

Aug 20th, 11:15 AM - 11:45 AM

Solar thermal power

John O'Donnell

Ausra

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Utility-scale solar power. Market prices. Now.

Solar Thermal Power

August 2008

John O'Donnell
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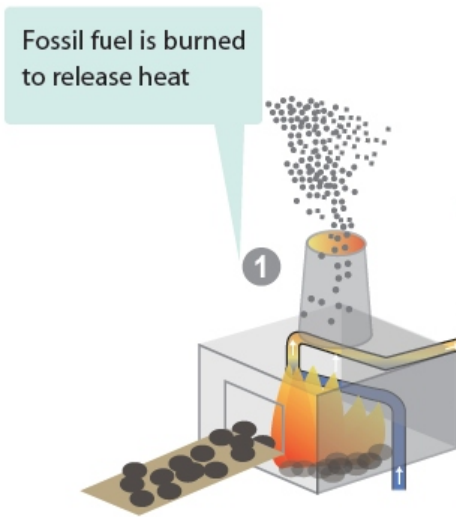
Ausra, Inc.

- Founded 2002 by Australian solar pioneer Dr. David Mills and colleagues
- Moved to US 2007
- Global provider of solar thermal energy systems and electric power
- Proven management and backers
 - Robert Fishman ran all power at Calpine
 - Team has built 30,000 MW of power projects
 - Vinod Khosla, Kleiner-Perkins, Kern Energy

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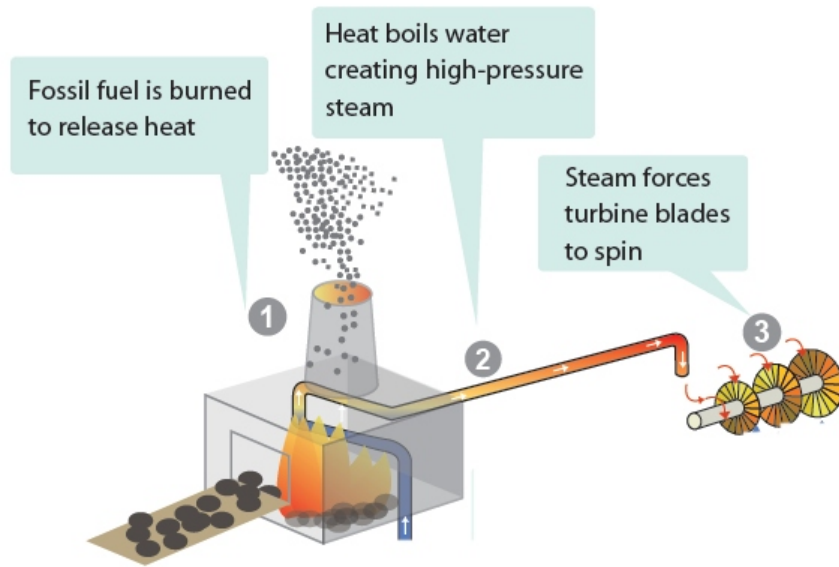


