.usmayors.org/climateprotection/agreement.htm. See also the list of mayors who signed: http://www.usmayors.org/climateprotection/list.asp. Buffalo's Comprehensive Plan also addresses Climate Change. *See* Buffalo's Comprehensive Plan, Environment (§1.5.1), *available at* http://www.ci.buffalo.ny.us/files/1_2_1/Mayor/COB_Comprehensive_Plan/section_245923343.html.

[2] Basic properties regarding methane can be found on the EPA's website, http://www.epa.gov/methane/, but I also found them nicely consolidated at Wikipedia: http://en.wikipedia.org/wiki/Methane#Uses.

[3] United States Environmental Protection Agency: Methane, Science, http://www.epa.gov/methane/scientific.html.

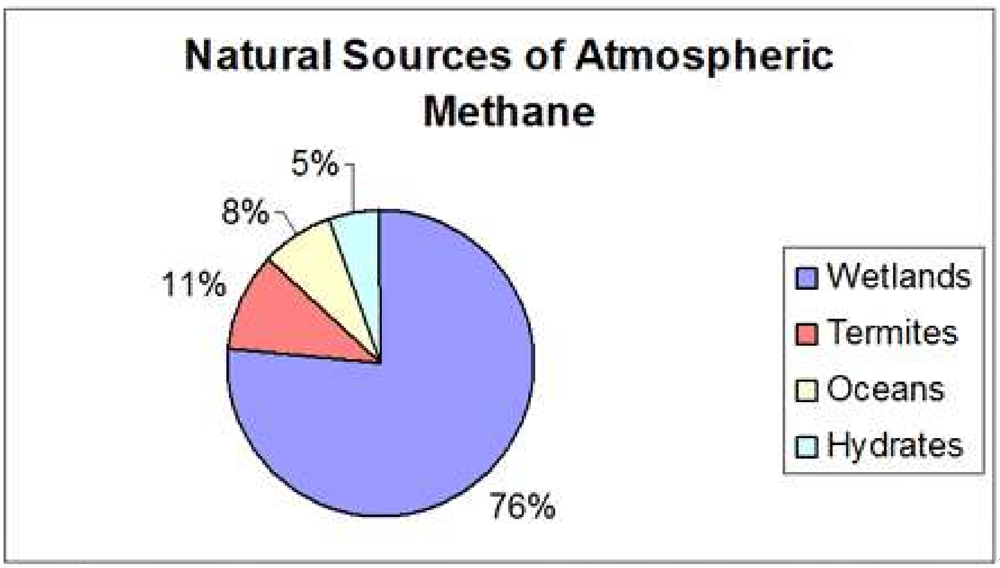
[4] United State Environmental Protection Agency: Methane, Sources and Emissions, http://www.epa.gov/methane/sources.html.

- **Wetlands**: These are great habitats for methane-producing bacteria, as they have both anaerobic (no-oxygen) conditions and abundant organic matter.

- **Termites**: These critters produce methane during digestive processes.

- **Oceans**: Methane is produced from anaerobic digestion in marine zooplankton and fish.

- **Hydrates**: Hydrates are solid deposits made up of water molecules and methane. They are stored deep underground, in ocean sediments and permafrost, and may be released due to changes in temperature, pressure, and salt concentrations. Hydrates are potentially a huge source of methane, as yet unquantified, that could be released with the onset of global warming.



[5]

In 2001, the International Panel on Climate Change (IPCC) estimated that 60% of global methane emissions were related to human activities.[6] In 2003, the largest methane-producing activities in the United States came from landfills, digestion and manure management associated with domestic livestock, natural gas and oil systems, and coal mining. Notably, wastewater treatment plants were the sixth largest producers of methane.[7]

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[5] *Id.*
[6] *Id.*
[7] *Id.*

Table 1: U.S. Methane Emissions by Source ($TgCO_2$ Equivalents)[8]

Source Category	1990	1997	2000	2003
Landfills	172.2	147.4	130.7	131.2
Natural Gas Systems	128.3	133.6	132.1	125.9
Enteric Fermentation	117.9	118.3	115.6	115.0
Coal Mining	81.9	62.6	56.2	53.8
Manure Management	31.2	36.4	38.1	39.1
Wastewater Treatment	24.8	31.7	34.3	36.8
Petroleum Systems	20.0	18.8	17.6	17.1
Rice Cultivation	7.1	7.5	7.5	6.9
Stationary Sources	7.8	7.4	7.3	6.7
Abandoned Coal Mines	6.1	8.1	7.7	6.4
Mobile Sources	4.8	4.0	3.4	2.7
Petrochemical Production	1.2	1.6	1.7	1.5
Iron and Steel	1.3	1.3	1.2	1.0
Agricultural Residue Burning	0.7	0.8	0.8	0.8
Total for U.S.	**605.3**	**579.5**	**554.2**	**544.9**

Because methane is such a powerful greenhouse gas, and because human activities are responsible for producing a large portion of what is being released, we have an opportunity to solve both a global warming and an energy problem by using methane as fuel.

