

The Department of Energy's Solar America Initiative



Highlights for 2007, New Activities in 2008



U.S. DOE Solar Energy Technologies Program

For More Information:

http://www.eere.energy.gov/solar/solar_america/

Email: craig.cornelius@ee.doe.gov

Tel: 202-586-1201

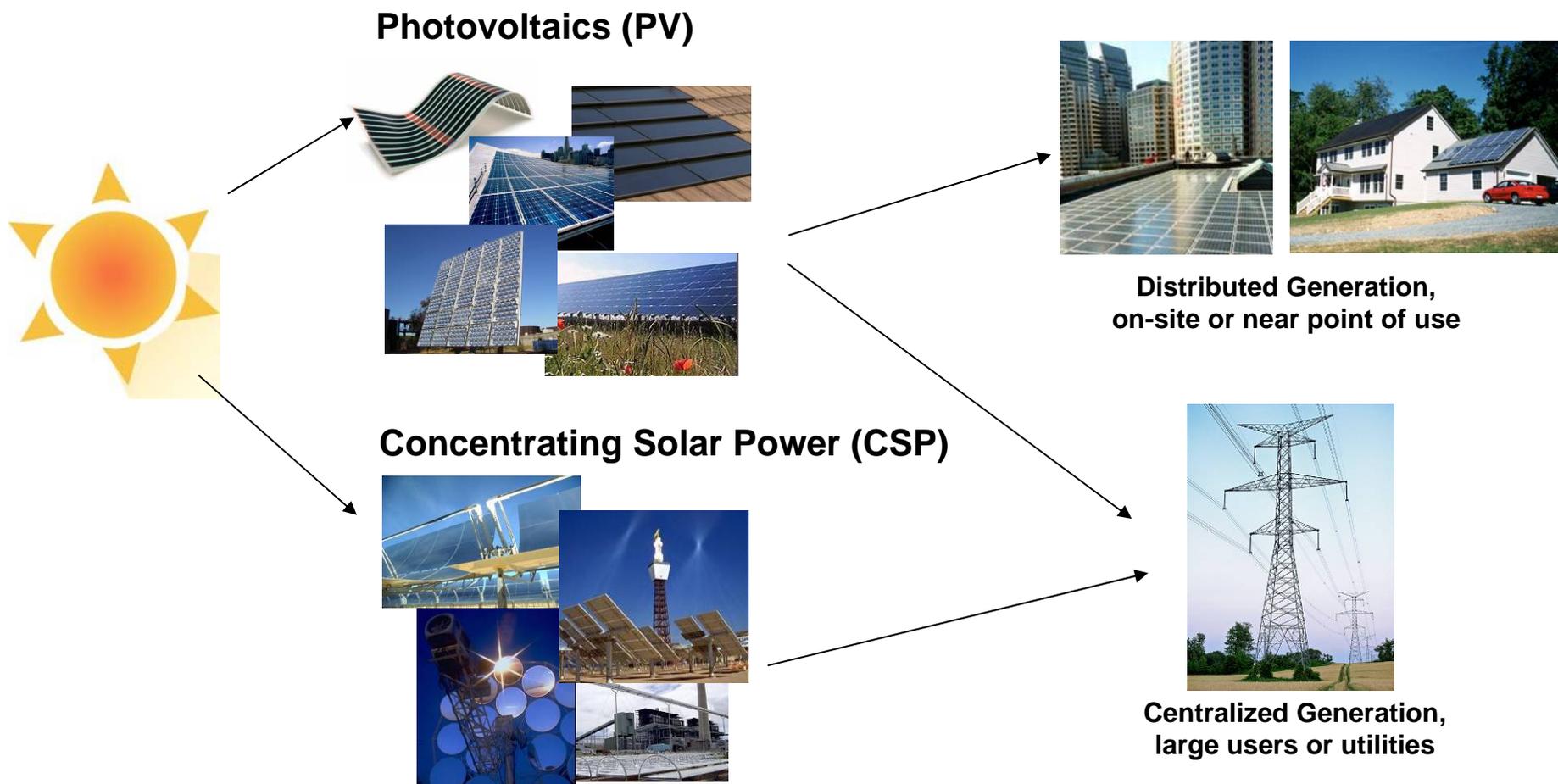
Agenda



- Introduction to DOE's Solar America Initiative
- CSP Market Status & DOE Programs
- PV Market Status & DOE Programs
- Solar Market Transformation & Policy Development



In the next years of the SAI, the DOE's Solar Program will focus on achieving price-parity and scale for solar electricity generation from *both PV and CSP*



PV program will target >30% market share for annual new capacity additions, CSP program will target baseload price/dispatchability and GW-scale.

In the SAI's first year, DOE invested across the "map" of U.S. players in R&D and market/regulatory efforts



**U.S. Department of Energy
Energy Efficiency
and Renewable Energy**
Bringing you a prosperous future where energy
is clean, abundant, reliable, and affordable

Solar America Initiative Across America



Activities:

Transforming Markets and Creating Demand

- **Codes and Standards:**
 - Solar America Board of Codes and Standards (NM)
- **State Technical Outreach:**
 - Clean Energy Group (VT)
 - National Assn of Regulatory Utility Commissioners (DC)
 - National Conference of State Legislatures (CO)
- ★ **Solar America Cities:**
 - Ann Arbor (MI)
 - Austin (TX)
 - Berkeley (CA)
 - Boston (MA)
 - Madison (WI)
 - New Orleans (LA)
 - New York (NY)
 - Pittsburgh (PA)
 - Portland (OR)
 - Salt Lake City (UT)
 - San Diego (CA)
 - San Francisco (CA)
 - Tucson (AZ)
- **Solar America Showcases:**
 - City of San Jose (CA)
 - Forest City Military Communities (HI)
 - Orange County Convention Center (FL)

The Solar America Initiative (SAI) is accelerating the development of solar technologies, including photovoltaics (PV) and concentrating solar power (CSP) systems, with the goal of making them cost-competitive across all sectors by 2015. This work could not be successful without the collaboration of all stakeholders in the solar community. This map illustrates the location of several SAI participants... from Solar America City awardees who will be developing solar projects and building awareness in their respective communities to multinational corporations who will work in strategic alliances with other companies, national laboratories, and universities to tackle solar manufacturing challenges. It is truly a nationwide effort to create a Solar America.

- **PV Capacity Credit Valuation Study:**
 - State University of New York (NY)
 - Tucson Electric Power (AZ)
- ★ **SAI Federal Projects:**
 - Architect of the Capitol (DC)
 - Smithsonian Institution (DC)

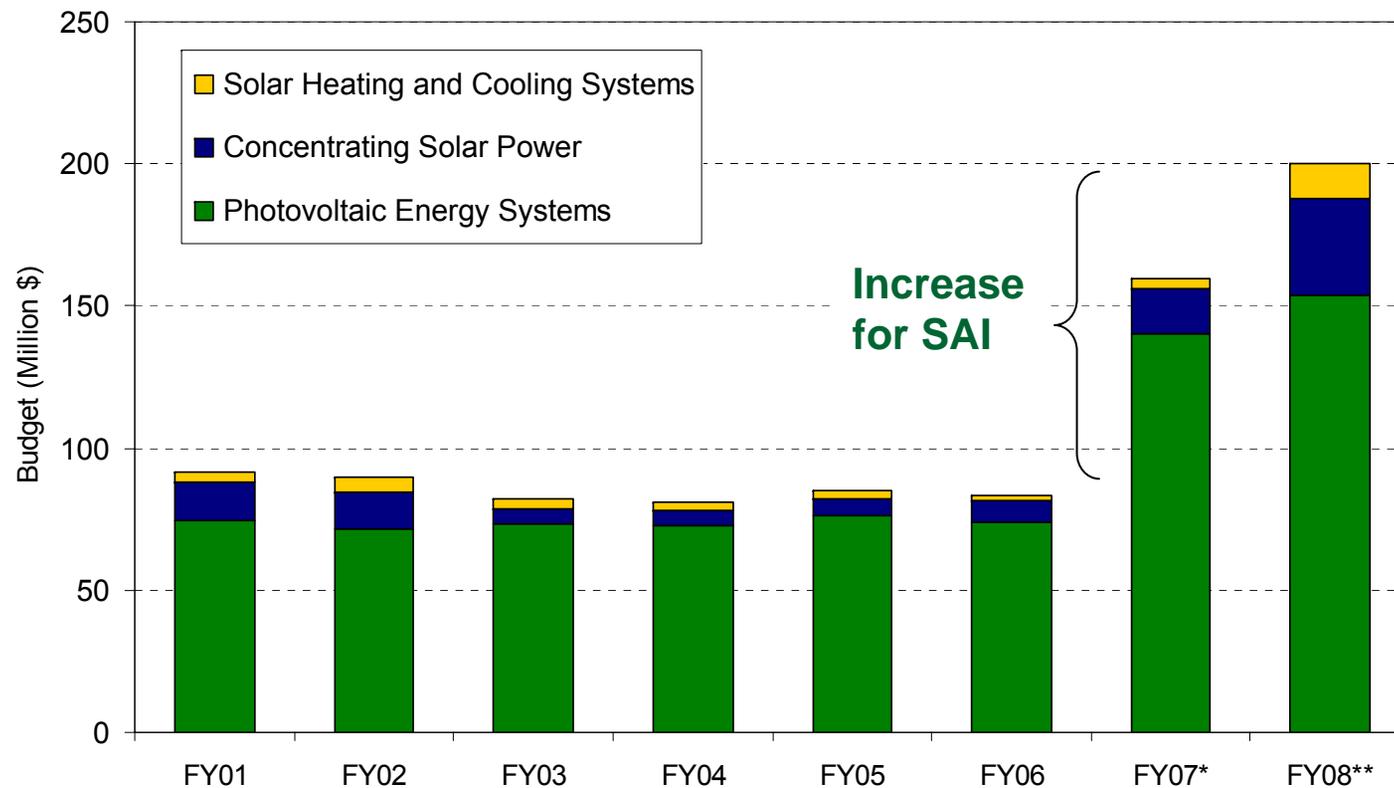
Developing Products and Building Supply

- **Technology Pathway Partnerships:**
 - Amonix (CA)
 - Boeing (CA)
 - BP Solar (MD)
 - Dow Chemical (MI)
 - General Electric (DE)
 - GreenRay (MA)
 - Konarka (MA)
 - Miasolé (CA)
 - Nanosolar (CA)
 - Sollant (CA)
 - SunPower (CA)
 - United Solar Ovonic (MI)
- X **PV Module Incubator:**
 - AVA Solar (CO)
 - Blue Square Energy (MD)
 - CalliSolar (CA)
 - EnFocus Engineering (CA)
 - MicroLink Devices (IL)
 - Plextronics (PA)
 - PrimeStar Solar (CO)
 - Solaria (CA)
 - SolFocus (CA)
 - SoloPower (CA)

Funding for the Solar America Initiative is accelerating supply growth & adoption of PV/CSP technologies



Solar Energy Technologies Funding, FY01 – FY08



Solar is emerging as a consensus priority for policy and funding support, due to resource potential and public appeal.

