Untapped Potential: Overcoming Barriers to Biogas Projects  
by Linda Girardi

Wastewater treatment facilities (WWTFs) are one of the biggest energy users in a community. Paradoxically, they also offer significant potential for generating energy that can be used onsite or distributed back to the electric grid. Subjecting sludge to anaerobic bacteria in a closed vessel (digester) produces biogas that has been successfully used to provide both heat and electricity. Yet, the US Environmental Protection Agency (USEPA) reports that fewer than 20 percent of the larger WWTFs with anaerobic digestion operations produce combined heat and power (CHP).¹

So why aren’t more WWTFs using anaerobic digestion and CHP to generate renewable energy from biogas? A key factor is economics, according to a recent study by the Water Environment Research Foundation (WERF) and New York State Energy Research and Development Authority (NYSERDA) in conjunction with Brown and Caldwell, Black & Veatch, Hemenway Inc., and the Northeast Biosolids and Residuals Association (NEBRA).²

The report, Barriers to Biogas Use for Renewable Energy, uncovered two primary economic barriers to CHP projects:

• The availability of capital resources
• The perception that the economics do not justify the investment

The study involved both an online survey and focus groups. The survey gathered information on perceived barriers to biogas projects from more than 200 respondents. The respondents represented a cross-section of utility personnel, including management, engineering and operations personnel at plants (Figure 1) ranging in capacity from less than 5 million to more than 500 MGD (millions of gallons per day). The focus groups provided an opportunity for researchers to validate the survey’s findings with utility representatives and to delve more deeply into the barriers deemed most significant from the survey. Focus groups were held in New York City and three other locations across the United States (Sacramento, Miami and Chicago).

Importance of the Bottom Line

Limited Capital Budgets: The study found that the economics of proposed CHP projects present the greatest barrier to biogas use. It is all about the bottom line. Utilities have many demands for limited capital budgets and CHP projects can take a backseat to higher priority needs, such as meeting regulatory and permit requirements or repairing aging infrastructure. Some WWTFs have found it difficult to even find funding to study or evaluate CHP projects, much less to design and construct them.

Acceptable Payback: Showing that CHP projects have an acceptable payback period is also a challenge. In some cases, the threshold for payback can require three to five years, which can be difficult for CHP to meet. For other utilities, a reasonable payback may be 10, 20, or as much as 30 years or the “bond period” for the expended capital. The choice of a reasonable payback period is not purely about economics, but about the perspectives of the decision makers. A number of uncertainties and risks can also undermine payback. These include calculating the costs associated with operations and maintenance, working with third parties (outside agents), and predicting future electricity prices.

Overcoming the Barriers

Although there can be significant economic barriers to starting up CHP projects, interest and investment in biogas use by WWTFs over the past five years have grown. There also is greater public interest in cost efficiency, renewable energy and sustainability – all of which support biogas use projects at WWTFs. The study probed for ways to reduce or reframe the economic obstacles that can stand in the way of a CHP project. Recommendations for breaking down these barriers include:

• Adding alternative feedstocks, such as fats, oil and grease (FOG) and high-strength wastes (HSW). Adding alternative feedstocks can result in two financial benefits: a tipping fee for the “waste,” and an increase in biogas production that results in greater reductions in purchased energy costs. For small WWTFs, the additional power that can be generated from FOG or HSW can significantly improve project economics and, in many cases, be the tipping point for moving ahead with a CHP project. Furthermore, additional revenue generated by receiving FOG and HSW improves the utility’s operating savings considerably.

• Improving the economics of CHP projects by considering alternative sources of funding. Pursuing and securing alternative sources of funding, such as grants, low-interest loans, or capital purchase agreements with third parties, is another strategy to implement biogas projects at some WWTFs. Grants and incentives cannot only improve project economics, but they also can create a sense of urgency and importance around a project. Depending on the size

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Figure 1. Plant Size of Surveyed Utilities
of the award, payback for projects can be significantly improved. Grants from organizations such as NYSERDA, as well as federal and state governments, are available to utilities for CHP projects.

- **Reframing the economics of CHP projects by using better financial comparison metrics.** Most utilities use simple payback as their metric for project financial feasibility. However, other well accepted financial evaluation metrics, such as return on investment (ROI) and net present value (NPV), may produce a more accurate portrayal of a project's benefits. It's also important to highlight cash flow potential, especially over the long term, and to include the service life of the equipment in the economic analysis. By focusing on economic criteria other than simple payback, the argument for CHP can often be more compelling.

**Finding the Fit**

Combined heat and power is a strong technical fit for many WWTFs. Moreover, it can be a compelling investment at WWTFs, depending on local electricity prices. While many WWTFs have already adopted CHP, other facilities have not taken steps to move a project forward, or have not been successful in getting a project off the ground. Decision makers sometimes take a narrow approach to evaluating CHP projects, which are often viewed as discretionary in nature. Finding the necessary capital and ensuring the payback is worth the investment are two key economic barriers that must be overcome if CHP projects are to expand.

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**References**


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