



Utility Perspective: *Solar Thermal Hybrid Projects*

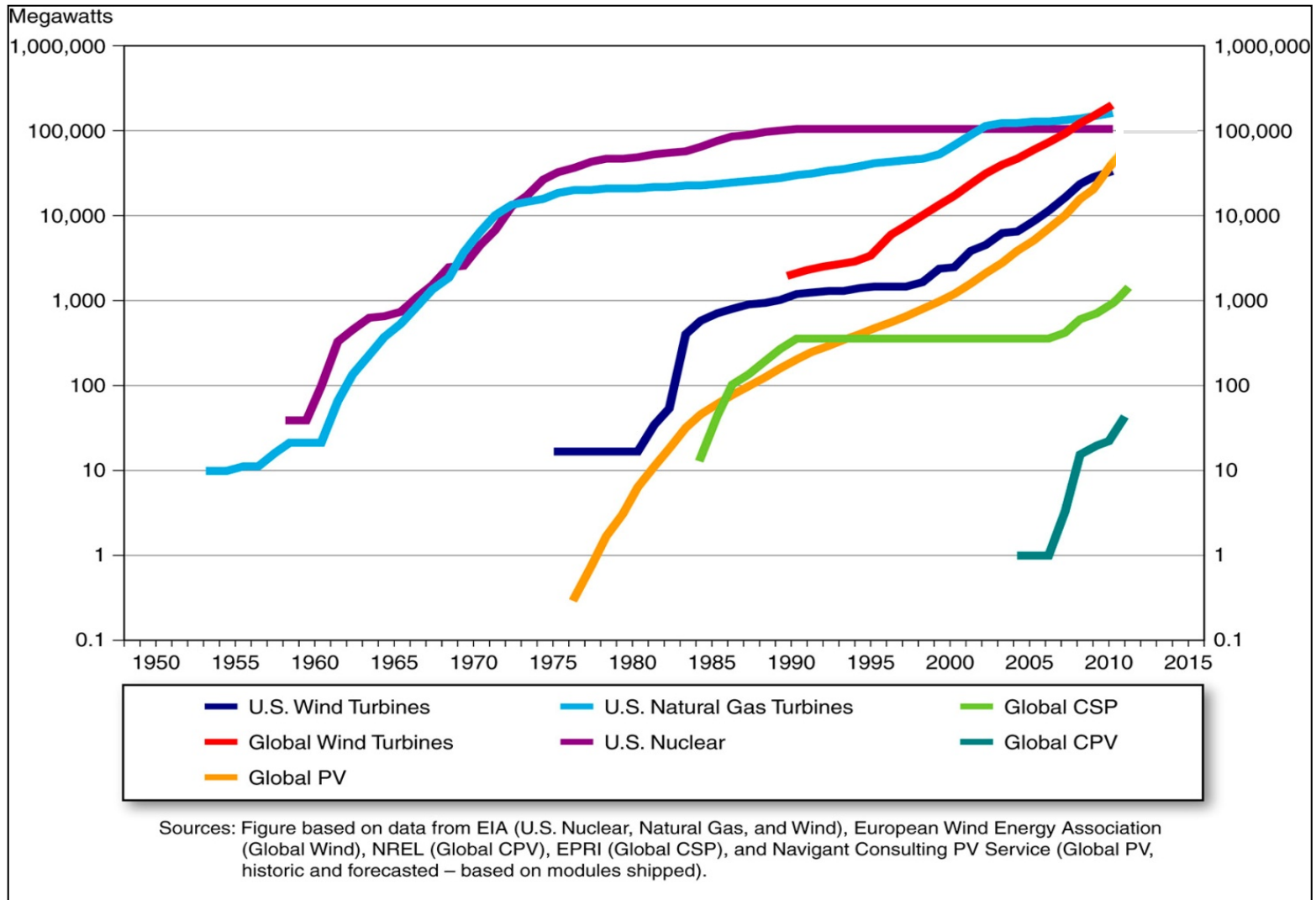
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Clean Energy Regulatory Forum

