Cost-reduction roadmap outlines two pathways to meet DOE residential solar cost target for 2030

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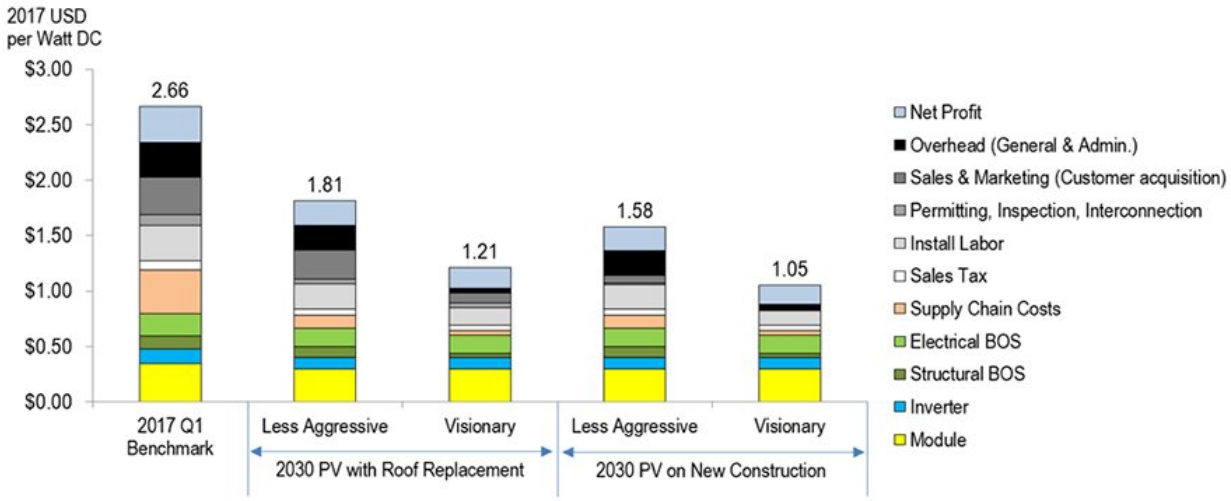

Modeled installed system costs of PV at time of roof replacement and new construction as compared to NREL's 2017 Q1 benchmark. Credit: National Renewable Energy Laboratory

Leveraging cost-reduction opportunities in the roof replacement or new construction markets for residential photovoltaic (PV) installations could help the United States meet the U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO) residential solar photovoltaic cost target by 2030, according to new research from the National Renewable Energy Laboratory (NREL).

The NREL analysis presents a potential roadmap for achieving the 2030 residential target of $0.05 per kilowatt-hour (kWh) by identifying and quantifying a plausible range of cost reduction opportunities and mapping how these opportunities could influence system costs in key market segments.

"Our findings suggest that between now and 2030 homeowners could see a considerable cost savings when installing PV and a new roof at the same time," said Kristen Ardani, lead author of the report and a solar technology markets and policy analyst at NREL. "We also found that PV installed on new construction offers opportunities for even greater cost reduction. However, it will require considerable business model and permitting process innovation to realize the cost savings potential identified in each of these market segments."

The analysis and findings are detailed in the Cost-Reduction Roadmap for Residential Solar Photovoltaics (PV), 2017-2030. The report identifies and defines four key cost-reduction opportunities that could have a significant impact on the installed cost of residential PV through 2030: market maturity, business model integration, product innovation, and economies of scale. To assess the potential impact of these specific cost-reduction opportunities, NREL researchers compared modeled residential PV system costs in 2030 to NREL's U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017. Since 2010, NREL has benchmarked current PV system prices for the residential, commercial, and utility-scale sectors. These benchmarks are generated using a bottom-up accounting framework for all component and project-development costs incurred when installing PV systems. The residential benchmark models the cash purchase price for systems excluding the federal investment tax credit. NREL used the same cost-accounting framework to model residential PV system costs in 2030 for the roof replacement and new construction markets. Consistent with previous benchmarking efforts, NREL derived modeling inputs and validated draft results via interviews

with industry and other subject-matter experts.

The analysis also examines two key market segments that demonstrate significant opportunities for cost savings and market growth: installing PV at the time of roof replacement, and installing PV as part of the new home construction process. NREL estimates that between 2017 and 2030, an average of 3.3 million homes per year are likely to be built or require a roof replacement. This translates into a technical market potential of roughly 30 gigawatts (GW) each year from 2017 to 2030. Enabling and/or capturing even a relatively small fraction of this technical potential could have a significant impact on the evolution of the electricity system in the United States.

For each market segment, the analysis models two pathways: a less aggressive pathway representing an incremental shift from current market practices, and a visionary pathway representing a more dramatic shift. The modeling results suggest that installing PV on new housing developments could enable residential PV installation savings of 61 percent relative to the Q1 2017 benchmark system price. In existing homes, installing PV at the time of roof replacement could lead to 55 percent in savings relative to the Q1 2017 benchmark system price. The greatest savings opportunities for these pathways include supply chain, sales and marketing, overhead, permitting, inspection, and interconnection, and installation labor.

This exercise demonstrates that savings associated with non-hardware balance of system or "soft" costs account for about 65 percent of the savings. In comparison, "hard" costs, including hardware cost, module-related improvement, and inverter-related improvement, represent about 22 percent of the modeled savings. Additionally, pathways that realize reliability improvement and financing changes, a mix of hard and soft costs, represent 13 percent in savings.

These findings illustrate that reducing soft costs could help industry to achieve the 2030 target, and that capturing these cost reductions will likely require considerable innovation in both technology and business models employed by industry.

Provided by National Renewable Energy Laboratory