

2022 AQMP: RESIDENTIAL AND COMMERCIAL BUILDINGS

Working Group Meeting #4

June 17, 2021

<https://scaqmd.zoom.us/j/96110759536>
Teleconference Dial In: +1 669 900 6833
Webinar ID: 961 1075 9536

Agenda

- Summary of the previous Working Group Meeting
- Approach for residential and commercial building control measures for the 2022 AQMP
- Proposed concepts for 2022 AQMP residential and commercial building control measures
- Next steps

Summary of Previous Working Group Meeting

- **May 6, 2021 WG Meeting:**

- Stakeholder presentations

- California Air Resources Board – *Building Decarbonization*
- Energy Solutions - *Introduction to the California TECH heat pump program*
- Southern California Edison - *Pathway to Building Electrification*
- Southern California Gas Company - *Decarbonizing the Gas Grid & Reducing Building Emissions*

2016 AQMP Control Measures Related to Residential and Commercial Buildings

- 2016 AQMP includes two control measures to reduce direct NO_x emissions
 - **CMB-02** Emission Reductions from Replacement with Zero or Near-Zero NO_x Appliances in Commercial and Residential Applications
 - **CMB-04** Emission Reductions from Restaurant Burners and Residential Cooking

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT



FINAL 2016
AIR QUALITY MANAGEMENT PLAN



General Approach

- Staff is proposing to separate CMB-02 and CMB-04 to create individual control measures commercial and residential sources and by equipment type
- Dedicating a control measure for each of individual category allows for a
 - More robust analysis for each equipment category
 - Recognizes status of technology and implementation approaches that are unique to each equipment category

CMB-02

CMB-02A
Residential Space Heating

CMB-02B
Commercial Space Heating

CMB-02C
Residential Water Heaters

CMB-02D
Large Water Heaters

CMB-02E
Laundry Dryers and Other
Appliances

CMB-04

CMB-04A
Residential Cooking
Devices

CMB-04B
Commercial Cooking
Devices

EXISTING CONTROL MEASURE

**2016 AQMP
CMB-02**

2016 AQMP CMB-02

Emission Reductions
from Replacement
with Zero or Near-
Zero
NOx Appliances in
Commercial and
Residential
Applications

Proposed to:

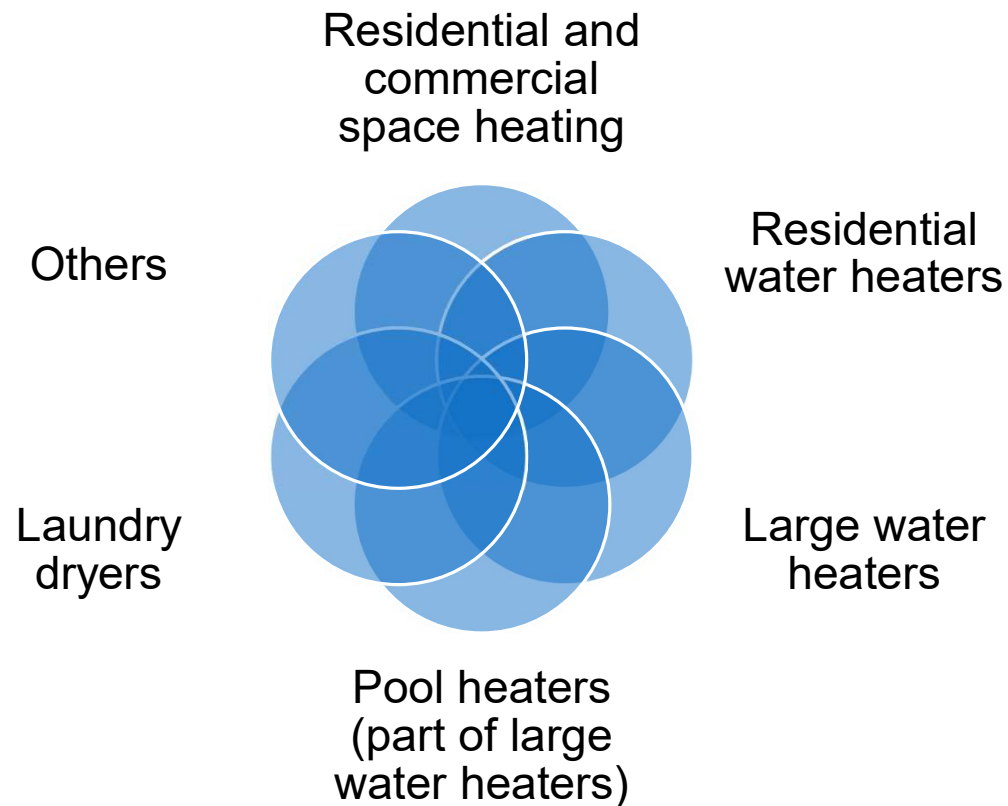
- Continue to implement Rule 1111 for residential and light commercial furnaces
- Regulate commercial space heating furnaces
- Incentivize zero and near-zero technology appliances