* President's Request for FY07 was \$148M, final FY07 CR provided \$159M.

** President's Request for FY08 was \$148M, current House mark for FY08 is \$200M.

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- **CSP Market Status & DOE Programs**
- PV Market Status & DOE Programs
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Aggressive R&D and CSP project development could displace most new fossil fuel plants in Southwest U.S.



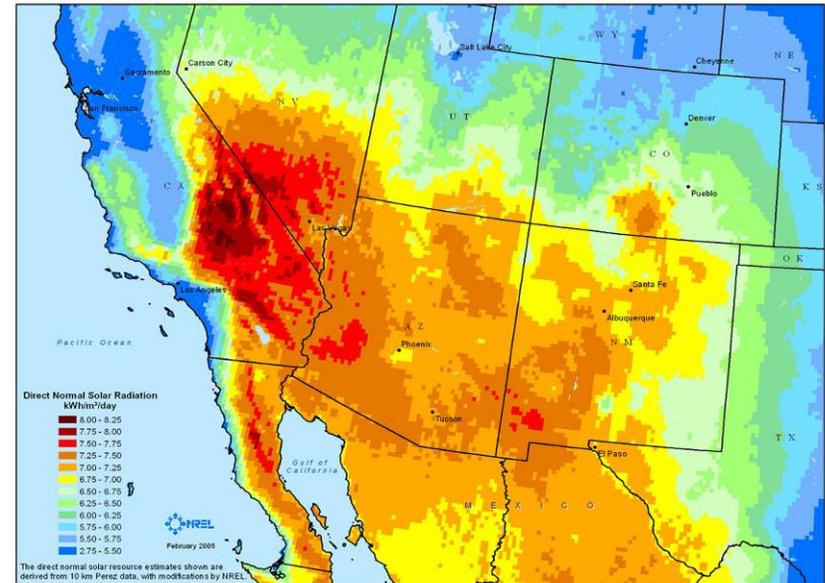
Untapped Generating Potential

- Solar energy in seven southwestern states – AZ, CA, CO, NV, NM, TX and UT – could generate more than 6X current U.S. electricity needs
 - Solar resource for 6,800 GW of versus current nation-wide capacity of approx. 1,000 GW

Significant Population Growth Centers

- 15 of the 20 fastest-growing metro areas in the country are in close proximity to solar resource
- By 2030, an estimated 41 million additional people will move to the Western United States (from 90 million in 2000 to 131 million people)

Direct-Normal Solar Resource for the Southwest U.S.



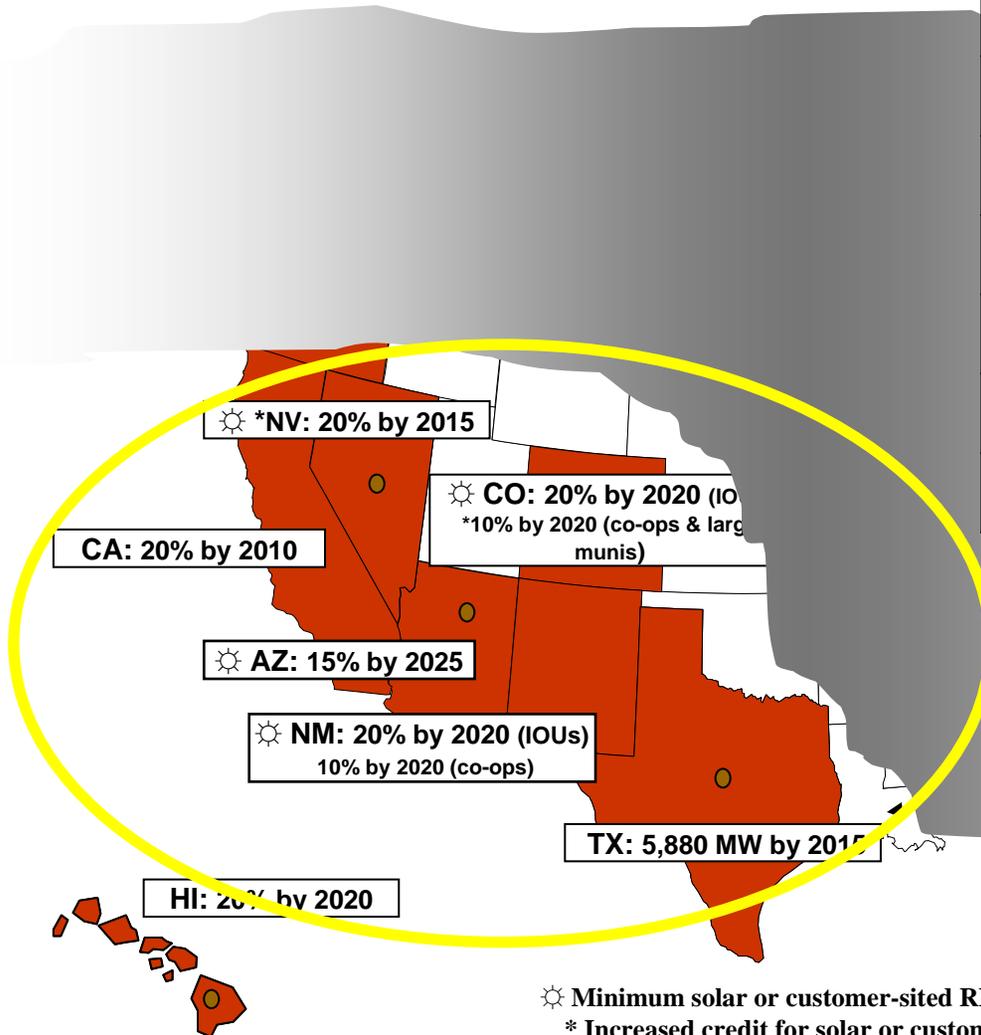
Potential Solar Generation Capacity by State

State	Land Area (mi ²)	Capacity (GW)	Generation (GWh)
AZ	19,279	2,468	5,836,517
CA	6,853	877	2,074,763
CO	2,124	272	643,105
NV	5,589	715	1,692,154
NM	15,156	1,940	4,588,417
TX	1,162	149	351,774
UT	3,564	456	1,078,879
Total	53,727	6,877	16,265,611

Primary CSP market will be states with quality solar resource and aggressive RPS requirements



State	RPS Requirement
Arizona	15% by 2025
California*	20% by 2010
Colorado	20% by 2020
Nevada	20% by 2015, 5% Solar
New Mexico	20% by 2015
Texas	5,880MW (~4.2%) by 2015



Potential CSP Markets

☀ Minimum solar or customer-sited RE requirement
 * Increased credit for solar or customer-sited RE
 †PA: 8% Tier I / 10% Tier II (includes non-renewables)

- State RPS
- ▨ State Goal
- Solar water heating eligible

RPS requirements are driving development of >3GW of projects for Southwest U.S. market



418.8 MW operating in U.S.

Up to 3,353 MW Planned in U.S.

Plant Name	Location	First Year of Operation	Net Output (MW _e)	Solar Field Outlet (°C)	Solar Field Area (m ²)	Solar Turbine Effic. (%)	Power Cycle	Dispatchability Provided By
Nevada Solar One	Boulder City, NV	2007*	64	390	357,200	37.6	100 bar, reheat	None
APS Saquaro	Tucson, AZ	2006	1	300	10,340	20.7	ORC	None
SEGS IX	Harper Lake, CA	1991	80	390	483,960	37.6	100 bar, reheat	HTF heater
SEGS VIII	Harper Lake, CA	1990	80	390	464,340	37.6	100 bar, reheat	HTF heater
SEGS VI	Kramer Junction, CA	1989	30	390	188,000	37.5	100 bar, reheat	Gas boiler
SEGS VII	Kramer Junction, CA	1989	30	390	194,280	37.5	100 bar, reheat	Gas boiler
SEGS V	Kramer Junction, CA	1988	30	349	250,500	30.6	40 bar, steam	Gas boiler
SEGS III	Kramer Junction, CA	1987	30	349	230,300	30.6	40 bar, steam	Gas boiler
SEGS IV	Kramer Junction, CA	1987	30	349	230,300	30.6	40 bar, steam	Gas boiler
SEGS II	Daggett, CA	1986	30	316	190,338	29.4	40 bar, steam	Gas boiler
SEGS I	Daggett, CA	1985	13.8	307	82,960	31.5	40 bar, steam	3-hrs TES

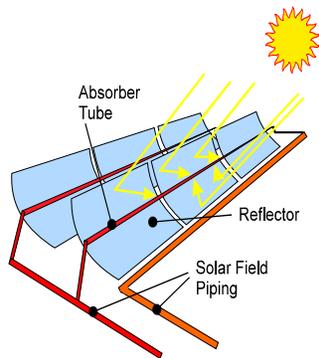
Utility/State	Capacity (MW)	Company	Technology - Status
Southern Cal Edison	500-850	SES	Dish – signed power purchase agreement
San Diego Gas & Electric	300-900	SES	Dish – signed power purchase agreement
Pacific Gas & Electric	500	Bright Source	Tower – MOU signed
Pacific Gas & Electric	553	Solel	Trough - signed power purchase agreement
Florida Power and Light	300	Ausra	Trough - project announced
SW Utility joint venture (APS)*	Est. 250	TBD	TBD – multiple expressions of interest

* In mid 2007 several Southwestern utilities requested proposals for the development of renewable power plants that will likely result in CSP projects

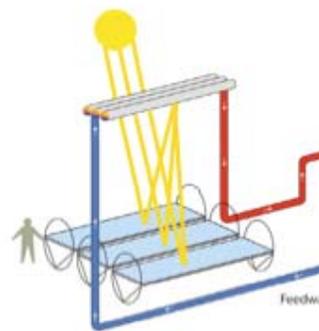
CSP industry is now pursuing multiple approaches to intermediate load power markets



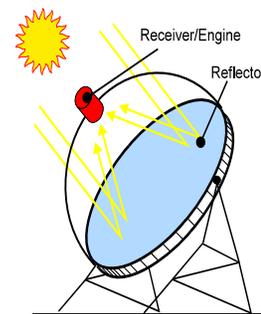
Trough



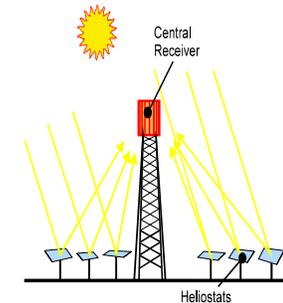
Linear Fresnel



Dishes



Tower



DOE Goals for Industry Technology Development & Projects:

- Intermediate power of 10 cents/kWh with by 2012
- Intermediate power of 7 cents/kWh with 2-4 hrs storage by 2015
- Baseload power of 5-6 cents/kWh with 12-14 hrs storage by 2020

More aggressive CSP program will accelerate RD&D on troughs, advanced concepts, storage, and markets



Technology		FY2008-FY2012	FY2013-FY2016	FY2017-FY2020
Intermediate Load Power		Establish/expand U.S. supplier base through manufacturing initiative, optical testing to optimize receiver & concentrator designs	Develop next-generation system capable of 450°C operation integrated with molten-salt storage.	Develop advanced collectors, receivers, selective coatings, and working fluids designed to operate at 550°C.
Baseload Power		Evaluate new concepts (e.g. CLFR, distributed power tower), test components, dish technology designed for mass production	Down-select best options, support prototype designs, identify key technology improvement opportunities.	Integrate high temperature CSP systems with advanced gas turbine/CC technology, reduce system cost through RD&D and manufacturing initiative.
Thermal Storage		Develop thermocline thermal storage, evaluate two-tank molten salt system, develop new storage medium and heat transfer fluids	Adapt storage system to advanced technology design, address cost, performance, operation and O&M issues	Develop advanced thermal storage up to 550°C for troughs and up to 1200°C for advanced CSP/CC technologies.

