

Solar RD&D Opportunities and Issues

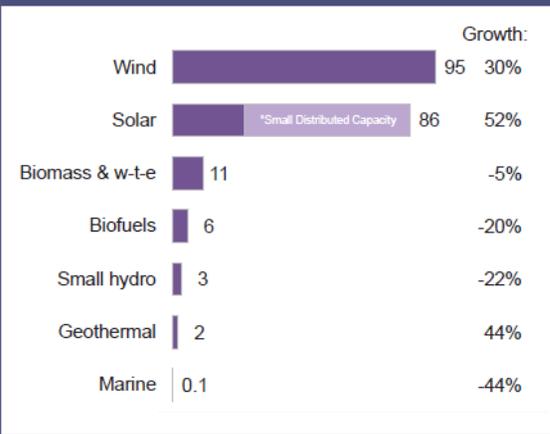
Presented to California Energy Commission
2012 Integrated Energy Policy Report
Lead Commissioner Workshop
June 6, 2012

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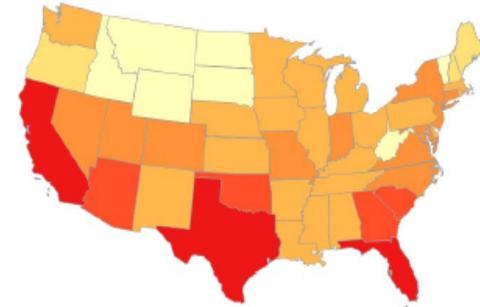
Solar Growth Prospects

FIGURE 6: FINANCIAL NEW INVESTMENT IN RENEWABLE ENERGY BY TECHNOLOGY, 2010, AND GROWTH ON 2009, \$BN

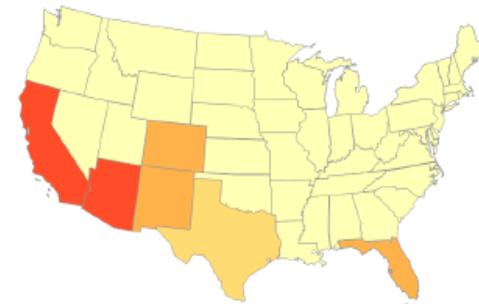


Over \$86 billion invested in 2010

2030 PV Capacity: 302 GW

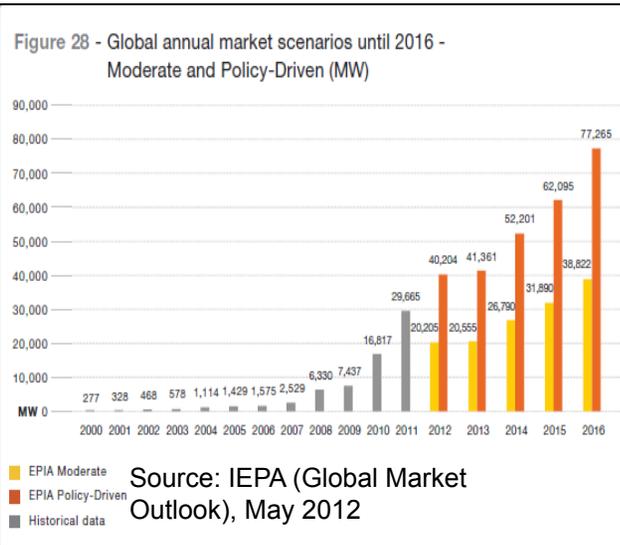


2030 CSP Capacity: 28 GW



Source: Bloomberg/UNEP: Global Trends in Renewable Energy Investment), 2011

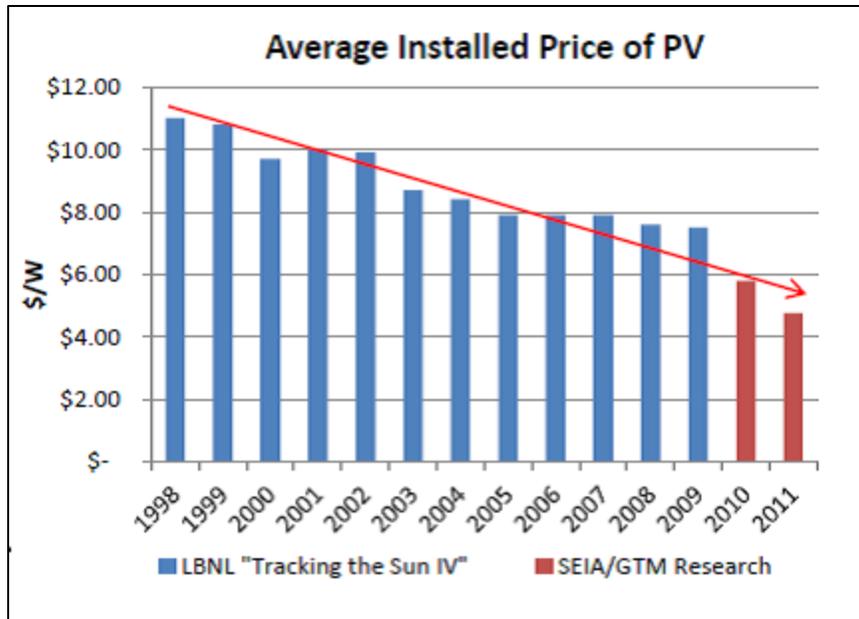
IEPA expects PV capacity to more than double by 2017 (30 GW to 77 GW)



