2008 Solar Annual Review Meeting

Session: CdTe
Company or Organization: PrimeStar Solar
Funding Opportunity: PV Incubator

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PrimeStar Solar
Making It Happen

Budget and Solar America Initiative Alignment

- 18 month SAI incubator project from Sept, 2007 to March 2009

Start	2007	2008	2009	Total
Sept 07	$0.12M	$2.35M	$0.51M	$2.98M

- This project supports the Solar America Initiative by accelerating development of high efficiency and low cost CdTe thin film PV module manufacturing. This will contribute to the goal of grid parity for PV power by 2015. It focuses on:
  - Improved efficiency for CdTe modules
  - Reduced manufacturing costs for CdTe modules
  - Reduced equipment cost for CdTe module manufacturing

PrimeStar Solar SAI-Incubator Project Overview

- PrimeStar Solar
  - Founded in 2006 – thin film equipment expertise
  - Commercializing NREL's world record efficiency CdTe PV
  - High volume low cost production

DOE CdTe National Team ,2006

PrimeStar Solar , Colorado - HQ, Engineering & Development

- SAI-Incubator is accelerating PrimeStar's development:
  - Prototype mini-modules
  - Pilot line design and commission

- Post SAI-Incubator
  - Rapid ramp to high volume automated manufacturing of full sized CdTe PV modules

PrimeStar Solar , Michigan - Equipment Build

Project Aligned with DOE CdTe Technology Roadmap

Parameter	Present Status (2007)	Future Goal (2015)	Approach
Champion device efficiency	16.5%	18%-20%	Improved modeling and device understanding
Commercial module efficiency	>9%	13%	Controlled carrier concentrations and improved back-contacts
Module cost ($/W)	1.25	0.70	Maturing deposition techniques/alternative absorber layer processes
$/Watt installed system cost	$4-5/W	$2/W	Enlarged and simplified module designs
LCOE	0.18-0.22 ¢/kWh	0.07-0.08 ¢/kWh	Scale up production
Overall process yield	80%	95%	Improved control of high rate depositions
Identify relevant degradation mechanisms	1.2% per year	0.75% per year	Develop appropriate accelerated lifetime testing for device and mini-modules metric

SAI-Incubator Project Update

Planned work since last Program Review	**Status**
T1: Qualify advanced window layer films	Completed Feb-08
T2: Optimize cell efficiency on mini-module substrates	In progress Due Sep-08
T3: Optimize module efficiency on mini-module substrates	In progress Due Mar-09
T4: Design pilot line equipment	In progress Due Jun-08
T5: Build and commission pilot line equipment	In progress Due Mar 09

Obstacle Discussion

- Barriers encountered or anticipated that may inhibit success of programs
  - Lack of ongoing research to push CdTe PV cell efficiency beyond 16.5%
  - Shortage of qualified thin film PV engineers and scientists as industry continues to expand