NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Sustainable Energy Resources for Consumers (SERC) – Solar Hot Water Heaters

Presenter:

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October 27, 2011

Solar Technologies

Solar Photovoltaics (PV)

Solar Hot Water (SHW)

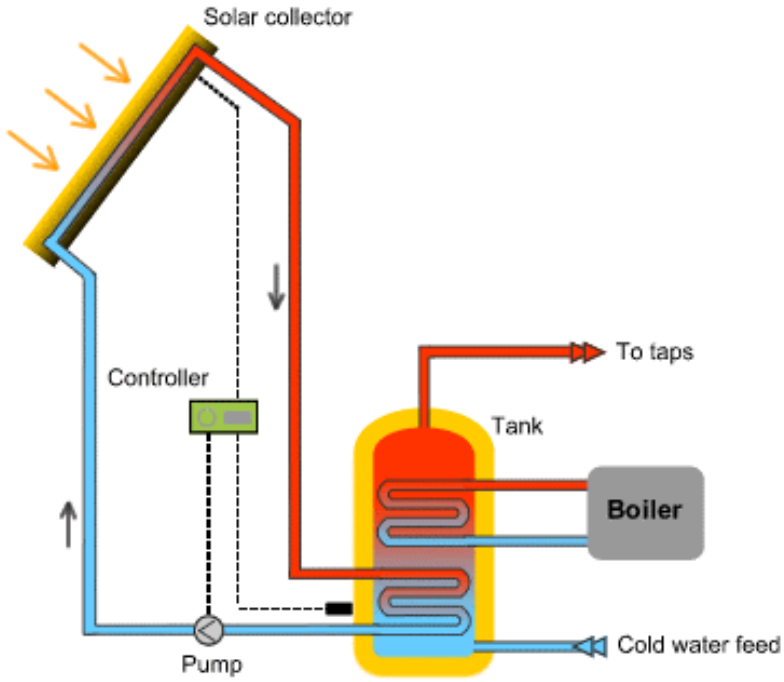
Solar Hot Water (SHW) Heat

Evacuated Solar Tube Collectors

Flat Plate Solar Collectors with Storage

SHW Basic System Elements

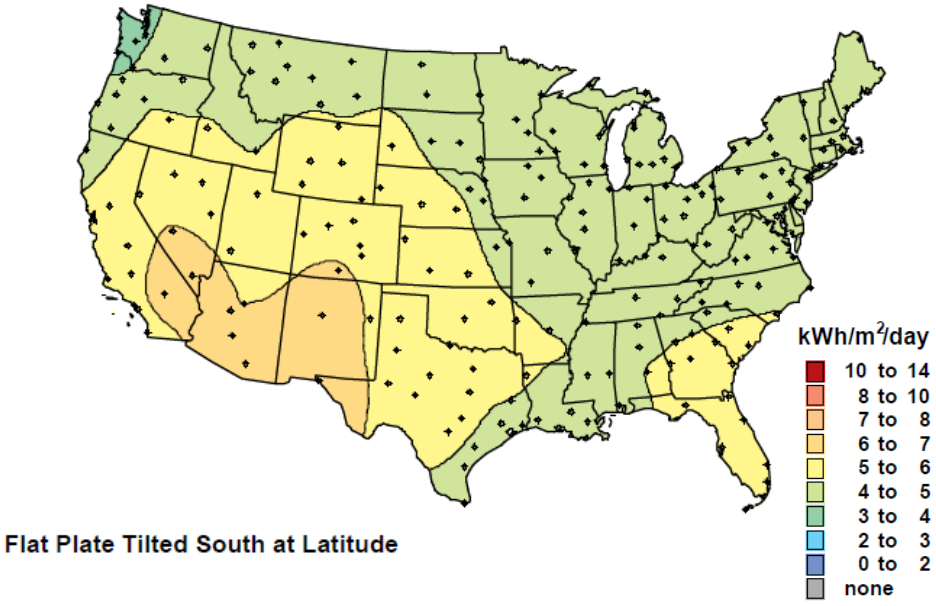
- Collector (flat plate or evacuated tube)*
- Storage tank*
- Piping*
- Controls*
- Transfer Medium (glycol or water)
- Circulation method (gravity or pumped)

