FACT SHEET

Community Development

CDFS-DEG1-13

Distributed Energy Generation Series

Producing Your Own Electricity in Ohio

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Introduction

The development of a productive electric system or grid in this country required a significant amount of foresight, investment, and time to assemble. The U.S. electric system evolved around a centralized model, which consists of roughly 5,400 large electric power plants that are connected through a complex network of more than 200,000 miles of electric transmission lines and 5.5 million miles of local distribution lines. This centralized model of large-scale fossil based electric power plants, transmission infrastructure, and distribution networks have dominated the industry for decades. However, some experts suggest the electricity industry in the United States is now transitioning into a more decentralized model. "While the future scope and scale of the industry is not yet apparent, recent trends indicate that distributed generation electricity applications may play an important role in this transformation" (Carley, 2009). This fact sheet is designed to help Ohio businesses understand the process of developing an on-site distributed generation system with a net metering agreement.

What Is Distributed Energy Generation?

"Distributed energy resources—also called distributed generation, distributed energy, and distributed power systems—are small, modular, decentralized, grid-connected or off-grid energy systems located in or near the place where energy is used" (U.S. Department of Energy, 2012). For the purpose of this fact sheet series we will refer to distributed energy resources as distributed energy generation (DEG) systems. DEG refers to on-site, small-scale electric generation systems typically owned by customers and interconnected to the grid to reduce the amount of electricity they purchase from the utility. They are "distributed" because they are placed at or near the point of energy consumption, unlike traditional "centralized" systems, where electricity is generated at a large electric power plant and then transmitted through the grid to the consumer (National Renewable Energy Laboratory, 2012). DEG systems include a wide range of technologies such as anaerobic digesters, wind turbines, solar systems, fuel cells, combined heat power, and natural gas systems.

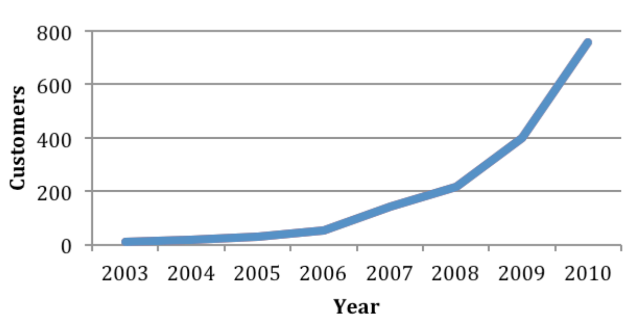
What Is Net Metering?

Net metering is a billing program developed through policy, offered by a utility company for customers who install DEG systems to produce their own electricity. When a DEG system is net metered, electricity from the system is first used to satisfy on-site demands, while any excess electricity is exported back onto the local utility distribution grid. The Ohio Revised Code defines net metering as, "measuring the difference in an applicable billing period between the electricity supplied by an electric service provider and the electricity generated by a customer-generator that is fed back to the electric service provider" (Ohio Revised Code, 2008). In general, this means an electric customer can use an on-site DEG system to offset a portion of their total electric consumption. Regardless of when energy is used or produced, the customer is only charged for the net difference at the end of the billing cycle. Attachment A visually illustrates different examples of how electricity may flow in a DEG system, based on the on-site energy demand compared to on-site generation during a specific period in time.

As of 2012, 46 states have established some form of a net metering policy, which promotes the adoption of renewable energy technologies through the establishment of DEG systems. While most states have a net metering policy, program rules vary in a number of ways including qualifying technologies, capacity limits, compensation structure for excess generation, and program fees. For example, most net metering programs include a compensation structure to address excess generation during a billing cycle through methods such as monthly rollover credits, annual resolution of outstanding credits, or direct payments, which may be based on wholesale or retail rates during a period. Most net metering policies place a limit on the maximum capacity an on-site generator is eligible to produce. However, Ohio, Arizona, and New Jersey have no capacity limit in place.

Technological advances over the past decade combined with the increase in state policies such as net metering has led to an increase in the installation of on-site, DEG systems. For example, between 2003 and 2010, nationwide customer participation in net metering programs grew by an average of 56% annually. Although it should be noted, while there is clearly a growth trend in the adoption of net metering projects, it still represented only 0.1% of all customers nationwide in 2010 (U.S. Energy Information Administration, 2012). As you can see in Figure 1, Ohio has also experienced a steady increase in net metering customers since 2003. Similarly to the national data, while Ohio has demonstrated a clear trend of growth in net metering systems established, it still represents a small percentage of Ohio consumers.