III. Why Wastewater Treatment Plants?

Many municipal wastewater treatment plants produce methane in their treatment processes. After wastewater is pumped from our homes to the treatment facility, it is flushed through a preliminary treatment process where large items like trash, sticks, plastic materials, and other non-soluble items are removed.[9] Primary and secondary treatment processes settle and

[8] *Id.*
[9] Water Environment Federation, *Go with the Flow*, http://www.wef.org/apps/gowithflow/theflow.htm.

remove solids, then disinfect and clarify the water using microorganisms.[10] Most of the solids and some of the non-recycled microorganisms are removed and treated separately as "sludge."[11] Anaerobic digestion is one method of treating this sludge. During anaerobic digestion, large tanks are used to mix and heat the sludge. Thriving in this warm, dark, oxygen-depleted environment, the microorganisms present in the solids use the organic material as a food source and convert it to byproducts, including methane gas.[12] The methane can be collected and reused to heat the digesters and facilities, but typically it remains unused and is burned or "flared off" into the atmosphere.

In a time when energy costs are steadily increasing and fuel supplies are becoming less reliable, it seems imprudent to waste free fuel - especially when we consider how energy-intensive wastewater treatment processes can be. According to the New York State Energy Research and Development Authority (NYSERDA), wastewater treatment plants in New York State consume about 1.5 billion kilowatt-hours (kWh) of electricity for sewage treatment and sludge management annually.[13] Furthermore, wastewater treatment plants use an estimated 170 million therms of natural gas and 16 million gallons of fuel oil annually for space heating and sludge processing.[14] It can take 1,700 kWh of electricity to treat one million gallons of sewage.[15] Amazingly, NYSERDA estimates that approximately 35% of all energy used by a municipality is used for drinking water and wastewater treatment, collection, and distribution pumping. For

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[10] *Id.*
[11] *Id.*
[12] *Id.* Methane is also referred to as "biogas."
[13] Paul Morini, *CHP Opportunities at New York State Wastewater Treatment Plants*, DISTRIBUTED ENERGY, July/August 2004, available at http://www.foresterpress.org/de_0407_chp.html, (citing Lawrence J. Pakenas, *Energy Efficiency in Municipal Wastewater Treatment Plants*. NYSERDA. 1996). Using an online "carbon calculator," it is estimated that 1.5 billion kWh of fossil-fuel generated electricity produces 1,500 kg of CO_2 annually. *See, e.g.*, Sustainability EG's Carbon Calculator, http://www.sustainability-ed.org/pages/what4-2.htm.
[14] *Id.*
[15] *Id.*

every million gallons of water that is treated and circulated through the community, $300 is spent in electricity consumption.[16]

Although in most cases methane cannot completely replace these significant energy needs, it certainly can defray costs and decrease a facility's reliance on the electrical grid. The quantity of methane produced by wastewater treatment plants is proportional to the volume of sewage processed; therefore, the bigger the plant, the higher the energy value. According to a 2006 feasibility report by the EPA:

- A typical wastewater treatment plant processes one hundred gallons per day of wastewater for every person served.
- Anaerobic digesters produce about one cubic foot (1 ft^3) of methane per 100 gallons of sewage treated.
- One cubic foot of methane equates to 2.2 Watts of power, or 600 Btu's of heat.
- The biogas generated from every 4.5 million gallons per day (MGD) processed can produce approximately 100 kW of electricity.[17]

The EPA estimates that wastewater treatment facilities processing more than five million gallons per day (5 MGD) produce enough biogas to make CHP technically and economically feasible.[18] As of December 2006, of the 16,676 operational facilities in the United States, only 1,066 produced more than 5 MGD.[19] Of those 1,066 facilities, only 544 utilized anaerobic digestion.[20] Therefore, although not all wastewater treatment facilities in the U.S. are ideal for CHP systems, a number of plants in Erie and Niagara County meet the EPA's criteria, including the BSA's

