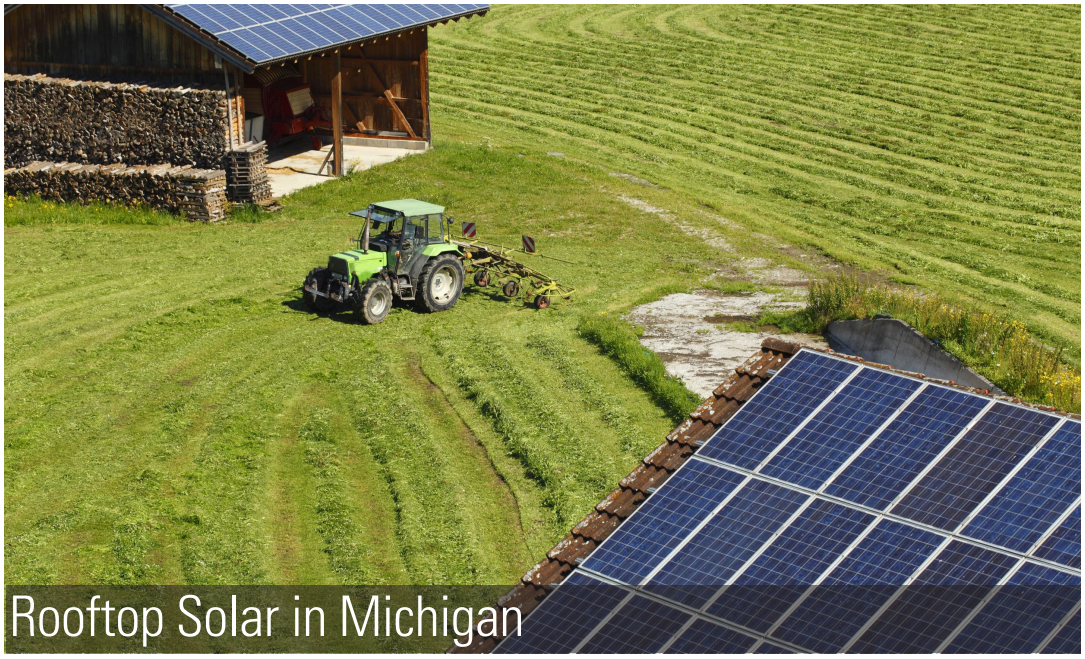
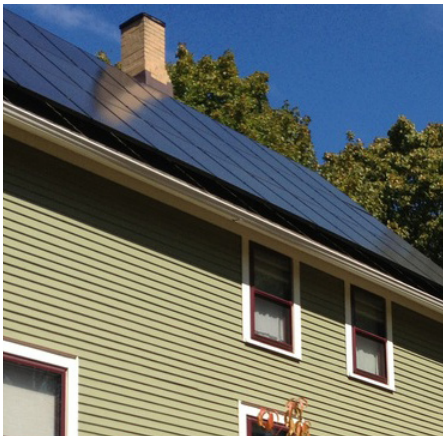


Rooftop Solar in Michigan



GLOBAL IMPACT ARTICLE SERIES

The movement to install rooftop solar systems, also known as distributed solar generation, is growing rapidly in the United States. These solar systems are small, on-site energy sources located at homes or businesses that operate as small electrical power plants. Many homeowners and businesses have installed rooftop solar panels to generate renewable energy and reduce carbon emissions that result from using fossil fuels to produce energy. Benefits to homeowners using solar systems include revenue for the surplus electricity contributed to the electric grid. The benefits of distributed solar to utility companies and the public include reduced grid congestion, reduced local air pollution and greenhouse gas emissions that impact public health.

Measuring the economic value of distributed solar generation (DSG) is somewhat contentious among a variety of stakeholders (e.g., homeowners and utility companies). Homeowners receive revenue from utility companies for contributing excess electricity to the grid. Customers are generally reimbursed for electricity at the full retail rate. The federal and state governments are responsible for developing policies that determine the compensation process, such as Net Energy Metering (NEM), for surplus electricity from rooftop solar that can be "sold" to the electric grid.

The issue of DSG compensation has become point of conversation within Michigan, which currently has a net metering program similar to other states in the nation. Some stakeholders interviewed stated that the contribution of distributed solar is undervalued. The current price of NEM in Michigan is $0.019/kWhr. Other stakeholders perceive that the value of DSG, and the amount paid to solar customers is too high, because solar customers are not paying for the use and maintenance of the electric grid. Utility companies, like DTE Energy and Consumers Energy maintain the grid and pass along this cost to non-solar customers. They contend that the current level of compensation for solar customers negatively impacts non-solar customers.

THE REAL VALUE OF SOLAR

The project team identified a need to assess the economic value and other benefits of DSG. Determining the overall value of solar may assist in determining a fair price for the solar energy provided by distributed solar users. In addition, the team provided policy makers and others with feedback about the benefits of solar from a variety of stakeholders, including DSG providers and representatives from utility companies. This information included discussions about how to value DSG and better integrate more solar into the electric grid.

The use of solar energy provides a variety of benefits. DSG generates renewable energy at the customer's home or business. After installation of rooftop solar systems, the cost of solar is free. There are no transmission and distribution costs. Solar energy does not emit any pollutants. In addition, solar energy helps reduce the total cost for homeowners or businesses that may be using both renewable and non-renewable types of energy.

