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**Technoeconomic analysis of the solar photovoltaic (PV) supply chain and PV systems coupled with storage**

**Abstract**

This talk will highlight the most recent efforts from the National Renewable Energy Laboratory (NREL) to track solar photovoltaic (PV) manufacturing capacities and trade flows and to calculate manufacturing costs, project levelized cost of electricity (LCOE), and project levelized cost of solar plus storage (LCOSS) for systems across the globe.

We will begin with an overview of the global PV supply chain and 2020 benchmark input data used for NREL’s bottom-up crystalline silicon (c-Si) and thin film PV module manufacturing cost models. The accounting standards that we follow are the U.S. Generally Accepted Accounting Principles (GAAP) and the International Financial Reporting Standards (IFRS). For the polysilicon, wafer, cell conversion, and module assembly steps of the c-Si supply chain, and for thin film modules, we will review the input data and methods used for calculating the costs of goods sold (COGS); research and development (R&D) expenses; and sales, general, and business administration (S, G, &A) expenses. This 2020 benchmark analysis is compiled for state-of-the-art c-Si and thin film PV module manufacturing in several countries.

We will also review our 2020 benchmark LCOE-based technoeconomic analysis of monofacial and bifacial PV systems, as well as our initial calculations of LCOSS across a range of storage durations. Next generation technologies that lower PV manufacturing and installation costs, reduce operations and maintenance (O&M) expenses, and improve system energy yield will also be highlighted. We will conclude with projections of solar market penetration to 2050 from NREL’s Annual Technology Baseline (ATB) model, which includes solar coupled with lower-cost storage scenarios as well as the range of future cost scenarios for other power generation sources. We look forward to sharing NREL's extensive work in these areas and discussing ideas for future directions.

**Biography**

Dr. Michael Woodhouse is a senior analyst and project lead within NREL’s Washington, DC, office. His analysis activities are focused on solar energy and storage technologies, economics, and policy. He is currently co-leading NREL’s solar technoeconomic analysis portfolio for clients within the U.S. Department of Energy (DOE) and has provided analysis support to projects with the U.S. Department of Commerce and the International Trade Commission. The current scope of work for DOE projects includes designing and developing bottom-up PV manufacturing cost modelling software, conducting PV system levelized cost of electricity (LCOE) and levelized cost of solar plus storage (LCOSS) calculations, tracking current global solar and storage policy issues, and attempting to quantify the cost and economic impacts from upcoming solar and storage technologies. Dr. Woodhouse also serves as the Associate Editor for energy economics and policy for the *Journal of Renewable and Sustainable Energy*.