April 18, 2012

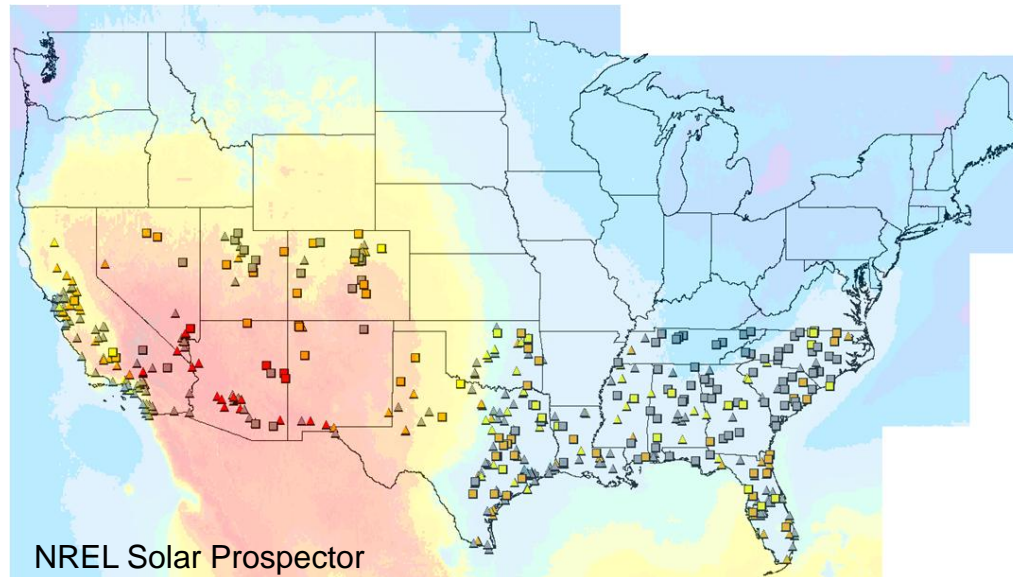
Greater PV Adoption Setting the Stage for CSP



NREL/EPRI Analysis: Solar Augment Potential of U.S. Fossil Fleet

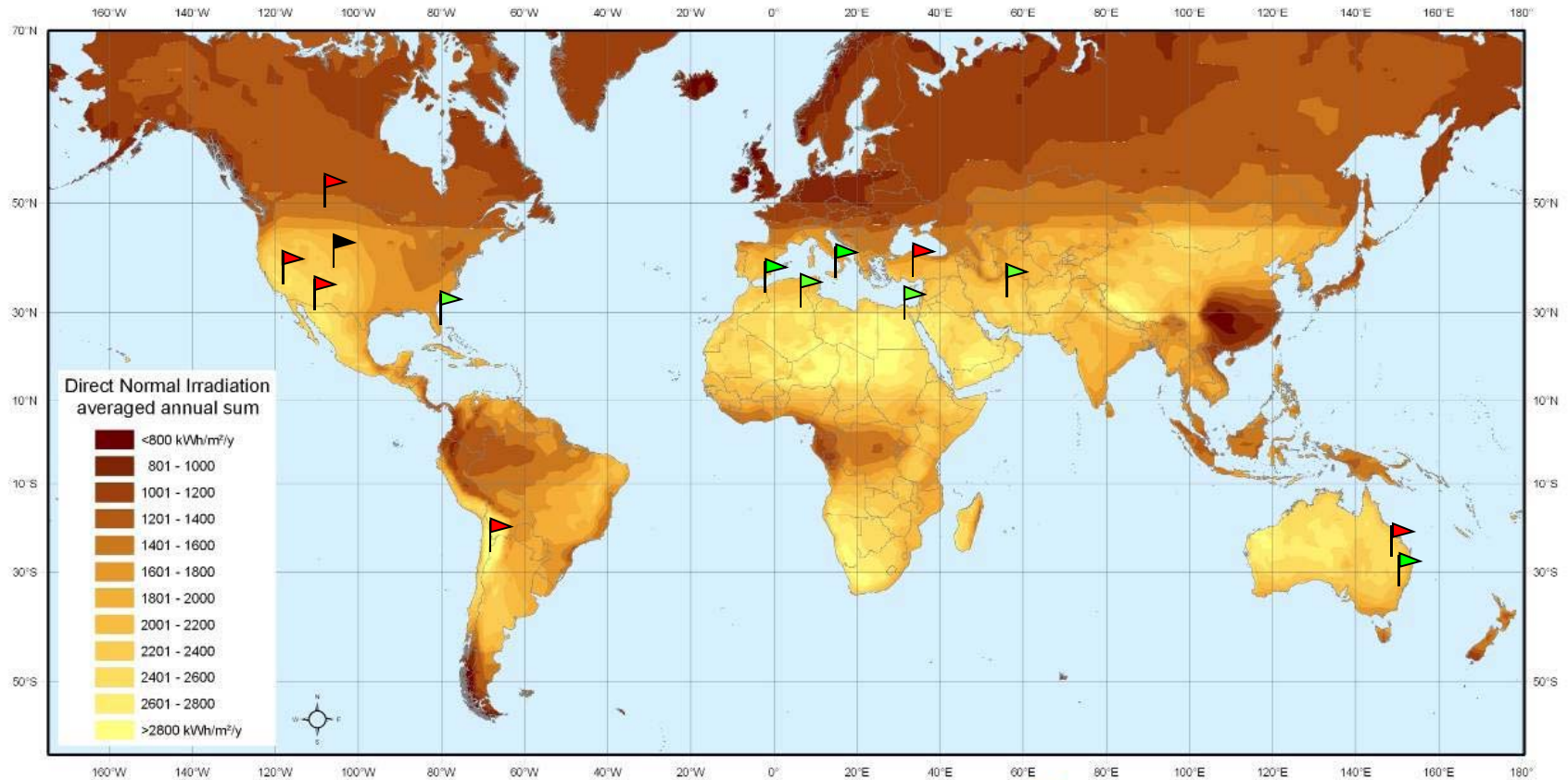
Significant solar potential at coal and gas power plants

