

Solar Photovoltaics: Technology, Performance, and Costs (Or how high and how low?)

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The prospects of current and coming solar-photovoltaic (PV) technologies are envisioned, arguing this solar-electricity source is beyond a *tipping point* in the complex worldwide energy outlook. Truly, a **revolution** in both the technological advancements of solar PV and the deployment of this energy technology is underway; PV is no longer an outlier. The birth of modern photovoltaics (PV) traces only to the mid-1950s, with the Bell Telephone Laboratories' development of an efficient, single-crystal Si solar cell. Since then, Si has dominated the technology and the markets, from space through terrestrial applications. Recently, some significant shifts toward *technology diversity* have taken place. Some focus of this presentation will be directed toward PV R&D and technology advances, from 40% concentrator cells and 20% thin-film technologies in the important imminent disruptive category to longer-term revolutionary concepts (quantum dot, intermediate-band, multiple-multijunction, bio-inspired cells) that have to be readied for our next generations of energy consumers. This presentation will be framed within some recent ground-breaking (perhaps radical) targets to bring installed PV system prices to the \$1/watt regime by the year 2017! The implications, technology and BOS development constraints, and the reality of this remarkable target will be explored. This presentation provides insights to the reasons for PV technology emergence, how these technologies have to be developed (an appreciation of the history of solar PV)—and where we can expect to be by this mid-21st century.