2022 AQMP: RESIDENTIAL AND COMMERCIAL BUILDINGS

Working Group Meeting #1

December 17, 2020

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Agenda

- Background
- 2016 AQMP Residential and Commercial Building Measures
- Net Emissions Analysis Tool (NEAT)
- 2022 AQMP
- South Coast AQMD Rules and Incentive Programs for Residential and Commercial Buildings
- Federal, State, and Other Local Agency Programs
- Next Steps and Timeline

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Background

- South Coast AQMD has initiated the development of the 2022 Air Quality Management Plan (AQMP) to address the attainment of the 2015 8-hour ozone standard (70 ppb) for the South Coast Air Basin and the Coachella Valley
- The Residential and Commercial Buildings Working Group has been developed to explore measures to further reduce NOx emissions from residential and commercial appliances
- The 2016 AQMP included control measures addressing zero and near-zero emission technologies including NOx appliances in commercial and residential applications

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Framework for Working Group

- Primary goal is NOx emission reductions for regional ozone attainment
- Recognize and maximize all co-benefits, such as GHG reductions, improvements in indoor air exposures, energy and cost savings for consumers
- Determine South Coast AQMD's most effective role in achieving the desired objectives
- Supplement and leverage existing residential and commercial building regulations and incentive programs
  - ❑ California's Title 24 program and other statutes
  - ❑ Local ordinances
  - ❑ Incentive programs by other agencies
- Collaborative, objective and transparent discussion amongst all stakeholders

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Objectives for the Working Group

- Seek NOx emission reductions beyond existing regulations and programs to assist in achieving ambient air quality standards
- Assist in updating the existing control measures in 2016 AQMP or developing new control measures for 2022 AQMP
- Develop specific actions that could be taken in the future
  - ❑ Regulations
  - ❑ Incentives
- Quantify the estimated emission reductions from those actions
- Identify opportunities for early action before 2022 AQMP adoption

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2016 AQMP Residential and Commercial Building Measures

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NOx Emissions from Stationary Sources

- Based on the 2016 AQMP, 2018 residential and commercial buildings represent approximately 35 percent of NOx emissions from stationary sources
- This is a significant category with potential NOx emission reductions

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Residential and Commercial Buildings Natural Gas Emission Sources NOx (tons per day)

Categories	2018	2023	2031
Residential Natural Gas Combustion – *Space Heating*	6.83	5.43	3.48
Residential Natural Gas Combustion - *Water Heating*	1.98	1.90	1.86
Residential Natural Gas Combustion - *Cooking*	1.58	1.51	1.48
Residential Natural Gas Combustion - *Other*	2.98	2.86	2.80
Commercial Natural Gas Combustion – *Space Heating*	0.54	0.50	0.49
Commercial Natural Gas Combustion - *Water Heating*	0.20	0.18	0.18
Commercial Natural Gas ICE	3.11	2.96	2.91
Commercial Natural Gas External Combustion	2.31	2.16	2.12
Total NG Equipment in Buildings	**19.53**	**17.5**	**15.32**
Total Stationary Sources	**57.7**	**52**	**50**
Total all Sources	**372**	**257**	**214**

Emissions are projections from the 2016 AQMP which will be updated for the 2022 AQMP

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2016 AQMP Control Measures Related to Residential and Commercial Buildings

- 2016 AQMP includes four measures to reduce direct and indirect NOx emissions
  - **CMB-02** reduces NOx emissions through replacement with zero or near-zero appliances in commercial and residential applications
  - **ECC-01** seeks co-benefit NOx emission reductions from existing GHG reduction programs, policies, and incentives currently implemented to meet the state's targets
  - **ECC-02** seeks co-benefit NOx emission reductions from implementation of required residential and commercial energy efficiency mandates such as Title 24 and SB 350
  - **ECC-03** seeks additional co-benefit NOx emission reductions from enhancements in existing residential building energy use

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Implementation of Control Measures