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[16] Gregory Lampman & Kathleen O'Connor, *How to Identify and Fund Projects to Improve the Energy Efficiency of Your Municipal Treatment Facility* (power-point presentation on file with author).
[17] EPA Combined Heat and Power Partnership, *Opportunities for and Benefits of Combined Heat and Power at Wastewater Treatment Facilities*, December 2006, at iii, available at http://www.epa.gov/chp/documents/wwtf_opportunities.pdf. (hereinafter *CHP Opportunities*).
[18] *Id.*
[19] *Id*. Note, however, that a number of wastewater treatment plants processing less than 5 million gallons per day have successfully installed CHP systems. *See* Section V, *infra*.
[20] *Id.*

Bird Island wastewater treatment facility, the Tonawanda and North Tonawanda facilities, and the Lockport facility.

Table 2: Wastewater Treatment Facilities (>5 MGD) with Anaerobic Digester(s) [21]

State	Facility Name	County	Influent (MGD)	Potential Electric Capacity (kW)
NY	BUFFALO, BIRD ISLAND STP (BSA)	ERIE	149	3,311
NY	TONAWANDA (T) WWTP	ERIE	19.625	436
NY	LOCKPORT (C) WWTP	NIAGARA	8.8	196
NY	NORTH TONAWANDA	NIAGARA	5.746	128

Of course, these numbers are rough estimates and can vary based on seasonal changes in energy demands, plant efficiency, and individual sewage processing systems (i.e. number of anaerobic digesters). Feasibility studies would have to be conducted to determine each plant's methane production rate and potential energy savings. However, the overall outcome is the same: wastewater treatment plants and other facilities that produce large quantities of methane can increase their efficiency, decrease utility costs and help combat global warming by utilizing the energy source they produce on-site, rather than paying for electricity provided by their local utility company.[22]

[21] *Id.* at Appendix A. This table is an excerpt from: "Full List of U.S. Wastewater Treatment Facilities (> 5 MGD) with at Least One Anaerobic Digester," which notes: "The following tables present an estimate of the potential electric capacity from CHP utilization at each facility based off the CHPP analysis. Each WWTF considering CHP will need to perform its own site-specific feasibility analysis to determine the true potential biogas generation rates; methods to compress, clean, and dry the biogas before combustion; and the costs and benefits of generating onsite heat and electricity." *Id.*

[22] The EPA's Combined Heat and Power Partnership estimates that if all 544 wastewater treatment facilities in the United States that operate anaerobic digesters and have influent flow rates greater than 5 MGD were to install CHP, approximately 340 MW of clean electricity could be generated, offsetting 2.3 million metric tons of carbon dioxide annually. These reductions are equivalent to planting approximately 640 acres of forest, or the emissions of 430,000 cars. *CHP Opportunities*, *supra* note15, at iii.

IV. How does CHP work?

In a typical methane-producing wastewater treatment plant, some biogas may already be used to fire boilers, which in turn heat the buildings and warm the digester sludge. The remaining methane is flared. However, in a plant with a CHP system, methane is used to produce both heat and electricity. Known as "on-site generation," the electricity generated is consumed only for the facility's electricity needs, rather than producing electricity for off-site electrical distribution.[23] There are three main parts of a "gas turbine" or "reciprocating engine" CHP system: a gas turbine, a generator and a heat recovery unit. Conditioned methane[24] is combusted in a gas turbine, turning the turbine blades that are connected to the alternator.[25] The alternator generates electricity that can then be distributed throughout the facility to power lighting, machinery and electronics.[26] Additionally, the hot exhaust fumes from the turbine generate thermal energy, usually in the form of steam or hot water, which is then used to heat buildings and boilers.[27] Gas turbines/engines are ideally suited for large industrial or commercial CHP applications requiring ample amounts of electricity and heat.[28]

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[23] New York State regulates on-site generation facilities, and there are numerous state and local siting, permitting and code issues that must be addressed. Although the regulatory system is far too extensive for me to address in this paper, NYSERDA has created a handbook for business and industry looking to adopt CHP systems. *See* Thomas Bourgeois, Adam Hinge & Anish A. Joshi (Pace University Energy Project), & Bruce Hedman (Energy and Environmental Analysis), *Clean Distributed Generation in New York State: State and Local Siting, Permitting andCode Issues*, May 2003, *available at* http://www.nesnora.com/pace/PaceGuidebook.pdf.

