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**Marty Turock Comments On IEPR Commissioner Workshop - AAFS
from Residential Hot Water Heaters**

Additional submitted attachment is included below.

CALIFORNIA ENERGY COMMISSION

COMMENTS OF MARTY TUROCK

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ON THE IEPR COMMISSIONER WORKSHOP ON LOAD MODIFIER INPUTS AND ASSUMPTIONS

Docket No. 26-IEPR-03

Submitted to:

California Energy Commission

Submitted by:

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San Diego, California

Date: September 9, 2026

COMMENTS ON LOAD MODIFIER INPUTS AND ASSUMPTIONS – RESIDENTIAL HOT WATER HEATERS

Dear Commissioners and CEC Staff:

I appreciate the opportunity to provide comments regarding the California Energy Commission's 2026 Integrated Energy Policy Report ("IEPR") electricity and gas demand forecast and, specifically, the Commission's treatment of Additional Achievable Fuel Substitution ("AAFS") and residential water-heating load modifiers.

These comments focus specifically on **residential water heating**, the second largest residential load that warrants more detailed treatment in the IEPR forecast because the transition from natural-gas water heating to electric water heating can materially affect both annual electricity consumption and hourly peak demand. I support the CEC's objective of developing a robust, transparent, and empirically grounded forecast of future electricity demand. I also support the Commission's recognition that electrification will increase electricity consumption while reducing natural-gas consumption.

However, the current model currently significantly underestimates the potential AAFS of residential water heaters because it only considers the forecast innovation benefits of heat pump water heater market adoption and does not account for any other emerging technologies, specifically, magnetic Immersed Induction™ water heaters that can offer greater unsubsidized affordability, fuel substitution, decarbonization, and daily AI-demand managed grid flexibility rather than just JA13-enabled emergency DR and ELRP utility events.

On June 26, 2026, CalMTA submitted their application to the CPUC, seeking approval to transition the Residential Heat Pump Water Heater (RHPWH) MTI Plan from Phase II Program Development to Phase 3 Market Deployment. On page 9 in Section 1.1 Market Overview of the Executive Summary it states:

“ In the retrofit market, the approximately 2.6 million homes with electric resistance water heaters represent the most accessible near-term opportunity for HPWH conversion in terms of ease of installation and consumer utility bill savings. The remaining 8.8 million homes with gas/propane water heaters represent the largest potential market conversion, but only some segments of the market have neutral to positive bill impacts under current rate structures.”

Acknowledging that the RHPWH MTI Market Deployment beachhead market focus will be on retrofitting electric resistance water heaters with heat pump water heaters, provides no currently affordable viable technology pathway to address ESJ community needs, as well as statewide decarbonization and NOx elimination from gas water heaters which represent 76% of California's installed base (8.8 million heaters). This represents a huge opportunity for AAFS as well as grid flexibility that would add hot water heaters along with V2G EV's and Home Batteries as a significant new source of thermal battery VPP's to offset peak demand.

I. SUMMARY OF COMMENTS

I respectfully recommend that the Commission apply R&D resources to evaluate how the overall TSB and TRC of emerging Induction Water Heater technology (IWH) compares to heat pump water heaters and any other emerging residential home water heater technologies for the following reasons:

Specifically, the CEC should:

1. **Model the TSB and TRC of All Competing Technologies (Electric Resistance WH, Gas Storage WH, Heat Pump Water Heaters (HPWH) and Induction Water Heaters (IWH) and any other emerging technologies)**
 - Affordability
 - Accessibility to Environmental and Social Justice (ESJ) communities
 - Efficiency/UEF
 - Environmental Impact (NO_x, GHG, sustainability)
 - Grid Resilience
2. **Regulatory Landscape**
 - California's decarbonization focus
 - DOE's energy efficiency/UEF focus
3. **California's Dilemma – UEF vs. TSB vs NAECA-4**
4. **Conclusions and Recommendation**

II. MODEL THE TSB AND TRC OF ALL COMPETING TECHNOLOGIES

AFFORDABILITY

The installed cost of ~\$4,000 for a heat pump water heater, is approximately double the installed cost of a new gas, electric, or next generation induction water heater (IWH), and could be 3X to 5X if a new 240V circuit and/or panel upgrade are required. When you then factor in that the 12-year life cycle cost of a HPWH is currently 80% higher than a gas water heater and forecast by CalMTA to still be 30% higher in 2047*, there is no viable customer value proposition even with rebates of \$1,000-\$1,500 for the HPWH.

There is currently no affordable solution for retrofitting the 76% installed base of California's gas water heaters and securing the decarbonization and NO_x elimination benefits to TSB.

*Reference CalMTA March 25, 2026, MTAB Meeting, Slide 75

ACCESSIBILITY TO ESJ COMMUNITIES

ESJ communities cannot afford a higher upfront cost for HPWH's, especially when there is no payback before their "new" replacement water heater rusts out in ~8-10 years. New induction water heater technology will be at a comparable installed price to current gas and electric water heaters, it is 120V plug-in ready, so there are no circuit or panel upgrades required. In addition, the novel tri-tank composite tank design replacing one large steel tank eliminates rust-out failures and makes 15-year warranties possible, extending the lifecycle until the next purchase is required.