In contrast, non-renewable energy is typically generated at a power plant and delivered to customers through a transmission and distribution system. Consumers pay to have energy delivered to their house, as well as the cost of using fossil fuels, such as oil, gas and coal. The overall cost of fossil fuels fluctuates, due to a variety of factors.

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Electricity production in the Great Lakes region is heavily reliant on coal-based generation, adding significant amounts of carbon dioxide to the atmosphere, with Michigan ranked as the 10th largest carbon dioxide emitter (in 2011) among states in the nation. In addition to its impacts on climate change, coal-fired generation also emits nitrogen oxides (NOx), sulfur oxides (SOx), and particulate matter (e.g., ash and soot), which can have adverse effects which degrade air quality and have adverse human health impacts, such as lung disease, cancer, and asthma.

PRICING SOLAR

The project team selected a few key factors to focus on to determine the value of solar, including:
1) A fuel price hedge to help stabilize the cost of fuel by locking in prices for a period of time
2) Environmental benefit
3) Reactive supply and voltage control, or the management of electricity to ensure that the transmission system is stable and efficient.

The total value from all three factors is $0.042/kWh (kilowatt per hour). See the cost estimate breakdown for each factor, below.

Fuel Price Hedge – Cost Estimate = $0.019/kWh
The economic benefit of solar power (renewable energy), assuming the investment in the installation is for the lifetime of the solar equipment (approximately 30 years). The use of solar would displace coal-and natural gas-fired generation (non-renewable energy). The availability and value of fossil fuels determines the price.

Environmental Benefit – Cost Estimate = $0.023/kWh
Reducing carbon emissions by using solar power is calculated by estimating the carbon emissions for the same power generation by fossil fuel. In addition, the social cost of carbon, established by the federal government, is applied to calculate the environmental benefit.

Reactive Supply and Voltage Control – Cost Estimate = $0.002/kVAr (reactive power)
DSG may help reduce transmission losses, increase transmission capacity, and maximize power transfer capability.

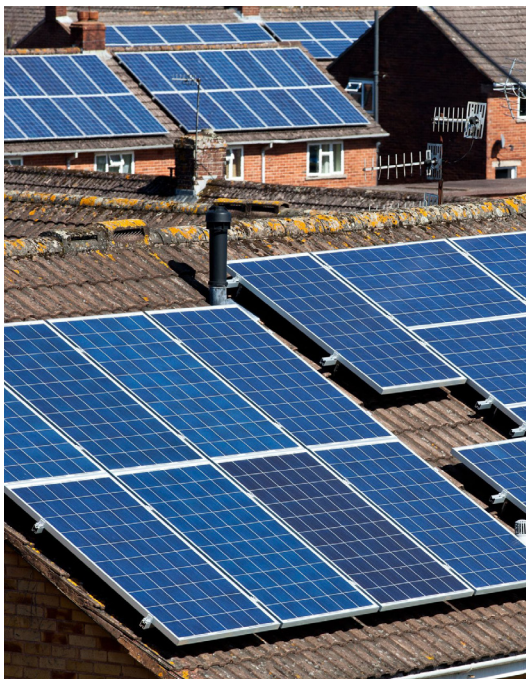
STAKEHOLDER FEEDBACK

On behalf of the Michigan Public Service Commission, the U-M Dow Sustainability Fellows team conducted interviews with relevant stakeholders (e.g., individuals and organizations) to understand their positions on the proposed alternatives to assessing the total value of distributed solar generation. A few alternatives for calculating solar generation tariffs were discussed. Based on stakeholder feedback, there was no consensus about policies suggested by the Commission. However, some policy options were unclear, making it difficult to predict how the market or policy makers would react to changing the tariff.

CONCLUSION

The student group recommended that the Michigan Public Service Commission consider a Value of Solar tariff. This would provide a more accurate estimate of the value of DSG, rather than Net Energy Metering. In calculating the tariff, the Commission would identify the benefits from DSG, and compensate solar customers appropriately. This information would be used to determine a fair tariff system for all customers. Additional recommendations for the Commission included:

1) Continuing to engage stakeholders about transitioning from net energy metering (NEM) to a Value of Solar tariff.
2) Conducting a thorough analysis of the value of distributed solar for the State of Michigan.



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PARTNERS

Michigan Public Service Commission

READ MORE

- Full Project Report: Valuing Distributed Solar Generation in Michigan
- Dow Masters and Professional Fellowship: Project Reports

The outlook of Michigan's solar policy is uncertain. Although, this project brought to light the importance of engaging a variety of stakeholders now, and in the future. Distributed solar generation is growing rapidly in the nation, due to policies that compensate solar users, as well as the declining cost of installing rooftop solar systems. Michigan and the nation may benefit greatly from careful consideration of a variety of benefits of distributed solar generation.

SUPPORT: Made possible by The Dow Chemical Company, the Dow Sustainability Fellows Program at the University of Michigan supports full-time graduate students and postdoctoral scholars at the university who are committed to finding interdisciplinary, actionable, and meaningful sustainability solutions on local-to-global scales. The program prepares future sustainability leaders to make a positive difference in organizations worldwide.

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