Supporting Market Transformation Activities:

- Support State and utility deployment efforts
- Work with Loan Guarantee Program to adapt loan guarantees to industry business process
- Work with BLM, State and local governments to mitigate land and permitting barriers
- Provide resource assessment to industry and utilities
- Provide analyses supporting CSP access to transmission



Aiming for >1GW installations and baseload power, a more aggressive DOE CSP program will have “room” for any technology showing competitive potential

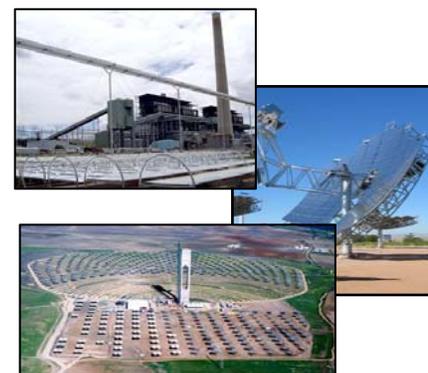
Troughs

- Optimize receiver and concentrator designs
- Develop next-generation collector designs and supply chain
- Scale-up plant size and increase operating temperatures



Advanced Concepts (CLFR, Towers, Dish-Stirling)

- Test new CLFR concepts in a power plant configuration
- Demonstrate new Tower plant designs to evaluate costs
- Address Dish manufacturability and Stirling engine reliability issues



Storage

- Develop advanced heat transfer fluids for more efficient operation at high temperatures with molten salt
- Test innovative designs for low-cost storage options, including thermocline tanks and new fluids for fields



2007 Priorities for the Solar America Initiative: CSP



1. Complete plan for accelerated CSP program with phased strategy for intermediate-load and GW-scale baseload plants.
2. Complete selections and awards for initial industry funding opportunity, and prepare for ramp-up if FY08/09 budgets allow.
3. Assure DOE LG program becomes engine for CSP development – solicit increased applications and support negotiations.
4. Develop proactive strategy for land allocation to CSP project development, supporting BLM and others as needed.
5. Develop proactive strategy to facilitate transmission access for new CSP projects, supporting FERC and others as needed.
6. Establish manufacturing sector outreach program to help qualify new high-volume vendors for CSP project developers.
7. Initiate financial sector education campaign, with emphasis on assuring availability of debt capital for projects.

Agenda

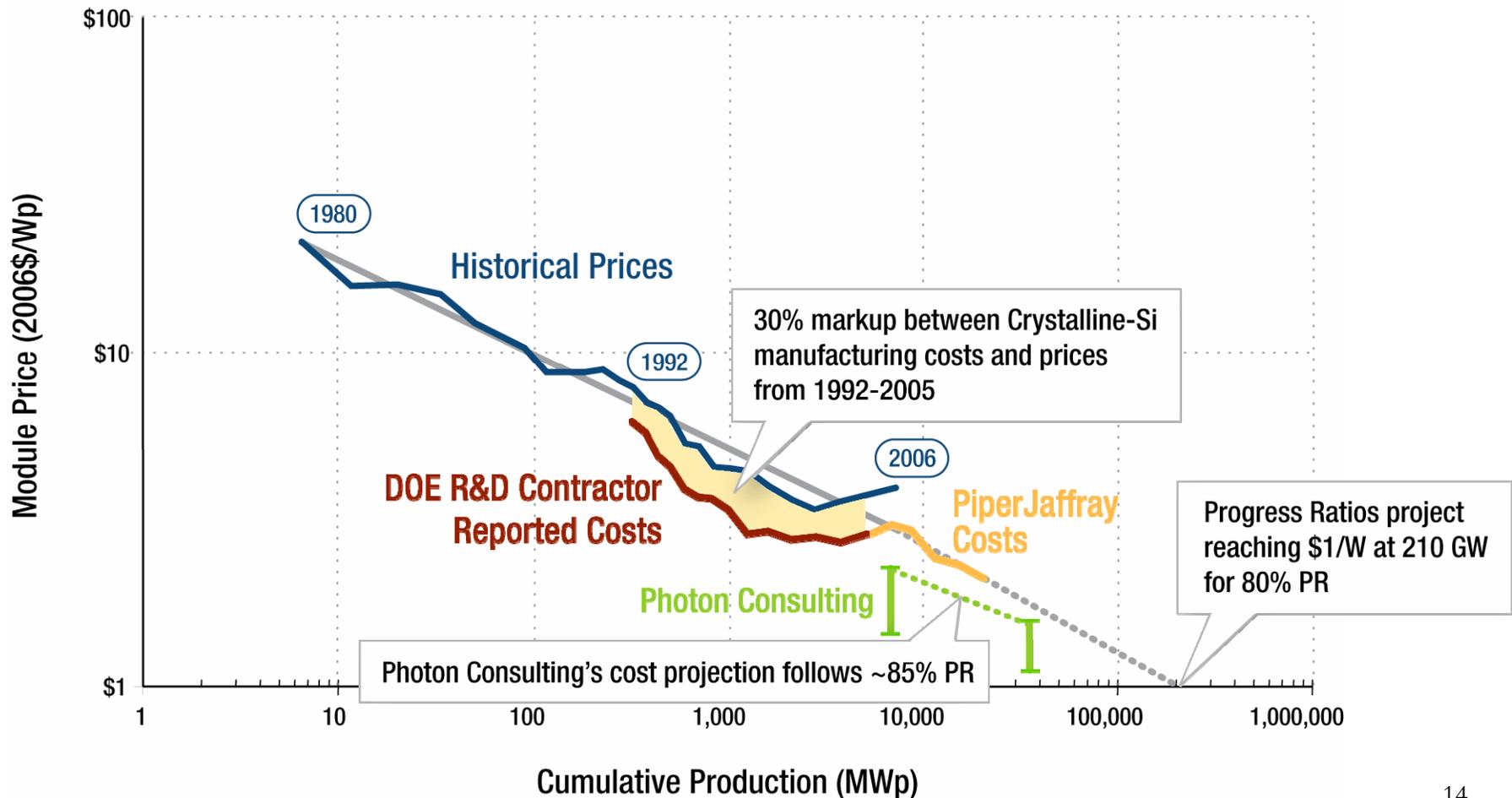


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- **PV Market Status & DOE Programs**
- Solar Market Transformation & Policy Development

PV industry is approaching grid parity across OECD, due to virtuous cycle of policy-driven demand creation, capital investment, and production growth



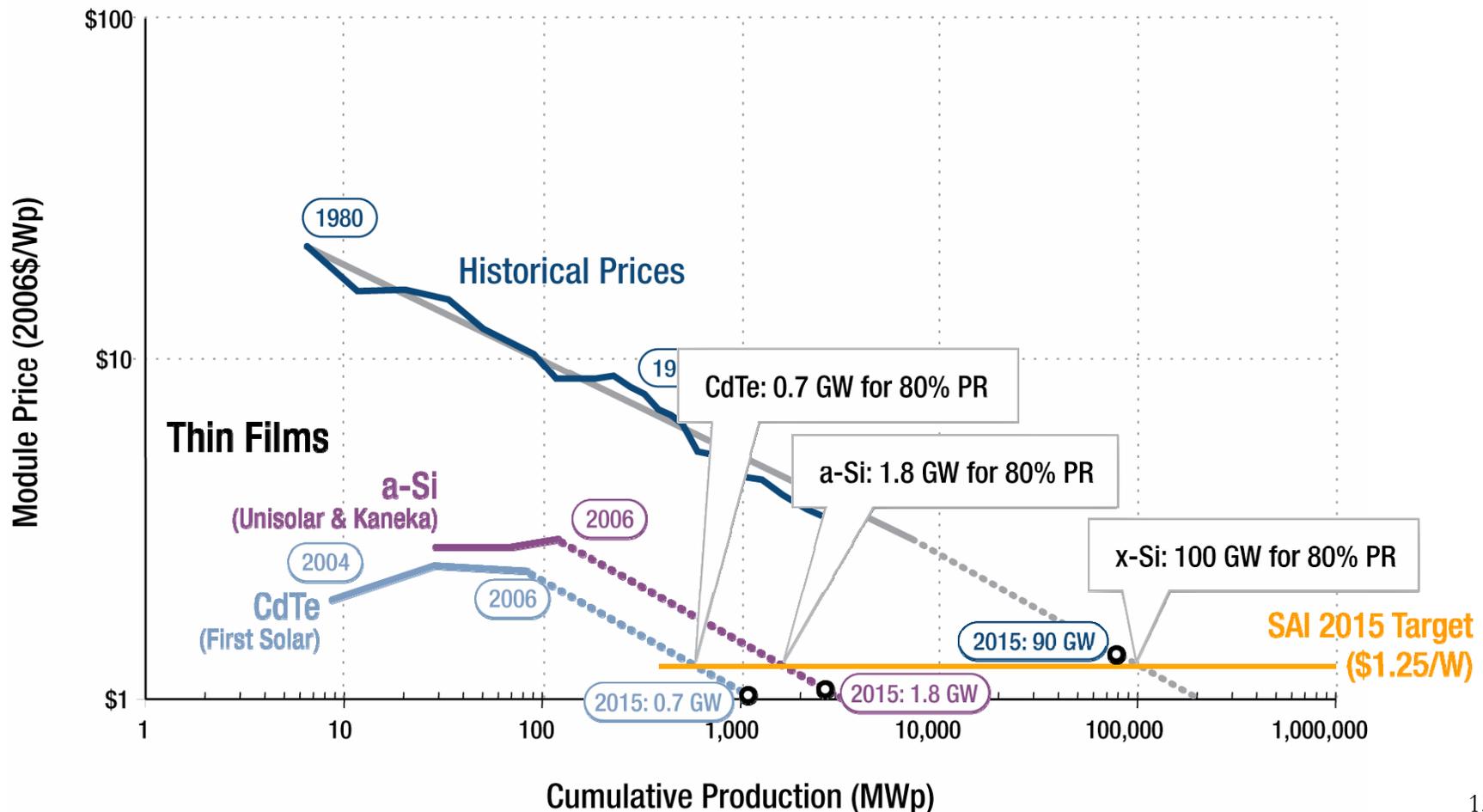
Historical and Projected Experience Curve for PV Modules



