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The EPAct Tax Credit Aspects of Natural Gas System Engineering & Implementation

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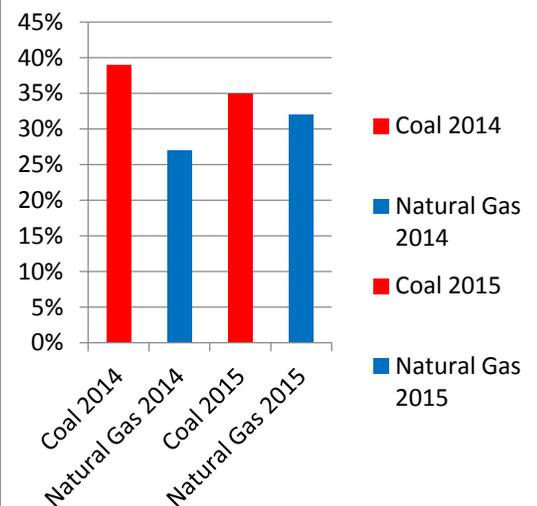
Natural gas conversions and other energy efficient HVAC and lighting improvements are eligible for EPAct 179D tax deductions.

Conversions from oil to natural gas are at a tipping point.ⁱ Over the past decade, the combination of hydraulic fracturing and horizontal drilling technology has allowed access to enormous quantities of natural gas from shale formations.ⁱⁱ As a result, in 2013, the U.S. became the world's largest producer of hydrocarbons, producing more petroleum and natural gas than both Russia and Saudi Arabia, the second and third largest producers in the world.ⁱⁱⁱ

This development has and will likely continue to have significant consequences for the natural gas industry. The availability of abundant, low cost natural gas means many consumers will see an opportunity to take advantage of competitive prices, which could remain low for a very long time.

As demonstrated in the chart, in the electric power sector, which is the largest consumer of natural gas,^{iv} utilities are using natural gas to generate electricity virtually matching that of coal.^v In addition, the lower greenhouse gas emissions associated with natural gas may spur demand for the natural gas alternative in part because greenhouse gas regulations for power plants are becoming increasingly stringent.

Electricity Generation by Source



In addition to natural gas consuming market share from other energy sectors, the demand for energy products overall is expected to rise significantly in the upcoming years. The Energy Information Administration, in its Annual Energy Outlook, projects total energy consumption to increase by 20% by 2035.

Recognizing the growing demand for energy, more specifically, clean energy, some large energy producers are developing novel solutions to keep up with this demand. In New York, National Grid, in partnership with the New York City Department of Environmental Protection, recently announced the launch of a wastewater treatment plant in Brooklyn, NY which will produce natural gas.^{vi}

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Novel solutions are also being developed to address other issues in the natural gas industry. As demand for the cheaper and cleaner alternatives grows, the capacity of infrastructure that is needed to support either conversions or new installations of natural gas systems must be increased proportionately.

Installation of new underground infrastructure, however, is both costly and challenging since many urban areas already have a complex network of above and below ground infrastructure that is difficult to work around. In response to this conundrum, the current national strategy involves not only the installation of significant pipe infrastructure, but also a higher utilization of existing natural gas pipeline. This would involve novel techniques such as completing the successful expansion of pipes already underground without having to dig them up.

Another novel solution being developed by National Grid involves connecting existing distribution systems in Queens and Brooklyn in order to increase the capacity of the existing network and the reliability of supply points.^{vii} Other innovations include new pipe repair and replacement technologies and novel methods for integrating large scale conversions.

Buildings converting to natural gas, as well as making other energy efficient HVAC, lighting, and building envelope improvements may qualify for EPAct 179D tax deductions.

The EPAct Tax Opportunities

Pursuant to Energy Policy Act (EPAct) Section 179D, property owners making qualifying energy-reducing investments in their new or existing locations can obtain immediate tax deductions of up to \$1.80 per square foot.

If the building project doesn't qualify for the maximum EPAct \$1.80 per square foot immediate tax deduction, there are tax deductions of up to \$0.60 per square foot for each of the three major building subsystems: lighting, HVAC (heating, ventilating, and air conditioning), and the building envelope. The building envelope is every item on the building's

exterior perimeter that touches the outside world including roof, walls, insulation, doors, windows and foundation.

Newtown Creek Wastewater Treatment Plant

As part of National Grid's commitment to sustainable energy solutions, they recently began the design and construction phase for a new purification plant in Brooklyn, NY that will convert biogas byproducts from the Newtown Creek Wastewater Treatment Facility into natural gas.^{viii} Newtown Creek is the largest wastewater treatment facility in New York City. The plant produces over 500 million cubic feet of biogas annually, a byproduct which is mostly methane (the main component of natural gas).^{ix} The amount of byproduct produced by the facility is expected to be enough to produce the amount of natural gas needed to power over 2,500 Brooklyn residences.