Heat



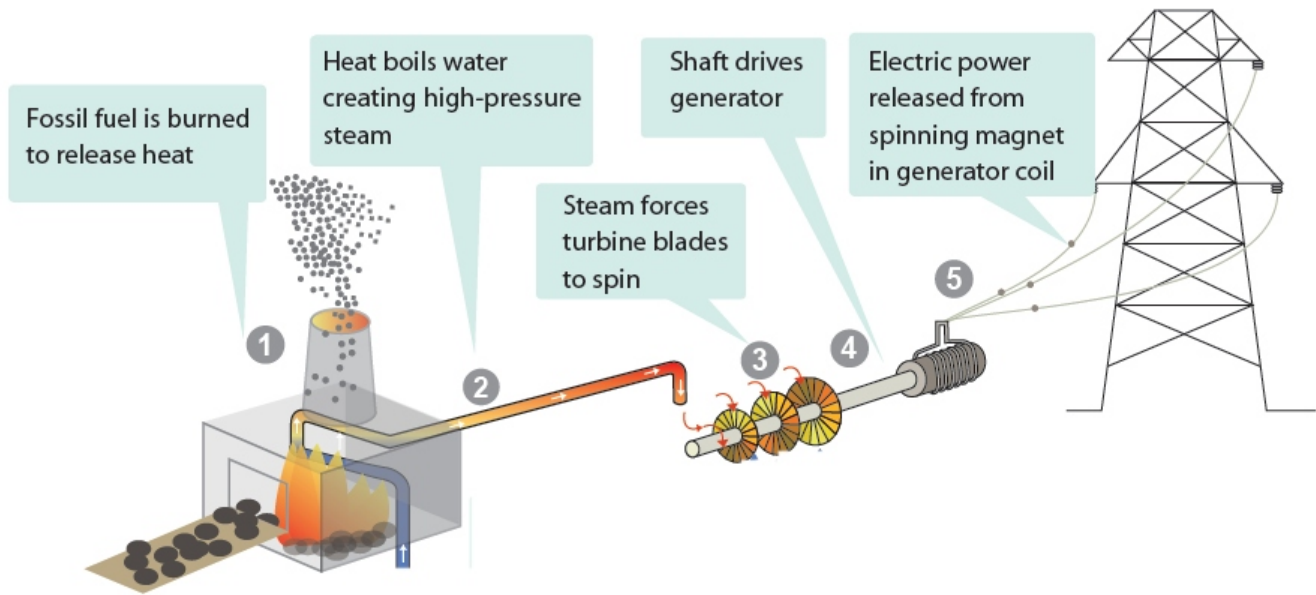


Heat Makes Steam



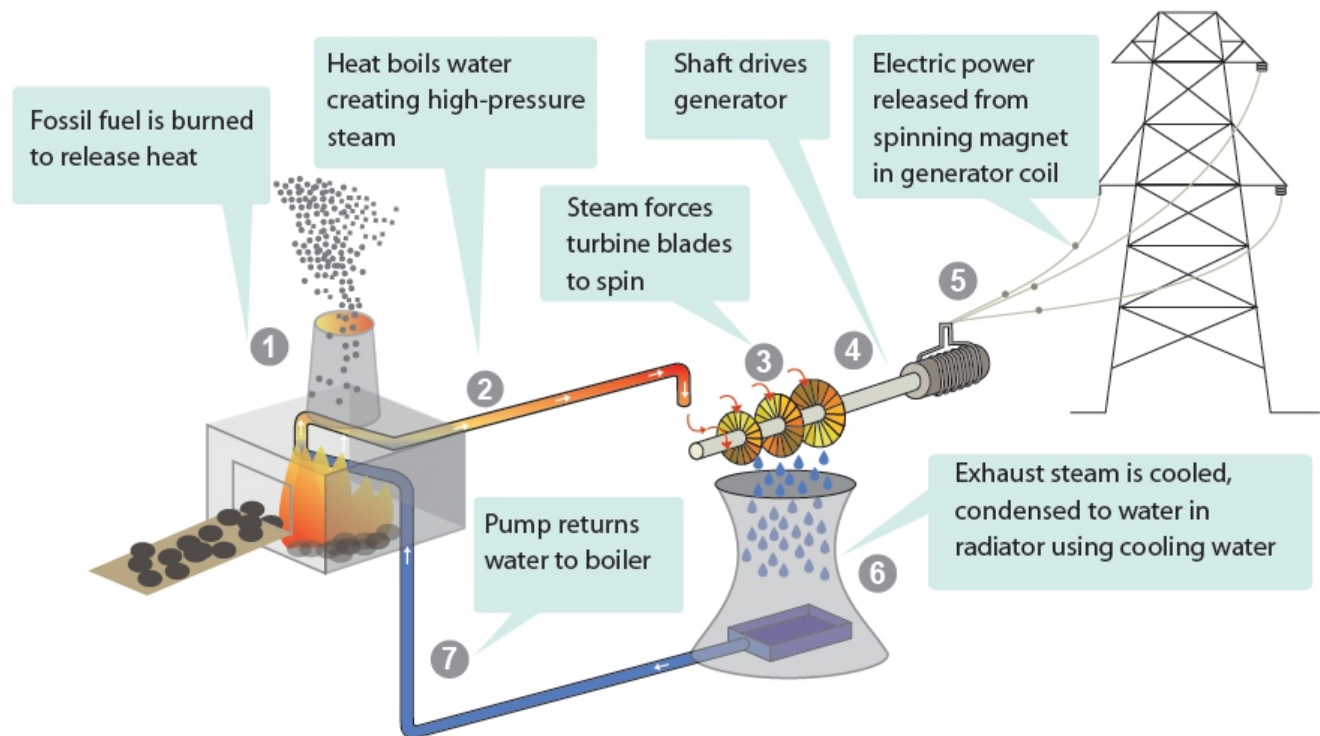


Steam Becomes Electricity



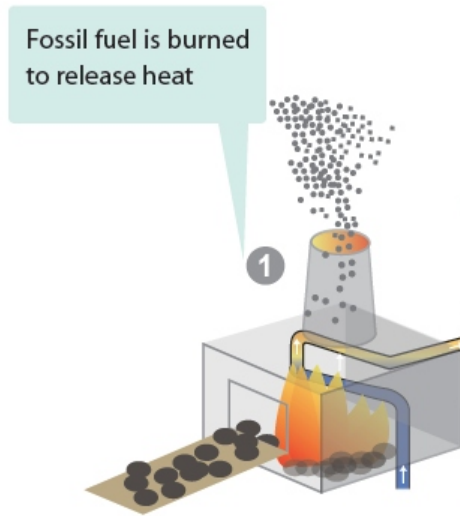


Steam Becomes Water; Repeat





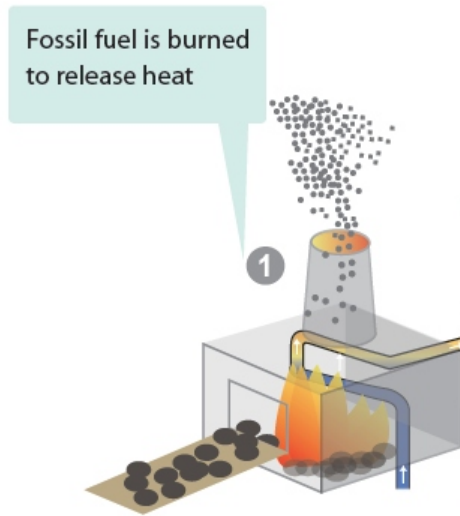
It's not the heat,



- 40% of heat energy becomes electricity
- Total heat released is tiny



It's not the heat, it's the CO₂



- Each molecule of CO₂, during its life in the atmosphere, traps **100,000 times** more heat than was released as it was formed.

- Ken Caldeira, Stanford



100,000 times



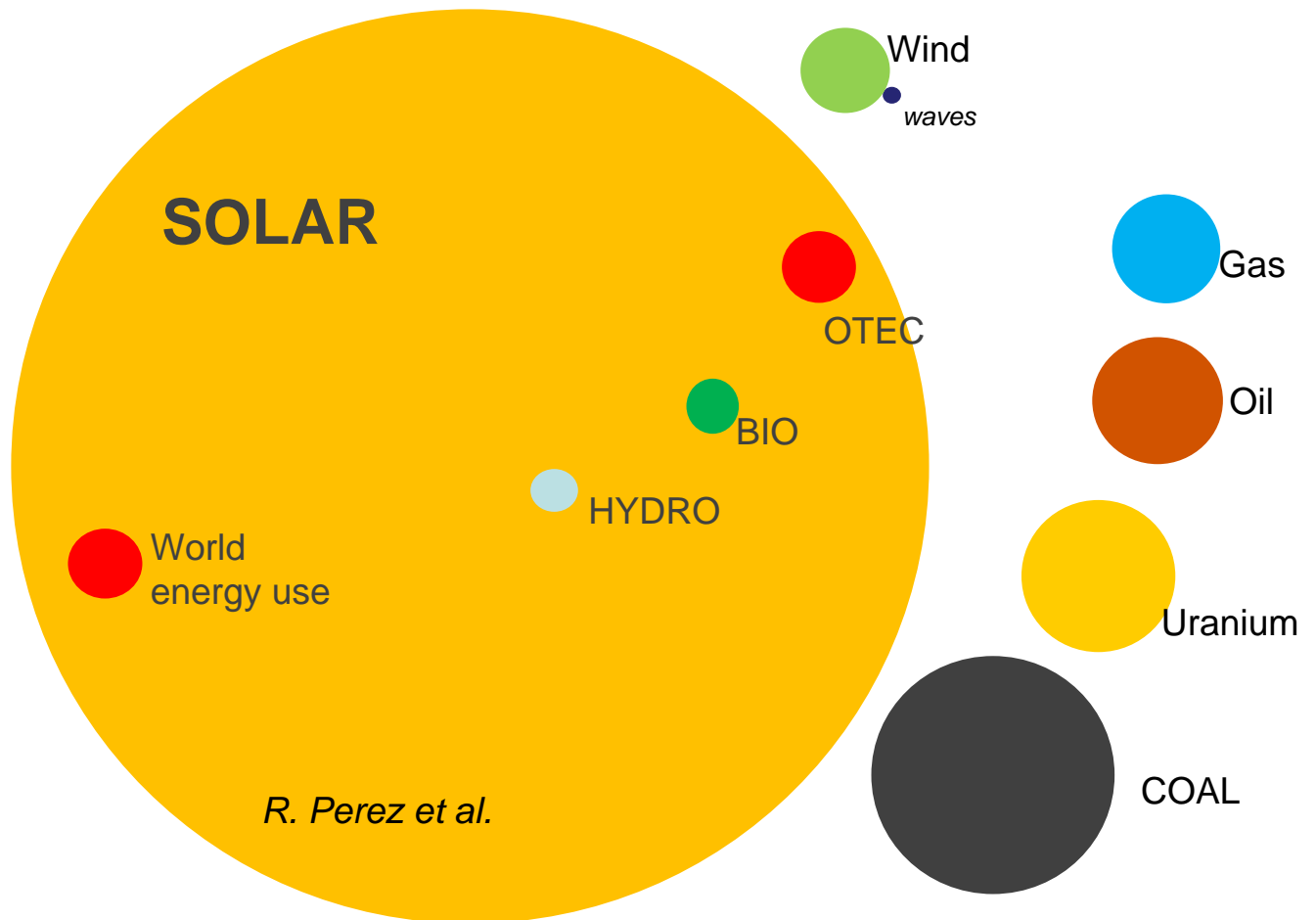
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Energy Choices

