CALIFORNIA SOLAR ENERGY INDUSTRIES ASSOCIATION

September 7, 2016

Chair Mary Nichols
California Air Resources Board
1001 I St.
Sacramento, CA 95814

Submitted electronically to: www.arb.ca.gov/cc/capandtrade/meetings/meetings.htm

RE: Comments of the California Solar Energy Industries Association on the Public Workshop on the Energy Sector to Inform the 2030 Target Scoping Plan Update

Dear Chair Nichols:

The California Solar Energy Industries Association (CALSEIA) strongly supports California's goals to reduce greenhouse gas emissions, including the 2030 target, and appreciates the opportunity to comment on the Public Workshop on the Energy Sector as part of the overall effort to inform the 2030 Target Scoping Plan Update.

Solar technologies, both photovoltaic (PV) and thermal, are at the center of meeting California's greenhouse gas emission goals, and solar PV and solar thermal play an important role in addressing the policy drivers for the scoping plan listed at the workshop.[1] Both rooftop PV and solar thermal chillers can reduce the demand for natural gas for electricity generation, and solar thermal technologies, like solar water heating and solar air heating, can reduce the demand for natural gas for heating water and space in residential, commercial and industrial buildings. In addition, by reducing natural gas usage, solar technologies can help to reduce the state's need for stored and transported natural gas, which indirectly helps address fugitive emissions and reduces emissions of methane as a short-lived climate pollutant.

Solar is not only an important part of reducing our greenhouse gas emissions, but is also a bright spot in the California economy. As noted in the 2030 Target Scoping Plan Concept Paper, solar is growing sector, creating 20,000 jobs in 2015, helping meet one of the key strategies of the Updated Scoping Plan of promoting resilient economic growth.[2]

Solar technologies are also part of the cross-cutting approach to address climate change,

[1] The five policy drivers: 1. Senate Bill 350 (RPS and doubling energy efficiency savings); 2. Governor's call to make heating fuels cleaner; 3. Reduce dependence on fossil fuels; 4. Address fugitive fossil methane emissions; 5. Short-Lived Climate Pollutant (SLCP) Strategy proposed actions, per "Public Workshop on the Energy Sector to Inform Development of the 2030 Target Scoping Plan Update," *August 23, 2016,* Slide 13.

[2] "2030 Target Scoping Plan Concept Paper," June 17, 2016, pp. 7-8, available at https://www.arb.ca.gov/cc/scopingplan/document/2030_sp_concept_paper2016.pdf.

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including within the energy sector, and CALSEIA was pleased to see rooftop solar technologies prominently included in the workshop. As shown by the "Synergies in the Energy Sector" slide presented at the workshop, solar technologies were recognized for their roles in demand reduction through improving energy efficiency, as well as by substituting fossil resources with renewables by heating water with solar power, and finally as part of on-site distributed generation on green buildings.[3] In addition, the California Energy Commission highlighted its research and development efforts for innovative technologies and approaches to deploying solar thermal in California.[4] The multiple roles that solar plays in helping meet our state's greenhouse gas reduction goals shows that solar should continue to be a central focus in the Scoping Plan Update.

While solar PV is recognized for its potential in providing clean electricity to meet our state's goals, it is important to note that the potential for solar thermal technologies to reduce California's greenhouse gas emissions is also great, especially for heating water. California homes and businesses use 2.5 billion therms of natural gas annually to heat water,[5] which is comparable to roughly 3% of total statewide greenhouse gas emissions and roughly equal to the total storage capacity of natural gas in the state.[6] The California Energy Commission estimates that 42% of residential natural gas usage is for water heating.[7] Solar thermal can reduce a significant portion of this natural gas usage—up to 50% to 80% for an average residential solar water heating system.[8]

An analysis by the National Renewable Energy Lab found that solar water heating systems are the best available technology for reducing greenhouse gas emissions from heating water. The relevant slide is included here as Attachment A.[9] These national results were updated with California-specific analysis for greenhouse gas emissions for different heating technologies at Sacramento, San Jose, and Los Angeles, and solar thermal has the lowest greenhouse gas

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[3] "Public Workshop on the Energy Sector to Inform Development of the 2030 Target Scoping Plan Update," August 23, 2016, p.85, https://www.arb.ca.gov/cc/scopingplan/meetings/08232016/scoping.plan.energy.workshop.pdf.

[4] *Ibid,* p.53.

[5] California Air Resources Board, "Climate Change Scoping Plans Appendices," available at http://www.arb.ca.gov/cc/scopingplan/document/appendices_volume1.pdf.

[6] Using a conversion factor of 0.005302 metric tons CO2-eq/therm from U.S. EPA, "Calculations and References," downloaded from www.epa.gov/cleanenergy/energy-resources/refs.html, and 2014 total CA greenhouse gas emissions of 441.5 million metric tons CO2-eq, http://www.arb.ca.gov/cc/inventory/data/data.htm.

[7] California Energy Commission, "Residential Natural Gas Consumption by End Use," available at energyalmanac.ca.gov/naturalgas/residential_use.html.

[8] Department of Energy, http://energy.gov/energysaver/estimating-cost-and-energy-efficiency-solar-water-heater.