Progress:

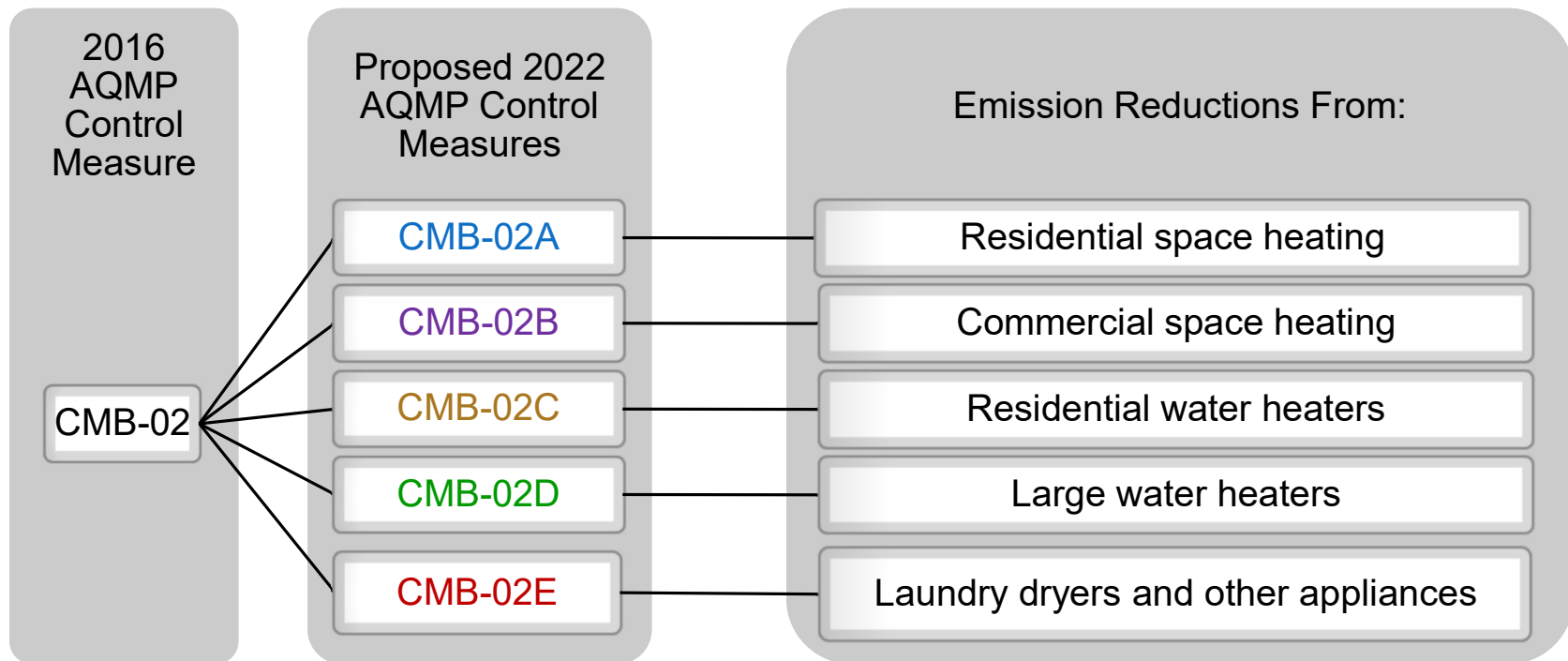
- Enhanced Clean Air Furnace Rebate Program for Rule 1111 implementation including electric heat pumps
- New projects funded for burner development, electrification, fuel cell, and home weatherization

