



• August 15-18, 2010 • Dallas, Texas •
• Dallas Convention Center •



Sun Like it Hot: Solar Water Heating

August 18, 2010

Renewable Energy Track

Presented by Kevin DeGroat, Antares Group, Inc.

Characteristics to Consider

- Resource/Climate: Solar Radiation, Freeze Protection, Extreme Weather (hail, wind loading)
- Costs
 - Capital Costs
 - Variable Costs (Backup Fuel, O&M)
 - Fixed O&M
 - Levelized Cost of Energy (LCOE)
- Footprint/Land Area
- **Available Incentives!**
- Thermal
 - Temperature ranges
 - Heat transfer medium – air, water, radiant
 - Practical volume of heat/cooling
 - Storage
- Other Considerations (i.e., water, environmental impacts, visual impacts, mission compatibility...)

ASHRAE Solar Collector Efficiency

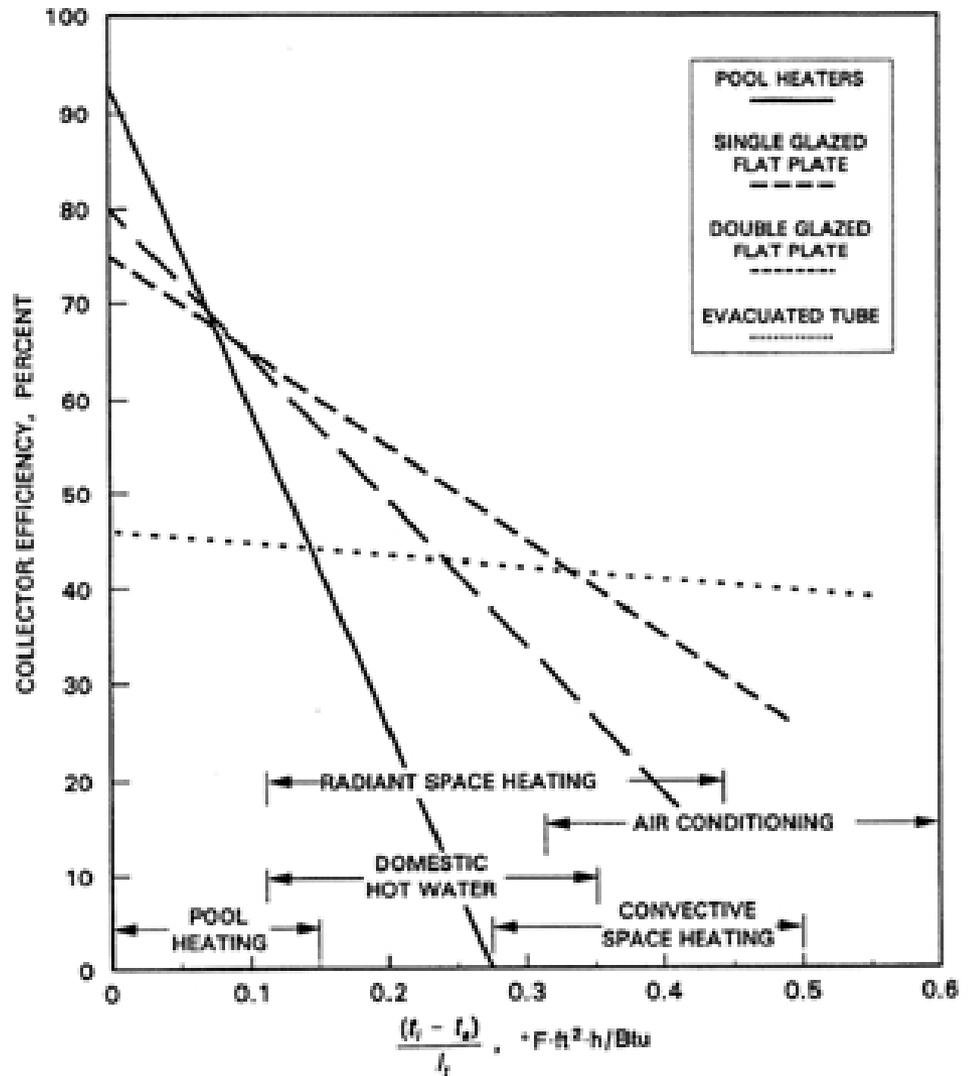


Fig. 11 Collector Efficiencies of Various Liquid Collectors

Measurement, Verification and Warranties