[9] Tim Merrigan, National Renewable Energy Laboratory, "Domestic Water Heating Technologies – GHG Reduction," July 2015, Slide 22. Entire report included as attachment to CALSEIA comments to a staff presentation for Preparation of a Climate Impacts Mitigation Program in connection with the Aliso Canyon Methane Leak, available at https://www.arb.ca.gov/lists/com-attach/4-aliso-canyon-mp-ws-BjcBMQEtBGUBKlVk.pdf.

emissions for heating water for each location. That analysis is included here as Attachment B.[10] Solar thermal has great potential and should continue to be an integral part of our state's efforts to reduce greenhouse gas emissions.

As part of the Scoping Plan to 2030, CALSEIA recommends CARB continue the suite of existing policies that are working to reduce our greenhouse gas emissions, including the leading building codes efforts such as Zero Net Energy and Title 24, as well as the California Solar Initiative (CSI)–Thermal rebate program. To date, the CSI–Thermal program has saved 4.95 million annual therms since 2010, the equivalent of nearly 42,000 residential installations, and reduced over 26,500 metric tons of annual CO2 emissions—the equivalent of taking over 5,500 cars off the road. These are real savings, but just a fraction of what the program can accomplish if the state continues its support.

The rebates were put in place in 2010, at a point when natural gas prices were plummeting, and effective rebate levels were finally put in place in May 2015. Since then, program activity has increased, with some of the greatest growth within the affordable housing sector. Now that the program is finally working as originally intended, the state should extend it for a long enough period of time for the industry to invest in growth. The ARB should include this program in the state's Updated Scoping Plan for meeting our 2030 goals. In so doing, the state will be supporting manufacturing and installation jobs, and helping lower energy bills, especially for low-income households.

Low-income residents should be a focus of the state's efforts to reduce greenhouse gas emissions, and CALSEIA strongly supports the Plan's environmental justice goals. There are important existing state efforts targeted at increasing access to solar for everyone, including low-income individuals and those in disadvantaged communities. The California Public Utilities Commission is currently developing the implementation of AB 693 (Irwin, 2015) that will use Cap-and-Trade dollars to provide rebates for solar deployment on multifamily residential buildings for low-income and disadvantaged communities. In addition, demand for solar thermal rebates funded by ratepayers through the CSI-Thermal program for low-income multifamily housing buildings is high, accounting for nearly half of the applications in 2015. Funding for low-income customers was exhausted in December and was replenished earlier this year out of funds dedicated to market rate housing. It is important that both of these programs continue to be part of the state's plans to meet our 2030 climate goals, and CALSEIA looks forward to working with CARB and the Environmental Justice Advisory Committee on increasing access to solar across the state.

Solar PV and thermal technologies are currently being deployed to decrease our state's greenhouse gas emissions, and should continue to be a part of our state's plan to meet our 2030 emission reduction goal. Therefore, CALSEIA fully supports the continuation of existing

[10] Table from Jeff Maguire and Tim Merrigan, National Renewable Energy Lab, March 10, 2016.

programs, such as the CSI-Thermal and AB 693 programs, and recommends that CARB continue to include solar PV and thermal technologies and programs in the Scoping Plan Update.

Thank you for the opportunity to submit these comments.

Respectfully,

Kelly Knutsen

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ATTACHMENT A: Domestic Water Heating Technologies – GHG Reduction Slide 22

Intersolar North America 2015

Tim Merrigan

National Renewable Energy Laboratory

Domestic Water Heating

What is the best available technology for reducing the **greenhouse gas** (GHG) impacts of heating water?

1. Solar water heaters (3 – 5 kW equivalent)
   - Gas backup – tankless
2. Heat pump water heaters with grid-tied PV (3 – 5 kW)
3. Solar water heaters (3 – 5 kW equivalent)
   - Electric resistance backup
4. Heat pump water heaters (in homes with air-source heat pumps and electric service at the water heater)
5. Electric resistance water heaters with PV (1 – 5 kW)
6. Natural gas water heaters
7. Electric resistance water heaters

Attachment B: Best Available Technology for Reducing GHG Impacts of Heating Water for Three Locations in California

Jeff Maguire and Tim Merrigan, National Renewable Energy Lab, March 10, 2016.

	Sacramento		San Jose		Los Angeles	
Annual	Source Energy Use (MMBTU)	GHG Impact (kg CO2 equivalent)	Source Energy Use	GHG Impact (kg CO2 equivalent	Source Energy Use	GHG Impact (kg CO2 equivalent
SWH – tankless gas backup	6	294	5	281	4	226
SWH – gas tank backup	6	332	6	311	4	237
HPWH with PV	12	440	12	450	10	356
SWH – electric tank backup	13	486	13	486	13	486
Heat pump water heater	17	628	16	605	13	497
Electric resistance with PV	22	811	22	835	20	769
Gas WH - Tankless	13	761	13	770	13	734
Gas WH – Storage tank	18	1068	18	1073	17	1022
Electric resistance tank	32	1203	32	1216	31	1157

1. Solar water heaters
    - Gas backup – tankless
    - Gas backup – tank
2. Heat pump water heaters with grid-tied PV
3. Solar water heaters
    - Electric resistance backup
4. Heat pump water heaters (in homes where the HPWH is installed in an unconditioned garage)
5. Electric resistance water heaters with PV
6. Natural gas water heaters
    - Tankless
    - Tank
7. Electric resistance water heaters