



U.S. Department of Energy  
Energy Efficiency and Renewable Energy



# Solar Energy Technologies

Renewable Energy  
Roundtable

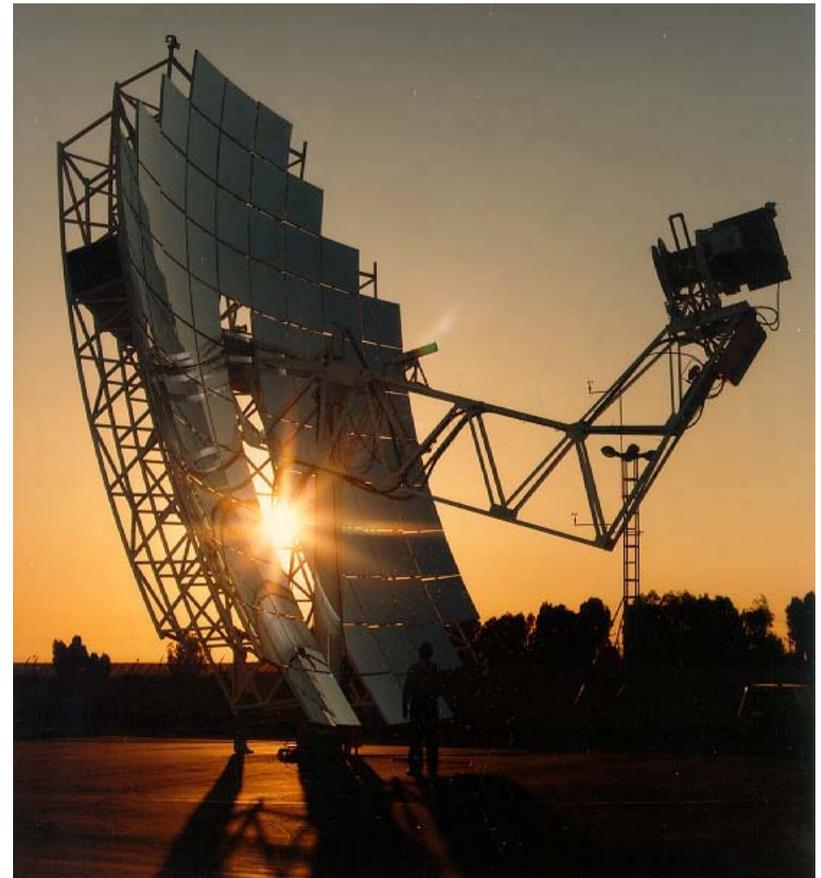
Tommy Rueckert – DOE  
Solar Program

November 8, 2002



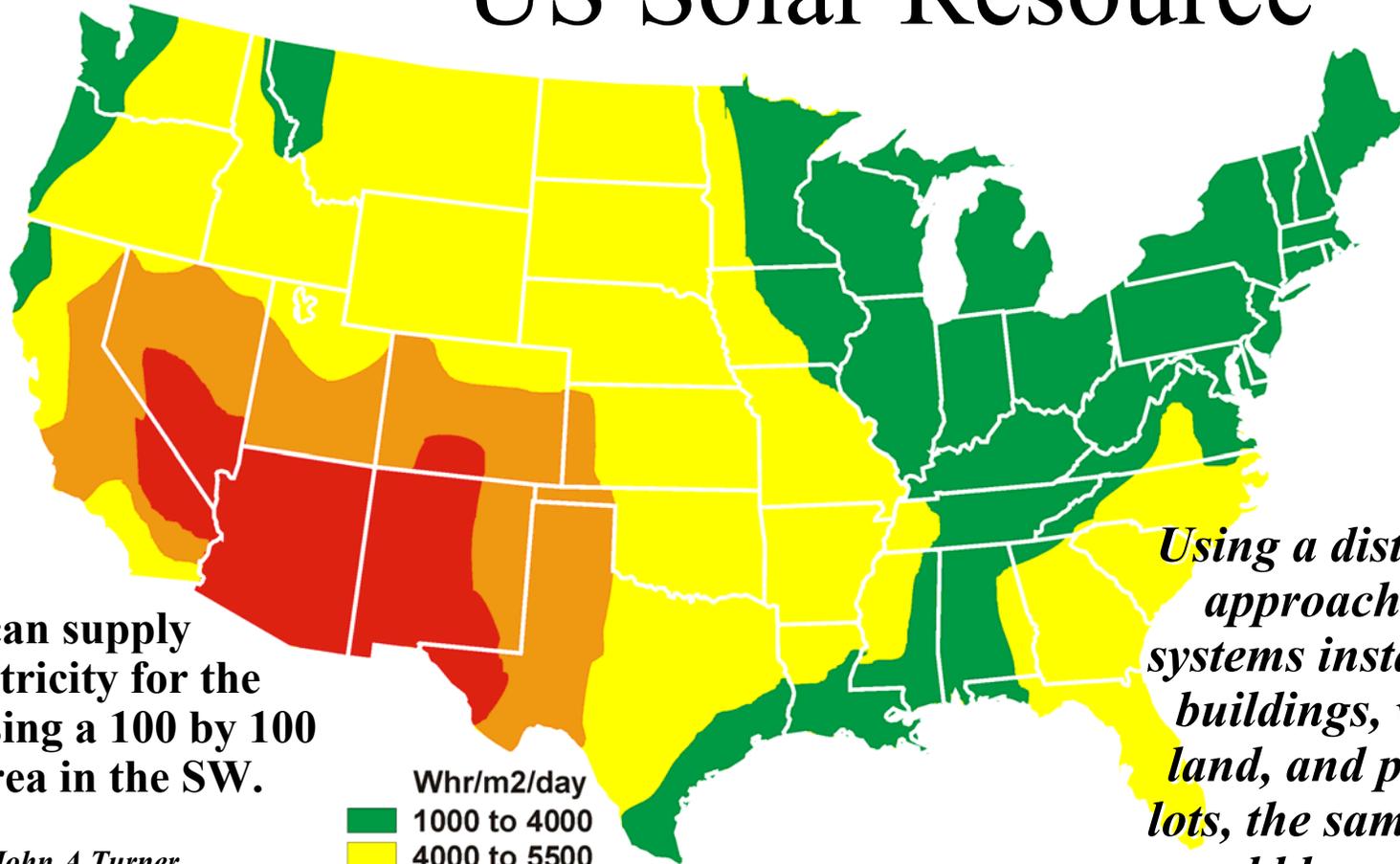
# The Value of Solar

- Energy Security
- Demonstrated Reliability
- Non-Polluting
- Flexible – Sized, Sited and Installed Faster
- Reduces Fuel Price  
Fluctuation in Energy Bills
- Avoids Costly Transmission  
& Distribution Upgrades





# US Solar Resource



**Solar can supply all electricity for the U.S. using a 100 by 100 mile area in the SW.**

*(Source: John A Turner, A Realizable Energy Future, Science Vol. 285, 30 July 1999)*

*Using a distributed approach with systems installed on buildings, vacant land, and parking lots, the same result could be achieved with PV in every state.*



# Photovoltaic Highlights

- Manufacturing R&D
- Thin-Film Partnerships