Source: DOE (SunShot Vision Study), Feb. 2012

DOE sees a ten-fold increase in PV by 2030

Solar Price Trends



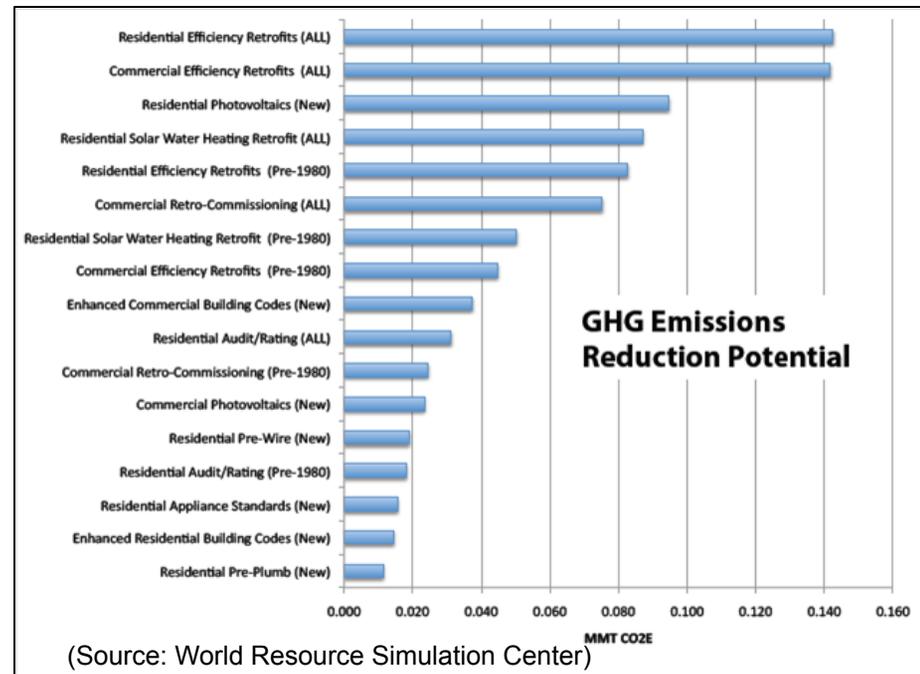
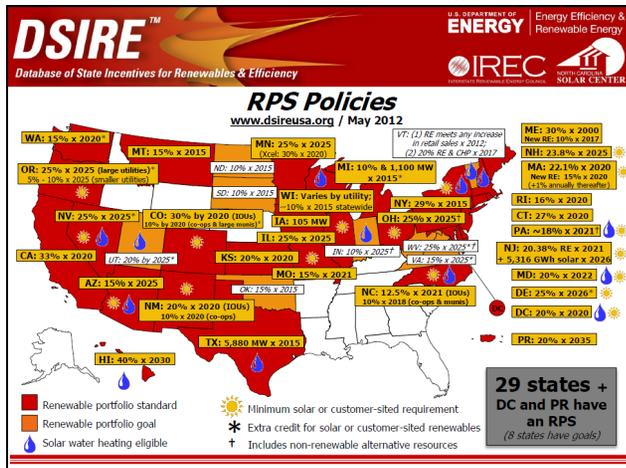
2010 installed PV costs have dropped to less than half their 1998 values

DOE's target for PV is a four-fold drop in costs by 2020 and a two-fold drop for CSP

Source: SEIA, 2012

	Utility PV		Residential Rooftop PV		Commercial Rooftop PV		CSP					
	SunShot	Ref.	SunShot	Ref.	SunShot	Ref.	SunShot			Ref.		
	\$/W _{DC}	\$/W _{DC}	\$/W _{DC}	\$/W _{DC}	\$/W _{DC}	\$/W _{DC}	\$/W _{AC}	hours storage ^b	CF (%)	\$/W _{AC}	hours storage ^b	CF (%)
2010	4.00	4.00	6.00	6.00	5.00	5.00	7.20	6	43	7.20	6	43
2020	1.00	2.51	1.50	3.78	1.25	3.36	3.60	14	67	6.64	6	43
2030	1.00	2.31	1.50	3.32	1.25	2.98	3.60	14	67	5.40	6	43
2040	1.00	2.16	1.50	3.13	1.25	2.79	3.60	14	67	4.78	6	43
2050	1.00	2.03	1.50	2.96	1.25	2.64	3.60	14	67	4.78	6	43

Solar Plays Many Roles Going Forward



Solar will play a critical role in achieving RPS goals. In CA, solar may contribute over 50% to the 33% RPS goal.



(Source: Solar Panels- Green Power)

Reducing GHG emissions

PV systems provide sustainable charging for PHEV; over 730,000 EV/ PHEV expected by 2016

Improving Solar Technologies/Integrating into the Grid

Improving performance and cost

- Increasing inverter reliability and lifetime
- Developing concentrating PV systems
- Hybrid PV/thermal systems

Enabling high PV penetration

- Improved inverter/meter communications
- Enhanced control systems with dashboards
- Transmission/distribution models for optimal PV locations
- Enhanced spatial and temporal solar models

Integrating DG solar with EE and DR

- Tools for optimal design of EE/DR/PV