- In 2019, awarded funding to 27 emission reduction incentive projects, totaling over $47 million, to support control measures CMB-02 and ECC-03
  - ❑ 16 projects would implement commercially available zero or low-emission control technologies
    - ❑ ~$15 million on 8 projects specifically targeting building appliances, heating, and energy
- The Net Emissions Analysis Tool (NEAT), has been developed as a policy analysis tool to assist in implementing control measures CMB-02 and ECC-03
  - ❑ Assesses emission reductions with zero and lower NOx emitting appliances in residential applications
  - ❑ Considers capital and operating costs, criteria pollutant benefits (e.g., NOx), and GHG co-benefits for a variety of climate zones, rate structures, and housing characteristics

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Current South Coast AQMD Funded Research Or Demonstration Projects – *NOx Reductions in Residential and Commercial Buildings*

Type of Project	Specific Project Goal
Burner Development	Ultra low-NOx commercial deep fat fryer development (80% NOx reduction)
	Rule1111 next generation prototype residential gas furnace for 7 ng/J NOx
	New swirl flame burner for 5-8 ng/J NOx (commercial furnaces)
Combustion Optimization	Demonstration of EcoZone for optimal air-gas ratio control with combo ribbon burners for commercial wholesale baking oven (25% NOx reduction)
Electrification	Multifamily affordable housing electrification project (replacing combustion based water heating, space heating, cooking, laundry appliances with electric heat pumps and induction cooktops)
Energy Efficiency	Residential weatherization retrofit project (San Fernando and Coachella Valleys)
	SoCal Gas Company high efficiency water heating incentive program
Fuel Cell Synergistic Benefit	Residential fuel cell demonstration with integrated Photovoltaic (PV) and storage

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Net Emissions Analysis Tool (NEAT)

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Net Emissions Analysis Tool (NEAT)

- Analytical software tool to help policy-makers determine the most cost-effective strategies for NOx and GHG emission reductions from residential sector
- Uses Residential Appliance Saturation Survey (RASS, 2009) detailed energy use by:
  - ❑ Housing type: single-family, multi-family and mobile homes
  - ❑ Climate zone
- Uses electric and natural gas utility rate structure information
  - ❑ Allows for low-income and standard rates calculation
- Provides visual output that displays results graphically
- Calculates changes in emissions and utility costs associated with a retrofit of existing appliances
  - ❑ Provides flexibility to input grid emissions and fugitive emissions from natural gas transmission
  - ❑ Allows for the analysis of new technologies
  - ❑ Includes option for solar panel installation and electric vehicle charging

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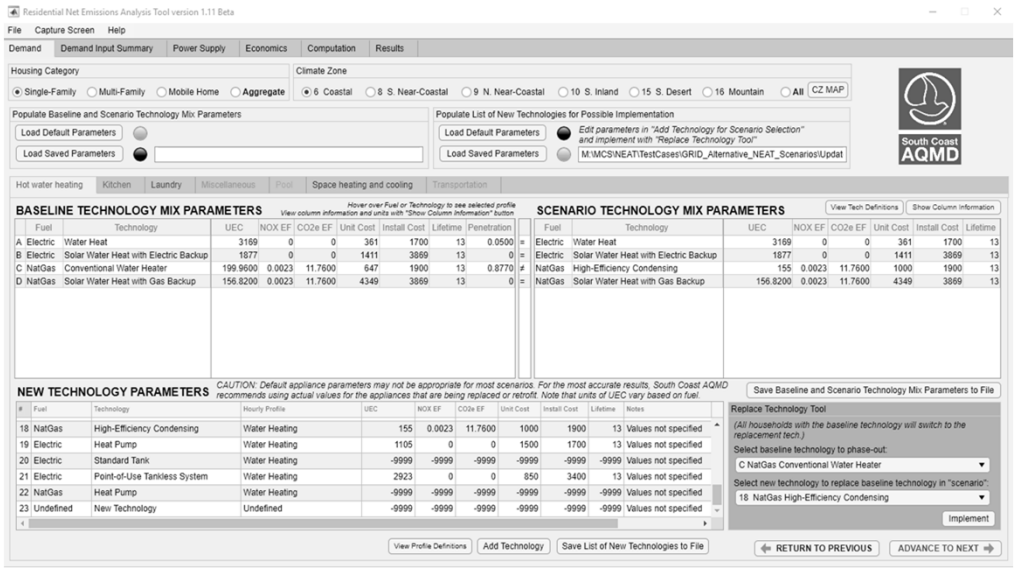
Net Emissions Analysis Tool (NEAT)



