The ups and downs of consum

Editor's note: The following are excepts from a question and answer article in the September/October issue of Basin Today, a publication from Basin Electric Power Cooperative. Basin Electric is a generation and transmission cooperative that serves parts of eight states, including Montana. In the article, Basin Electric Manager of Member Marketing Ron Rebenitsch is interviewed by Basin Today Editor Mary Klecker.

The evolution of society has ushered in technological advancements and increased efficiencies that have spanned across all spectrums, including the energy industry. Gone are the days where consumers – commercial and residential – can only obtain all their power needs from their local utility company's base-load and peaking generators. The system is evolving to include distributed, renewable and other generation resources. Today's consumers have several choices, one of them being self-owned generation. In fact, many people are looking to distributed generation as an answer to the environmental and transmission concerns that face our country. The idea is tempting. But it's not the moneymaking, be-in-control-of-your-own-energy-destiny fairytale developers often promise. The reality is that there are ups and downs to owning distributed generation and several considerations must be taken into account before entering this arena.

Basin Electric Power Cooperative Manager of Member Marketing Ron Rebenitsch.
(Photo courtesy of Basin Electric)

What types of distributed generation are consumers purchasing?

Whether a consumer is purchasing a generator for a home or for a business, generators come in all shapes and sizes, ranging from diesel- and natural gas-powered turbines, microturbines, wind turbines/chargers, solar-charged batteries, fuel cells … the list goes on.

What are the drivers for consumers to owning distributed generation?

There are four main economic reasons people or companies choose to purchase distributed generators. In addition to the economic drivers, many people regard environmental concerns as the most important driver of all, particularly for distributed generation, such as wind, which is obviously not fossil-fueled. All of these reasons can be mutually exclusive, or they can work together.

Of the economic drivers, the first would be avoidance of transmission and distribution costs. One thing typically not understood by consumers is that more than half the cost of a kilowatt-hour is usually related to the cost of providing the transmission and distribution wires to move the electricity from the utility generators to the consumer. The actual electricity, such as what might be provided by a distributed generator (i.e., a wind turbine) is only a small part of the cost of providing firm power supply. In cases where the addition of distributed generation allows the utility or the consumer to avoid adding new transmission and distribution lines, distributed generation may offer an economical alternative, if the avoided cost of new wires can be credited to the distributed generation application. Of course, the distributed generation must then be able to run at the same times the avoided transmission or distribution system would have been needed. In other situations, a consumer may want total independence and is seeking to disconnect from the system. In those cases, a reliable distributed generation system may be the only choice.

Another reason to consider distributed generation arises where a low-cost fuel is available. For instance, if you're a dairy farmer with a manure disposal problem, it could make sense to install a methane digester that will digest the manure – actually convert it to a better form of fertilizer – and in the process, create methane, which can be burned by a generator or a small microturbine. The cost of the fuel in that case is substantially lower than other locally available conventional fuels, such as propane or natural gas. It could actually be considered a zero-cost fuel, since the primary objective is to dispose of the manure in an environmentally sound manner.

The next driver would be situations such as in an industrial process where the consumer has a need for non-electrical heat. In these cases, waste heat may be available from the generator. For example, hot water can be obtained from a heat exchanger connected to the generator's engine radiator; or low-grade steam can be extracted from the exhaust of an engine or turbine driving the generator. The waste heat can then be used to offset the cost of other energy purchases, such as the use of gas or oil previously used to heat water or make steam.

And finally, is the case in which a consumer already has a backup generator that is used for emergencies. Some co-

ner owned generation

ops have a rate structured to pay consumers what they think are roughly close to market prices. Typically standby generators (often called gensets) are diesel-engine driven – say at hospitals – and if started, they can be used as a power supply resource. The consumer could use the genset to either drop off the electrical grid, or to interconnect to the system and operate parallel to the grid.

What are the cost considerations of distributed generation?

First, there is capital, followed by fuel, maintenance, interconnection, and finally environmental permitting.

The capital cost for an internal combustion diesel engine is typically $300-500 per kilowatt of nameplate capacity (size). For internal combustion gas-fueled engines, the prices range from $600-800 per kilowatt. Wind turbines range from $1,100-$1,300 per kilowatt for small projects. Large wind projects – say 50 megawatts or more – are around $950-1,050 kilowatt.

Diesel is one of the more expensive fuel resources. At $1 per gallon, diesel is typically a bit more than $7 per million Btus versus natural gas at $4-6 per million Btus. For central station power plants, the economics are different. A coal plant has a high capital cost, but a very low fuel cost – well below $1 per million Btus. In contrast, a peaking plant, such as a gas turbine will have a low capital cost, but operate on a high-cost fuel such as natural gas or diesel.

For anyone looking at purchasing distributed generation, it's important to realize all of these facilities require maintenance. For an internal combustion engine, Basin Electric is typically seeing quotes in the neighborhood of a penny per kilowatt-hour or higher just to do the maintenance on a unit that is run on an almost continuous basis. Microturbines have less maintenance than a diesel unit, but they have a higher capital cost, plus they are less efficient.