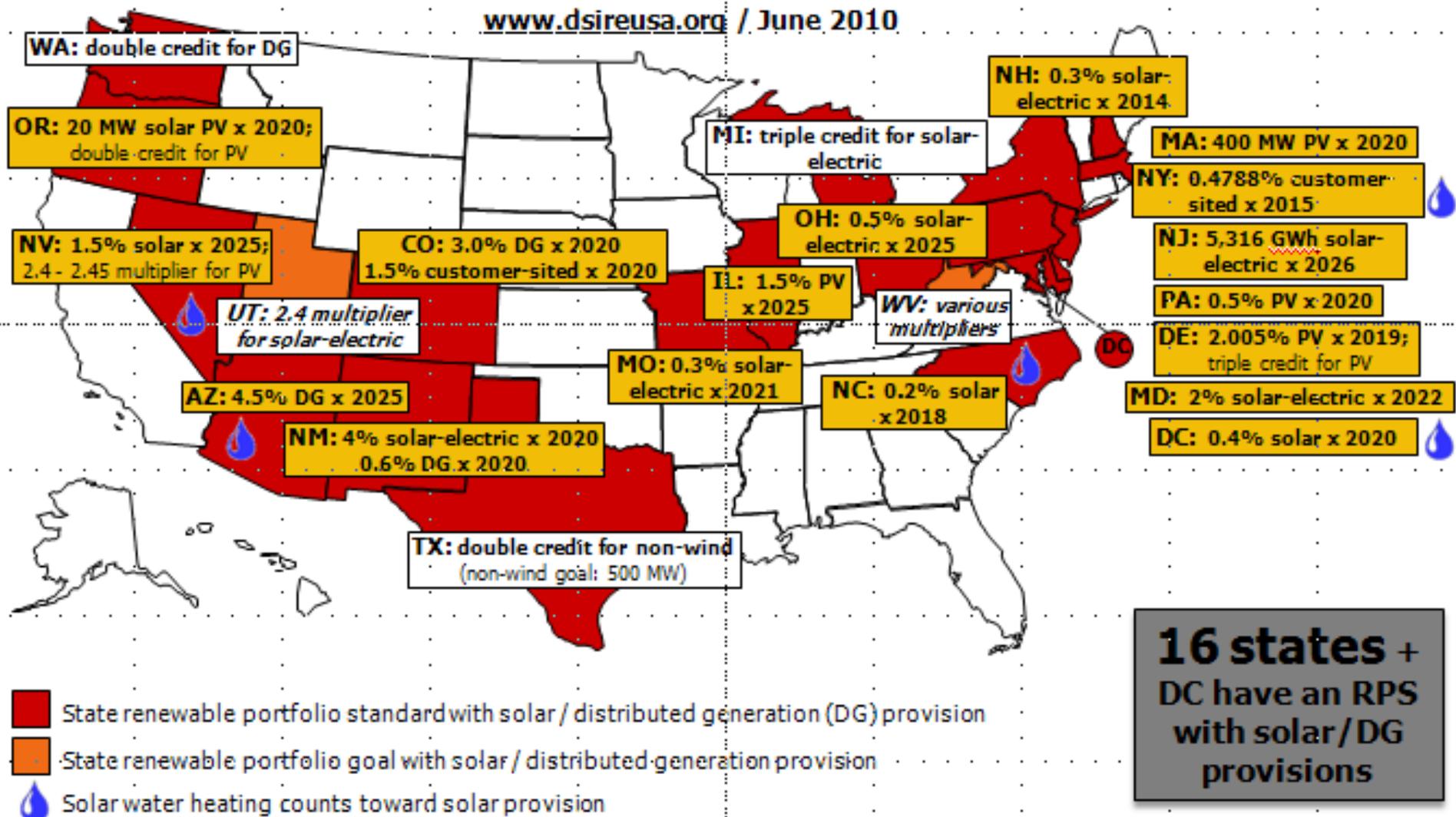
- Renewable energy is like any other energy project – measure it, verify it, maintain it
- Meters should be standard on larger systems
- Third party design review and commissioning for major systems are standard before investors commit to large projects – think like the pros
- Vendors should commit to performance levels you require:
 - Output: Volume, Thermal
 - Reliability: Planned and Unplanned Outages
 - Availability: Especially Performance When Needed
 - Actual vs. Promised Fixed and Variable Cost
- Verify actual performance on delivered equipment if possible!
- Design and maintenance can be purchased with equipment
- The Solar Rating and Certification Corporation (SRCC) certifies solar thermal collectors and systems and EnergySmart solar water heaters are available
- Warranties – which components do they cover, for how long, and what do they cover