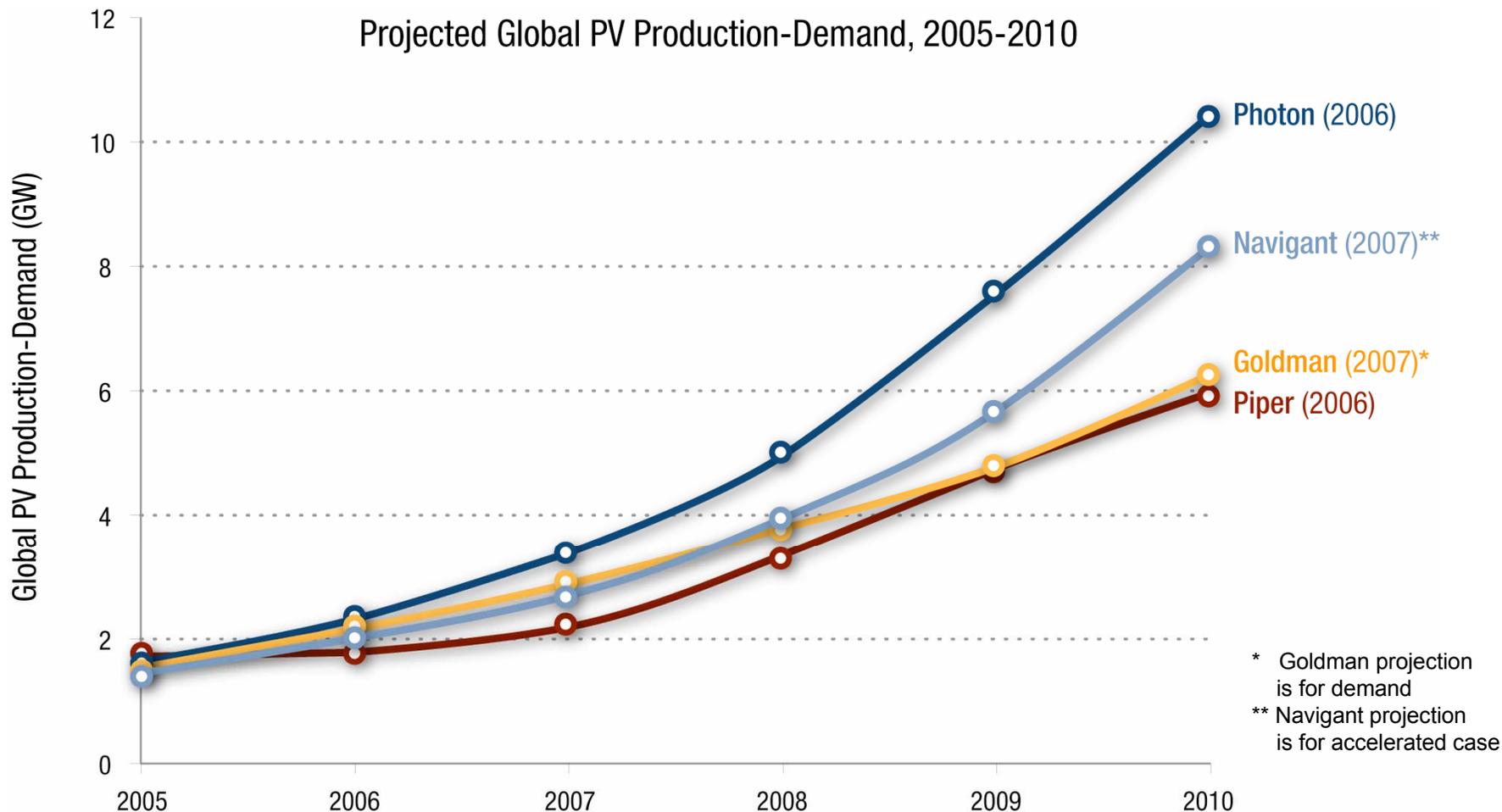
PV industry (both c-Si and TF's) can achieve nationwide price parity by 2015 by maintaining learning curves and gradually declining CAGR in line with historical experience



Historical and Projected Experience Curve for PV Modules

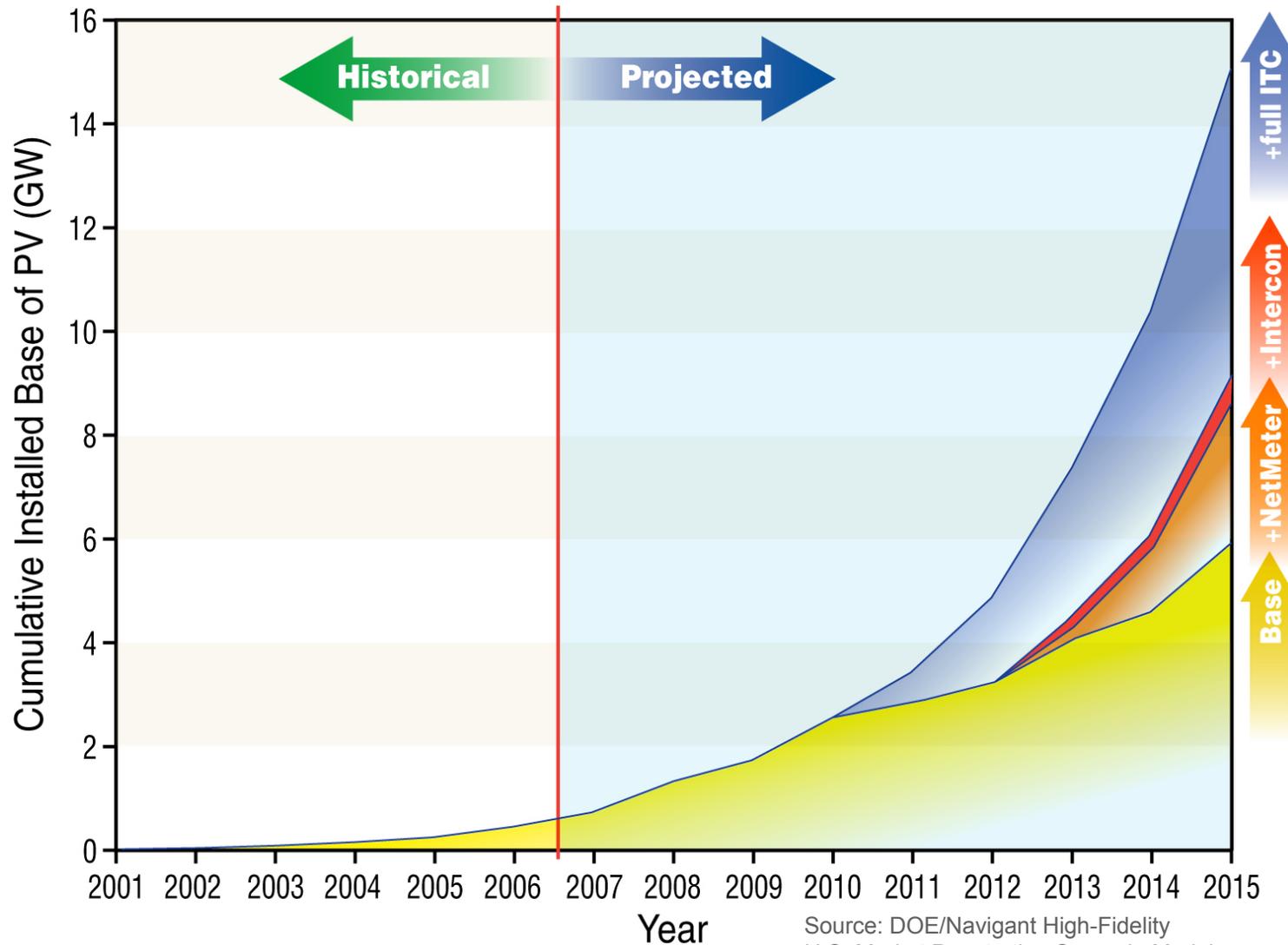


Production is expected to ramp quickly through 2010, as shipments catch up to capacity and new suppliers enter



**Analyst forecasts for global production/demand vary based on different expectations on ramp-rate for polysilicon, thin films, and downstream channel evolution.
 ** Note that all analyst estimates for 2010 have since been increased by 25-50%.**

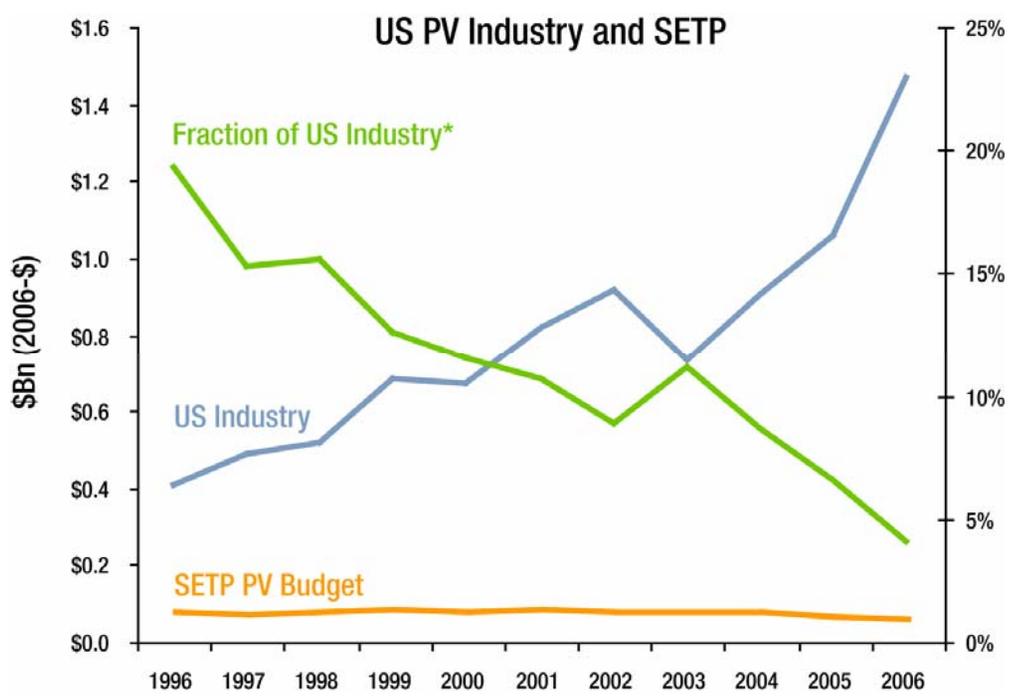
If SAI price reduction trajectory is realized, with tax stimulus extension and improvements to grid policy, U.S. market could grow to absorb >15GW of installs by 2015



Source: DOE/Navigant High-Fidelity U.S. Market Penetration Scenario Model



To maintain relevance in an expanding industry, DOE is focused on “validating” new technology and accelerating change in supply chains and business models