Interconnection is also a critical component. The local system has to be able to take the power, and upgrades to the electrical grid are typically very expensive. A very important part of interconnection is safety. Consumers must have the right electrical equipment that will disconnect them from the system if the system goes down. It's very dangerous for a lineman to work on a line that he thinks is not energized, when in fact, it is energized because a local distributed generator is operating, but the lineman doesn't know that. All the safety interlocks and electronics must be in place.

It's also important to note that when consumers decide to purchase a distributed generation unit, they assume a lot of responsibility, obligations and liabilities. Power quality, system safety and delivery requirements are just a few examples.

And lastly, it's a consumer's responsibility to work with the state and all permitting agencies to make sure the units are environmentally compliant with all regulations. Just like fuel, capital and maintenance, interconnection and environmental permitting costs are the responsibility of the consumer.

Are there government incentives to consumers who purchase wind turbines?

It depends on the state. Some states provide minimal tax incentives; others provide significant incentives. It is important to note that to receive a federal production tax credit of 1.8 cents per kilowatt-hour, consumers must sell the power to an independent third party; they can't get a production tax credit for electricity produced that they have consumed themselves.

Consumers also need to understand that the bundled rate on their electric bills includes the transmission, wires and power plant used to serve them when the wind is not blowing. The actual electricity cost representing fuel and operation is only a small part of the cost of providing the firm "flip-the-switch" power supply most consumers take for granted.

There is obviously more than meets the eye to consumer-owned distributed generation, especially with the costs involved. If it's not a money saver or maker, why are consumers attracted to it?

Their decision to enter into this arena certainly

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isn't driven by economics. There are several reasons. Some people want or need the security of backup generation. Others purchase wind turbines out of a sense of environmental stewardship. Obtaining an adequate rate of return to justify the investment is not easy – if it were, there would be many more distributed generation projects. Many of the nation's largest companies have explored the various technologies and found the economics did not warrant an investment.

What is net metering and how does that fit into the picture?

Net metering is when customers decide to self-generate to save money on their electric bill. For example, if they generate 5 kilowatt-hours, under net metering, their meter would be rolled back 5 kilowatt-hours. Basin Electric's position is that net metering is very unfair to the other customers, because it displaces the fixed costs of the entire electrical system that provides firm power all the time, and those costs then must be paid by other consumers.

The consumers who want to self-generate need to realize that their current electrical rate is typically "bundled." What this means is that their electric bill contains the cost of the consumer's share of the entire electrical system, such as transmission and distribution, power plants, backup reserves, etc. It's also important to recognize that when their generator is not meeting their needs – say the wind isn't blowing, or the generator breaks down – and they want back-up power from the local utility, they have to be responsible for the cost to have that resource standing by to meet their needs. There is a part of the system that is allocated to be there when they need it, and they need to recognize that as a cost responsibility. They can't expect their neighbors to pay for it. Somewhere in the system, when their generator runs, a power plant backs down. Conversely, when their generator stops running, somewhere on the system, another generator will need to increase generation. This is because the load on the system doesn't change whether their generator is running or not. Most of the time, the consumer's generator allows the system to save fuel, but does not allow the system to reduce investment in transmission or distribution.

If Basin Electric does not support net metering, how does it figure its rates for consumers with distributed generation?

Basin Electric charges a standby rate, which is based on what it costs us to have the needed resources ready to provide power to those consumers who have distributed generation should their generator not run. This is generally the cost of transmission and the cost of having a generating resource available. We charge a standby rate to consumers whose distributed generation is greater than 150 kilowatts. Below that, the distribution cooperative will determine a rate to recover the cost of its service to those customers.

What value does consumer-owned distributed generation bring to the utilities?

The primary value that a consumer-owned generator brings to the system is fuel displacement. When a consumer's generator is running, all else remains equal – the poles and lines – but somewhere in the system, a generating station has backed down, so less fuel is being used. For a generator that can be scheduled, such as a gas turbine or diesel engine, a distributed generator may also provide capacity, which has value. However, if a consumer can't reasonably expect to be online during the peak times or has an unschedulable resource, then there is little or no capacity value brought to the system.

What is the difference between capacity and energy?

Capacity is the ability to meet load obligations at a defined point or at a required time. Energy is the actual kilowatt-hours of electricity used over a billing period.

Any last words for people considering distributed generation?

I think if people are thinking about saving money and making money with self-generation, they must look before they leap. Generator salesmen frequently paint a glowing picture, but the reality is that the economics must reflect the real value of the product you are providing to the system. If your generator can provide real capacity to the system, it has more value than a generator that cannot be relied upon to be there when needed. It must be remembered that typically more than half the cost of electricity is transmission and distribution costs, not the actual electricity itself. Unless you're willing to completely disconnect from the system, so you don't use any of the system's resources, you should expect to pay for the part that you use, just like everyone else.