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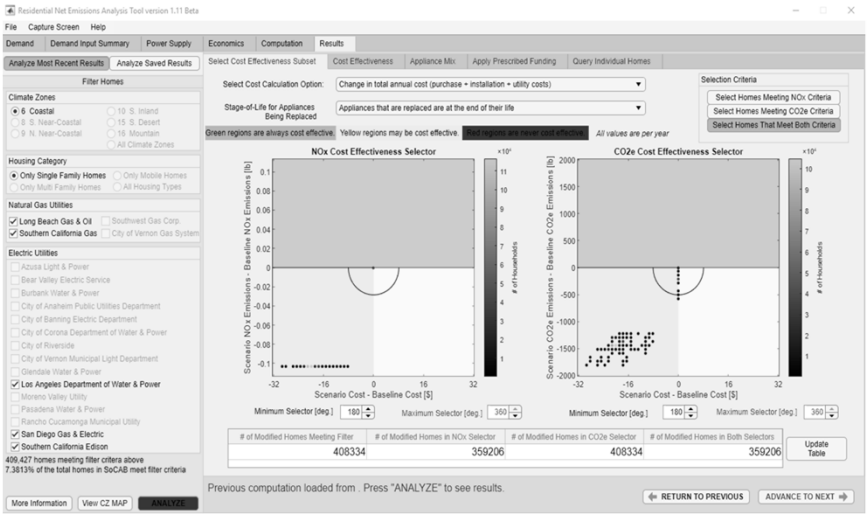
Net Emissions Analysis Tool (NEAT)



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2022 AQMP Overview

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2015 Ozone Standard

- In 2015, the U.S. EPA strengthened the National Ambient Air Quality Standards (NAAQS) for ozone to 70 parts per billion (ppb)
- Nonattainment classifications for South Coast Air Basin and Coachella Valley

Standard	Level	South Coast Classification	Coachella Valley Classification	Attainment Date
2015 8-hour Ozone	70 ppb	Extreme	Severe	August 3, 2038 (South Coast) August 3, 2033 (Coachella Valley)
2008 8-hour Ozone	75 ppb	Extreme	Severe	July 20, 2032 (South Coast) July 20, 2027 (Coachella Valley)
1997 8-hour Ozone	80 ppb	Extreme	Extreme*	June 15, 2024 (both South Coast and Coachella Valley)
1979 1-hour Ozone	120 ppb	Extreme	Attainment	February 6, 2023 (South Coast)

**Voluntary reclassification from severe to extreme in July 2019*

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Key State Implementation Plan (SIP) Elements and Due Dates for 2015 Ozone Standard

	8/3/2020	8/3/2021	8/3/2022	8/3/2028
Severe and Extreme Areas	Baseline Year Emissions Inventory	Nonattainment New Source Review	Attainment Demonstration	Section 185 Fee Program (Failure to attain)
	Emissions Statement		Reasonably Available Control Measures	
	Reasonably Available Control Technology Demonstration		Reasonable Further Progress	
			Conformity	
			Contingency Measures	
	Vehicle Miles Traveled Offset		Enhanced Inspection and Maintenance Program	
Extreme Area Only		Clean Fuels for Boilers	**2022 AQMP**	

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2022 AQMP Control Strategy Framework

- South Coast AQMD Control Measures
  - ❑ Stationary Sources (e.g., Residential and Commercial Buildings)
  - ❑ Mobile Sources
- CARB's Updated SIP State Strategy for South Coast Air Basin
  - ❑ Mobile Sources
  - ❑ Consumer Products
- SCAG's 2020 Regional Transportation Plan (RTP)/Sustainable Communities Strategy (SCS) and Transportation Control Measures (TCM)

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South Coast AQMD Rules and Incentive Programs for Residential and Commercial Buildings

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Residential and Commercial Buildings