[24] Methane is considered "dirtier" than the natural gas we use in our homes, and therefore must be conditioned prior to use in a CHP system. Conditioning involves removing moisture and other impurities. Phone interview with Timothy Lockhart, Chief Operator, Water Pollution Control Center, Lewiston, NY, on October 23, 2007.

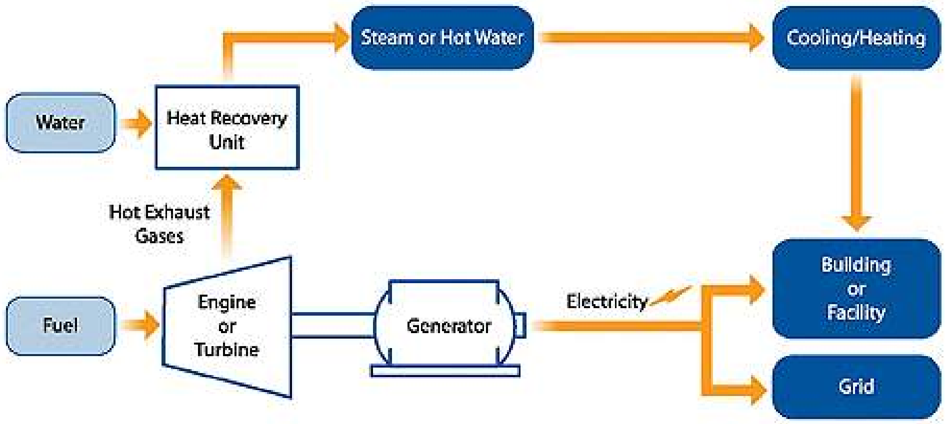
[25] EPA Combined Heat and Power Partnership, *Basic Information*, http://www.epa.gov/chp/basic/index.html.

[26] *Id.* .

[27] *Id.*

[28] *Id.*

CHP: Gas Turbine or Engine with Heat Recovery Unit[29]



V. Successful Systems at Wastewater Treatment Facilities

Cities throughout the country are implementing methane-fueled CHP systems in their municipal operations. Hayward, California's cogeneration plant offsets one third of its wastewater treatment energy needs, saving between $300,000 and $400,000 annually.[30] Dayton, Ohio installed a similar system to provide electricity to its wastewater treatment plant. Its facility was installed as part of a federal grant which paid 75% of the overall construction cost, estimated at $7 million.[31] In 2003, the town of Essex Junction, Vermont installed two methane-powered 30kW microturbines[32] to generate electricity and heat for their wastewater treatment plant.[33] Although this 2 MGD plant did not comply with the EPA's "5 MDG minimum" recommendation, the system still proved cost-effective within seven years.[34] The plant saves $37,000, or 36% of its energy costs annually, uses nearly 100% of its waste methane (compared to 50% when used for heating purposes only), and reduced its dependence on the electrical

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29 *Id.*
30 UNITED STATE CONFERENCE OF MAYORS BEST PRACTICES GUIDE 43 (2007) *available at* http://www.usmayors.org/uscm/best_practices/EandEBP07.pdf.
31 *Id*. at 42.
32 A microturbine is a very small turbine, fueled by natural gas or some other energy source that generates electricity for use in homes or commercial establishments.
33 Northeast CHP Application Center, *Project Profile: Essex Junction WWTF*, *available at* http://files.harc.edu/Sites/GulfCoastCHP/CaseStudies/EssexJunctionVT.pdf.
34 *Id*.

grid.[35] Furthermore, the plant demonstrated that methane fired cogeneration at small facilities is indeed a viable option.

Municipalities have found that a combination of funding incentives and long-term energy efficiency gains can result in significant cost savings. In November 2005, the City of Gresham, Oregon installed a cogen system in its 20 MGD wastewater treatment plant.[36] The Caterpillar lean-burn engine and 395 kW synchronous generator convert methane gas into 55% of the treatment plant's power needs, reducing the city's annual electricity costs by $208,000, an average of between $18,000 and $20,000 savings per month.[37] Although the project totaled $1.1 million, the city estimated the system would pay for itself within five years.[38] Furthermore, the project received significant funding from state business energy tax credits ("BETCs") as well as from the Energy Trust, a public purpose Oregon-based nonprofit dedicated to energy efficiency and renewable energy generation.[39] This funding defrayed the cost of the project and lessened the payback period by more than two years.[40]