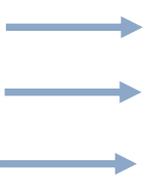


TECHNICAL IMPROVEMENT OPPORTUNITIES		METRICS	
TEIR 1 TIOs	TEIR 2 TIOs	Performance	Reliability
Modules	Module	High-Impact	Moderate-Impact
	Absorber	High-Impact	Moderate-Impact
	Cells and Contacts	High-Impact	Moderate-Impact
	Interconnects	High-Impact	Moderate-Impact
	Packaging	High-Impact	Moderate-Impact
Inverters & BOS	Manufacturing	High-Impact	Moderate-Impact
	Inverter	High-Impact	Moderate-Impact
	Inverter Software	High-Impact	Moderate-Impact
	Inverter Components	High-Impact	Moderate-Impact
	Inverter Packaging/Manufacturing	High-Impact	Moderate-Impact
Storage	Energy Storage (under consideration)	Moderate-Impact	Moderate-Impact
	Systems Engineering & Integration	High-Impact	Moderate-Impact
SER!	Manufacturing/Assembly	High-Impact	Moderate-Impact
	Installation/Maintenance	High-Impact	Moderate-Impact



Implications For DOE:

- Market viability eclipsing “science” results
- Private funding now available for R&D
- Cost trajectories are increasingly secure



Response by DOE:

- Focus R&D on cost and production scale-up
- Validate technologies, align Lab R&D with industry
- Create/prepare markets for new product:
 - Regulatory environment & grid integration
 - Application “showcases”, gov’t purchasing

PV R&D pipeline will support technologies/companies, with funding opportunities calibrated to maturity



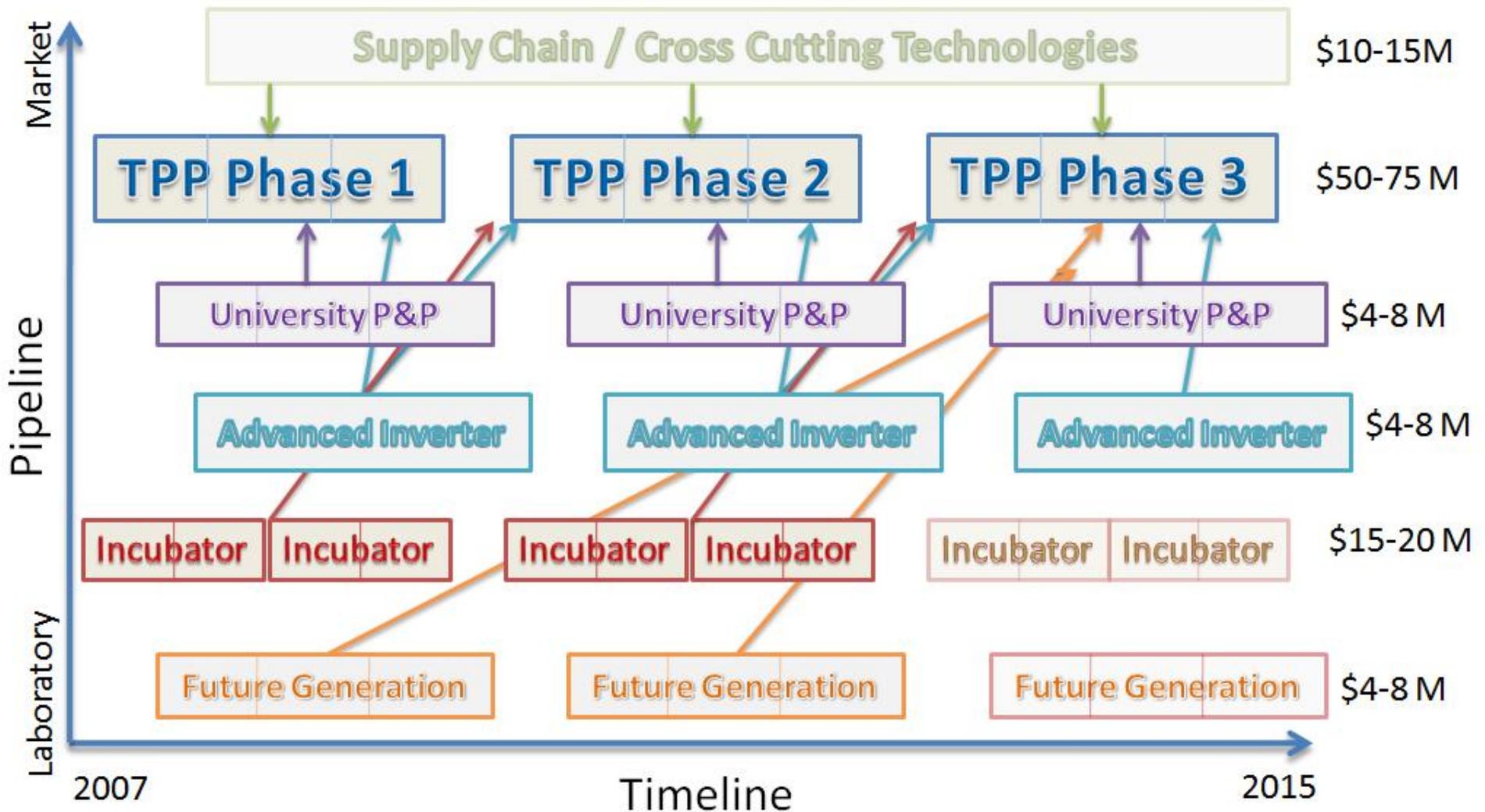
PHASES	Material & Device Concepts	Device & Process Proof of Concept	Component Prototype & Pilot Scale Production		System Development & Manufacturing	
SOLICITATION	Solar Energy Utilization	Future Generation PV Devices & Processes	PV Component / System Incubator	Advanced Inverters & Energy Management Systems	University Product & Process Development Support	Technology Pathway Partnerships
FUNDING SOURCE	DOE/O/S, BES	DOE / SETP	DOE / SETP	DOE / SETP	DOE / SETP	DOE / SETP
DESCRIPTION	New materials and pathways for solar to electric conversion	Novel devices or processes with potentially significant performance or cost advantages	Prototype PV components or systems produced at pilot-scale with demonstrated cost, reliability, or performance advantages	Design, test, and produce advanced inverters and energy management systems with improved reliability, enhanced value, and reduced costs	Universities perform targeted materials science and process engineering research in support of industry-led teams developing new PV systems for commercialization in 2010-2015	PV systems and components ready for mass production delivering energy at target costs
PROJECT LIFECYCLE	3 years	3 years	1.5 years w/ 9 mo. On/Off Ramp	3 years	3 Years	3 years
ANNUAL FUNDING LEVEL	\$0.3 - 1.5 Million	≤ \$300K	\$1 - 2 Million	\$1 - 2 Million	Up to \$300,000/year	\$2 - 7 Million
TEAM LEADS	Universities or Laboratories*	Businesses or Universities*	U.S. Commercial Entity	U.S. Commercial Entity	Universities	U.S. Commercial Entity
ELIGIBLE PARTICIPANTS	All	All	Universities / Laboratories*	All	Universities	Universities / Laboratories*
ENTRANCE CRITERION	Basic science properties conceived/simulated	Materials synthesized; properties observed	Coupon-scale PV cell; process demonstrated in lab; proof of concept demo	Power electronics and control system manufacturing capability	Identification of manufacturing process or component improvements possible through targeted research investigations.	Prototype components; pilot production demo; business case established
EXIT CRITERION	Materials synthesized; properties observed	Coupon-scale PV cell; process demonstrated in lab; proof of concept demo	Prototype components; pilot production demo; business case established	Pre-commercial inverters / energy management systems submitted for product certification	Incorporation of research results into commercial manufacturing operations or product designs.	Commercial PV systems and subsystems; scaled production demonstrated >25MW
TOPICS	<ul style="list-style-type: none"> Single-crystal, polycrystalline, amorphous, and nanostructured inorganic and organic materials Electronic structure Single or multiple junction solar cells 	<ul style="list-style-type: none"> New devices and structures using materials such as thin-film silicon, microcrystalline/amorphous silicon, polycrystalline metal chalcogenides and oxides, nanocrystalline materials, biomimetic concepts, organic materials, photoelectrochemical cells, dye-sensitized materials, materials with low-dimensional quantum structures Very-high efficiency epitaxial solar cells or other concepts 	<ul style="list-style-type: none"> Modules: multiple technologies (including CPV) seeking efficient material use, better performance, or improved manufacturing BOS Components: higher reliability inverters, CPV trackers, rapid installation features, storage systems Systems: controls and smart monitoring, integration of components, factory diagnostics 	<p>Lower cost, higher value systems resulting from:</p> <ul style="list-style-type: none"> integrated circuitries, advanced thermal management, advanced transient overvoltage protection, micro-grid-ready controls, replacement of unreliable components, integration with storage or UPS, compatibility with buildings applications, communications options, customer-friendly energy monitoring, reduction in parts and installation steps, standards compliance, innovative packaging, self diagnostics, and incorporation of other new enabling technologies 	<p>Identifying and developing:</p> <ul style="list-style-type: none"> Fabrication processes to improve material properties during manufacture Improved solar cell materials innovative device designs to improve solar cell efficiency Simplex, lower cost manufacturing processes New electrical contacting techniques for improved efficiency and reliability Diagnostic techniques to identify properties and quality of solar cells materials during manufacturing Improved materials utilization processes Understanding of chemistry between encapsulants and solar cell materials Providing careful long-term field testing of modules and systems in support of product improvement 	<ul style="list-style-type: none"> Partnerships with U.S. industry for projects that focus on development, testing, demonstration, validation, and interconnection of new PV components, systems, and manufacturing equipment Technology improvements in PV system and component design, integration, and installation will be a focus Cost reductions, performance enhancements, and reliability improvements are sought for all aspects of PV systems

NOTE: The NREL and SNL teams that are part of the SETP program will continue to provide technical support for these activities through the SETP but will not be direct participants

