

DOCKETED

Docket Number:	23-IEPR-03
Project Title:	Electricity and Gas Demand Forecast
TN #:	251648
Document Title:	Presentation - Incorporating Zero-Emission Appliance Standards into AAFS
Description:	6. Ethan Cooper, CEC_23-08-18_IEPR_Presentation
Filer:	Raquel Kravitz
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	8/17/2023 9:30:28 AM
Docketed Date:	8/17/2023



Incorporating Zero-Emission Appliance Standards into AAFS

August 18, 2023

Ethan Cooper

Energy Assessments Division, Advanced Electrification Analysis Branch



Statewide and Local Emission Standards/Rules/Measures

- Statewide:
 - CARB's 2030 zero-emission space and water heating appliance standard from the 2022 State SIP Strategy¹.
 - Rulemaking process started in 2023 (first workshop on May 10th).
 - Expected regulatory board hearing date of 2025.
- Local:
 - BAAQMD² Regulation 9, Rules 4 and 6 for space and water heating appliances:
 - Adopted by the air district in March 2023.
 - SCAQMD³ low- and zero-emission control measures for multiple end uses:
 - Rulemaking process for residential measures starting date - Fall 2023.

¹2022 State Strategy for the State Implementation Plan, adopted on September 22, 2022

²Bay Area Air Quality Management District - Final Staff Report on Proposed Amendments to Regulation 9, Rule 4 and Rule 6

³South Coast Air Quality Management District - 2022 Air Quality Management Plan and Public Consultation Meeting Presentation on Amended Rule 1111



Fuel Substitution Scenario Analysis Tool

- FSSAT used for:
 - AB 3232 California Building Decarbonization Assessment
 - Demand Scenarios project
 - 2022 IEPR Demand Forecast Update
- FSSAT is a “what if” policy analysis tool examining the cost, energy, and greenhouse gas impacts of different fuel substitution scenarios given different levels of additional achievable energy efficiency (AAEE) and fuel substitution (AAFS) assumptions.



Updated Zero-Emission Appliance Standard Characterization for 2023 IEPR

Table 1: AAFS Levers for the Modeling of the Zero-Emission Appliance Standard in FSSAT

	AAFS Levers	AAFS 3 (Planning Scenario)	AAFS 4 (Local Reliability Scenario)	AAFS 5	AAFS 6
Programmatic Characterization	AAEE Gas/Elec Scenario	Scenario 3	Scenario 2	Scenario 2	Scenario 2
	Programmatic AAFS	Scenario 3	Scenario 4	Scenario 5	Scenario 6
Zero-emission appliance technology characterization (modeled via FSSAT)	Water Heater and Space Heating	Yes	Yes	Yes	Yes
	Other FSSAT end uses	No	No	Yes	Yes
	Residential Propane	No	No	Yes	Yes
	AQMDs	BAAQMD	BAAQMD	BAAQMD	BAAQMD & SCAQMD
	Technology Set	Mixed Efficiency Technologies	Mixed Efficiency Technologies	Mixed Efficiency Technologies	Single-Best Efficiency Technologies
	Technology Efficiency Weighting	Evenly Weighted Efficiencies	Evenly Weighted Efficiencies	Evenly Weighted Efficiencies	N/A
	Ramp Up Adoption Rate	Linear Ramp (10% reduction in interim years)	Linear Ramp	Linear Ramp	Linear Ramp



Zero-Emission Appliance Standards Replacement Assumptions

Table 2: FSSAT Zero-Emission Appliance Standards Replacement Assumptions for the 2023 IEPR