Current South Coast AQMD Rules and Incentive Programs

- Rules
  - ❑ Rule 1111 - Reduction of NOx Emissions from Natural-Gas-Fired, Fan-Type Central Furnaces
  - ❑ Rule 1121 - Control of Nitrogen Oxides from Residential Type, Natural-Gas-Fired Water Heaters
  - ❑ Rule 1146.2 - Emissions of Oxides of Nitrogen from Large Water Heaters and Small Boilers and Process Heaters (Commercial)
- Rebates and Incentives
  - ❑ Clean Air Furnace Rebate Program
  - ❑ Residential EV charging incentive pilot program
  - ❑ Wood Stove & Fireplace Change-Out Incentive Program

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South Coast AQMD Roles

New Construction

- No land use authority, but can comment on planning decisions based on CEQA impacts
- Subject to new and existing state and local building codes
- Regulations for certain appliances in new home builds (similar to no wood burning fireplaces in new developments under Rule 445 or new units meeting a standard)
- Coordinate efforts and develop programs in partnership with state and local governments
- Minimal short-term emissions benefits

Existing Housing Stock

- Evaluate opportunities for further reductions from existing rules or developing new rules to regulate emissions from new appliance sales and installations (e.g., household furnaces and water heaters)
- Given the low rate of new construction, most potential for reductions
- Can encourage turnover with financial incentives

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Estimated Reductions if all New Residential Buildings Have Zero Emissions

Description	Space Heating	Water Heating	Cooking	Others	Total
Emissions per household (tons per day) in 2018	1.339E-06	3.411E-07	2.717E-07	5.145E-07	
Number of new households in 2023	363,190	363,190	363,190	363,190	
Emission reductions associated with zero-emission new households in 2023 (tpd)	**0.170**	**0.124**	**0.099**	**0.187**	**0.580**
Number of new households in 2031	787,207	787,207	787,207	787,207	
Emission reductions associated with zero-emission new households in 2031 (tpd)	**0.369**	**0.269**	**0.214**	**0.405**	**1.256**

- Based on projected emissions from the 2016 AQMP. 2022 AQMP emissions inventory is currently under development.
- The numbers are high-level regional scale approximation.

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Federal, State, and Other Local Agency Programs

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Federal, State, and Other Local Agency Programs

ENERGY STAR® Program

Energy Saving Legislature

Appliance Energy Efficiency Codes

Building Energy Efficiency Codes

Rebates and Incentives

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Federal Program

ENERGY STAR®

- A joint program of the Environmental Protection Agency (EPA) and the Department of Energy (DOE)
- Certify energy-efficient products, including appliances, lighting, computer equipment, electronics, heating and cooling products, windows, and insulation
- Certify energy-efficient homes, apartments, commercial buildings, and industrial plants
- Enable utilities leverage to ENERGY STAR as a common national platform for their efficiency programs

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State Legislature – *Energy Saving Goal*

SB 350

- Increases California's renewable electricity procurement goal from 33 percent by 2020 to 50 percent by 2030
- Requires the state to double statewide energy efficiency savings in electricity and natural gas end uses by 2030
- Authorizes utilities to undertake transportation electrification
- The Energy Commission is coordinating with affected utilities and electrical corporations subject to SB 350

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State Legislature - *Appliances*

California Title 20

- Appliance energy efficiency program
- Promote the use of energy and water efficiency appliances
- Title 24 and Title 20 are two different requirement standards that apply to two different aspects. However, they complement each other.
- California Energy commission adopted energy efficiency standards for the following categories:
  - ❑ Central air conditioners, central heat pumps, cooking and washing, heating, lighting, pool, refrigeration, water heater, motor, electronics, plumbing, etc.