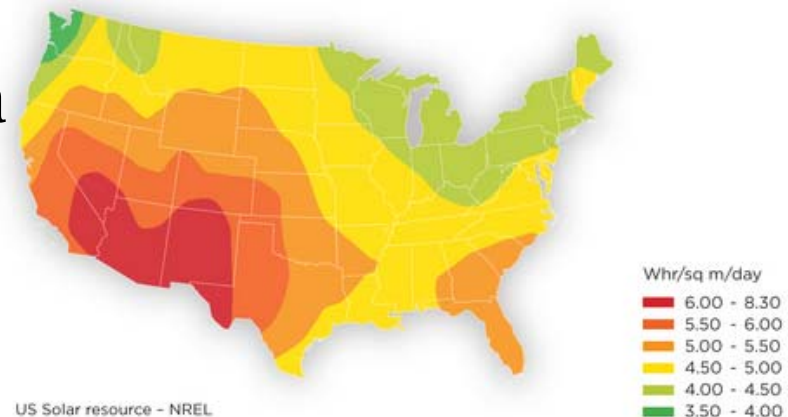


R. Perez et al.

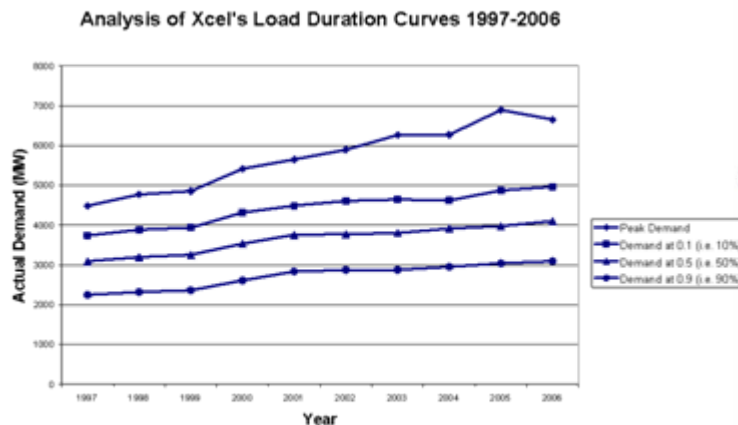
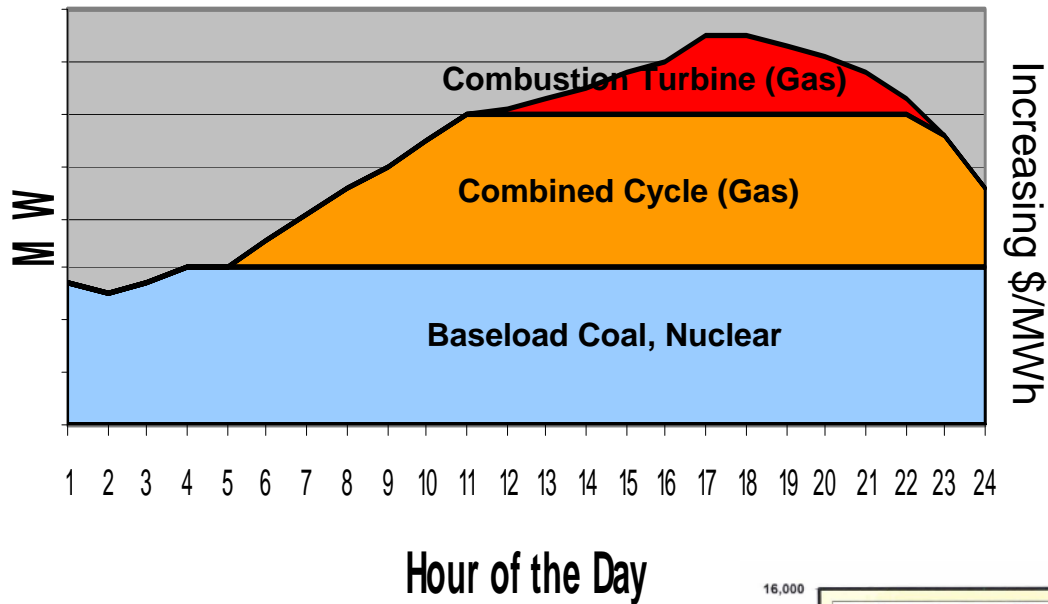


Nevada: The Saudi Arabia of sun

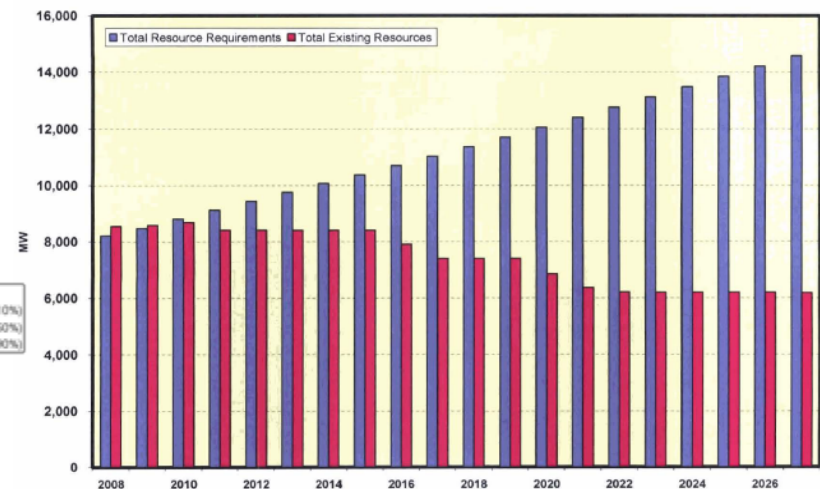
- Nation's best combination of
 - Available Land
 - Sunshine
 - Market Need/Opportunity
- Solar Industry Is Investing In Nevada
 - Power plants
 - Solar panel installs
 - Manufacturing