2016 AQMP CMB -02

Source Categories



Proposed 2022 AQMP Control Measures Based on CMB-02



2022 AQMP Initial Concepts for CMB-02A

Emission Reductions From Residential Space Heating

Applicability

- Residential furnaces with heat input $\leq 175,000$ BTU/hr

Background

- Rule 1111
 - 65% NO_x reduction (from 40 to 14 ng/j) starting October 2019
 - 14 ng/J furnaces available for:
 - Condensing and non-condensing furnaces
 - Weatherized furnaces*
 - Incentives early deployment through Clean Air Furnace Rebate Program



Emissions Inventory

- 11.7 tons per day NO_x emissions (2018 inventory) (estimated 4.1 tons per day after full implementation)

* Compliance date for weatherized furnaces is October 2021

Technology Assessment

- 14 ng/J NO_x technology yet to be implemented for weatherized and mobile home furnaces
- Prototype furnaces targeting lower and near-zero emission rates (5 - 8 ng/J) but not be feasible for all applications
- Expanding all electric space heating and cooling heat pump market driven by demand for energy efficiency
 - Residential sector is dominant market
- Incentives promote consumer demand for new technology including all electric heat pumps

Implementation Approaches

- Continue to implement Rule 1111 and Clean Air Furnace Rebate Program
- Expand incentives for zero and near-zero emission technologies

Estimated Emission Reductions

- 7.6 tons per day NO_x reductions (65% of 2018 inventory) over 25 years
- Additional reduction of 0.014 tons per day NO_x reductions for incentivizing every 10,000 spacing heating furnaces

2022 AQMP Initial Concepts for CMB-02B

Emission Reductions From Commercial Space Heating

Applicability

- Commercial space heating furnaces with heat input >175,000 BTU/hr and <2,000,000 BTU/hr (Space heating furnaces with higher capacity are regulated by Rule 1147)

Background

- Commercial space heating > 175,000 BTU/hr to 2,000,000 BTU/hr are unregulated
- ~ 93 percent of commercial buildings use non-electric heating fuel¹
- Baseline NOx levels for individual units are not known

Emission Inventory

- 2.5 tons per day NOx emissions (2018 inventory)

¹ www.greenbiz.com/article/trend-commercial-buildings-go-all-electric

Technology Assessment

- Gas-fired commercial furnaces
 - 14 ng/J NO_x, possibly lower, could be feasible for commercial furnaces
 - Three prototype models (rated at 200k, 300k, 400k btu/hr) were tested below 14ng/J in early 2021
- Zero-emission furnaces
 - Early adoption of zero emission space heating technologies from building decarbonization
 - Seeking input for specific zero emissions space heating technologies

Implementation Approaches

- Develop rule to regulate NO_x emissions from gas-fired furnaces between 175,000 and 2,000,000 BTU/hr
- Explore use of incentivize early adoption of zero emission technologies

Estimated Emission Reductions

- 1.6 tons per day NO_x reductions (65% of 2018 inventory) over 25 years
- Additional reduction would be achieved by incentives