Territory	Building Type	AAFS Scenario	2020-25	2026	2027	2028	2029	2030-40
All Air Districts	Commercial New Construction	All	0%	0%	0%	0%	100%	100%
All Air Districts	Residential New Construction	All	0%	100%	100%	100%	100%	100%
All Air Districts besides BAAQMD and SCAQMD	Existing Buildings*	AAFS 4-6 (AAFS 3)	0%	20% (10%)	40% (30%)	60% (50%)	80% (70%)	100%
BAAQMD	Existing Buildings HVAC	All	0%	25%	50%	75%	100%	100%
BAAQMD	Existing Buildings Water Heating	All	0%	50%	100%	100%	100%	100%
SCAQMD	Existing Buildings Residential	AAFS 6	0%	25%	50%	75%	100%	100%
All Air Districts	Propane Replacement** Existing Buildings	AAFS 5-6	0%	20%	40%	60%	80%	100%
All Air Districts	Propane Replacement New Construction	AAFS 5-6	0%	100%	100%	100%	100%	100%

*Existing Buildings is only looking at replacing equipment on burnout

**Propane replacement is solely for water heating and HVAC end uses in the Residential sector.



Implication of Zero-Emission Appliance Standards in AAFS 3-6

- Expected energy impacts of the various versions of the zero-emission appliance standard modeling in FSSAT:
 - Gas savings from FSSAT modeling will increase by AAFS scenario.
 - Added electricity from FSSAT modeling, however, will increase differently.
 - AAFS 6 assumes only a single best (most efficient) technology will replace a gas appliance, leading to lower added electricity consumption than AAFS 5.



Thank you

Ethan Cooper

ethan.cooper@energy.ca.gov

Nicholas Janusch, Ph.D.

nicholas.janusch@energy.ca.gov



Appendix: State Zero-Emission Appliance Standards Table for CARB

Table 3: Statewide Zero-Emission Appliance Standards from CARB

Implementer	CARB
Regulation/Rule/Measures	Zero-Emission Appliance Standard
Description	Measure stating that, beginning in 2030, 100 percent of new space and water heaters (for either new construction or existing buildings) sold in California would need to meet the zero-emission standard.
Jurisdiction	Statewide
Data Source Links	<u>CARB 2022 State SIP Strategy</u>



Appendix: Local Zero-Emission Appliance Standards/Rules Table for BAAQMD

Table 4: Local Zero Emission Standards/Rules from BAAQMD

Implementer	BAAQMD
Regulation/Rule/Measures	Regulation 9, Rule 4 and 6 for Building Appliances
Description	<p>Rule 9-4: Zero NOx emission standard starting in 2029 for natural gas-fired space heaters.</p> <p>Rule 9-6 (small water heaters): Zero NOx emission standard starting in 2027 for natural gas-fired water heaters below 75,000 BTU/hour.</p> <p>Rule 9-6 (large water heaters): Zero NOx emission standard starting in 2031 for natural gas-fired water heaters between 75,000 - 2,000,000 BTU/hour.</p>
Jurisdiction	Bay Area air district
Data Source Links	BAAQMD Final Staff Report on Proposed Amendments to Regulation 9, Rule 4 and Rule 6



Appendix: Local Low- and Zero-Emission Control Measures Table for SCAQMD

Table 5: Local Low- and Zero-Emission Control Measures from SCAQMD

Implementer	SCAQMD
Regulation/Rule/Measures	Control Measures R-CMB-01, R-CMB-02, R-CMB-03, R-CMB-04
Description	<p>R-CMB-01: Control measure proposing a rule to require the installation of only zero or low NOx water heaters in the residential sector starting in 2029.</p> <p>R-CMB-02: Control measure proposing a rule to require the installation of only zero or low NOx space heaters in the residential sector starting in 2029.</p> <p>R-CMB-03: Control measure proposing a regulatory and incentive approach to switch residential natural gas cooking equipment with zero or low NOx emission appliances starting in 2029.</p> <p>R-CMB-04: Control measure proposing a rule to require the installation of only zero or low NOx appliances for other/miscellaneous end uses in the residential sector starting in 2029.</p>
Jurisdiction	South Coast air district
Data Source Links	SCAQMD 2022 Air Quality Management Plan