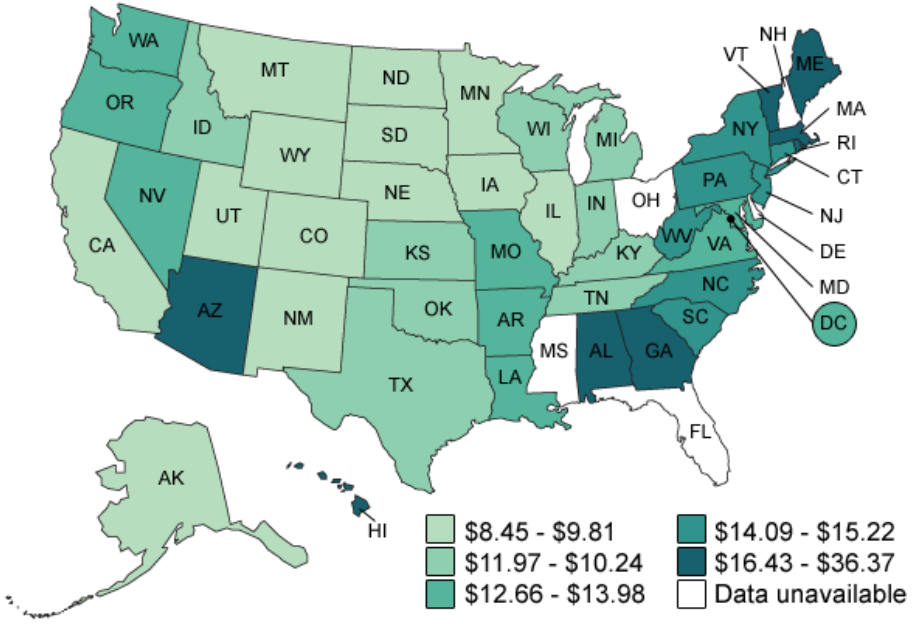


* Often provided as pre-engineered(packaged) systems

SHW Factors

- Availability of “solar resource”
- Efficiency of collector **system**
  - varies (pre-engineered)
- Cost of alternative fuels





SHW Basic System Characteristics

Comparison of Solar Hot Water System Types				
Characteristic	**Thermosyphon (gravity fed, simple system)**	**Active direct (pumps water)**	**Active indirect (pumps glycol)**	**Drainback (collector fluid can empty)**
Low profile-unobtrusive		x	x	x
Lightweight collector		x	x	x
Survives freezing weather			x	x
Low maintenance	x			x
Simple: no ancillary control	x			
Retrofit potential to existing store		X	x	x
Space saving: no extra storage tank	x	X		

SHW System Considerations

- ✓Systems operate best with routine maintenance (annual)
- ✓Make sure unit has an automatic vacation mode or heat dissipater
- ✓Where possible avoid custom designed systems
  - Custom systems may require a qualified technician for servicing
- ✓Systems are not intended to meet 100% of hot water load
  - Approximately 60-75% of the hot water load, depending on location and system efficiency

Certified Solar Thermal Installers

North American Board of Certified Energy Practitioners (NABCEP)

"A technician in good standing with the Public Utilities Commission who has successfully completed an approved solar thermal training course and carries a current license as a Master Plumber, Master Oil Burner Technician or Propane and Natural Gas Technician or is a class 2 or 3 nationally certified refrigeration technician."

Contact information for installers can be found at:
http://www.nabcep.org/installer-locator

Key Considerations

- ❑ Require site inspection prior to installation
- ❑ Require *minimum* **system** warranty
- ❑ Reference *minimum* installation standards (certified installers)
- ❑ Differentiate between pre-engineered systems and 'custom' designs
- ❑ Specify systems *minimum* solar fraction
- ❑ Request unit pricing

Field Verification Checklist Items

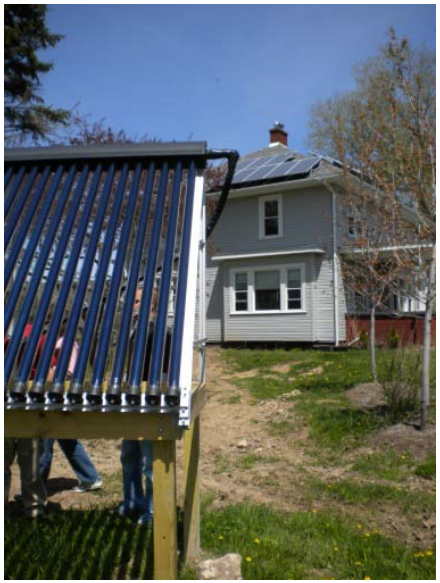
Solar Thermal Post Evaluation Checklist

PROJECT INFORMATION	
Property Address	
System Brief Description	
Number of Panels	
Orientation	
Tilt	
Estimated annual kBTU from SRCC rating	
Solar Installer Company (if applicable)	
Inspector	
Inspection Date	
Time of Measurement	
Ambient Temperature	
Solar Radiation (W/m^2)	
Temperature of Water at Panel (°F)	

