U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

The Parker Ranch installation in Hawaii

Update on Solar Program Activities

February 14, 2011

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Agenda

1. Summary of $1/W Workshop from August 2010
2. Current Request for Information (RFI)
3. Questions

Summary of $1/W Workshop

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Date:	August 11th and 12th, 2010
Attendees:	86 total; 11 for Power Electronics breakout (mix from Federal Govt., academia, industry)
Format:	Introductory comments; breakout sessions; plenary discussion to discuss results
Read-ahead:	$1/W Photovoltaic Systems – White Paper to Explore a Grand Challenge for Electricity from Solar

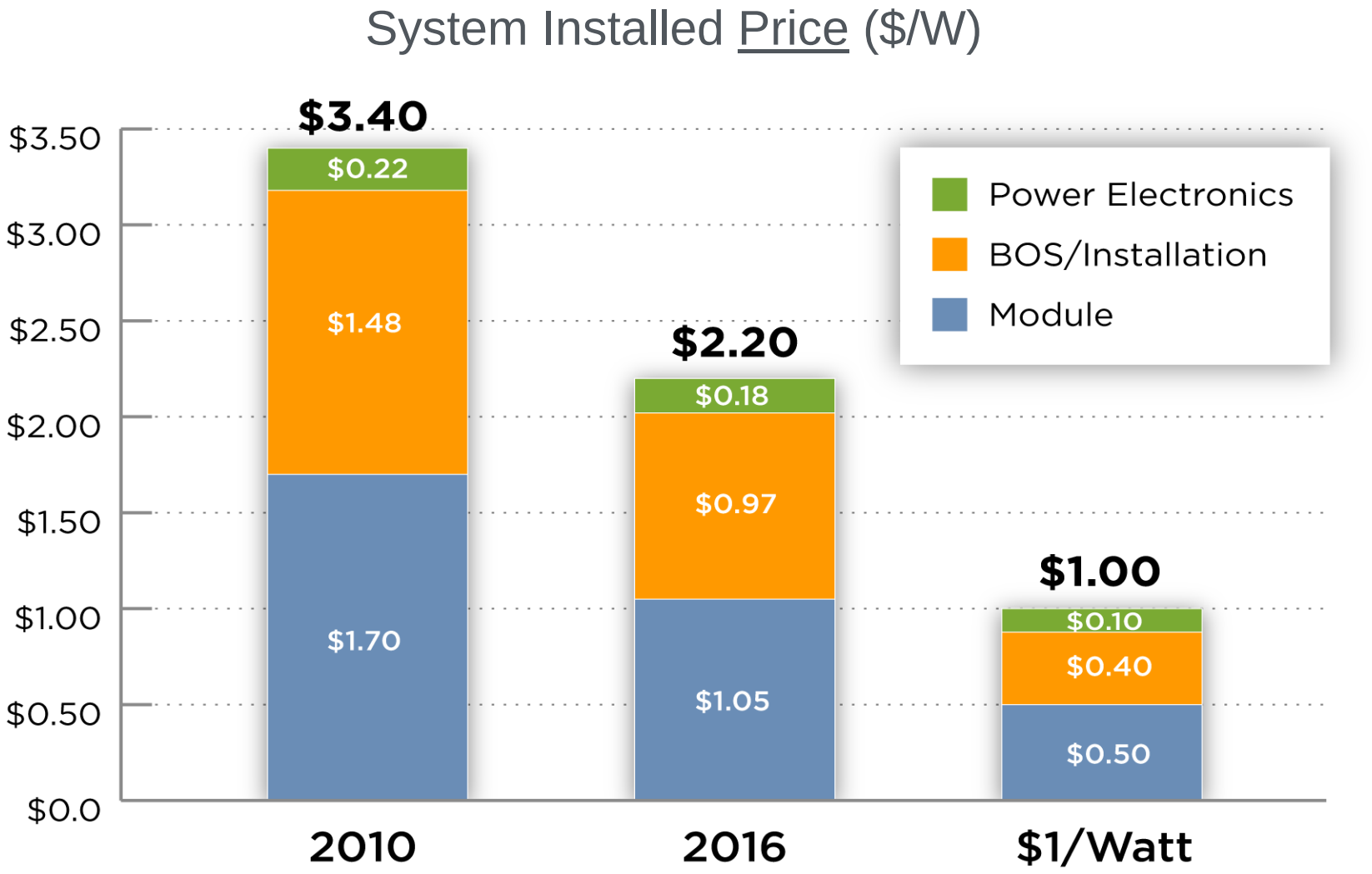
Summary of $1/W Workshop

$1/watt installed by 2017: Defining the Objective

- **By 2017**: Demonstration of all key components and installation methods in systems at least 5MW in size and initial production orders for equipment capable of delivering $1/watt installed systems in 2017
- Includes all components, equipment and installation processes to produce grid compatible electricity
- Target could be met with systems installed on the ground or on buildings
- Earth-abundant materials
- Recyclable components
- Meets all applicable safety and environmental standards

From the $1/W White Paper

Summary of $1/W Workshop



From the $1/W White Paper

Summary

Centralized Power Electronics	
Goals	**Key Take-Aways**
Reduce first cost	• Economies of scale could reduce inverter cost 5¢/watt. • Higher frequency switching could reduce cost an additional 3-4¢/watt .
Improve reliability to 30 years	• Maintenance contracts could be cheaper than designing inverter for higher reliability. • Manufactures know what fails – and solder joint failures have multiple solutions.
Integrate smart grid functionality	• Adding reactive power capability is relatively inexpensive and recommended. • Adding ability to manage storage may cost 6-7¢/watt for a bi-directional converter and is a nice to have extra.
Understand Implications for system cost	• Operating at a higher voltage will drive out system wire cost. • Higher frequency switching will reduce converter size and weight.