Summer Peak Growing 2x Avg

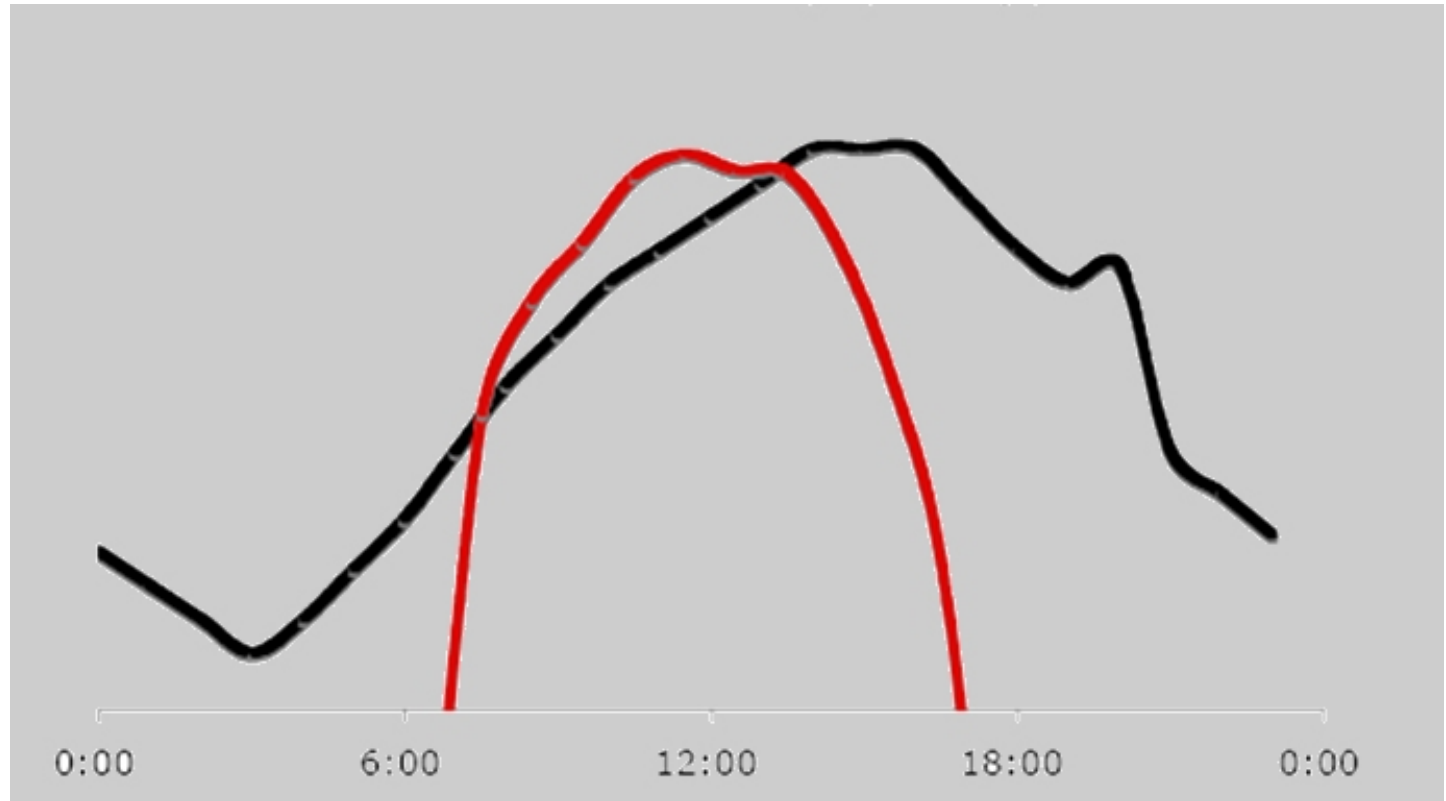


Note that Peak Demand has been rising faster than the increase in demand in other parts of the curve.





