

DOCKETED	
Docket Number:	18-IEPR-09
Project Title:	Decarbonizing Buildings
TN #:	223804
Document Title:	Solar Thermal Technologies - Advantages and Barriers
Description:	Presentation by Ed Murray at June 14, 2018 IEPR Workshop on Achieving Zero Emission Buildings
Filer:	Stephanie Bailey
Organization:	California Solar + Storage Association
Submitter Role:	Public
Submission Date:	6/13/2018 11:38:54 AM
Docketed Date:	6/13/2018

Solar Thermal Technologies: Advantages and Barriers

2018 IEPR Workshop Achieving Zero Emission
Buildings

Ed Murray

Chairman, California Solar & Storage Association
President, Aztec Solar Inc



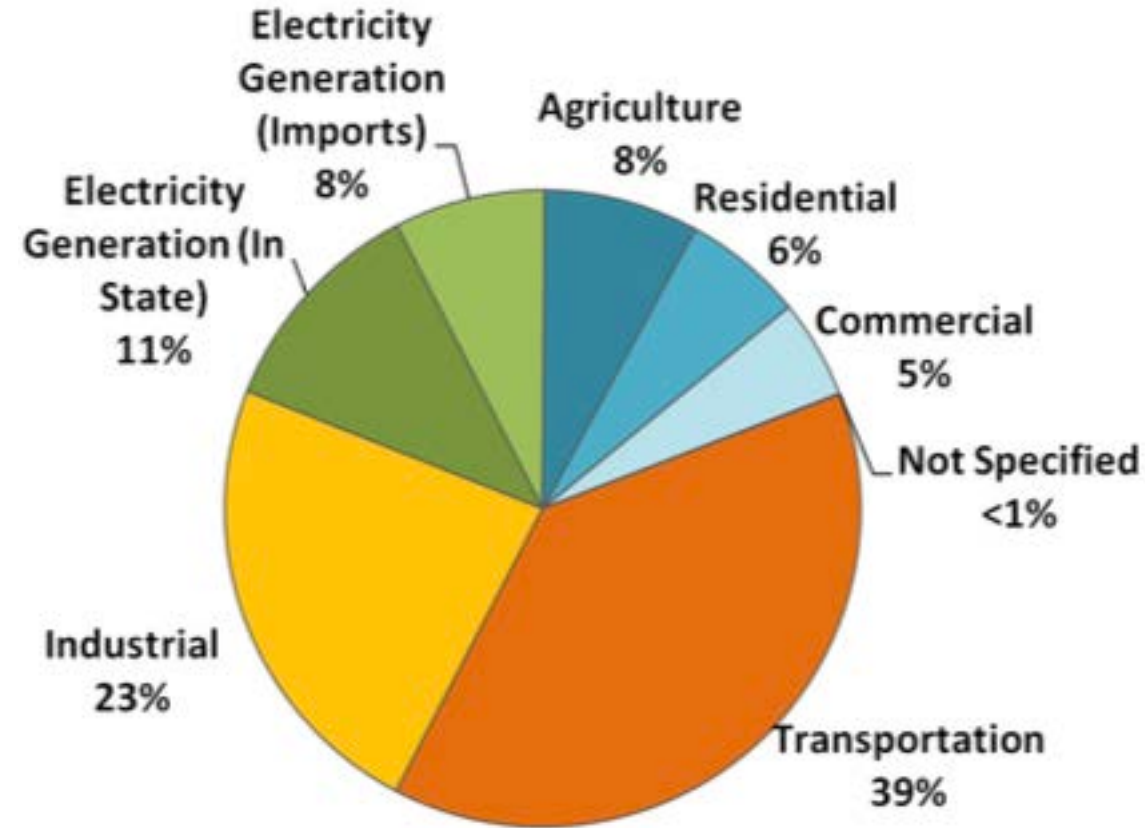
Large Potential for Reducing Greenhouse Gas Emissions Through Full Deployment of Solar Thermal in CA

Total emissions from residential alone is 26 million metric tons of CO₂ per year

Approximately 12 million housing units in CA

Potential emission savings from solar thermal in CA residential sector is up to 9 million metric tons of CO₂ per year (~2%)

Additional potential for CO₂ reductions from industrial, agricultural and commercial sectors



2015 Total CA Emissions: 440.4 MMTCO₂e

Solar Thermal is Best Available Technology for Reducing Greenhouse Gas Impacts of Heating Water

Solar thermal is twice as efficient in reducing CO₂ emissions compared to heat pumps

Existing workforce, market and eight in-state manufacturers

Easy to service, no refrigerants

Annual growth in natural gas savings doubled (106%) between 2016 to 2017 for multifamily housing sector

CPUC rules and incentive programs with strengthened role in California building standards

Location	Sacramento	San Jose	Los Angeles
Annual Emissions	GHG Impact (kg CO2 equivalent)	GHG Impact (kg CO2 equivalent)	GHG Impact (kg CO2 equivalent)
SWH + tankless gas	294	281	226
SWH + gas tank	332	311	237
HPWH with PV	440	450	356
SWH + electric tank	486	486	486
Heat pump	628	605	497
Gas WH -Tankless	761	770	734
Elect. resistance + PV	811	835	769
Gas WH – Storage	1,068	1,073	1,022
Elect. resistance tank	1,203	1,216	1,157

Source: T. Merrigan and J. Maguire, NREL, March 10, 2016. SWH = Solar Water Heater; HPWH = Heat Pump Water Heater; PV = Photovoltaic; WH = Water Heater

Barriers to Full Deployment of Solar Thermal in CA

Natural gas is 85% of CA water heating consumption

Low cost of natural gas makes water heating low priority for household budget

Low awareness and lack of culture for using solar to heat water in CA

At time of replacing water heater, consumers often do not consider alternatives like solar thermal



Courtesy of Heliodyne



Courtesy of Sun Earth



Courtesy of Heliodyne