- Building Integrated PV
- Beyond the Horizon  
and High Performance





# PV Goals by 2006

- Reduce PV module cost by 30% from \$2.50 to \$1.75/Watt
- Establish greater than 20-year lifetime for PV systems
- Reduce recurring costs by 40%
- 1 GW cumulative U.S. sales (export and domestic)





# Solar Thermal Highlights

- 1000 MW Initiative for Concentrating Solar Power
- 1 MW Projects in Nevada (dishes) and Arizona (troughs)
- Development of polymer solar hot water collector
- Broader partnerships - state, federal, and international





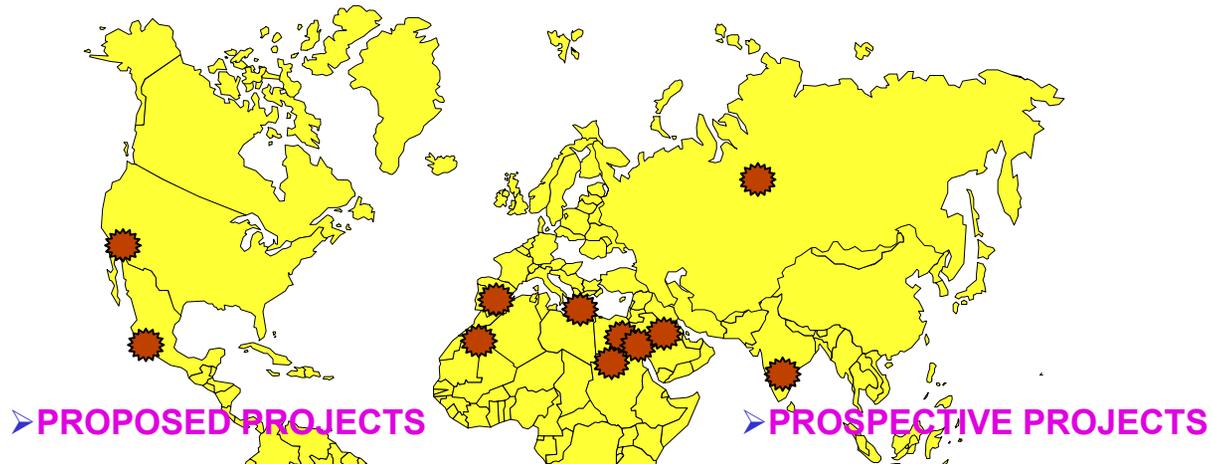
# Solar Thermal Goals by 2006

- Reduce the cost of large-scale CSP technologies from 10–12¢/kWh to under 9¢/kWh
- Improve the reliability of distributed dish systems from 200 to 800 hours MTBF
- Integrate solar into energy efficient buildings to achieve an annual energy bill under \$600
- Though use of polymer designs, reduce the cost of solar water heating from 8 to 4¢/kWh