Federal Requirements Related to SWH

- Solar water heating for 30% of load if life-cycle cost-effective (EISA Section 523, December 2007)
 - DOE NOPR for 10 CFR 433 and 10 CFR 435
http://www1.eere.energy.gov/femp/regulations/notices_rules.html
- Solar thermal can help meet “new” requirement in EO 13432
- Small, unmetered systems can help with energy intensity goal
- Solar thermal **DOES NOT** count toward EPA Act goals
- Reduces GHG emissions:
 - Scope 1 depending on natural gas, coal or other fossil fuel displaced or avoided
 - Scope 2 based on electricity displaced

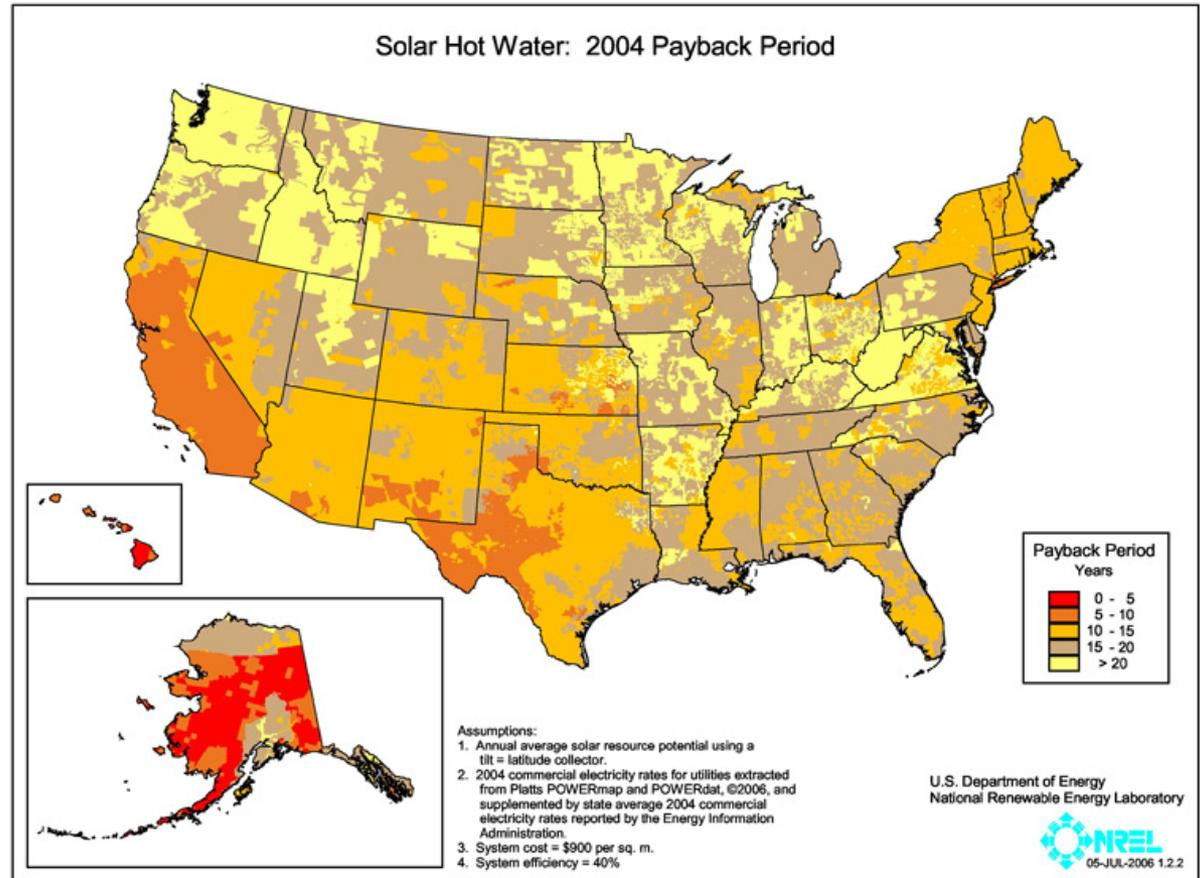
RPS Policies with Solar/DG Provisions

www.dsireusa.org / June 2010



Tools, Technology Alerts and Other Resources

- FEMP Webpage: www1.eere.energy.gov/femp/information/access_tools.html
- NREL Resource Maps/Analyses: <http://www.nrel.gov/gis/femp.html#water>
- FRESA, Federal Renewable Energy Screening Assistant



Other Resources for Solar Thermal

- SRCC Website
 - Standard SWH and Collectors
 - ASHRAE Checklist Commercial Systems
- Natural Resources Canada, Air Collectors
- IEA-Solar Heating and Cooling Programme, new technologies and research
- Solar Program Guide for Federal Agencies

Solar Water Heating at Federal Sites

Phoenix
Federal
Correctional
Institute,
Bureau of
Prisons, AZ



Federal Energy Management Program

Achieving Results with Renewable Energy in the Federal Government

Heating Water with Solar Energy Costs Less at the Phoenix Federal Correctional Institution