Inspection Checklist				
Yes	No	N/A	General	Note
			Backup heater is either: ___electric ____natural gas ___propane	
			Installation is of industry standard and workmanlike quality.	
			Collectors are optimized for performance without sacrificing aesthetics.	
			Installation is consistent with plumbing diagram.	
			Installation is consistent with manufacturers' instructions.	
			City inspection(s) have been passed: Permit #_____ Date_____	

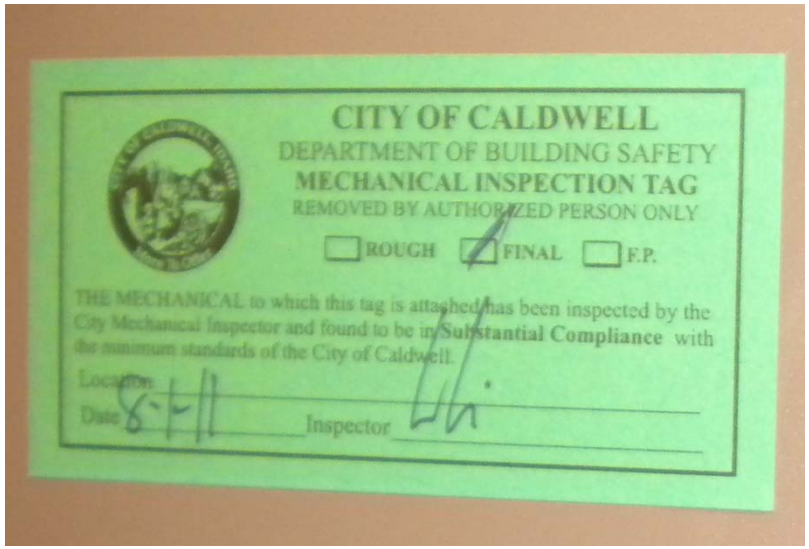
Field Verification Checklist Items

- ✓Number of panels & the type of installation
- ✓Modules permanently installed
- ✓Brief description
- ✓Background information



Field Verification Checklist Items

- ✓Additional system components: backup heater
- ✓Quality workmanship
- ✓Matches plumbing diagrams
- ✓City inspection



Field Verification Checklist Items

- ✓System components are new
- ✓Collectors are SRCC rated (OG-100 or OG-300)
- ✓Insulation is properly restored
- ✓Penetrations are sealed
- ✓Pressure does not exceed 80psi
- ✓Maintenance access exists

SRCC OG-100 CERTIFIED	This product certified by the Solar Rating and Certification Corporation c/o FSEC, 1679 Clearlake Road Cocoa, FL 32922 (321)638-1537 www.solar-rating.org SRCC Document OG-100	Sample Solar Corporation P.O. Box 12345 Anytown, CAÂ 97402 Model No.:Â Super Sample Gross Area: 3.72 m2 (40.00 ft2) Serial Number:	Clear Day Rating in Category C 8.6 kWh/day 29 kBtu/day

http://www.solar-rating.org/ratings/

Equipment and Installation

Field Verification Checklist Items

- ✓Confirm the roof is in good condition (10 years remaining, at least)
- ✓Roof penetrations are sealed and flashed
- ✓Collectors have good solar access

Poor Roof Condition

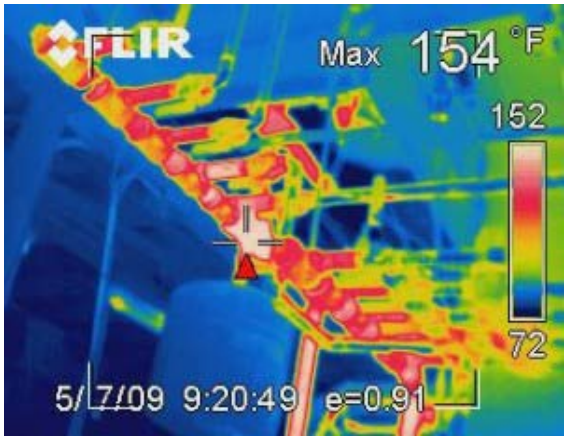
Good Roof Condition

Field Verification Checklist Items

- ✓Check for plumbing leaks
- ✓Confirm pipes are appropriate materials for the job
- ✓Check for pipe insulation, especially in unheated spaces