The Town of Lewiston, New York is a prime example of a small, local municipality that has implemented successful methane recapture CHP technology. In 2001, Lewiston's Water Pollution Control Center, which processes approximately 2 MGD, installed a set of biogas-fueled microturbines. It was able to offset 25% of its electricity needs, saving between $39,000 and

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[35] *Id*.
[36] Press Release, City of Gresham*, City of Gresham Generates "Green" Power into "Green" Savings at Wastewater Treatment Plant*, Feb. 7, 2006, available at http://www.energytrust.org/news/060207_CoGen_Celebration.pdf.
[37] *Id.*
[38] *Id. See also* Energy Trust of Oregon, *Case Study: Biopower- City of Gresham Wastewater Services*, Oct. 2006, *available at* http://www.energytrust.org/library/case_studies/GreshamWastewater_CS.pdf.
[39] Energy Trust, http://www.energytrust.org/.
[40] Energy Trust of Oregon, *Case Study: Biopower- City of Gresham Wastewater Services*, Oct. 2006, at 3, *available at* http://www.energytrust.org/library/case_studies/GreshamWastewater_CS.pdf.

$43,000 annually in electricity costs.[41] The town received 100% of its funding from New York State to cover installation and material costs, including $125,000 from the New York Power Authority for capital equipment and engineering and $100,000 from Governor Pataki's Petroleum Overcharge Restitution Fund.[42] Lewiston is currently applying for a new grant from NYSERDA to fully fund an upgraded, even more efficient CHP system.[43]

The Town of Amherst is also attempting to implement methane-recapture technology to fuel its wastewater treatment plant. In 2004, it began working with Siemens Building Technology to perform efficiency upgrades after receiving more than $1,350,000 through NYSERDA's New York Energy Smart Commercial and Industrial Performance Program.[44] Although the system, which uses methane to power individual machinery rather than producing electricity via one generator, has had technical problems in the past,[45] Amherst estimates that the system, when fully operational, will save taxpayers more than $500,000 annually in energy costs.[46]

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[41] Phone interview with Tim Lockhart, Town of Lewiston Water Pollution Control Center, Lewiston, New York, Oct. 23, 2007.

[42] Timothy Lockhart, Town of Lewiston Water Pollution Control Center, *Microturbine CoGeneration Using Biogas* (power-point presentation, on file with author).

[43] Phone interview with Tim Lockhart, Town of Lewiston Water Pollution Control Center, Lewiston, New York, Oct. 23, 2007.

[44] NYSERDA Press Release, *Town of Amherst Partners with NYSERDA and Siemens to Reduce Energy Costs at Wastewater Plant*, Dec. 7, 2004, *available at* http://www.nyserda.org/Press_Releases/2004/PressRelease20040712.asp.

[45] Phone interview with Wendy Taber, Amherst Wastewater Treatment Plant, Amherst, New York, Oct. 23, 2007.

[46] NYSERDA Press Release, *supra* note 33.

In addition to Lewiston and Amherst, the following municipalities have received funding from NYSERDA to complete cogen/CHP projects at their wastewater treatment facilities:

Table 3: Cogeneration Projects at New York State Wastewater Treatment Facilities [47]

Facility	Developer	Fuel	Units	Capacity	Commission
26th Ward Water Pollution Control Plant Brooklyn, NY	NYPA	Digester Gas	2	400 kW	07/31/2003
Hunts Point Water Pollution Control Plant Bronx, NY	NYPA	Digester Gas	3	600 kW	07/31/2003
New Rochelle Waste Water Treatment Plant New Rochelle, NY	Emerald Power	MSW	1	1000 kW	
Oakwood Beach Water Pollution Control Plant Staten Island, NY	NYPA	Digester Gas	1	200 kW	07/31/2003
Red Hook Water Pollution Control Plant Brooklyn, NY	NYPA	Digester Gas	2	400 kW	07/31/2003
Village of Fredonia Wastewater Treatment Dunkirk, NY	O'Brien & Gere	Natural Gas	1	70 kW	
Waste Heat Sludge / City of Auburn Auburn, NY	NYPA	MSW	1	1400 kW	

