Update on Solar Program Activities

February 14, 2011
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1. Summary of $1/W Workshop from August 2010

2. Current Request for Information (RFI)

3. Questions
Summary of $1/W Workshop

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

$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

System Installed Price ($/W)

- **$3.40** in 2010:
  - Module: $1.70
  - BOS/Installation: $1.48
  - Power Electronics: $0.22

- **$2.20** in 2016:
  - Module: $1.05
  - BOS/Installation: $0.97
  - Power Electronics: $0.18

- **$1.00** in $1/W Watt:
  - Module: $0.50
  - BOS/Installation: $0.40
  - Power Electronics: $0.10

*From the $1/W White Paper*
## Summary

### Centralized Power Electronics

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<tr>
<th>Goals</th>
<th>Key Take-Aways</th>
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| **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.  
- Manufacturers 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. |
### Decentralized Power Electronics

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| **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. |
http://www1.eere.energy.gov/solar/financial_opportunities.html
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
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**
SEGIS-AC Meeting, February 9th, Washington DC

Please contact
kristen.nicole@ee.doe.gov
Questions?

Kevin Lynn
Acting Lead for Systems Integration
kevin.lynn@ee.doe.gov
202.586.1044

Mike Cliggett
Technology Development Manager, Technology Validation Project
michael.cliggett@ee.doe.gov
202.586.3626

Kristen Nicole
System Integration Analyst
kristen.nicole@ee.doe.gov
202.287.1781