2022 AQMP Initial Concepts for CMB-02C

Emission Reductions From Residential Water Heaters

Applicability

- Residential water heater with heat input $\leq 75,000$ BTU/hr

Background

- Regulated by Rule 1121
- Last amended September 2004
- Current NOx emission limit of 10 ng/J (15 ppm) has been fully implemented since 2008

Emission Inventory

- 1.9 tons per day NOx emissions (2018 inventory)

Technology Assessment

- Conducting technology assessment for Rule 1146.2 (large water heater) that may also address residential water heaters regulated under Rule 1121
- The assessment would evaluate technologies including (but not limited to):
 - Gas burner with emission rate lower than Rules 1146.2 and 1121;
 - Gas heat pump water heater;
 - Residential fuel cell water heater;
 - 120-volt all electric heat pump water heater; and
 - Higher tier (e.g., higher efficiency) heat pump water heater

Implementation Approaches

- Potential Rule 1121 amendment for a lower emission limit if feasible
- Explore use of incentivize early adoption of zero emission technologies

Estimated Emission Reductions

- To be determined

2022 AQMP Initial Concepts for CMB-02D

Emission Reductions From Large Water Heaters

Applicability

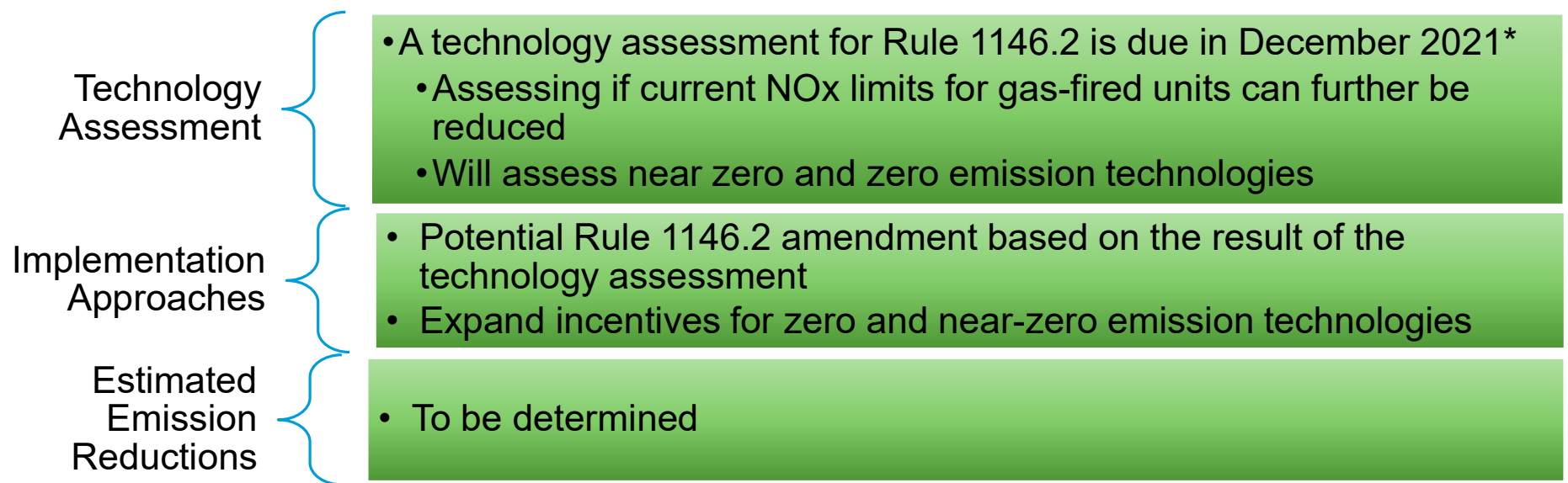
- Large water heaters with heat input $\leq 2,000,000$ BTU/hr
- Including pool heaters
- Excluding residential water heaters currently regulated under Rule 1121

Regulatory Background

- Regulated by Rule 1146.2
- Current NOx emission limit (established in 2006):
 - 14 ng/j (20 ppm) for new units
 - 55 ppm for existing units $\leq 400,000$ BTU/hr
 - 30 ppm for existing units $>400,000$ BTU/hr and $\leq 2,000,000$ BTU/hr