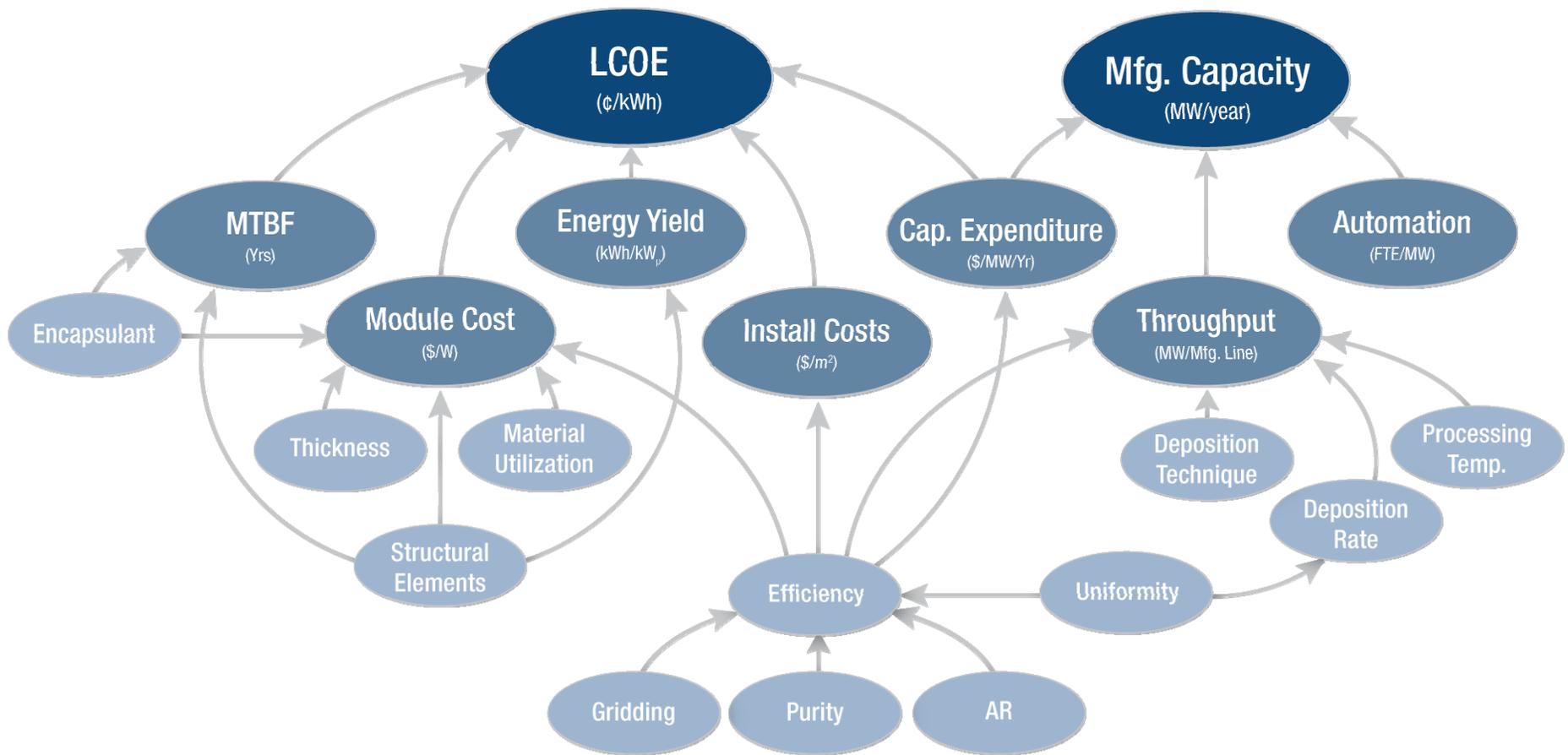
...in addition to offering different funding pools for technologies/companies at various stages, program structure offers on/off ramps aligned with stages



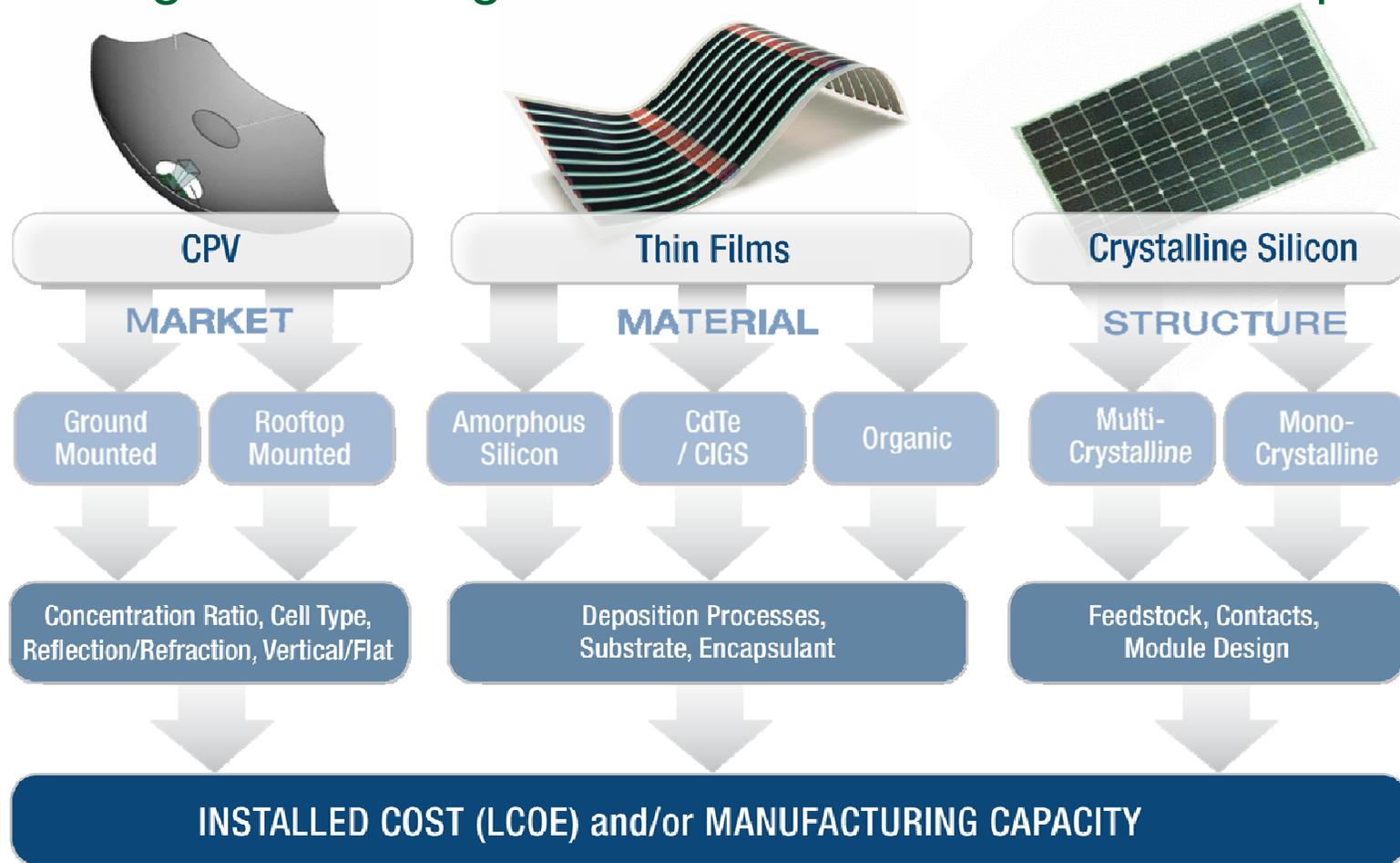
Annual Funding



DOE assesses market potential of R&D investment through analysis of a constrained hierarchy of technology characteristics and manufacturing metrics

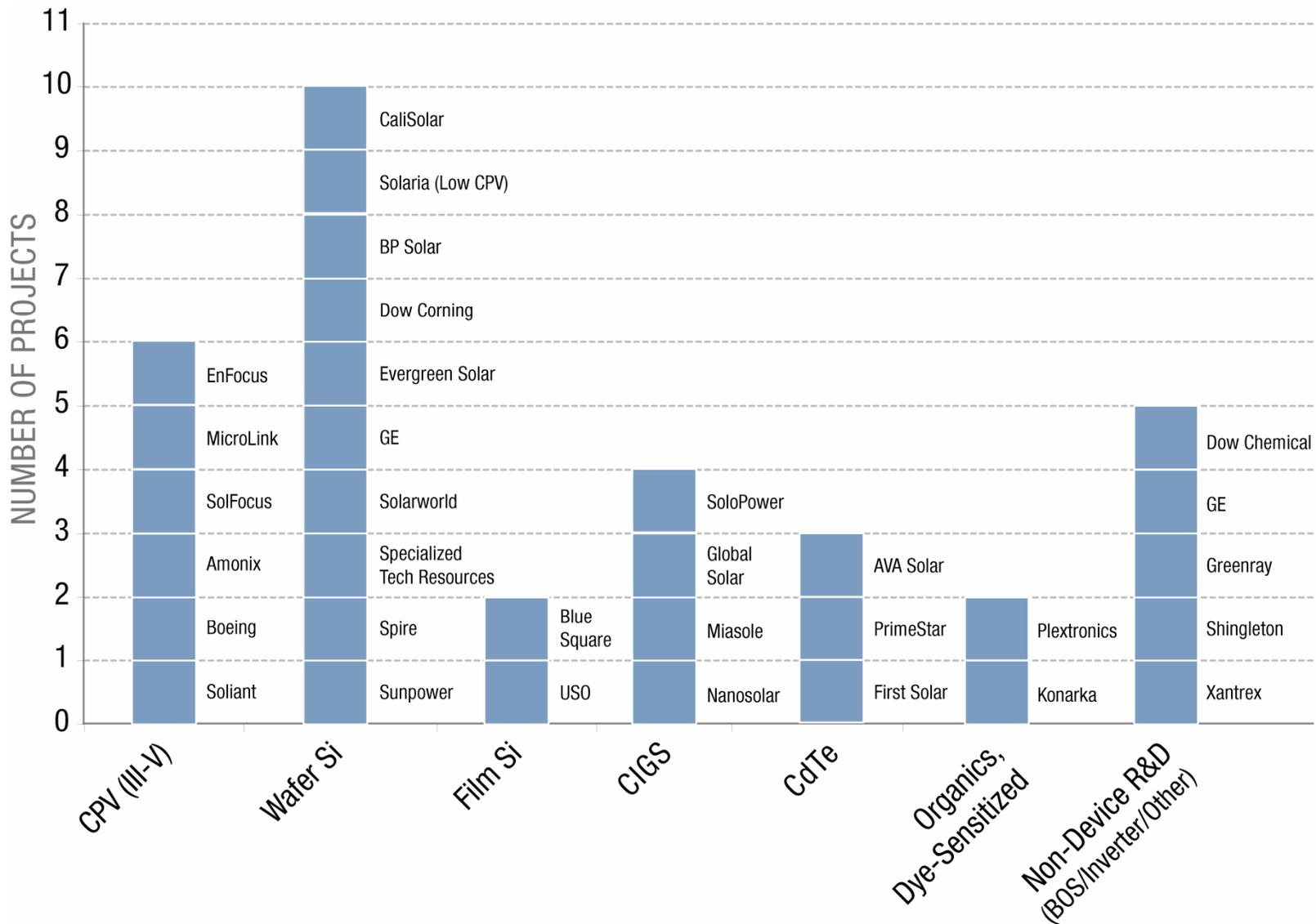


DOE approaches technology-based investments by assessing differentiation of process/performance and correlating to advantages for installed cost and scale-up