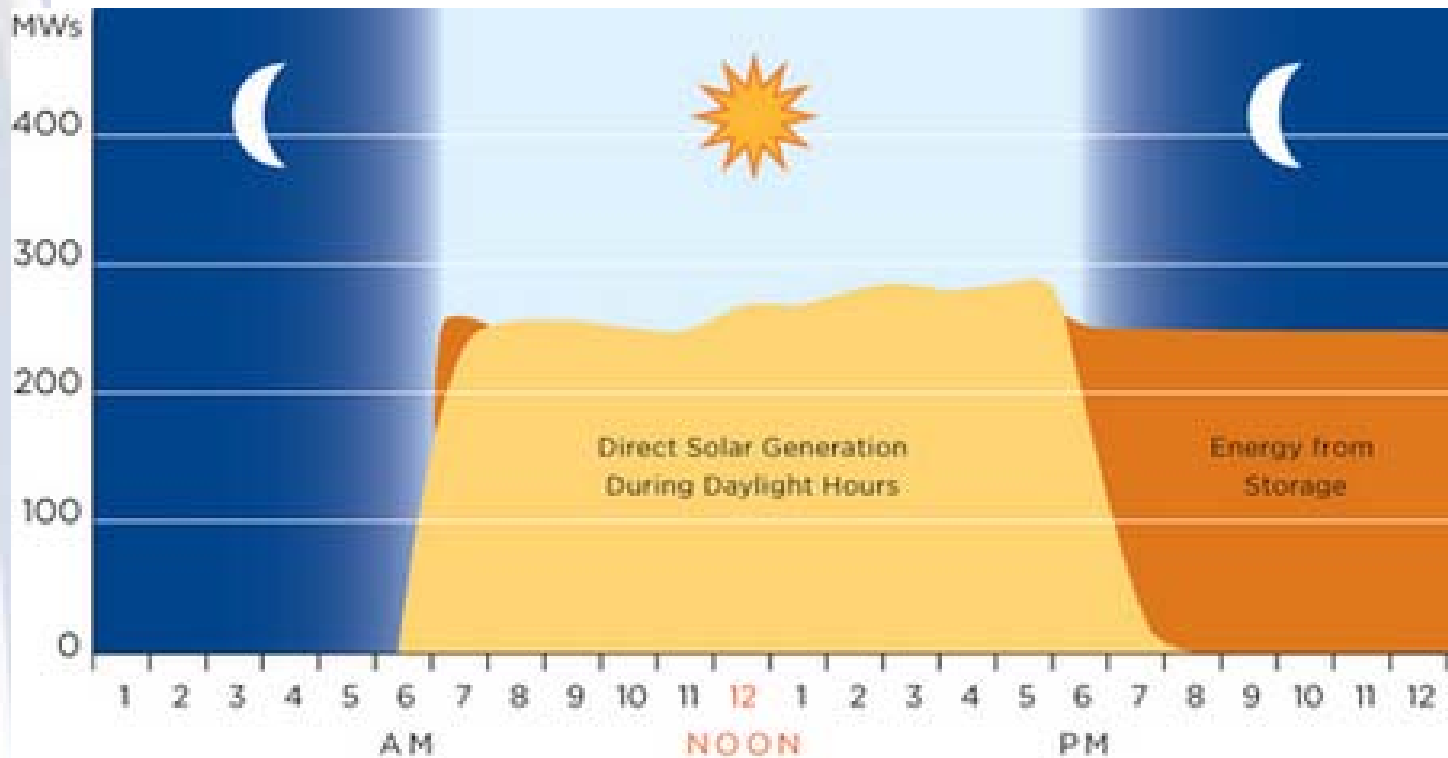
Solar Delivers On-Peak



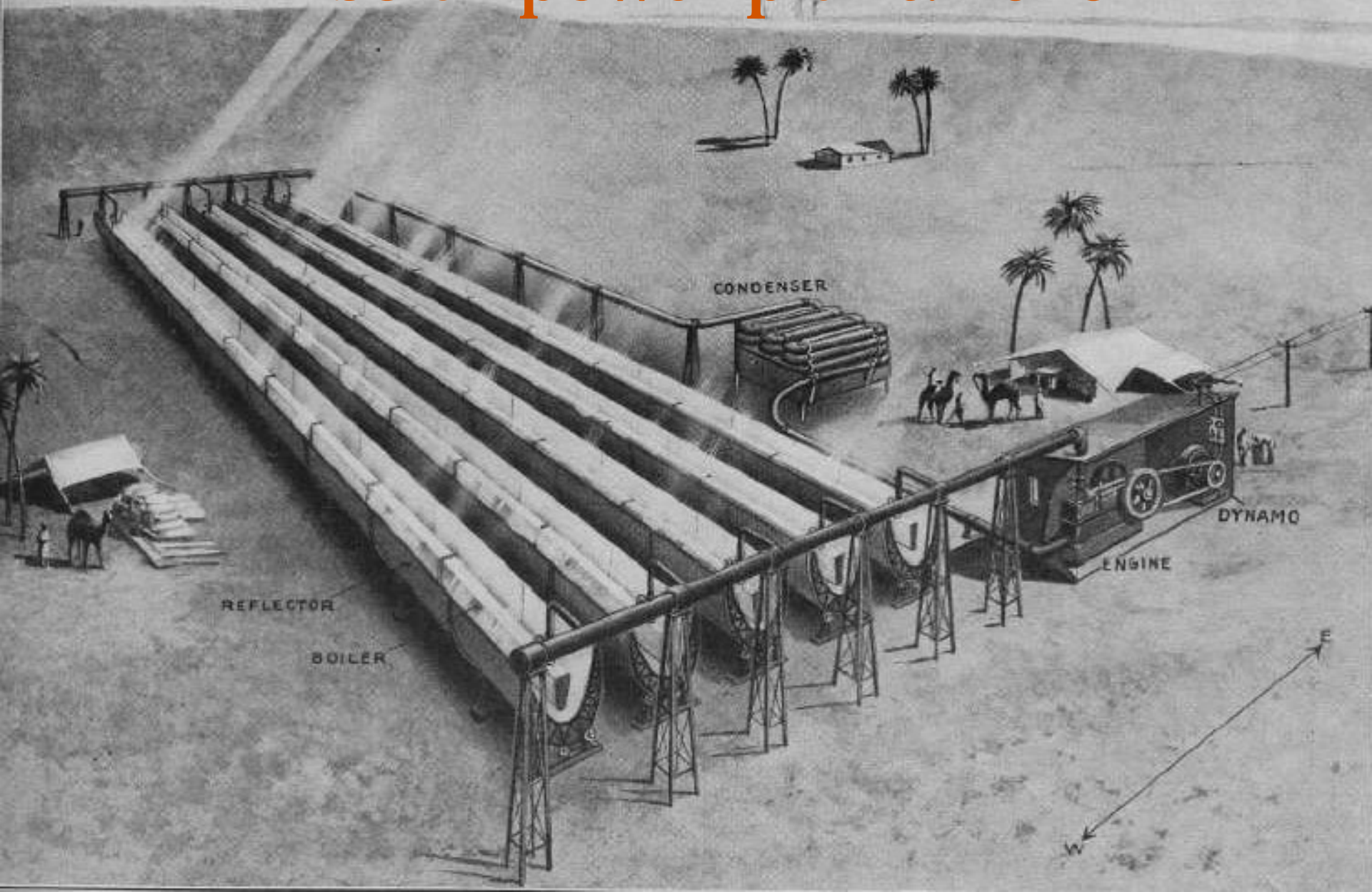
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Day And Night Solar Power