EFFICIENCY/UEF

Energy efficiency is a key element of the TSB calculation, but higher UEF heat pumps applicability is economically skewed toward new construction, commercial applications, remodelers, and the DIY market. However, CalMTA's market assessment concludes that their RHPWH market transformation Market Deployment Plan will focus on the retrofit of electric resistance water heaters, because there is just no solid value proposition to replace gas water heaters.

However lower UEF induction water heater's optimize efficiency, consumer performance, and grid load shifting. Further, innovative composite tri-tank geometry, combining staged thermal storage, outlet-first recovery, retained thermal energy, and enhanced fluid dynamics and thermodynamics the IWH has the highest heating effectiveness despite its lower UEF. A comparative analysis revealed that induction water heaters enable greater than 2X and 5X, 105°F hot water yield per kWh as compared to electric resistance and gas, respectively.

It should also be noted that the nominal voltage/power rating of a heat pump water heater at 240V/4500W is 2.5X the voltage/power draw of an induction water heater 120V/1800W. In terms of gas water heater fuel substitution, the adoption barrier of circuit/panel upgrades is eliminated by retrofitting with induction water heaters.

ENVIRONMENTAL IMPACT

Induction Water Heaters deliver very significant environmental impacts that are key elements of the comprehensive TSB metric. Because IWH can affordably displace gas water heaters, California's 8.8 million installed base of gas water heaters can effectively be replaced, reducing natural gas CO₂-equivalent emissions as well as changes in load shape. This fuel substitution of natural gas also eliminates harmful NO_x criteria pollutants which cause smog formation and respiratory illnesses.

The refrigerants used in heat pump water heaters have high global warming potential up to 1,430 times the impacts of carbon dioxide. This is not required in induction water heaters.

GRID RESILIENCE

Current "Smart" water heaters available in the market utilize the JA13 protocol for compliance with water heater demand management systems but only enable utilities to initiate periodic DR and ELRP emergency events to those ratepayers who have opted in.

The new Induction Water Heater has an embedded AI demand management layer in every unit, which enables aggregation into thermal storage VPP's during daily peak demand periods, not just DR and ELRP events. This will also raise the TSB metric for IWH's.

By absorbing solar overgeneration and dropping load during grid stress, flattening load curves through efficient market adoption, California can defer or completely avoid multi-million dollar substation and distribution line build-outs and the accompanying rate increases.

III. REGULATORY LANDSCAPE

CALIFORNIA'S DECARBONIZATION FOCUS

There are a growing number of regulatory policy and legislative initiatives enacted and under review at state government agencies that have the goal of accelerating an affordable clean energy economy through electrification and the resultant decarbonization and other environmental and health impacts.

California Electrification/Decarbonization Policy Landscape — 2026

<u>Policy / Regulation</u>	<u>Status in Sept. 2026</u>	<u>Main target</u>	<u>Electrification effect</u>
AB 1279 – California Climate Crisis Act	Law	Statewide GHG emissions	Establishes 2045 carbon-neutrality objective
CARB Zero-Emission Space & Water Heater Standard	In development	New space & water heaters sold in CA	Potentially eliminates sales of conventional GHG-emitting gas equipment
SB 1221	Law / implementation underway	Natural-gas distribution system	Creates neighborhood-scale gas-to-electric conversion and gas-system retirement pilots
AB 2313 – Home Energy Choice Act	Enrolled / awaiting Governor action	Residential gas service lines	Creates an incentive for customers whose gas line needs replacement to discontinue gas service and electrify instead of replacing the gas line

<u>Policy / Regulation</u>	<u>Status in Sept. 2026</u>	<u>Main target</u>	<u>Electrification effect</u>
Bay Area AQMD Rule 9-6	Adopted / implementation underway	Water heaters	Zero-NOx requirements that effectively eliminate conventional gas WHs in affected applications
South Coast AQMD Rule 1146.2	In effect	Larger water heaters / boilers	Zero-NOx requirements
South Coast AQMD Rules 1111 / 1121	Under continuing policy development	Furnaces / water heaters	Potential future zero-NOx requirements

There is currently no affordable residential hot water heater product offering that can electrify and decarbonize gas water heaters, to comply with these current and proposed laws, ordinances and policies that have been implemented to enable California to achieve the AB 1279 carbon neutrality objective.

Furthermore, the CPUC should not underestimate negative residential ratepayer sentiment. I participated in SDG&E's March 9, 2026 Public Workshop on the CPUC's SB 1221 Pilot Neighborhood Decarbonization Programs. During the Q&A segment of this workshop ~30 local citizens expressed their opinions regarding this program intended to reduce natural gas infrastructure upgrades by transitioning some neighborhoods to zero-emission alternatives. The feedback was unanimously negative, with **every** speaker voicing concern regarding who is going to pay for the replacement of their perfectly fine operating gas stoves, water heaters, and clothes dryers.