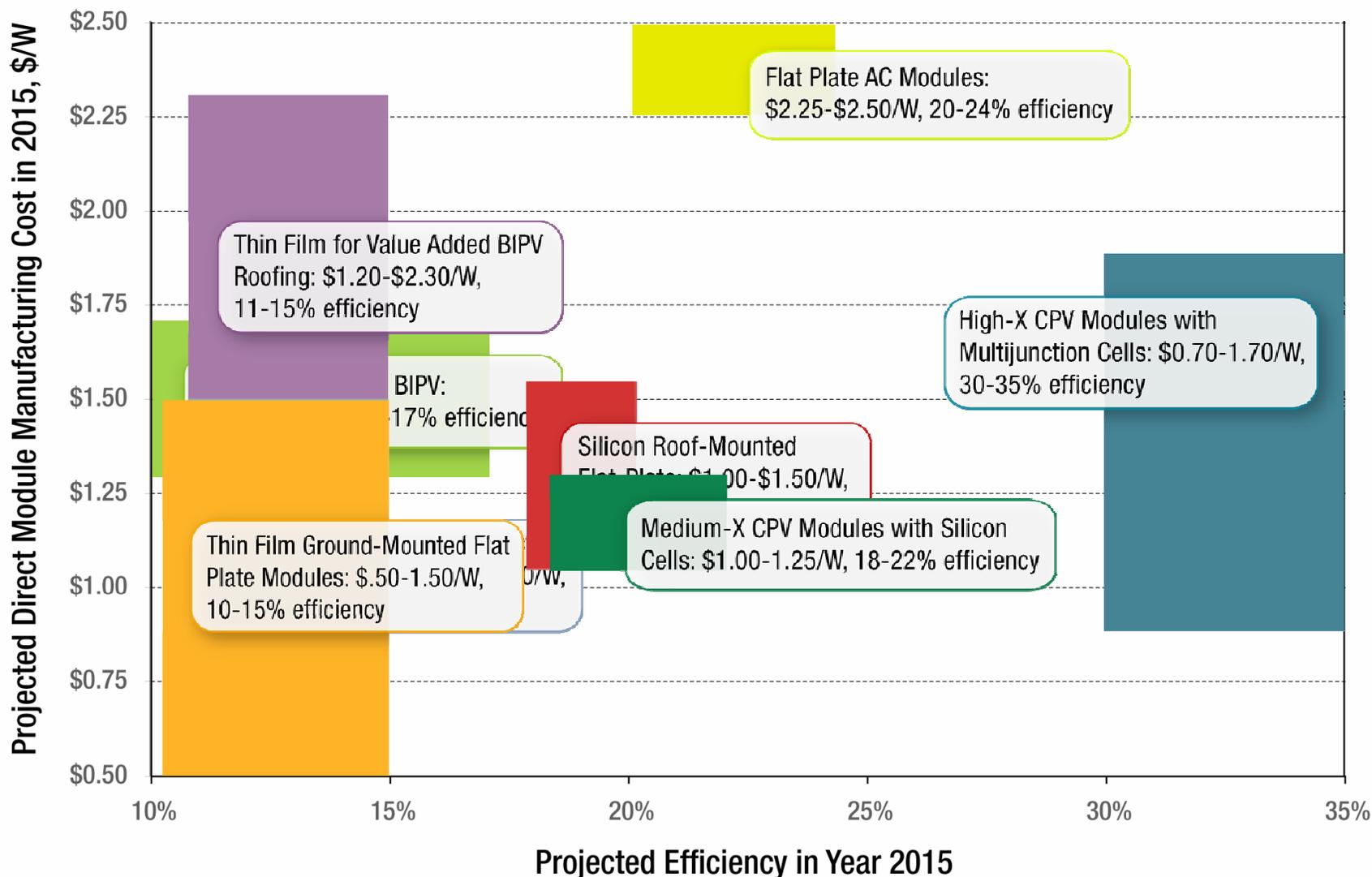


- Binning technologies allows an “apples to apples” comparison.
- Approach ensures best-in-breed funding across all promising technologies.

DOE's product R&D portfolio balances maturity & risk, with new early-stage companies adding diversity



DOE will drive its product R&D towards optimal solutions for major markets – while consensus remains unclear, investors should focus on application fit/advantages

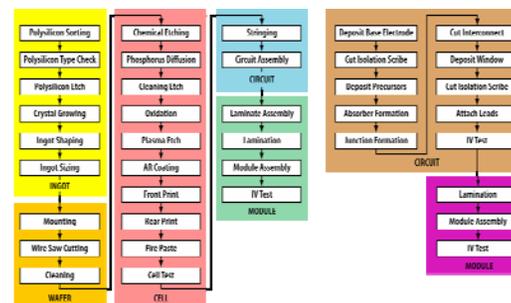




New activities in PV Supply Chain Development are intended to accelerate scale-up of domestic “upstream” segments and to clear major bottlenecks

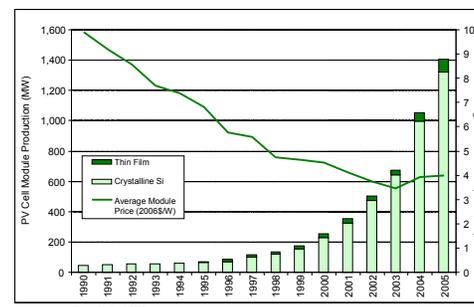
Ensure Availability and Low Cost of Equipment:

- ❑ Optimization of low cost manufacturing equipment to assure scaling & cost reduction.
- ❑ Qualification of new U.S. equipment suppliers.



Ensure Availability of Critical Materials Supplies:

- ❑ Develop material solutions to prevent future scaling bottlenecks (glass, encapsulants, optical coatings).
- ❑ Explores lower cost feedstock processes.

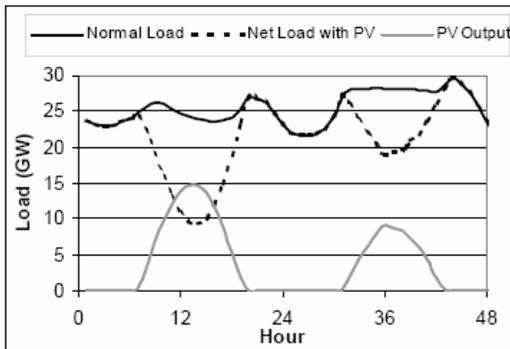


Build and Train Human Capital for Suppliers:

- ❑ Cultivate a world-class research and labor pool to support product dev’t & manufacturing.
- ❑ Establish university training programs and industry-based apprenticeships.



New activities in grid integration will address emerging risks and barriers for wide-scale PV market penetration



Assess potential effects of large PV deployment on grid reliability

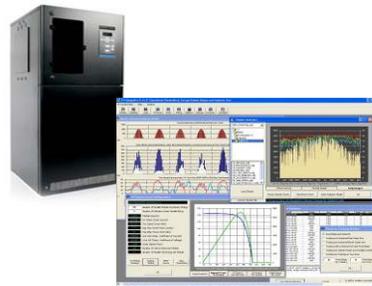
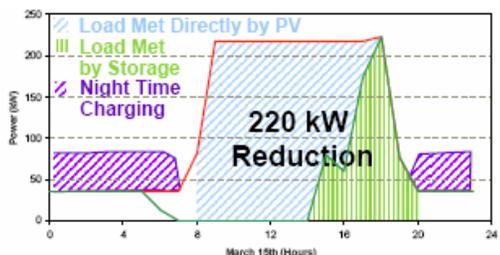
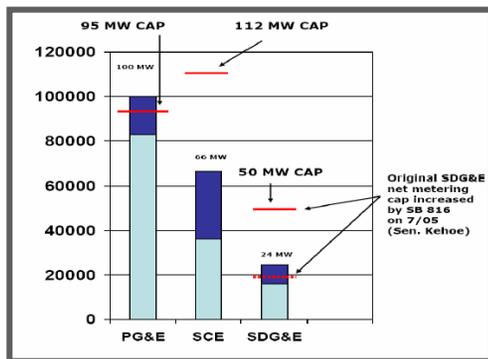
- Behavior of PV systems and the impact on the existing grid
- Effect on central generation maintenance and operation costs, especially peaking power plants

Engage with utilities to mitigate barriers to technology adoption

- Prevent grid impacts from becoming basis for market barriers, e.g. caps on net metering and denied interconnections to “preserve” grid
- Provide utilities with needed simulations, controls, and field demos

Develop technologies that make distributed solar easier to integrate

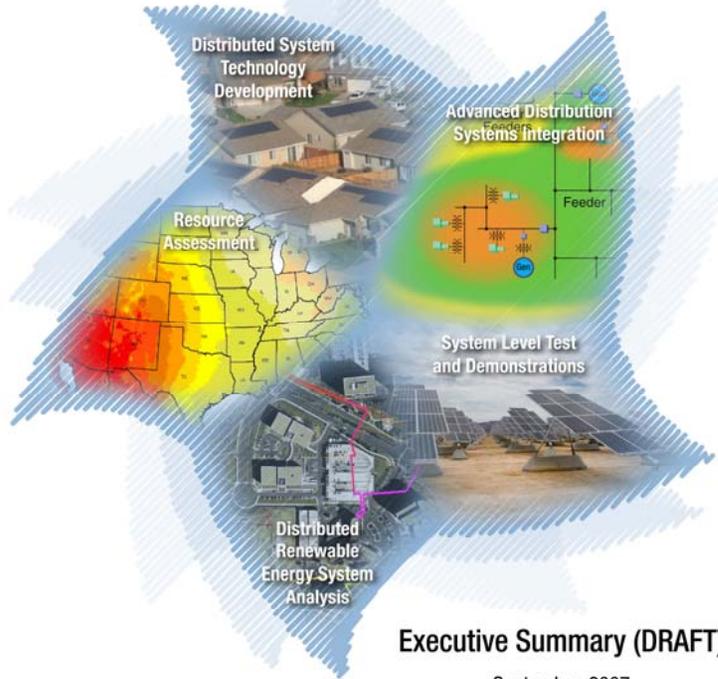
- Batteries to shape load & production
- Controls that allow utilities to “manage” distributed PV/storage assets



DOE kick-started Grid Integration program in 2007, with study to identify technical/market impacts of high penetration and plan R&D and field demo programs



Renewable Systems Interconnection



- Distributed PV System Configurations of the Future
- Advanced Distribution Systems Design
- System-Level Field Test and Demonstration Plan
- Solar Resource Assessment
- Codes, Standards, and Regulatory Implementation
- PV Market Penetration Scenarios & Analysis

2007 Priorities for the Solar America Initiative: PV



1. Fill out the industry R&D pipeline for new products/processes
 - Innovative module designs & manufacturing approaches
 - Increased reliability and functionality for power electronics
 - Next generation of low-cost, scalable PV devices
2. Establish framework for university involvement in SAI
 - Initiate industry sub-contracts, projects for new devices and for process dev't
3. Calibrate National Lab research portfolio and role for the future
4. Ramp-up test & evaluation for development & qualification
 - Develop new accelerated testing for reliability/lifetime prediction
 - Provide T&E services needed for growing industry
5. Catalyze collaboration on industry-wide issues (e.g. standards)
6. Prepare to launch new activities (supply chain, grid integration)
7. Expand U.S. demand “pull” through policy & regulatory measures
 - Engage on Federal-level policies (tax policy, government PPAs, etc)
 - Engage on State-level policies (metering, interconnection, rates, rebates)

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- **Solar Market Transformation & Policy Development**

DOE Solar Program is working to make Loan Guarantee Program a useful mechanism to reduce cost of capital for solar manufacturing & project finance