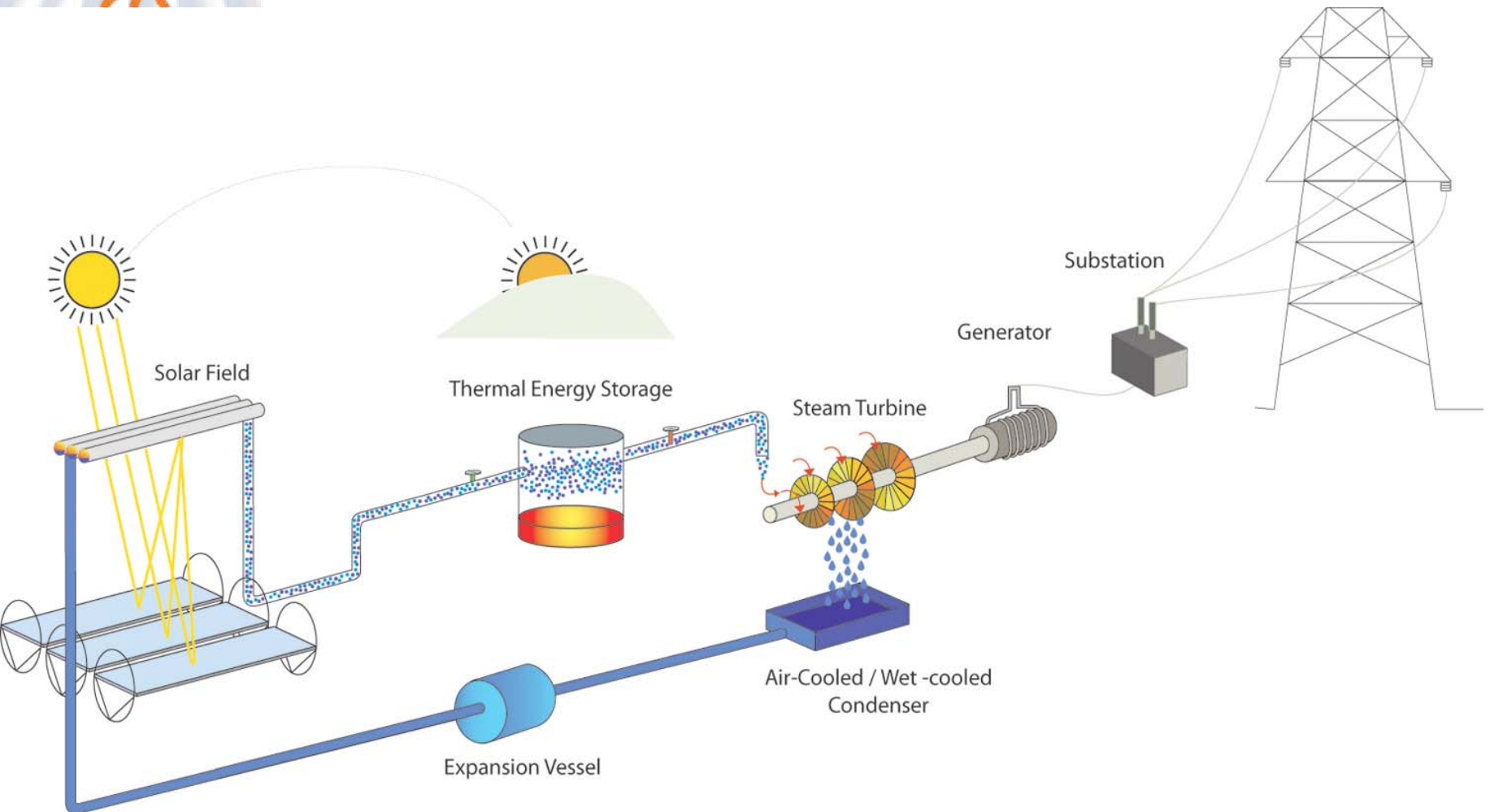


1st solar power plant: 1916





Solar Thermal Plant Elements



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Solar thermal power systems

- Point focus

Dish



Tower



- Line focus

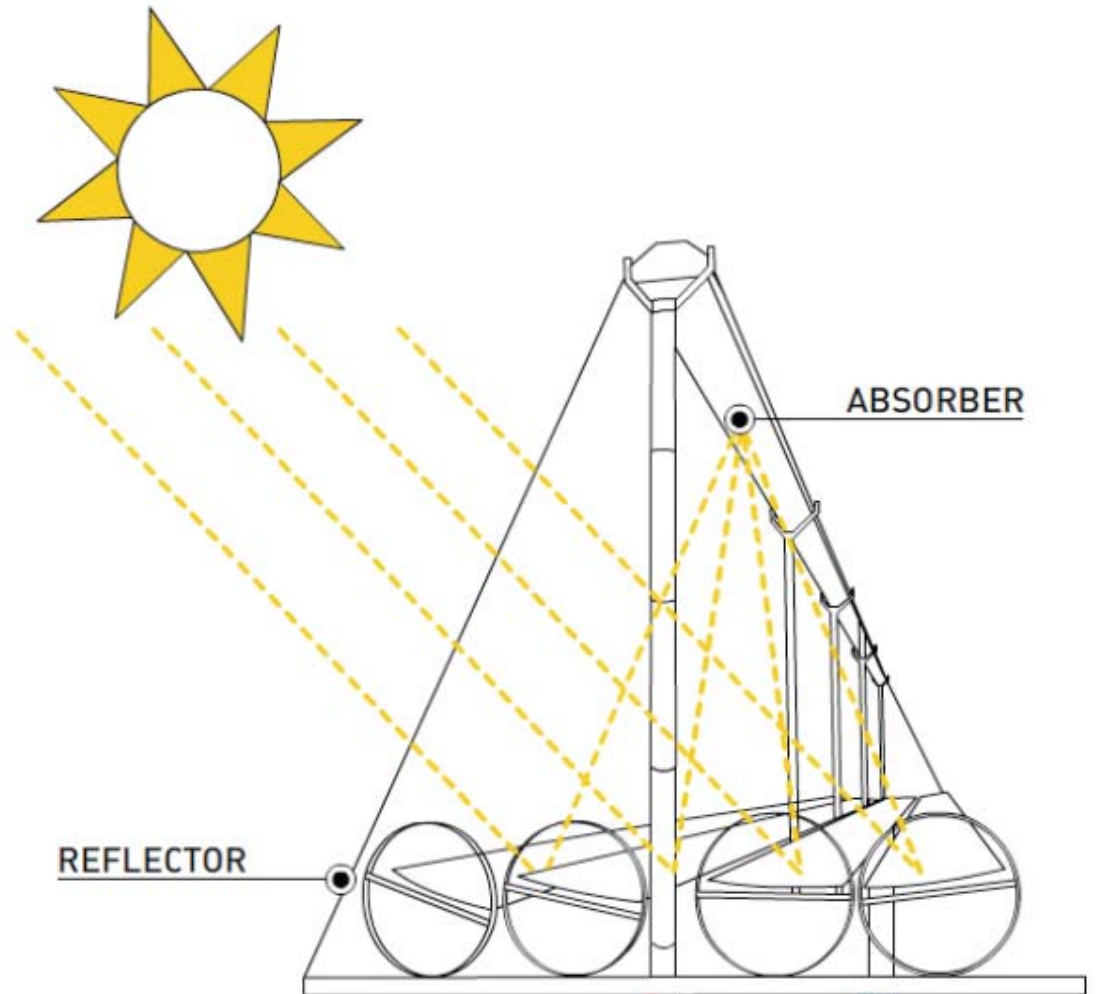


Trough

Linear Fresnel



Simple CLFR Collector



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Compact Linear Fresnel Reflector (CLFR)



Trough Heat Collector (Receiver)

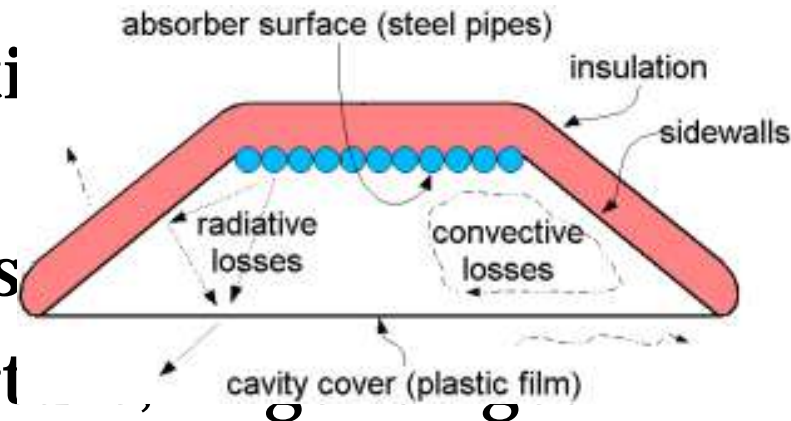
- Heat absorbing pipe coating
 - Gets hot, stays hot
 - Breaks down in air
 - Vacuum insulated
- Handmade blown glass envelope
 - Bellows, glass-metal contacts





Ausra's Simpler Receiver

- Air stable heat absorbing surface needs no vacuum
- Ausra makes coated receiver pipe in high volume
- Air-insulated receiver: fast simple fabrication
- Direct steam generation with molten salt
 - Much lower “parasitic” losses
- Larger collector aperture





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Liddell Power Station, New South Wales; Online 7/08