Figure 1. Estimated Net Metering Customers in Ohio



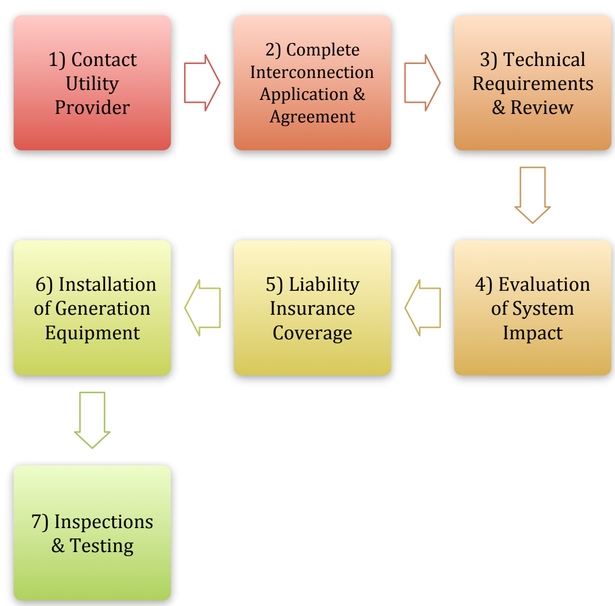
Data Source: U.S. Energy Information Administration
http://www.eia.gov

The Interconnection Process

As mentioned earlier, the electrical grid was designed around a centralized electric generation model. The integration of DEG systems can present challenges to grid operators such as managing the intermittent nature of solar and wind systems and maintaining delivery voltage levels that meet industry specifications (American Electric Power, 2013). Therefore, DEG systems can potentially create operating conditions that may require special equipment to ensure the system continues to operate safely and effectively. Equipment used in a DEG system must be connected and installed in compliance with technical requirements of the system manufacturer. Systems must also be in compliance with local, state, and federal codes.

Net metering programs and interconnection rules vary by state. Figure 2 highlights several of the main steps in the interconnection process. If you are considering the installation of a DEG system, the first step is to contact your local electric utility provider to review your plans. A list of the contact information for electric utility companies in Ohio can be found at **www.PUCO.ohio.gov**.

Figure 2. Interconnection Flow Chart



Case Study: Cooper Farms Wind Project

Cooper Farms, established in 1938, is a family owned and operated company consisting of two divisions including the live animal division and the food processing division. The company is a producer of poultry and pork products with four locations in northwest Ohio, employing more than 1,400 people. Motivated by increasing electric rates, leadership at Cooper Farms established a team to explore the feasibility of installing wind turbines to offset a portion of the electricity usage at the Van Wert facility. According to Jim Cooper, CEO of Cooper Farms, "Their finding was that it did make economic and sustainability sense to use wind energy for a portion of our electrical needs" (Cooper Farms, 2013). As a result, in September 2011 the company started construction on two 1.5-megawatt wind turbines on 85-meter towers. The two turbines were originally designed to generate 60 to 65 percent of the electricity needed at the Van Wert cooked meats facility. However, the success of the first two turbines was so significant that the company decided to install a third turbine in 2012, offsetting roughly 80% of the facility's electrical demands.

One Energy LLC, a wind power company based in Findlay, Ohio, built the Cooper Farms wind project. During a renewable energy workshop in northwest Ohio, One Energy president Jereme Kent said, "This is a financial investment; it just happens to be green. We will never tell you, go spend six or seven million dollars to be green. We will tell you, spend six or seven million dollars to be profitable, and if you can be green while doing this, great" (Ohio State University Extension, 2013). Kent said a project similar to the one built at Cooper Farms has a 4- to 6-year return on investment, including warranty and maintenance costs.