VI. Funding

A major concern for most municipalities – for those in Western New York especially – is funding. According to the Erie County Department of Sewerage Management, in order to be viable and cost-effective, the payback period on a cogeneration project must be limited to ten or fifteen years at most.[48] Unfortunately, past efficiency audits at Erie County's Lackawanna plant have shown that the technology continues to be expensive, with payback periods of no less than

[47] NYSERDA DG/CHP Integrated Data System, http://chp.nyserda.org/facilities/index.cfm?sort=Category&order=ASC.
[48] Interview with Tom Whetham, Erie County Division of Sewerage Management, Buffalo, New York, Nov. 2, 2007.

twenty years.[49] In contrast, the Buffalo Sewer Authority believes the payback period to install CHP at its Bird Island Facility would be less than 10 years.[50] In any case, if the true costs of pollution and global warming are also factored in, CHP is immediately worthwhile. Furthermore, with energy costs continuing to rise and the increased availability of federal and state incentive programs, these projects are becoming financially viable even to those who ignore the externalities.

NYSERDA is a public benefit corporation created by the New York State Legislature in 1975.[51] Its mission is to "facilitate change through the widespread development and use of innovative technologies to improve the state's energy, economic, and environmental wellbeing."[52] NYSERDA is a major source of funding for energy efficiency and renewable resources development projects in Western New York. Since 1998, it has provided more than $26 million to support more than 500 projects in Erie and Niagara Counties.[53] Combined with funding from NYSERDA partners, the value of these projects totals more than $65 million.[54] NYSERDA currently offers project development funding through a number of grant programs. For example, through January 2008, NYSERDA is soliciting proposals under three specific categories relating to CHP: demonstrating DG-CHP (distributed generation-combined heat and power) technologies in a variety of applications and end-use sectors; performing re-

[49] *Id.* Tim Lockhart, the chief operator of the Water Pollution Control Center in Lewiston, N.Y., estimates that the cost to purchase, install and maintain a microturbine is approximately $1,000 for every kW generated. Other estimates put the number closer to $1,500 per kW generated. This means a 350 kW generator will cost between $350,000 and $700,000, no small expense for a local wastewater treatment plant. *See* Energy Now, Distributed Generation, Natural Gas Technology Conference, Houston, TX, May 14, 2002, at 14 (power point presentation), *available at* http://www.netl.doe.gov/publications/proceedings/02/ngt/Horning.pdf.
[50] Interview with Dave Commerford, General Manager, Buffalo Sewer Authority, Nov. 26, 2007.
[51] About NYSERDA, http://nyserda.org/About/default.asp.
[52] *Id*.
[53] NYSERDA Press Release, *supra* note 35.
[54] *Id*.

commissioning studies to improve the operation of existing NYSERDA-funded DG-CHP systems which were placed into service prior to January 1, 2005; and conducting DG-CHP technology transfer, market transformation and policy studies of general interest to stakeholders throughout New York.[55] Additionally, NYSERDA offers continuing grant programs that subsidize individual energy audits, equipment upgrades, and service contracts, all of which can be used to fund CHP feasibility studies and installation projects.[56]

VII. Buffalo Sewer Authority and Erie County Sewer Districts

There are numerous possibilities for cogeneration at wastewater treatment plants in the Buffalo area. Erie County is made up of eight sewer districts, including seven wastewater treatment facilities. Of these Erie County facilities, Lackawanna is the only plant that operates anaerobic digesters. However, over the past six years, the Division of Sewerage Management has merged a number of the area's individual municipality sewers with the County in an effort to eliminate duplicate services, improve operational and administrative efficiency, and promote transparency among the area's wastewater treatment facilities.[57] The County believes these mergers to be a success, noting that the consolidation of services has provided future cost savings for residents while easing concerns over future regulations, lessening potential liabilities, and helping workforce succession planning.[58] As the County continues to consolidate the remaining sewer districts in the region, it should reconsider the feasibility of installing cogeneration technology at its newly-acquired facilities and should dedicate funding for such projects.