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State Legislature - *Buildings*

California Title 24

- Building Energy Efficiency Standards that are designed to ensure new and existing buildings achieve energy efficiency
- The Energy Commission is required by law to adopt standards every three years
- Applicable to all new construction of, and additions and alterations to, residential and nonresidential buildings
- 2019 standards require:
  - ❑ Low-rise residential building photovoltaic (PV) energy generation system
  - ❑ Nonresidential buildings solar ready
  - ❑ Improvements for attics, walls, eater heating, and lighting
  - ❑ Efficiency improvements to nonresidential standards include alignment with the ASHRAE 90.1 2017 national standards

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Local City Ordinances - *CEC approved*

Local Ordinances	Date Approved	Type
Los Angeles, County of	April 8, 2020	Cool Roofs, Additional Photovoltaic (PV)
Santa Monica, City of	December 11, 2019	Electric Preferred, Additional PV
West Hollywood	December 11, 2019	Additional PV, Solar Thermal, Green Roof

Santa Monica 2019 Ordinance Requirements Summary:

No change from 2016 ordinance:

- *PV for residential and non-residential*

New requirements:

- *PV for major addition*
- *All electric or PV for pool heating*
- *Adopting CEC electric vehicle charging*
- *All electric or mixed fuel building and more energy efficiency for mixed fuel to incentivize all electric building*

40 cities statewide that have moved towards zero emission requirements during new construction

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Local Utilities

So Cal Gas

- Residential rebates
  - ❑ Energy Star Certified smart thermostat, natural gas dryer, tankless water heater, pool heater, storage water heaters, fireplace insert, freestanding oven, and furnace
- Business rebates (efficiencies exceeding Title 20 and 24 standards)
  - ❑ Business equipment rebates
    - ✓ Qualified boiler, heat recovery rooftop unit, ozone laundry system, pool heater, cloth washer, storage/tankless water heater, pipe/fitting/tank insulation, etc.
  - ❑ Food service Equipment rebate
    - ✓ New, qualifying, natural gas-fired foodservice equipment
- Energy efficiency incentives
  - ❑ Specified types of Energy saving projects not cover by other rebate programs

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Local Utilities

Southern California Edison

- Residential rebates and incentives
  - ❑ Heat pump equipment with high Uniform Energy Factor eligible for rebates
    - ✓ Heater pump water heater, central HVAC heat pump, and mini split HVAC heat pump
  - ❑ SCE Marketplace
    - ✓ For consumers searching energy efficient products and discovering incentive programs offered by SCE and other agencies
  - ❑ Clean fuel reward program
  - ❑ Home or business area network rebate
  - ❑ Residential energy efficiency loan program
- Business rebates and incentives
  - ❑ Energy saving for existing buildings
  - ❑ Energy saving by design for new construction

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Next Steps and Timeline

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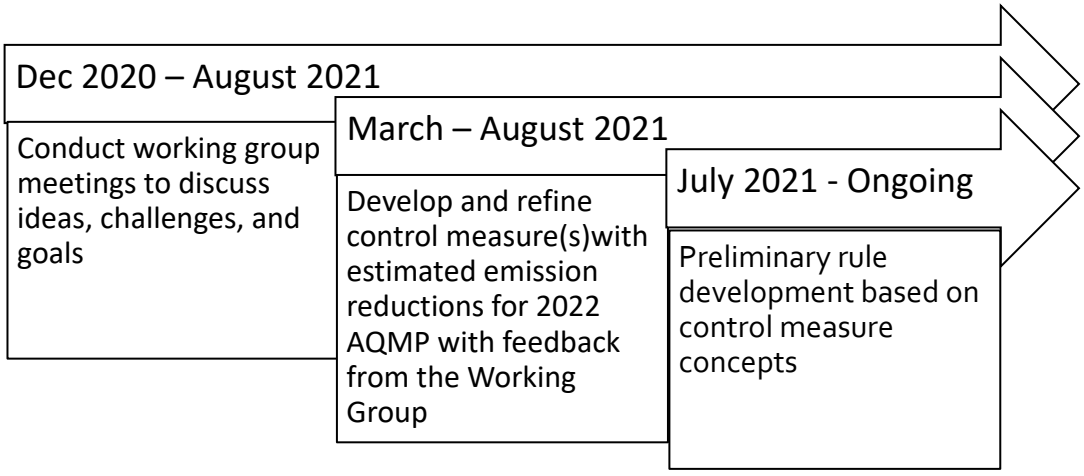
Timeline for Development



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