Emission Inventory

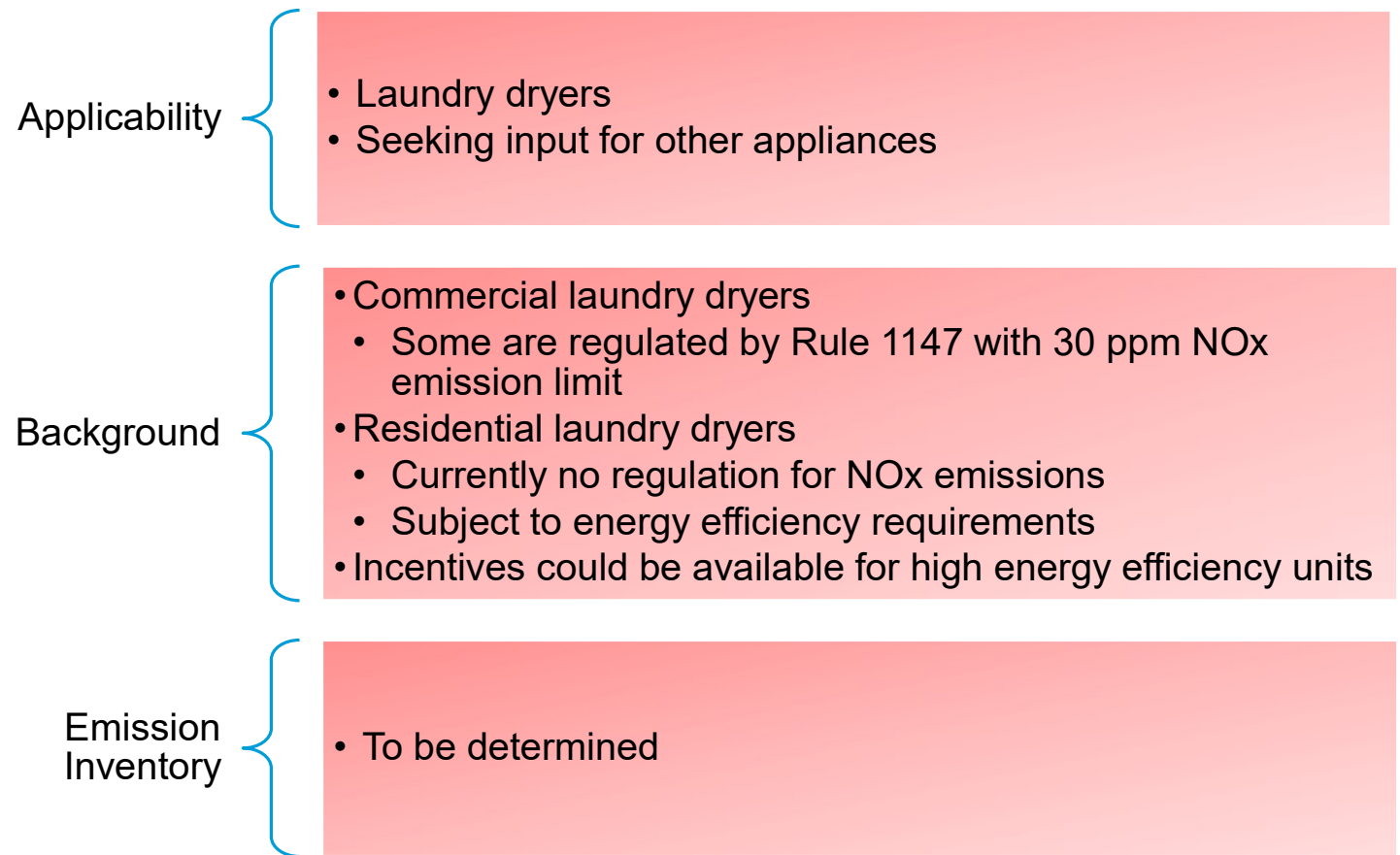
- 0.6 tons per day NOx emissions (2018 inventory)