LOAN GUARANTEE SOLICITATION ANNOUNCEMENT



U.S. Department of Energy
Loan Guarantee Program Office

FEDERAL LOAN GUARANTEES FOR PROJECTS THAT
EMPLOY INNOVATIVE TECHNOLOGIES IN SUPPORT OF THE
ADVANCED ENERGY INITIATIVE

Solicitation Number: DE-PS01-06LG00001

OMB Control Number: 1910-5129

Announcement Type: Initial

Issue Date: August 14, 2006
Pre-Application Due Date: November 6, 2006

DOE Solar Program Actions

- Assuring availability of funds within LG portfolio budget for solar
- Performing due diligence on solar-specific technical and market considerations
- Supporting analysis of credit subsidy cost and other solar-specific financial parameters

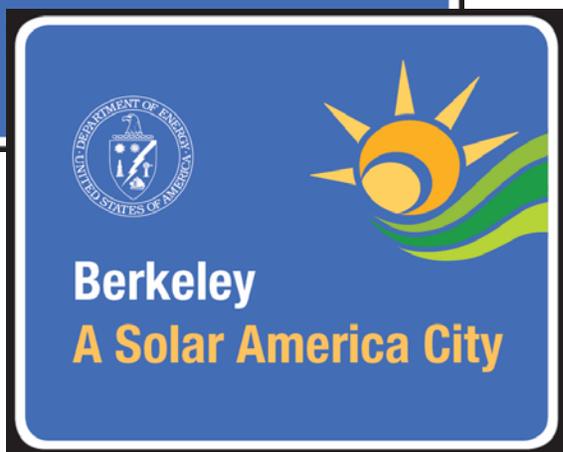
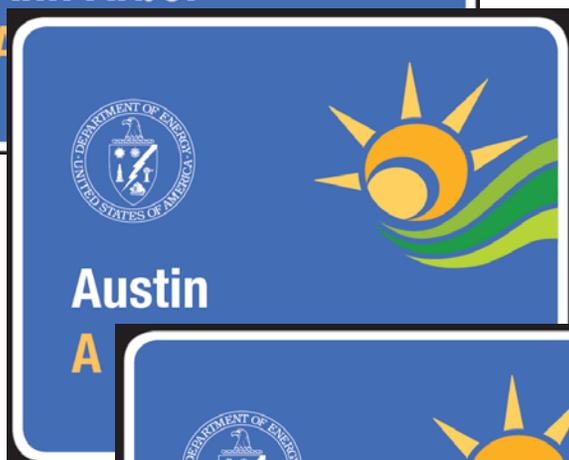
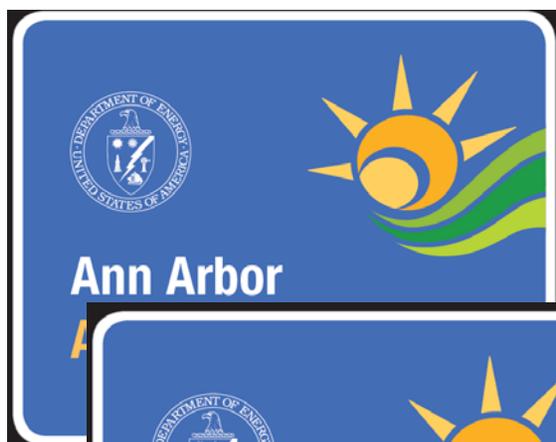
DOE LG Program Actions

- Streamlining application & negotiation process to match project timelines
- Resolving credit subsidy cost questions & financing tools (guarantee vs treasury direct loan)

First Pre-Application Decisions: 10/2007 (?)
Next Solicitation: Q1/Q2 2008 (?)



DOE continues to offer technical assistance to cities and commercial “showcase” opportunities to develop new markets for solar technologies



Orange County Convention Center, Florida



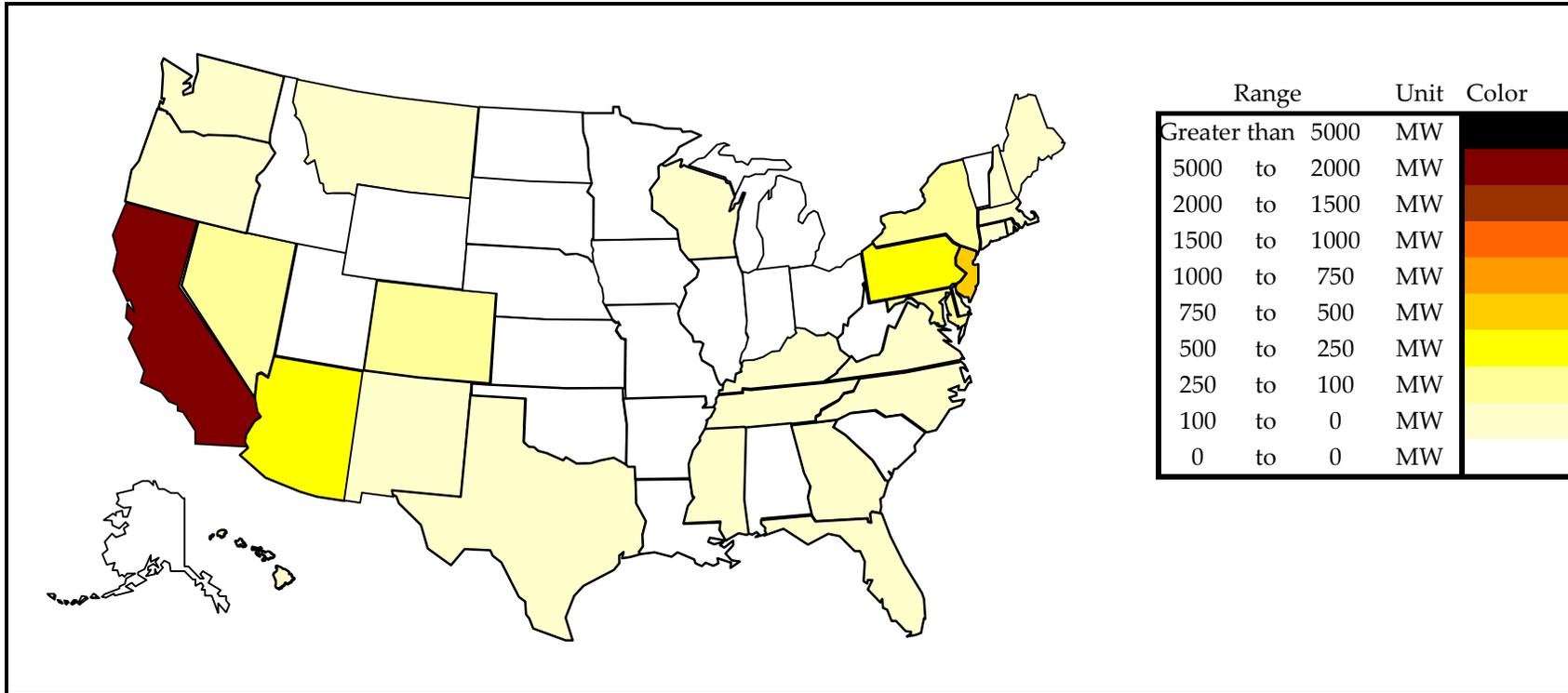
Forest City Military Communities, Hawaii



City of San Jose, California

Next Cities Solicitation: 11/2007
Next Showcases Solicitation: 11/2007

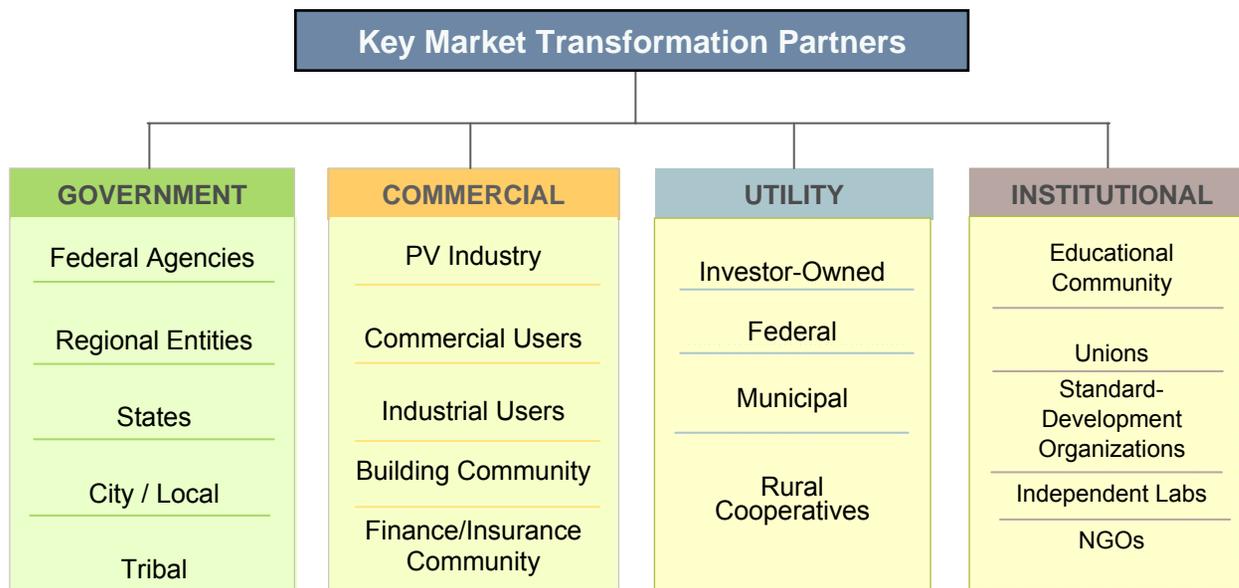
DOE's market transformation efforts will focus on states that are best "natural markets" for solar, supporting formulation of improved policies and facilitating demo's



- CA: Net Metering
- AZ: Interconnection, Net Metering, RPS
- TX: Net Metering, RPS
- FL: Interconnection, Net Metering, RPS
- NC: Interconnection, Net Metering, SREC's
- PA: Interconnection, Net Metering, RPS
- OH: Net Metering, RPS/Incentive
- MD: Interconnection, RPS
- NM: Interconnection, Net Metering, RPS
- DE: Interconnection, Net Metering



DOE is partnering with key organizations to provide information/assistance to policy makers and regulators with the goal of creating solar-friendly markets



State Policy & Technical Assistance: NCSL, NARUC, IREC, Clean Energy Group



Utility Outreach: SEPA

Codes & Standards: NMSU, SEIA



For More Information on the DOE Solar Program:



Overview: http://www.eere.energy.gov/solar/solar_america/index.html

National Technology Roadmaps
Ready for Review

Program Plans: http://www.eere.energy.gov/solar/solar_america/planning.html

Overview of Solar America
Initiative TPP Awards (PDF 4.6 MB)
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Overview of SAI PV
Incubator Awards (PDF 4.6 MB)
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Funding: http://www.eere.energy.gov/solar/solar_america/funding_opportunities.html

Solar Program Newsletter
(PDF 706 KB) Download Adobe Reader

Newsletter: http://www.eere.energy.gov/solar/solar_newsletter_july07_ck.pdf