In addition, the project will reduce CO2 emissions by 16,000 tons annually, the equivalent of taking 3,000 cars off the road.^x

The project is the first of its kind and involves a number of technological challenges and hurdles. *"Developing renewable biogas at Newtown Creek will serve as a blueprint for the type of transformative, sector-crossing projects needed to improve our air emissions and meet our greenhouse gas reduction targets,"* said Sergej Mahnovski, Director of the Mayor's Office of Long Term Planning and Sustainability. *"The projects will also act as a catalyst for developing new markets and technology for the resources recovered, both in New York City and elsewhere."*^{xi} Those resources can be quite substantial. Energy generated at U.S. wastewater treatment plants (WWTPs) could potentially meet 12% of the national electricity demand, according to the National Association of Clean Water Agencies.

Other public officials had similar comments to about the initiative. *"Through this creative public/private partnership, the City of New York, National Grid, and Wastewater Management have demonstrated what a pathway to greater grid efficiency and reliability can look like"* said Richard Kauffman,

Chairman of Energy and Finance for New York State. *“Innovative local solutions like this will be critical to ensuring that communities receive the clean power they need and deserve.”*^{xii}

Wastewater Treatment Process

The technology most commonly used to turn wastewater into a renewable fuel source is called anaerobic digestion. Essentially, microorganisms break down the organic material in wastewater in an oxygen-free environment. The process yields “biogas” consisting mainly of methane and carbon dioxide. This methane can be combusted to produce electricity as well as compressed natural gas (CNG).^{xiii}

Although the technology has been around for some time, many innovators in the industry are trying to move it forward. Cleveland-based Quasar Energy Group is currently involved in a collaborative effort with the Ohio Agricultural Research and Development Center at Ohio State University. The partnership is developing technology that will hopefully be adopted by older municipal wastewater treatment plants in the U.S. that are in need of upgrades. The technology couples Quasar’s liquid anaerobic digestion technology with solid-state anaerobic digestion to increase energy outputs, expand the feedstock base, and broaden the market application for the system.^{xiv}

Other innovations include the developments of MIT spinoff, Cambrian Innovation in Boston. Their EcoVolt product uses electrically active organisms to produce both electricity and heat while treating wastewater. The treatment that takes place in the EcoVolt reactor is enhanced by a process called electromethanogenesis.

With this novel approach, electrodes are coated with electrically active microbes that convert organic wastewater pollutants into electricity. The electricity is then sent to other electrodes coated with different microorganisms, which inevitably convert the electricity, ambient protons and carbon dioxide into methane.^{xv}

National Grid Brooklyn/Queens Interconnect

National Grid recently began construction on the Brooklyn/Queens Interconnect initiative. When

completed, it will connect the company’s existing distribution systems in Brooklyn and Queens. This cross county capability is expected to provide reliability, safety, and flexibility to the existing infrastructure as it currently stands in both counties.

The plan involves installing 1.6 miles of 26-inch and 12-inch coated steel pipeline underneath the Rockaway Inlet beginning at Beach 169th Street in the Rockaways, and ending at the intersection of Flatbush Avenue and Aviation Road in Brooklyn.^{xvi}

The new 12-inch pipeline will connect National Grid’s existing distribution systems in Brooklyn and Queens and provide a back-feed for both areas to ensure adequate natural gas supplies for the Rockaways. The 26-inch pipeline will connect to the Williams Transco proposed Rockaway Delivery Lateral Project, which will provide a needed additional natural gas delivery point for New York City from the existing Transco system.^{xvii}

Williams’ existing Transco pipeline is a major transporter of natural gas, delivering much of the natural gas consumed in the Northeast, extending from Texas to New York City. This new access point to the Transco pipeline system will provide much needed service and reliability to the New York City area.

The \$83 million project will be the first major pipeline to be installed in the area in 50 years and is expected to lead to more conversions to natural gas. *“We are investing heavily in our gas infrastructure to ensure reliability, safety and to connect our customers”* said Ken Daly, president of National Grid New York. *“This project is critical to provide the additional clean economical natural gas supplies that our customers need”*.^{xviii}

Large Scale Natural Gas Conversions

The Village of East Hills on Long Island is part of a first-in-kind initiative to provide a large portion of residents in the village access to natural gas lines. The new project is expected to save residents hundreds and perhaps thousands of dollars per home that would otherwise be spent on running gas lines to their residence.

The project is part of a partnership between the village of East Hills and National Grid. Through the new program, approximately 1,000 homeowners in East Hills will be able to convert to gas without a charge for extending the gas lines. Senator Martins, praised the efforts saying *“This is an innovative clean energy program, whereby our installation of 60,000 feet of new, modern gas mains will provide over 1,000 customers access to clean natural gas ... Long Island communities will benefit from cleaner air as this program has the equivalent impact to the environment of taking 15,000 cars off the road for a year.”* Many people see this as a model of how the government and private sector should work together to provide access to natural gas lines on a national scale.^{xix}

Conclusion

Given the low natural gas prices and increasingly stringent air pollution requirements, natural gas conversions are becoming more prevalent. Those making the upgrade from oil to natural gas should be aware of the EPAct 179D tax deductions available for these upgrades and other lighting, HVAC, and building envelope improvements.

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