Interconnection and Net Metering for Small Scale Solar Electric Systems

Executive Summary

Small sized renewable energy projects, such as rooftop solar panels, are gaining momentum across the country including mid-Missouri. Columbia Water and Light has fielded numerous requests for interconnection information and is anticipating that a formal request will be received in the near future. Given Columbia's unique role as the only Missouri utility to have a Renewable Energy Portfolio Standard, it is timely for the utility to consider adopting policies and procedures for such interconnections.

Traditionally projects connecting independent generators to an electric utility have involved large scale (megawatt sized) installations. By nature of their size such projects have included extensive engineering design work which has insured performance standards and interconnection compatibility. This is changing for small scale renewable energy projects which can now avoid the need for customized engineering by use of equipment specifically designed and certified for interconnection projects.

Utilities across the country are finding it beneficial to provide access for small scale renewable energy projects. Austin Energy in Texas, Jacksonville Electric Authority in Florida, and Pacific Gas and Electric (PG&E) in California are examples of such utilities that have adopted simple and open interconnection procedures. PG&E has the largest number of interconnections with over ten thousand small scale solar interconnections, providing just over 1% of their peak load. They have found that safety and compatibility issues can be met by incorporating equipment and installation standards from such credible organizations as the Underwriters Laboratory and the Institute of Electrical and Electronic Engineers (IEEE).

Beyond installation concerns, utilities and independent generators must also construct a financial arrangement for any electricity that is sent into the utility system. 'net metering' is commonly understood to describe a transaction in which the customer (generator) trades electricity with the utility. A single meter, for example, can measure electricity flowing to the utility from a solar array on sunny days when production exceeds consumption, and then reverse its direction to measure the amount of electricity used by the customer on cloudy days, or at night. At the end of the month the customer is billed for the difference or the 'net' amount of electricity used over the month's time.

Most solar owners use more electricity in their household than they produce each month so they still have a residual amount on their monthly bill. Should however, the solar system produce more electricity than the customer uses during the month, a credit can be carried to the subsequent month, but only on a limited basis.

Currently Missouri law requires a different type of metering and financial transaction. Missouri CSR 240 20.065, called 'net metering' actually requires utilities to meter electricity flows separately. It specifies that utilities separately meter any electricity used by the customer and the electricity that is sold to the utility by an interconnected generator. It also requires the utility to pay 'avoided cost' for any electricity that is sold to the utility.

'Avoided cost' represents the cost that the utility avoids (wholesale power costs) when it purchases power from an independent generator. Typically it is an average cost for wholesale power. Since CSR 240 is applicable to all utilities in Missouri, any installation in Columbia must thus include meters to separately measure the two electrical flows, and must pay avoided costs for any electricity sold to the utility system.

Determining avoided costs for solar energy is more complex than identifying the average power costs for the utility. An analysis of the value of solar produced electricity shows the costs of the power that it displaces are significantly higher than the utility's average wholesale costs. This is because solar energy is both a daytime source of power and a renewable resource. These two independent attributes of solar energy make it more valuable than other power resources.

To determine the value of electricity produced only during the daytime an investigation was conducted of the hourly prices for wholesale power of the Day Ahead Market hosted by the Midwest Independent System Operator (MISO). Over one year of data was used to develop average hourly power costs for a typical day. These hourly costs are depicted in Exhibit A.

Between midnight and 6 AM, prices are at their lowest and the non-daylight period as a whole averages $42 per megawatt hour (MWH). During hours of daylight, when electric production from solar panels occurs, the market prices rise to an average of $63 per MWH. Since Columbia both purchases and sells electricity in the Day Ahead Market, this price of $63 can be considered as an index for the avoided cost of daytime electricity.

Besides being produced during daylight hours, solar energy is also a renewable resource. This renewable attribute further enhances the value of solar power because it helps Columbia Water and Light meet the renewable energy mandate. Examination of two independent renewable projects that the utility has contracts for, the Jefferson City Landfill and the Bluegrass Ridge Wind Farm, show that a renewable energy attribute increases the value of electricity by an average of $8 per MWH above other non-renewable forms of energy.

The combination of daytime production value and the renewable attribute of solar electricity bring the avoided cost for this energy source to $71 per MWH which is approximately equal to Columbia Water and Light's non-summer retail rate of $76 per MWH, or $0.076 per Kilowatt Hour (KWH). This price equivalence allows the utility to offer the financial equivalent of net metering to any small scale solar system while still paying the avoided costs required by state law.