Economics of DEG Systems

By investing in on-site DEG systems with net metering, consumers can benefit from lower utility bills and increased stability in expenses (U.S. Energy Information Administration, 2012). The cost effectiveness of a DEG system varies based on a number of factors including:

- Average annual consumption of electricity
- Current and projected cost of electricity from utility provider
- Cost of installing a DEG system
- Operation and maintenance cost of the DEG system
- Estimated electricity generated by the DEG system
- Financial incentives such as grants, tax credits, renewable energy credits, and bonus depreciation programs

It is important to critically analyze the economic potential of DEG projects on an individual basis. The influencing factors outlined above are variable in nature. For example, according to data from the U.S. Energy Information Administration, between 2001 and 2012 the average retail price of electricity to Ohio's Industrial Sector has increased by more than 45 percent from 4.27 cents per kilowatt-hour to 6.21 cents per kilowatt-hour. Furthermore, a 2012 study by the National Renewable Energy Laboratory noted "the price of U.S. PV systems has fallen by nearly 30% since the second half of 2010, and further near-term price reductions are likely as the U.S. market matures" (National Renewable Energy Laboratory, 2012). While policy mandates and financial incentives (subsidies) greatly influence the economic viability of a DEG system, other factors such as the cost of electricity from the utility and installed cost of DEG systems can also significantly influence the payback period of projects.

Summary

State policies and technological developments have led to an increase in residential and business consumers installing small-scale, on-site generators (U.S. Energy Information Administration, 2012). The cost of a DEG system is significant and, depending on the factors outlined in the prior section, may not be economical in every situation. However, a growing number of Ohio businesses are analyzing projects, with some posing a payback period worthy of an investment. In addition to the Cooper Farms case study, a growing number of Ohio businesses have recently developed DEG systems to offset a portion of their electrical needs.

Additional Resources

The Public Utility Commission of Ohio — **www.puco.ohio.gov/puco/**

AEP Ohio — **www.aepohio.com**

Dayton Power & Light — **www.dpandl.com**

Duke Energy Ohio — **www.duke-energy.com/ohio.asp**

First Energy — **www.firstenergycorp.com**

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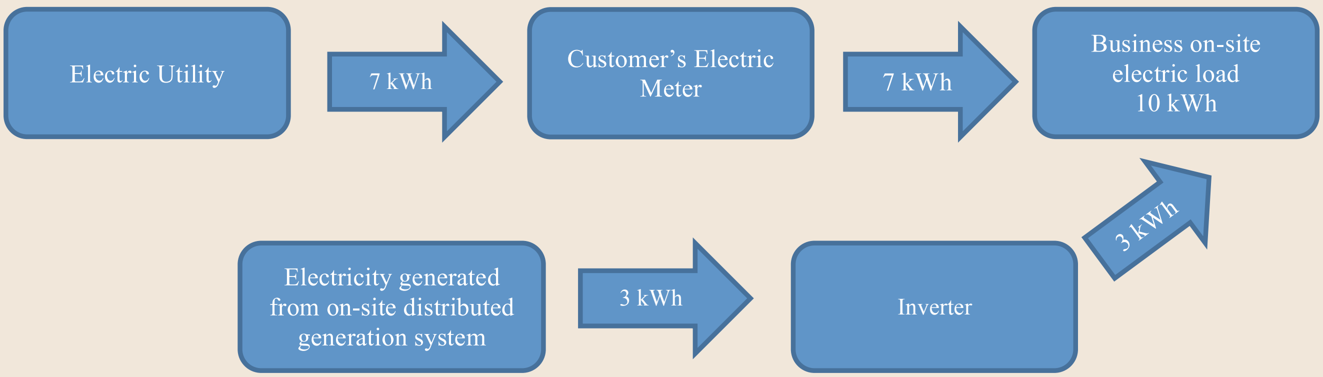
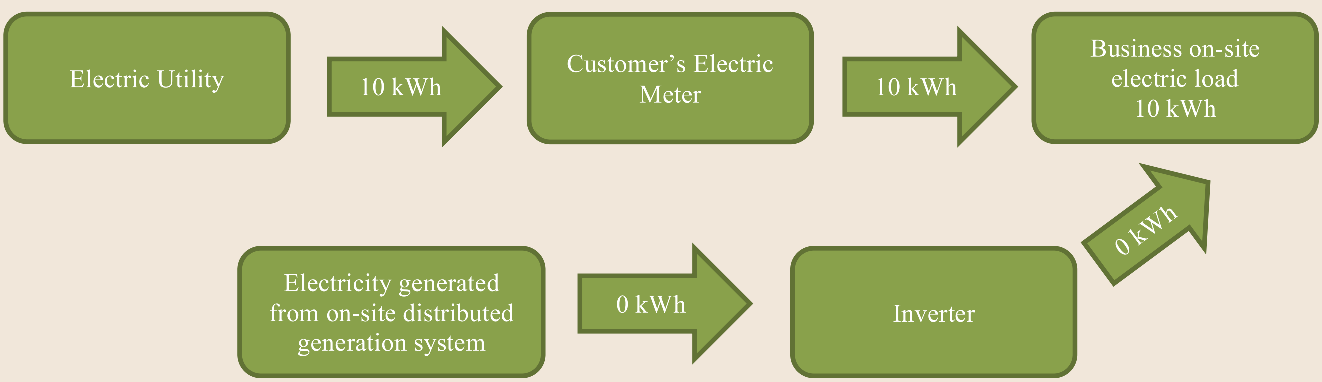
Attachment A. Examples of Electricity Flow with a Net Metering Agreement