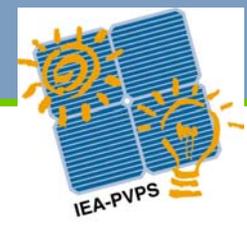


# CSP International Projects



Country	Type	MW
Australia	"Big" Dish	2-20
Brazil	Tower/Dish	30-50
Egypt	ISCCS/Trough, Tower	150
Greece	SEGS/Trough	50
India	SEGS/Trough, Tower	35
Mexico	ISCCS/Trough, Tower	135-310
Morocco	SEGS/Trough	80
USA	Dishes	1-2

Country	Type	MW
Egypt	Trough, Tower	4,000
Iran	SEGS/Trough	100
Israel	ISCCS/Trough, Tower	85
Jordan	Tower	30
Russia	Trough, Dishes	2-5
So. Africa	TBD	10-100
Spain	Tower, Trough	10
USA	Dishes, Trough	1-10



# PV International Projects

Task #	Task Description	Task Status
I	Exchange and Dissemination of Information on Photovoltaic Power Systems	Extended for 5 years to May 2004. Task I is required as part of the PVPS with utility sector support
II	Operational Performance of Photovoltaic Power Systems and Subsystems	U.S. does not participate. Very limited participation by others
III	Use of Photovoltaic Power Systems in Stand-alone and Island Applications	U.S. does not participate. Task has excellent and broad international participation
IV	Modeling of Distributed Photovoltaic Power Generation in Support of the Grid	U.S. did not participate. Task did not continue beyond concept
V	Grid Interconnection of Building-Integrated and Other Dispersed Photovoltaic Power Generation	Task was disbanded after successful workshop in March 2002.
VI	Design and Operation of Modular Photovoltaic Plants for Large Scale Power Generation	Task Completed in 1998. Future work will be under Task VIII
VII	Photovoltaic Power Systems in the Built Environment	Task has been disbanded but a final workshop is still being scheduled in FY03
VIII	Very Large Scale Photovoltaic Power Generation Systems in Remote (Desert) Areas	Initiated in Jan 1999 for 4 years to Dec 2002. U.S. Utility participation is confirmed
IX	Deployment of Photovoltaic Technologies: Co-operation With Developing Countries	Initiated for 5 years to May 2004. U.S. DOE is now a participant with broad industry support
X	Large Scale Application of Grid-connected Urban Scale PV Power Systems	Under Development



## IEA PVPS Country Participation

<u>Country</u>	<u>Task I</u>	<u>Task II</u>	<u>Task III</u>	<u>Task IV</u>	<u>Task V</u>	<u>Task VI</u>	<u>Task VII</u>	<u>Task VIII</u>	<u>Task IX</u>
Australia	*		○		○		○		○
Austria	○	○			○		○		
Canada	○		○		✓		○		○
Denmark	○				○		○		○
European Union	○	○							✓
Finland	○		○				○		○
France	○	○	*						○
Germany	○	*	○		○		○		○
Israel	○	○			○			○	✓
Italy	○	○	○	✓	○	*	○	○	○
Japan	○	○	○		*	○	○	*	○
Korea	○		○					○	
Mexico	○				✓				✓
Netherlands	○	○	○		○		*	○	○
Norway	○		○						
Portugal	○		○	✓	○	○		○	
Spain	○		○			○	○	○	✓
Sweden	○		○				○		✓
Switzerland	○	○	○		○		○		○
Turkey	○								
United Kingdom	○		○		○	○	○		*
USA	○				○	○	○	○	○

\* Operating Agent

○ Country Participation

✓ Participation Under Consideration

Note: Task IX includes representatives from World Bank, UNDP & PV industry; interacts with UNEP, GEF, ASTAE, ADB, AfDB & PV Industry and Targets 14 developing countries initially (Argentina, Brazil, China, Dominican Republic, Ghana, Honduras, Kiribas, Indonesia, India, Morocco, Philippines, South Africa, Vietnam & Zimbabwe)



# Key Countries





# For Further Information

- The Energy Efficiency and Renewable Energy website:  
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