Expert Assessments of Future Photovoltaic Technologies

AIMEE E. CURTRIGHT,*,†,‡
M. GRANGER MORGAN,† AND
DAVID W. KEITH§

Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, Pennsylvania, United States of America and Energy and Environmental Systems Group, University of Calgary, Calgary, Alberta, Canada

Received May 26, 2008. Revised manuscript received September 7, 2008. Accepted October 2, 2008.

Environmental Science and Technology

TABLE 2. The 18 Experts Who Participated in This Study

name	affiliation	name	affiliation
Barnett, Allen	University of Delaware	Merfeld, Danielle	GE Global Research
Green, Martin	University of New South Wales	Nozik, Arthur	NREL and U. of Colorado
Hambro, Chip	First Solar	Parkinson, Bruce	Colorado State University
Hammond, Troy	Plextronics	Rosey, Richard	Solar Power Industries
Hegedus, Steven	University of Delaware (IEC)	Shaheen, Sean	University of Denver[a]
Janssen, René	Eindhoven U. of Technology	Surek, Tom	Motech Americas[a]
Lewis, Nathan	Cal Institute of Technology	Swanson, Richard	SunPower
McCandless, Brian	University of Delaware (IEC)	Williams, Brown	Evergreen Solar
McConnell, Robert	NREL	Wohlgemuth, John	BP Solar

[a] Formerly at NREL.

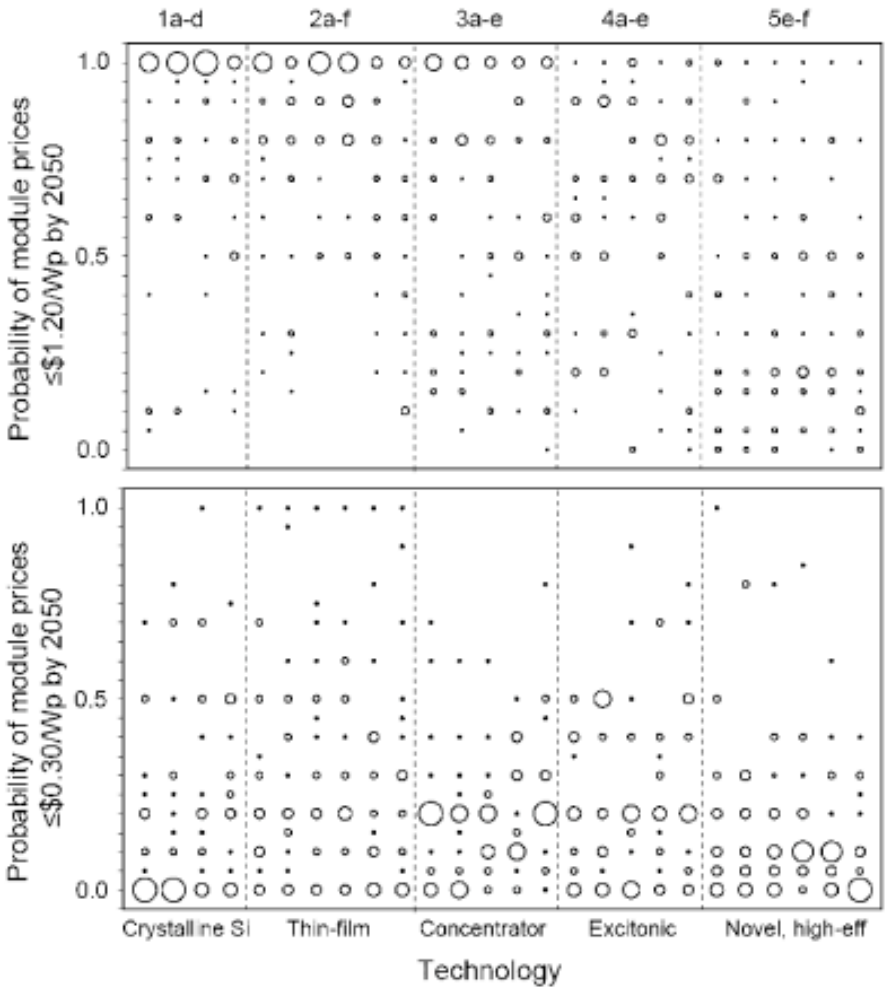

FIGURE 2. Probability of achieving module prices of (top) $1.20/$W_p$ or less and (bottom) $0.30/$W_p$ or less by 2050. The results shown here are for all 26 current and emerging PV technologies and for all 18 experts, regardless of expertise level in a given technology. The circle diameter represents the number of experts who responded with the given probability for the given PV technology; the smallest circle corresponds to one expert, the largest in the top panel corresponds to 9, and the largest in the bottom panel corresponds to 7.

Given these factors, the low probabilities that many experts assess of meeting a price of $\$0.30/W_p$ by 2050, and the wide dispersion in their assessments of efficiencies and prices, we conclude that PV may have difficulty becoming economically competitive with other large-scale, low-carbon bulk electricity options in the next 40 years. At the same time, it seems likely that PV will continue to expand into a variety of smaller-scale markets. Of course, past efforts to make technical and energy-related predictions have often missed the mark (*33*, *34*). Unanticipated technical developments could similarly overturn the judgments herein, but before R&D reduces uncertainties, massively subsidized deployment of existing technology is arguably not the best way to increase the odds of such an outcome.