A large solar thermal system installed at the Phoenix Federal Correctional Institution (FCI) in 1998 heats water for the prison and costs less than buying electricity to heat that water. This renewable energy system provides 70% of the facility's annual hot water needs. The Federal Bureau of Prisons did not incur the up-front cost of this system because it was financed through an Energy Savings Performance Contract (ESPC). The ESPC payments are 10% less than the energy savings so that the prison saves an average of \$6,700 per year, providing an immediate payback. Boiler maintenance and hot water service call costs for the facility have also been reduced.

The solar hot water system produces up to 50,000 gallons of hot water daily, enough to meet the needs of 1,250 inmates and staff who use the kitchen, shower, and laundry facilities. Because solar energy is cleaner than conventional electric power, the environment benefits as well. Solar water-heating systems add no carbon dioxide or other emissions to the air around them. This renewable energy system offsets an average annual consumption of 1,000 megawatt-hours (MWh) of electricity and the release of nearly 600 tons of CO₂. For comparison, conventional electricity produced in Arizona emits 1,109 pounds of CO₂ per MWh.

The Federal Bureau of Prisons worked with the Department of Energy (DOE) Federal Energy Management Program (FEMP) and the ESPC contractor, Industrial Solar Technology Corporation (IST), to design and install the



Parabolic trough concentrator modules at the Phoenix Federal Correctional Institution produce up to 50,000 gallons of hot water daily—enough hot water for kitchen, shower, laundry, and sanitation needs for 1,250 inmates and staff.