- Estimated >21 GW across 16 states
- All *Excellent* sites in southwest, but at least one *Good* site per state



**Hybrids offer near-term opportunity to
accelerate CSP learning curve**

Worldwide Operating and Planned Projects



- ▲ = operating
- ▲ = planned or under construction
- ▲ = decommissioned

Data based on NASA SSE 6.0 dataset for a 22-year period (July 1983 - June 2005)
<http://eosweb.larc.nasa.gov/sse/>

Map created and map layout by DLR 2008
<http://www.dlr.de>

Together...Shaping the Future of Electricity

Project Summaries

CSP Technology	Plant Name	Net Output (MWe)	Location	Solar Steam Application	Online Date
United States					
Trough	Martin Next Generation Solar Energy Center	3705 (CC), 75 (solar)	Indiantown, FL	Rankine cycle w/ (2) 2x1	2010
Trough	Cameo	49 (coal), 1 (solar)	Palisade, CO	Feedwater heating	2010 (offline)
Trough	Palmdale Hybrid Power Project	520 (CC), 50 (solar)	Palmdale, CA	Rankine cycle w/ 2x1	2013 (Q3)
International					
LFR	Liddell Power Station	2000 (coal), 3 (solar)	NSW, Australia	Feedwater heating	2008
Trough	Yazd Solar Thermal Power Plant (YSTPP)	450 (CC), 17 (solar)	Yazd Province, Iran	Rankine cycle w/ 2x1	2009
Trough	Archimede	760 (CC), 5 (solar)	Sicily, Italy	Rankine cycle w/ 2x1	2010
Trough	Béni Mathar Plant	450 (CC), 22 (solar)	Ain Béni Mathar, Morocco	Rankine cycle w/ 2x1	2010
Trough	Kuraymat ISCCS	120 (CC), 20 (solar)	Kuraymat, Egypt	Rankine cycle w/ 1x1	2011
Trough	Hassi R'Mel ISCC Power Station	130 (CC), 25 (solar)	Hassi R'mel, Algeria	Rankine cycle w/ 2x1	2011
LFR	Mejillones	150 (coal), 5 (solar)	Northern Chile	Feedwater heating	2012
Trough	Medicine Hat	203 (CC), 1 (solar)	Alberta, Canada	Rankine cycle w/ 2x1	2012
Trough	Agua Prieta	464 (CC), 12 (solar)	Agua Prieta, Mexico	Rankine cycle w/ 2x1	2013
LFR	Kogan Creek	750 (coal), 44 (solar)	Queensland, Australia	Feedwater heating	2013
Tower	Karaman	450 (CC), 50 (solar)	Karaman, Turkey	Rankine cycle w/ 1x1	2015