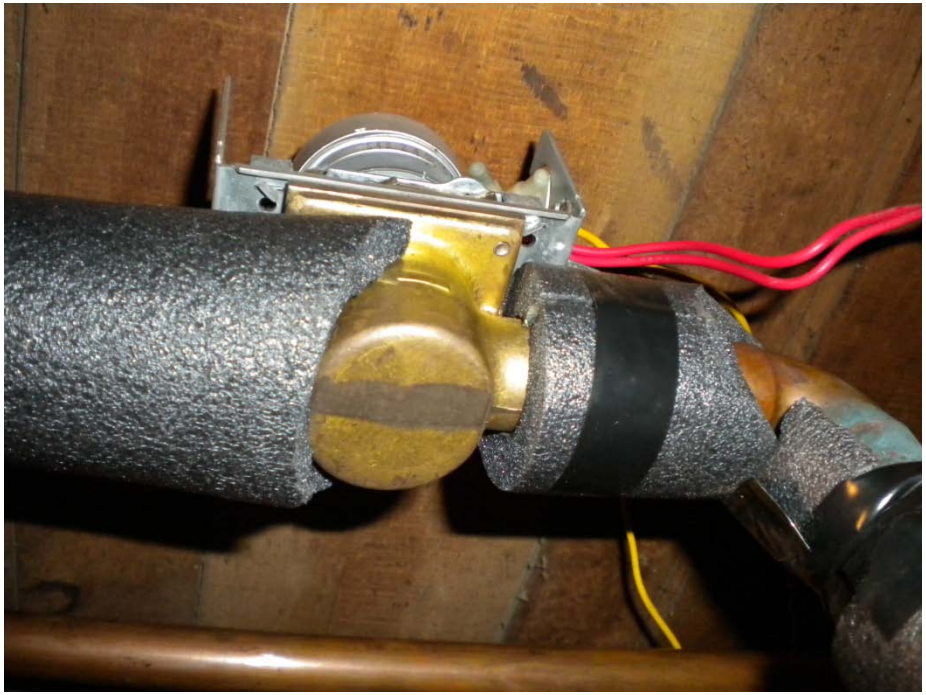
Leaking tank valve

Copper piping



Uninsulated pipes should be insulated

Equipment and Installation

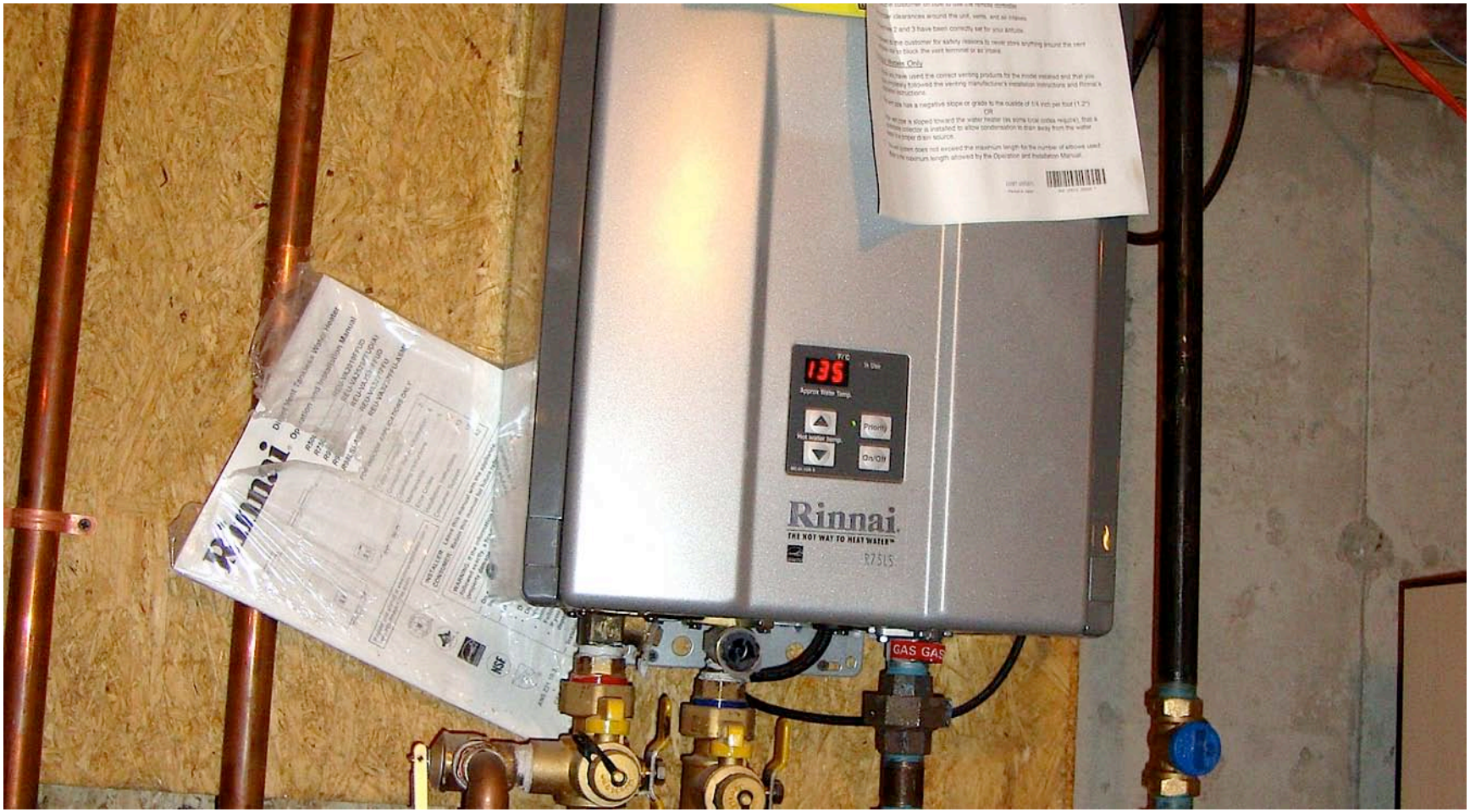


Field Verification Checklist Items

✓Electrical wiring should be up to code

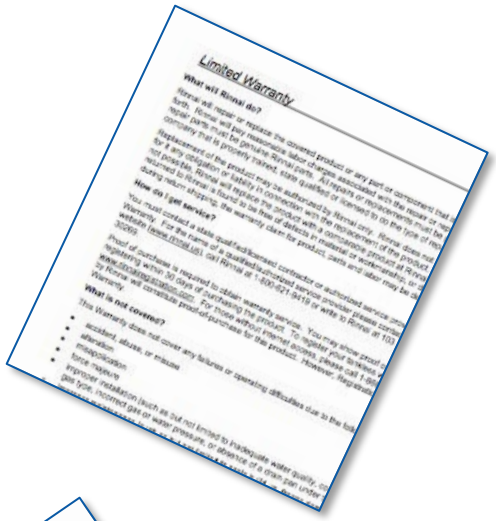
✓Check that fluids are appropriate for the system by comparing manuals/documentation and labels on maintenance logs or invoices

User Documentation



Field Verification Checklist Items

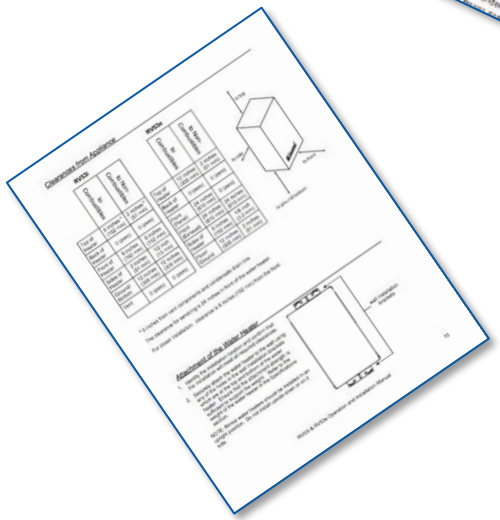
- ✓Check for proper documentation and contact information
- ✓Client education


Limited Warranty

What will Rinnai do?

How do I get service?

What is not covered?



Questions?

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