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177 MW, 1 square mile



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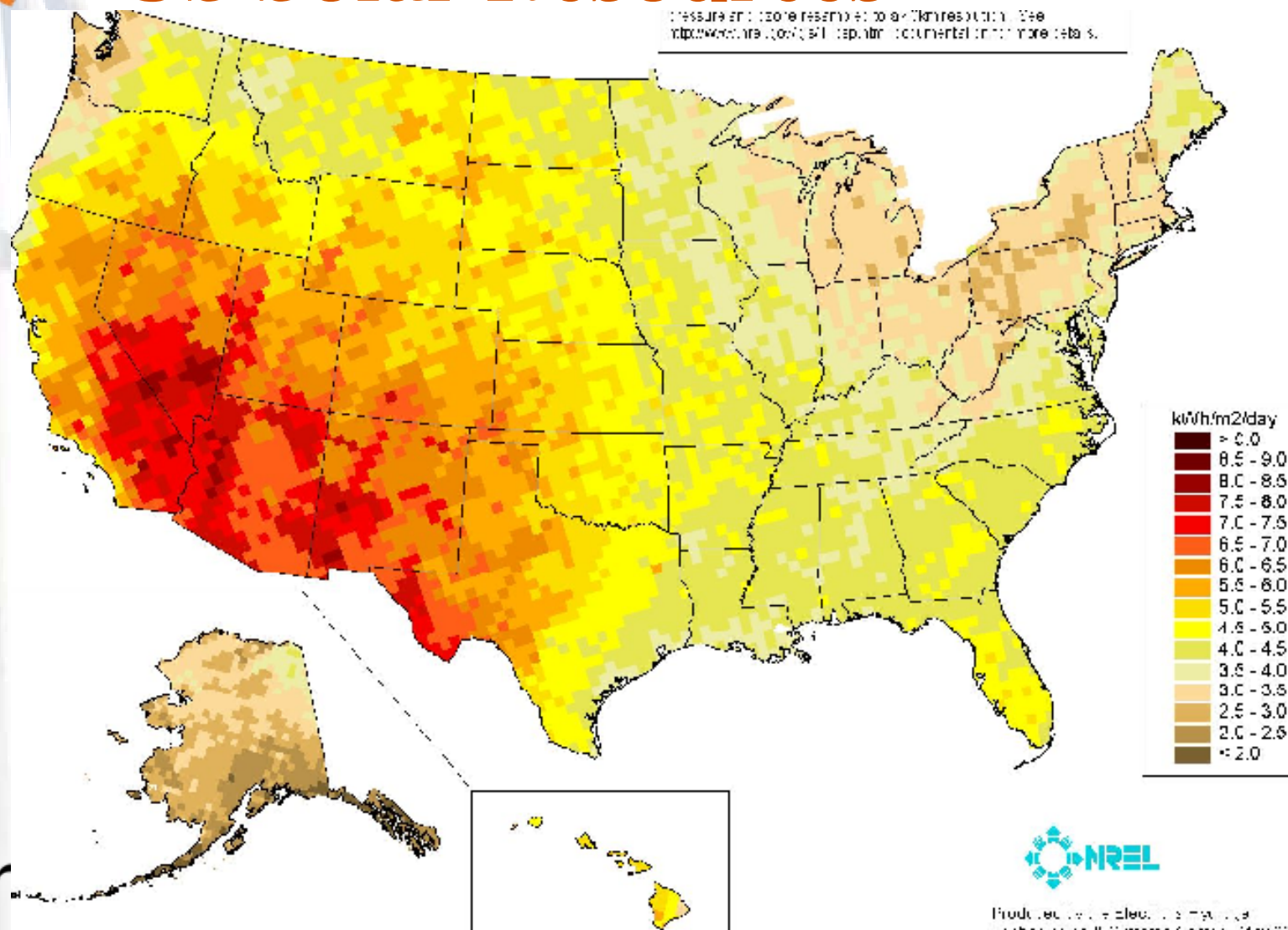
Carrizo Energy Farm for PG&E in CA; rendering; Online 11/10 ²⁴

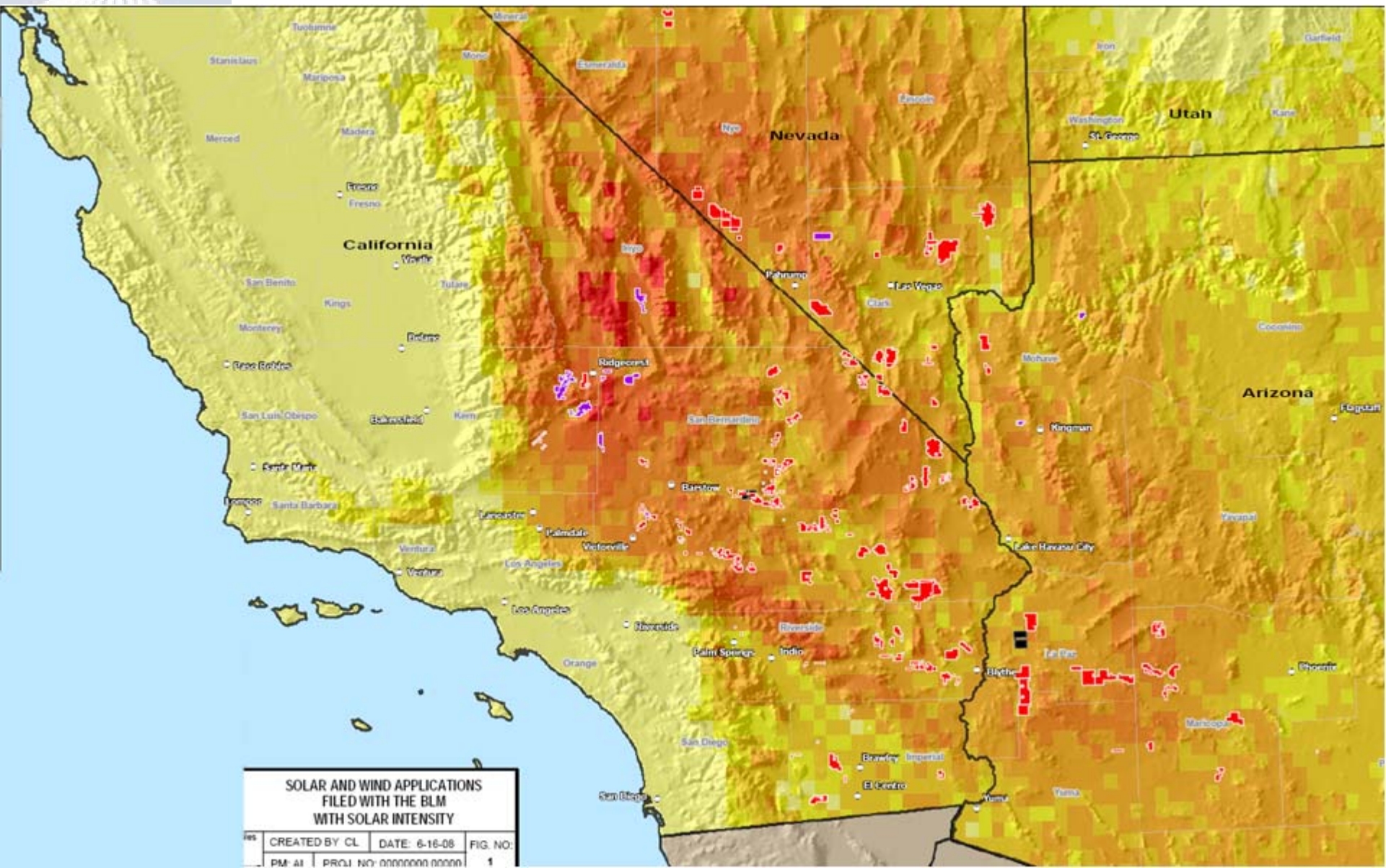
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US Solar Resources

Pressure and zone resource data at 1km resolution. See http://www.ausra.com/solar/pressure_documental.html for more details.