Overview: When a on-site distributed generation system is generating electricity, that electricity is first used to satisfy on-site electrical load demands. In the event excess on-site electricity is generated, it is fed back onto the local utility distribution grid. The following images generalize various scenarios to illustrate the bidirectional nature of the alternating current (AC) electrical flow in a net metering agreement.

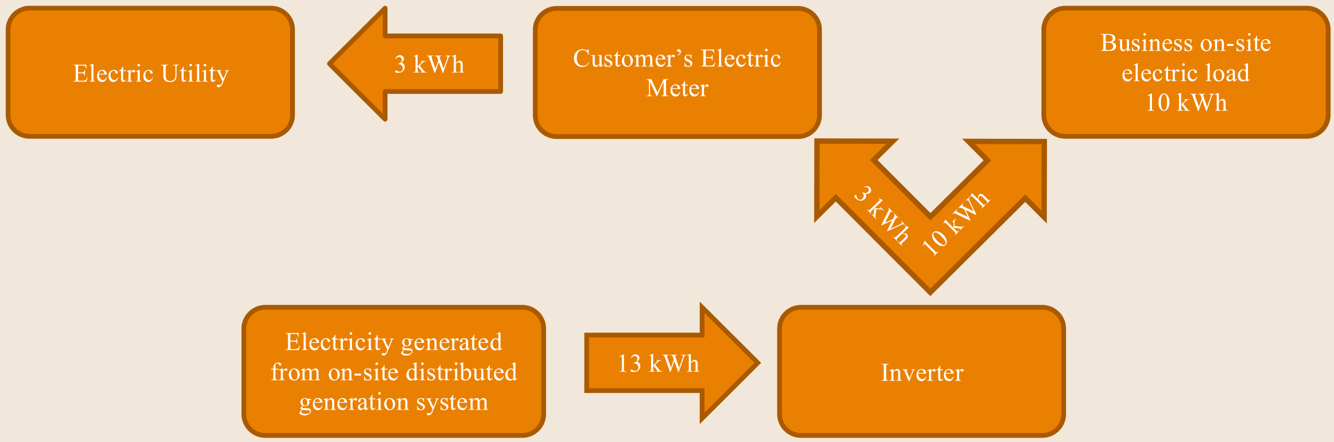
Scenario 1 — This scenario shows an on-site electric load demand that exceeds the amount of electricity available from the on-site electric generation system. As a result, the balance of electricity needed to meet the load demand is satisfied with electricity from the traditional electric utility provider.



Scenario 2 — This scenario shows a situation where the on-site electric generation system is not producing electricity, however there is a on-site electric load demand. As a result, all of electricity needed to meet the load demand is satisfied with electricity from the traditional electric utility provider.



Scenario 3 — This scenario shows a situation where the on-site electric generation system is producing more electricity than is required to meet the on-site electric load demand. As a result, excess electricity from the on-site generation system is fed back onto the local utility distribution grid.



Scenario 4 — This scenario shows a situation where the on-site electric generation system is producing electricity during a time when there is not an on-site electric load demand. As a result, all the electricity from the on-site generation system is fed back onto the local utility distribution grid.