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[55] NYSERDA Current Funding Opportunities, http://www.nyserda.org/funding/funding.asp?i=2.
[56] *See* Matt Griffiths, NYSERDA Programs Powerpoint Presentation, Dec. 8, 2005, *available at* http://www.getenergysmart.org/contractorspartners/energysmartcommunities/overview.asp.
[57] Joseph L. Fiegl, *Regional Sewer Mergers Shape the Future of the Division of Sewerage Management*, Erie County Division of Sewerage Management: Mergers, *available at* http://www.erie.gov/dsm/mergers.asp.
[58] *Id.*

Other facilities not run by Erie County, including the BSA, Amherst and Tonawanda, utilize anaerobic digestion and produce methane in their wastewater treatment processes. Additionally, the City of Grand Island has made recommendations to install anaerobic digesters at its wastewater treatment facility to reduce the amount of solid waste generated.[59]

BSA operates New York State's second-largest wastewater treatment facility on Bird Island, at the foot of West Ferry Street.[60] The plant processes the sewage of 550,000 users over 110 square miles and has a capacity to fully-process 360 MGD.[61] In 2006, the BSA rehabilitated four of its anaerobic digesters, thereby improving energy efficiency and increasing its methane production.[62] Currently, BSA uses all of its methane produced on-site to power plant operations, including heating digesters, firing its sludge incinerator, and heating the facilities.[63] However, within the next two years, BSA plants to completely overhaul its sludge incinerator, allow it to run primarily on the sludge that it burns.[64] This would free up extra methane, which could be used to generate electricity. For example, Dave Commerford, the General Manager of BSA, anticipates that within the next few years there could be enough unused methane to completely offset the $1.2 million in annual electrical demands for the plant's aerator.[65] Therefore, as long as proper funding can be acquired, BSA is a prime candidate for CHP.

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[59] City of Grand Island Council Session, June 6, 2006, *available at* http://www.grand-island.com/departments/City_Council/Cnow/PDFs/06132006-G3.pdf.
[60] BUFFALO SEWER AUTHORITY 68TH ANNUAL REPORT 8 (2005-2006), *available at* http://www.ci.buffalo.ny.us/files/1_2_1/BSA/IntranetFiles/05-06_AR.pdf.
[61] *Id.*
[62] *Id.*
[63] Interview with Dave Commerford, General Manager, Buffalo Sewer Authority, Nov. 26, 2007.
[64] *Id.*
[65] *Id.*

The Erie County Legislature recognizes that the cost of energy "is skyrocketing and will likely continue to increase," and "as such, [its] energy bills will continue to increase."[66] The County Legislature has also acknowledged that "energy use by municipalities contributes substantially to the problems of pollution and global climate change."[67] Methane-fueled cogeneration is a perfect opportunity for both the BSA and other Erie County wastewater treatment facilities to accomplish its energy efficiency and emissions reduction goals.

VIII. Conclusion

Energy use by municipalities contributes substantially to the problems of pollution and global warming, in addition to consuming a large portion of our tax dollars. Installing methane-fueled cogeneration technology at wastewater treatment plants is one way for municipalities and communities to reduce emissions, combat global warming, and save money over time. Cogeneration has numerous benefits, including improving energy efficiency, minimizing waste by utilizing free fuel that is generated on-site, and decreasing dependence on the electrical grid. Although the up-front costs can be significant, NYSERDA funding is available and payback periods may be diminishing, depending on the future cost of fuel and individual plant efficiency. Therefore, the Buffalo Sewer Authority and Erie County Department of Sewerage Management should consider - and over time, regularly *reconsider* - the feasibility of installing cogeneration technology in one or more of their methane-producing wastewater treatment facilities.

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[66] *See* County of Erie, Local Law No. 5-2007, *available at*: http://www.erie.gov/legislature/pdf/LL_NO5-2007.pdf.
[67] *Id.*

Contacts:

NYSERDA
Ed Kier, CHP Project Coordinator
518-862-1090 x3269
chp.nyserda.org

Erie County Legislator
Betty Jean Grant
790 East Delavan Avenue
Buffalo, NY 14215
Telephone: 894-0914
Fax: 896-1463
Email: grant@erie.gov

Erie County Department of Sewerage Management
Thomas J. Whetham P.E., Deputy Commissioner
Edward A. Rath County Office Building
95 Franklin Street, Room 1034
Buffalo, New York 14202
Telephone: 716-858-8383 or 867-5789
Fax: 716-858-6257

Erie County Department of Environment and Planning
Energy Smart Programs
Bonnie Lawrence
858-8560

Buffalo Sewer Authority
Dave Cummerford, General Manager
851-4664 x 201

Town of Lewiston
Water Pollution Control Center
Timothy R. Lockhart, Chief Operator
501 Pletcher Rd.
Lewiston, NY 14092-1099
716-9754-8291
716-9754-4077 (fax)

Town of Amherst
Water Treatment Facility
Wendy Taber
691-9776 x 15