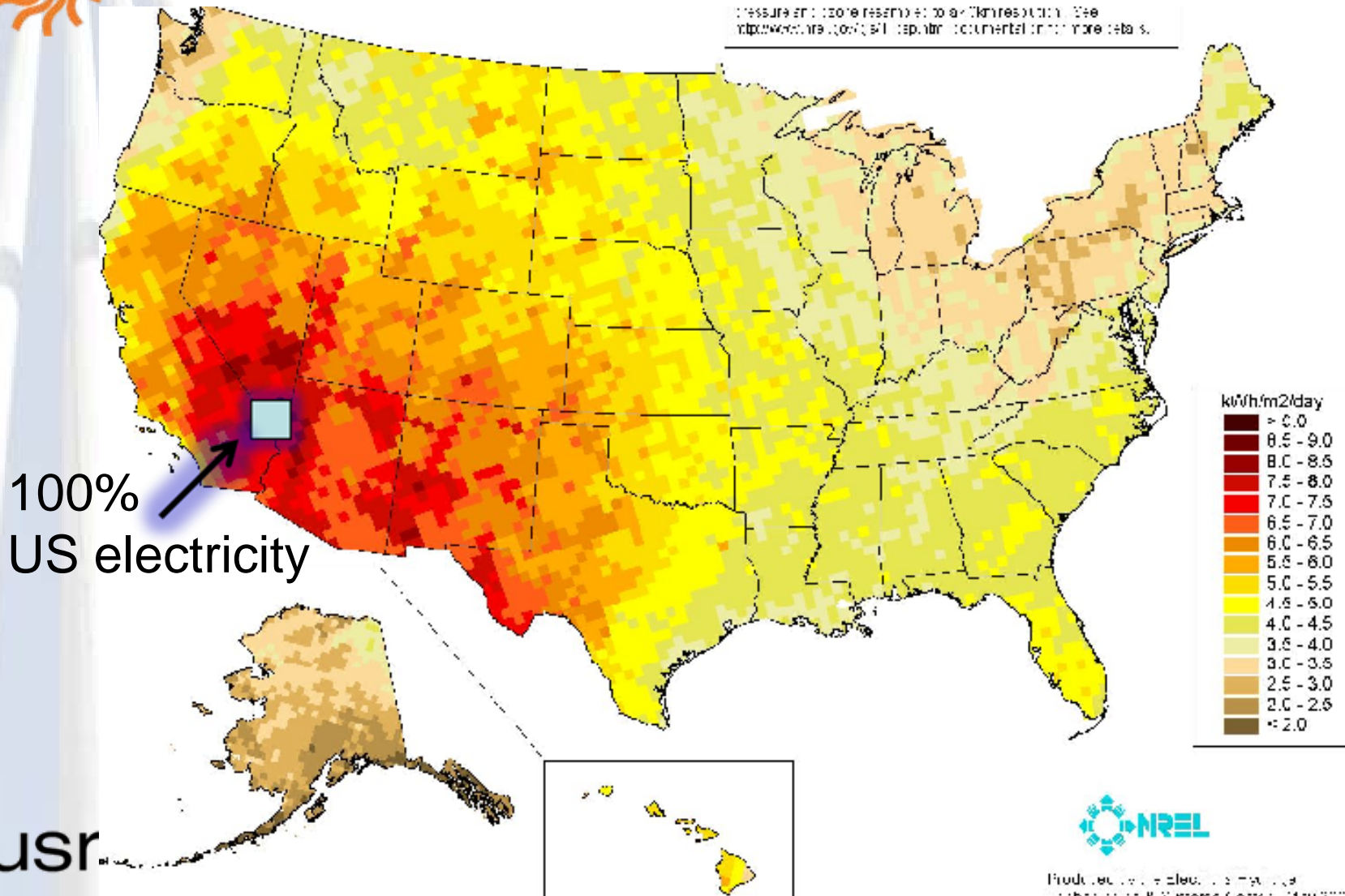






US Solar Resources

Pressure and zone reserved for climate resolution. See <http://www.nrel.gov/sr/republish/Documentation/forMoreDetails>.

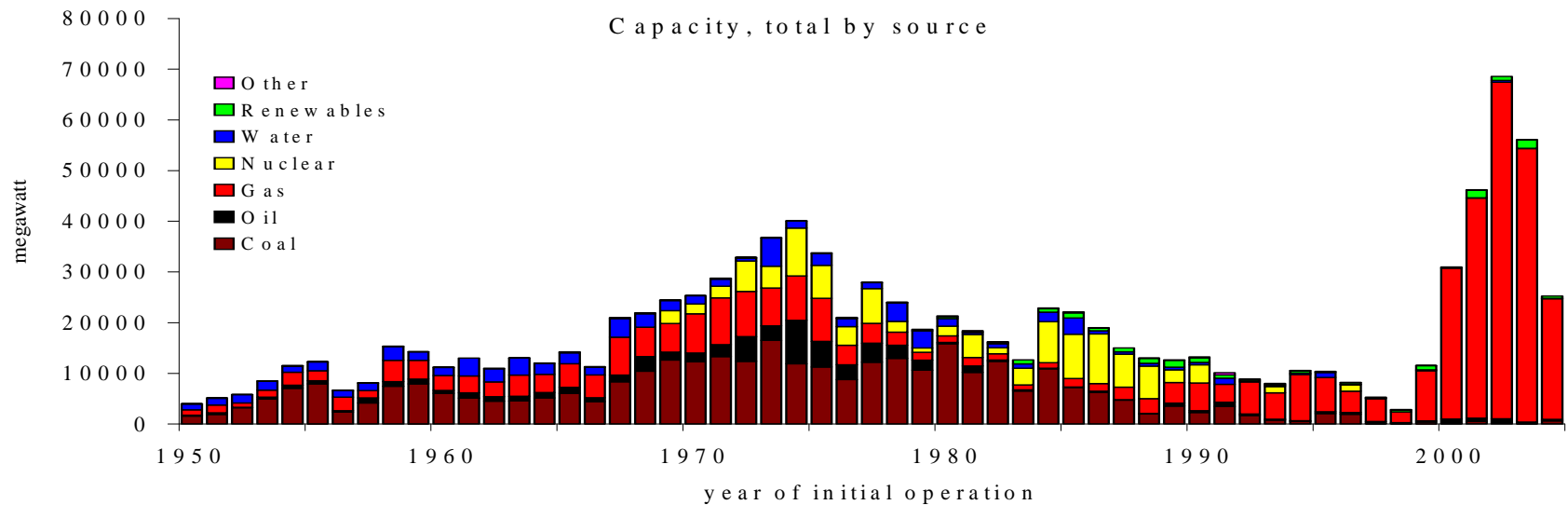


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Power Industry Can Respond

- Large shifts in investment follow market forces
- 250 GW from 1996-2005
- Rapid build-out when market, technology ready
- The time for the next shift has come





Three Problems

- Supply Chain and Technology
- BLM and Land availability
 - Zero acres for solar; 80M acres for oil & gas
- Stable Solar Tax Policy
 - Senator Reid has introduced 8 times
 - Still “TBD”

We Can Do It!



Economic Security
Energy Security
Climate Security



WAR PRODUCTION CO-ORDINATING COMMITTEE

Power to the Nation: HVDC