With the installed cost of the hot water heater being the most expensive of these three gas appliances, having an unsubsidized induction water heater that also creates grid resilience as an option for electrification/decarbonization will be an effective catalyst and best practice for compliance with these laws and policies as well as accelerating the CPUC's desired market transformation. Positive experience with hot water electrification will also lead to increasing homeowner's acceptance of whole home electrification, while reducing the overall cost of the required incentives.

DOE's ENERGY EFFICIENCY/UEF FOCUS

The DOE published the fourth-generation/fourth-stage federal residential water-heater efficiency standards under NAECA (National Appliance Energy Conservation Act) on May 6, 2024 with a compliance date of May 6, 2029. The practical ramification of NAECA-4 implementation is that all new electric water heaters with capacity >35 gallons and <120 gallons must utilize heat pump water heaters to comply with the minimum 2.3-2.5 Uniform Energy Factor (UEF) requirement.

This UEF specification requirement on the appliance, would preclude Induction Water Heaters (IWH) and other potential emerging technologies from competing in the residential hot water heater market, leaving no other option for gas water heater replacement along with the additional benefits of unsubsidized affordability, fuel substitution, decarbonization, NOx elimination, and daily AI-demand managed grid flexibility. This underscores the need for TSB and TRC analysis of all competitive hot water heater technologies to insure the best solution for both ratepayers and the utilities.

IV. CALIFORNIA'S DILEMMA – UEF vs. TSB vs. NAECA-4

California, its agencies and initiatives, will probably have to resolve the contention between UEF and TSB and NAECA-4 (in its current form). The contention comes from the concentration of rulemaking around maximizing efficiency that has been conflated with maximizing TSB as follows:

- **UEF is a product efficiency metric, not a system-value metric:** different fuels have different avoided energy costs, marginal emissions, infrastructure costs, capacity values and decarbonization value.
- **UEF Does Not Consider Load Shape:** two electric water heaters can consume different annual energy but impose very different costs on the electric grid depending on when they consume that energy. UEF does not value daily load shifting, controllable thermal storage, or avoided coincident peak demand.
- **Federal policy recognizes grid value beyond UEF:** DOE preserves a distinct >75-gallon GEWH electric-resistance class for products intended for thermal-storage or demand-response programs. This provides direct regulatory evidence that water-heater value can include controllability and grid function in addition to appliance efficiency.

- **UEF is appliance centric:** that does not measure consumer hot-water service under high-demand events. Hybrid HPWHs use supplemental resistance heat when heat-pump capacity alone cannot satisfy demand, which practically changes both energy consumption and peak electrical demand.

- **UEF is a standardized laboratory metric:** that doesn't account for the reductions in lifecycle performance caused by seasonality, compressor wear, refrigerant leakage, evaporator blockage, and scale.

- **TSB can capture** energy, generation capacity/grid value, T&D impacts and GHG/decarbonization value.

- **TRC captures the resource-cost side of** equipment, installation, electrical upgrades, maintenance, expected repair and relevant program costs.

Note that lifecycle resource cost should also include technology-specific maintenance and expected repair costs. HPWHs require periodic air-filter and condensate maintenance and incorporate compressors, evaporators, fans, refrigerant circuits and associated controls that introduce lifecycle service and repair exposure. These costs should be modeled probabilistically rather than assumed to occur in every installation.

Proceeding forward in achieving California's ultimate goal of carbon neutrality by 2045 it will be challenged to maximize Total System Benefit for both Ratepayers and the Utilities. I have outlined the serious ramifications that adherence to DOE NAECA-4 has with regard to California's targeted market transformation of residential hot water heaters. As such, California will either have to adjust its thinking about TSB limited to the gains it may obtain in a minority segment of this market, or work with the DOE on revision to NAECA-4 that opens the door to alternative technologies that can optimize efficiency, performance, grid, environmental, and affordability goals of the CPUC.

V. CONCLUSIONS AND RECOMMENDATION

The good news for California is current DOE administration now explicitly emphasizes **consumer choice and upfront costs** in its July 2026 proposed Process Rule changes. Recent appliance-policy debates demonstrate that consumer choice, upfront cost and practical product availability can become as consequential to successful market transformation as modeled lifecycle efficiency. Further, it is possible that efficiency standards may be dissolved altogether, as a bill introduced by Senator Mike Lee (Utah) would effectively block the DOE from updating efficiency standards for new appliances and equipment and would give the executive branch new powers that could be used to revoke or weaken current standards.

This creates the opening for California to engage with the DOE in pursuit of emerging technologies that would maximize California's TSB that translates to materially enhanced ratepayer, utility, and sustainability benefits.

In terms of residential decarbonization, induction water heater (IWH) technology could be very impactful in driving market transformation across California in the very near term, recognizing that there are currently 8.8 million gas water heaters installed, and of the 600,000 gas water heaters that are sold each year in California, 80% are same day emergency replacements. So we are not asking homeowners to discard currently working products, but to just make a smarter decision when they purchase their new water heater.

I hope that this comprehensive overview of the California residential hot water heater market and its tremendous opportunity to be a major contributor to California's decarbonization and grid resilience, makes a compelling case to apply R&D resources to evaluate the holistic TSB and TRC benefits of induction water heaters against all other competing technologies. The fastest way to accelerate innovation is through fair market competition.