

Title: An evaluation of the exchange of value and energy in net metering in North Carolina

Master of Science in Technology Thesis Research

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Net metering is a policy that enables customers with solar photovoltaics (PV) to receive retail value for their solar energy. Large-scale evaluations of net metering performed in other states have presented this retail value as a cost to the customer's utility. However, net metering rules in North Carolina often result in net metering customers exporting high-value, peak daytime energy to the utility, and receiving credit for low-value, off-peak nighttime energy in return. The value discrepancy in this exchange has not been present in large-scale evaluations, and my research has developed a method for quantifying the value of the balance of this exchange. My results indicate that utilities often benefit from this exchange, which suggests that net metering of distributed solar PV could be a mutually beneficial arrangement between a customer and his utility. These conclusions point to possible utility models in the future that includes customer rooftop solar PV as an integral part of business plans, enabling lower energy prices, fewer greenhouse gasses, and sustainable utility revenue streams for the next generation of the electricity grid in the U.S.

References:

- Beach, R. T., & McGuire, P. G. (2013). *The Benefits and Costs of Solar Generation for Electric Ratepayers in North Carolina*. Berkeley: Crossborder Energy.
- Hummon, M., Denholm, P., & Margolis, R. (2013). Impact of photovoltaic orientation on its relative economic value in wholesale energy markets. *Progress in Photovoltaics: Research and Applications*, 21, 1531 - 1540. doi:10.1002/pip.2198
- McConnell, D., Hearps, P., Eales, D., Sandiford, M., Dunn, R., Wright, M., & Bateman, L. (2013). Retrospective modeling of the merit-order effect on wholesale electricity prices from distributed photovoltaic generation in the Australian National Electricity Market. *Energy Policy*, 58, 17-27. doi:10.1016/j.enpol.2013.01.052