

Terawatt-Scale Photovoltaics: Trajectories and Challenges

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Dr. Nancy Haegel

Center Director of the Materials Science Center, Materials and Chemical Science and Technology Directorate, National Renewable Energy Lab

Abstract:

It is well understood and commonly cited that the solar energy resource significantly exceeds the world's total energy consumption. However, despite dramatic advances in deployment and cost reduction, the vision of PV providing a significant fraction of global electricity generation—and ultimately, total energy demand—remains to be realized. In the near term, PV has a clear path for substantial growth. Longer term, the question remains whether PV will be able to provide a moderate (e.g., 20%, ~ 4 TW in 2030) or a large (e.g., 50%, ~ 10 TW in 2030) fraction of world electricity needs.

Terawatt scale PV deployment is achievable with growth rates substantially below what the industry has achieved over the past decade. Material for this presentation will be drawn from The Terawatt Workshop and a resulting April 2017 publication in *Science*. Global leaders in PV came together to highlight the opportunity and discuss the challenges that could impede the vision of TW scale PV. These challenges include the continuing demand for improved efficiency and reliability, the required magnitude of capital expenditure, the need for a sustainable industry (both financially and environmentally), as well as needs for grid modernization and consistent policies to meet energy demand and enable greenhouse gas reduction and global prosperity based on a secure and sustainable energy system. Finally, the presentation will briefly address some research directions in PV that could directly impact DoD programs and warfighter mobility, survivability and time on mission.

Biography:

Dr. Nancy M. Haegel is the Center Director for the Materials Science Center in the Materials and Chemical Sciences Directorate at the National Renewable Energy Laboratory (NREL). There, she leads an organization of over 100 staff, associates, and post-doctoral and graduate students providing fundamental and applied materials science discovery and problem-solving for current and next-generation renewable energy and energy-efficient technologies. She joined NREL in 2014 after serving ten years as a Distinguished Professor of Physics at the Naval Postgraduate School. Previously, she held faculty positions at Fairfield University and UCLA. Her research interests are in electronic materials and materials physics, imaging of electronic and energy transport using integrated e-beam and near-field optical techniques, high resistivity semiconductors, characterization of solar cells, nuclear radiation detectors and infrared imaging and spectroscopy. She contributed to the development of transient models for the infrared detectors on the Spitzer Space Telescope and prototyped remotely triggered Identification Friend or Foe devices for individual and vehicle protection. Her research has been supported by the National Science Foundation, the David and Lucile Packard Foundation, Research Corporation, NASA, the Office of Naval Research, and the Domestic Nuclear Detection Office of the Department of Homeland Security.



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