Summary (cont.)

Decentralized Power Electronics	
Goals	**Key Take-Aways**
Reduce first cost	• Need high volume production to drive down cost. • Limited availability of high voltage switches. • Need to integrate components to achieve scale manufacturing. • No 3-phase micro-inverters available for utility-scale applications.
Improve reliability to 30 years	• Limited field experience - need tools to understand/predict failures and monitoring to better identify failure issues.
Integrate smart grid functionality	• Challenge for micro-inverters is coordinating thousands of converters. • Reactive power relatively easy to add. • Storage solutions not clear.
Understand Implications for system cost	• Decentralized power electronics could increase system yield 4-8% reducing all system components and related costs (including inverter). • 3-phase AC system results in lower cost of wiring, protection features and labor.

Current RFI

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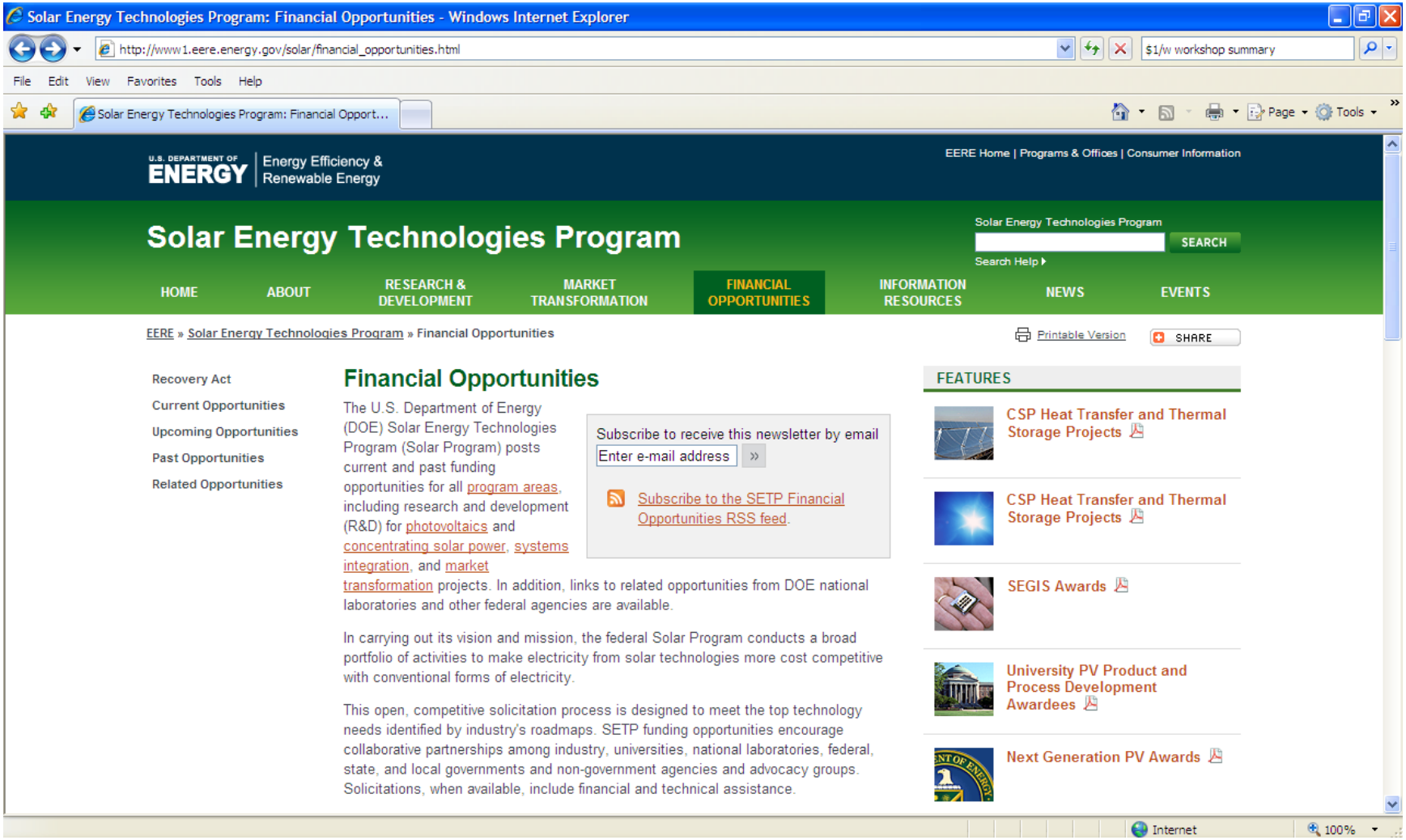

http://www1.eere.energy.gov/solar/financial_opportunities.html

Current RFI

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Title: $1/W PV Systems: Solar Energy Grid Integration Systems, Advanced Concepts

Subject: DOE is requesting information on Solar Energy Grid Integration Systems, Advanced Concepts (SEGIS-AC) and how changes in power electronics impact the cost of the PV system as a whole.

Due Date: February 4, 2011

Current RFI

The RFI seeks feedback on:

a) Investment Amount

$7-9M annually for three years ($24-27M), subject to annual appropriations

b) Topic Areas

(1) *Smart-Grid Functionality*

(2) *Using Power Electronics to Address Balance of System Costs*

c) Evaluation Criteria

Current RFI

SEGIS-AC Meeting, February 9th, Washington DC

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Questions?

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