Solar Water Heating at Federal Sites

Ft. Sam Houston,
TX District
Heating



Solar Water Heating at Federal Sites

- Moanalua Terrace, HI Military Housing



Solar Water Heating at Federal Sites

- Chickasaw National Recreation Area, OK



Camp LeJeune, NC



SRCC for Standard SWH Systems

**SOLAR WATER HEATING
CERTIFICATION AND RATING**



SRCC OG-300

CERTIFIED SOLAR WATER HEATING SYSTEM

SUPPLIER: Heliodyne, Inc.
4910 Seaport Avenue
Richmond, CA 94804 USA
(510) 237-9614
(510) 237-7018 Fax

SYSTEM NAME: Helio-Pak Helix SS PV

SYSTEM TYPE: Indirect Forced Circulation

LOCATION: TAMFORTH



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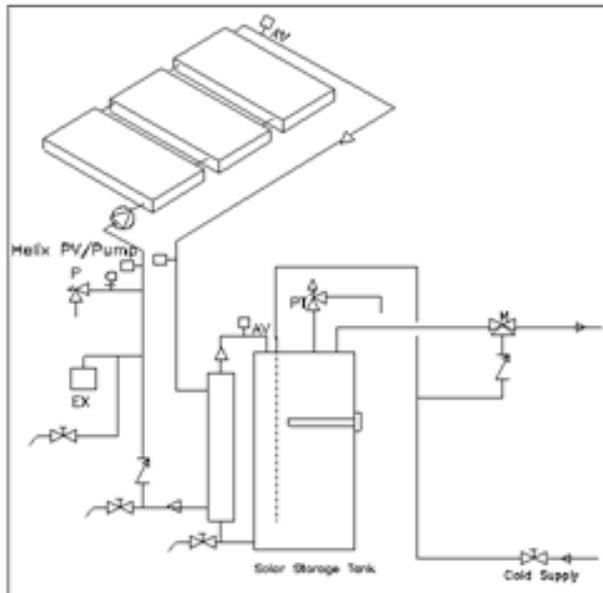
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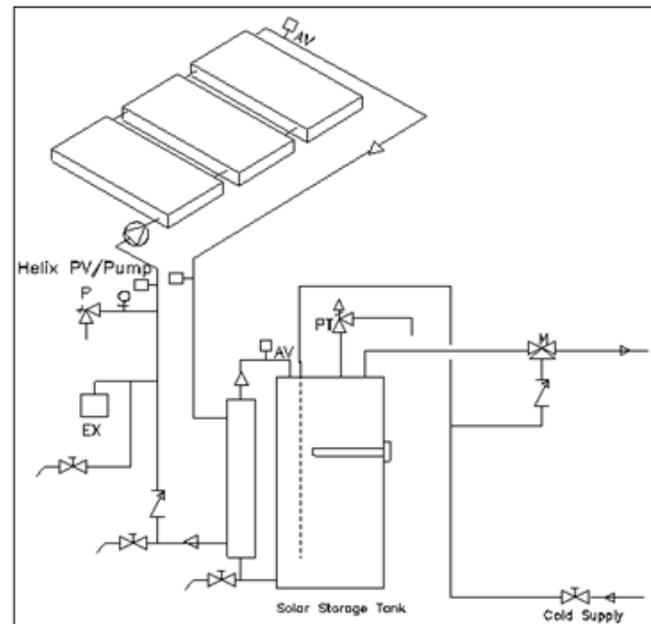
Description: Glazed Flat-Plate, Photovoltaic Panel Controller, Shell and Tube Heat Exchanger with a Single Wall, No Load Side Heat Exchanger, Freeze Tolerance: -60 F, Fluid Class II, Electric Auxiliary Tank

System Model Name	Com 300#	Com Date	Collector Panel Manufacturer	Collector Panel Name	Total Panel Area (Sq-ft)	Solar Tank Vol (g)	Solar Tank Vel (g)	Aux Tank Vol (g)	Aux Tank Vel (g)	SEF	Annual Savings (kWh)	Annual Solar Fraction
HP HX SS 3 3366 G PV 120 SE S	2005003R	28-APR-06	Heliodyne, Inc.	336 001	7.5	80.3	454	120		3.7	3431	.82
HP HX SS 3 408 G PV 120 SE S	2005003L	28-APR-06	Heliodyne, Inc.	408 001	9	96.7	454	120		11.3	3530	.85

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OG-300 System Reference 2005003R SVG Diagram Display



Contact Information

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