U.S. Department of Energy
Energy Efficiency and Renewable Energy

Welcome to the DOE High-Tech Inverter Workshop

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Systems Driven Approach

How is it applied?

- SDA uses a formal and rigorous method of identifying and evaluating research needs relative to market targets

Example

- Nominal PV market target is 6¢/kWh
- What do inverters contribute to the cost target, and what combination of lifetime/initial cost is most effective? What are the technical paths to next-generation inverters?

Key Result

- To which parameters are LEC and other metrics for inverters most sensitive?

Technology Development

FUNDAMENTAL RESEARCH

Measurements and Characterization

Exploratory Research

High Performance Photovoltaics

Environmental Health and Safety

ADVANCED MATERIAL & DEVICES

Thin Film Partnership

Advanced Manufacturing R&D

Module Reliability R&

TECHNOLOGY DEVELOPMENT

Systems Engineering and Reliability

- Field test and evaluation
- Balance of system development (i.e inverters)
- Improve codes, standards, and certification

Building Integrated Photovoltaics (BIPV)

- Research on PV/building concepts and components
- Coordination with Zero Energy Buildings
- Coordination with Million Solar Roofs Initiative

Outreach and Communication

- International and domestic market facilitation
- Training, education, and technical assistance
- Solar exhibits and displays
- Communication plan and products
- Solar Decathlon

PV Balance of Systems Development

Inverter tests at Sandia National Laboratories support new product development and manufacturing; assure safety and reliability for inclusion in state rebate programs, such as California.

Goals: Leap-frog current inverter technologies and develop lower-cost, high-reliability inverters that double today's MTBF.

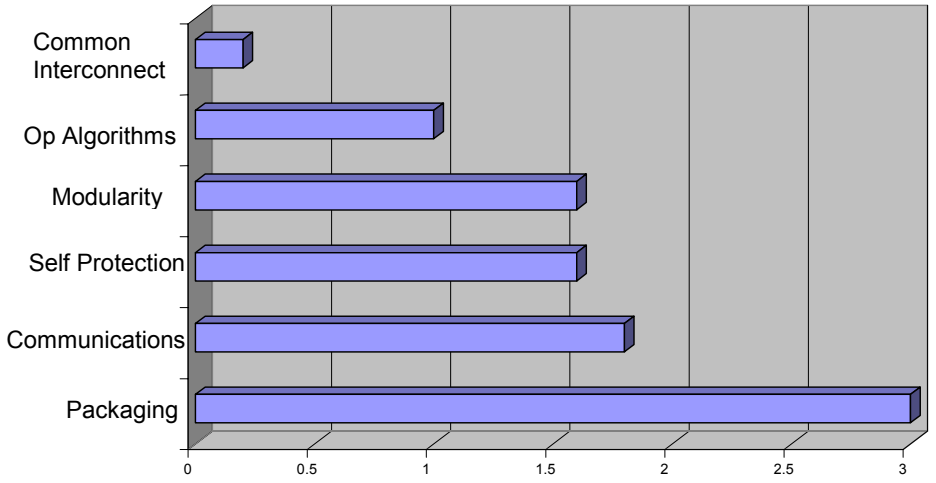
Milestones:

- Award Phase II contracts for the "High Reliability Inverter Initiative" (December 2003)
- Develop advanced PV inverter prototypes (October 2004)
- Complete development of high-reliability inverters for commercialization (January 2006)

Accomplishments:

- Prototypes developed for new inverter technologies with advanced controls
- Complete draft "Inverter Test Protocol," validation tests with CEC inverters
- Evaluated performance, safety, and reliability (benchmark) of 11 new designs providing key "improvements" criteria

High Reliability Inverter Priorities for Systems and Subsystems (from Inverter Workshop)



2003 Peer Review

"This work is outstanding and essential to PV industry development.

This work is also essential to other distributed generation technologies, and if there is one recommendation from the panel it is to try and expand connections to inverter research supported by fuel cell developers and other distributed generation technologies."

Page 23, September 2003 Peer Review of the DOE Photovoltaic Subprogram

Day One Agenda Overview

- Presentations on Research and Technical Issues
- Breakout Sessions – Focused Discussion
  - Capacitor/Components
  - Surge Protection, Thermal Management and Packaging
  - Power Electronics, Communications, Controls
- Primary Goal to Map Technology Issues to Key Influences in Relation to Inverter R&D Timeline

Day Two Agenda Overview

- Presentations on Code and Standards Issues
- Breakout Sessions – Focused Discussion
  - UL Standards Related Issues and Needs
  - Utility Related Standards Issues and Needs
  - Inverter Manufacturers Issues and Needs
- Primary Goal: Mapping Areas of Agreement and Controversy Related to Inverters
- Follow-Up