* Specified under Rule 1146.2 (c)(13)

2022 AQMP Initial Concepts for CMB-02E

Emission Reductions From Laundry Dryers and Other Appliances



Technology Assessment

- Rule 1147 limit for laundry dryers is up to date as the Best Available Retrofit Control Technology and Best Achievable Control Technology
- Zero-emission laundry dryers
 - 75% of residential laundry dryers are electric
 - Requires a 240-volt outlet

Implementation Approaches

- Explore in incentives for near zero and zero technologies

Estimated Emission Reductions

- To be determined

EXISTING CONTROL MEASURE

**2016 AQMP
CMB-04**

2016 AQMP CMB-04

Emission Reductions from Restaurant Burners and Residential Cooking

Proposed
to

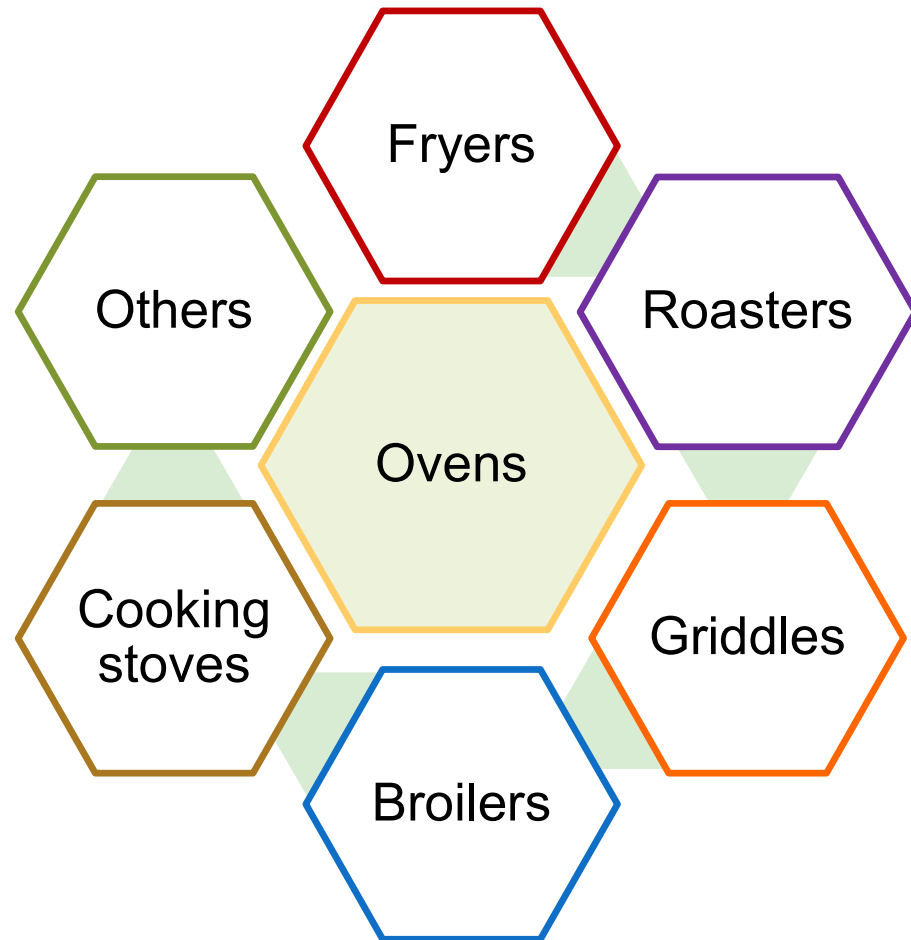
- Fund the development and incentivize the use and installation of low-NOx burner technologies
 - Consider developing a manufacturer-based rule to establish emission limits for cooking
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Progress:

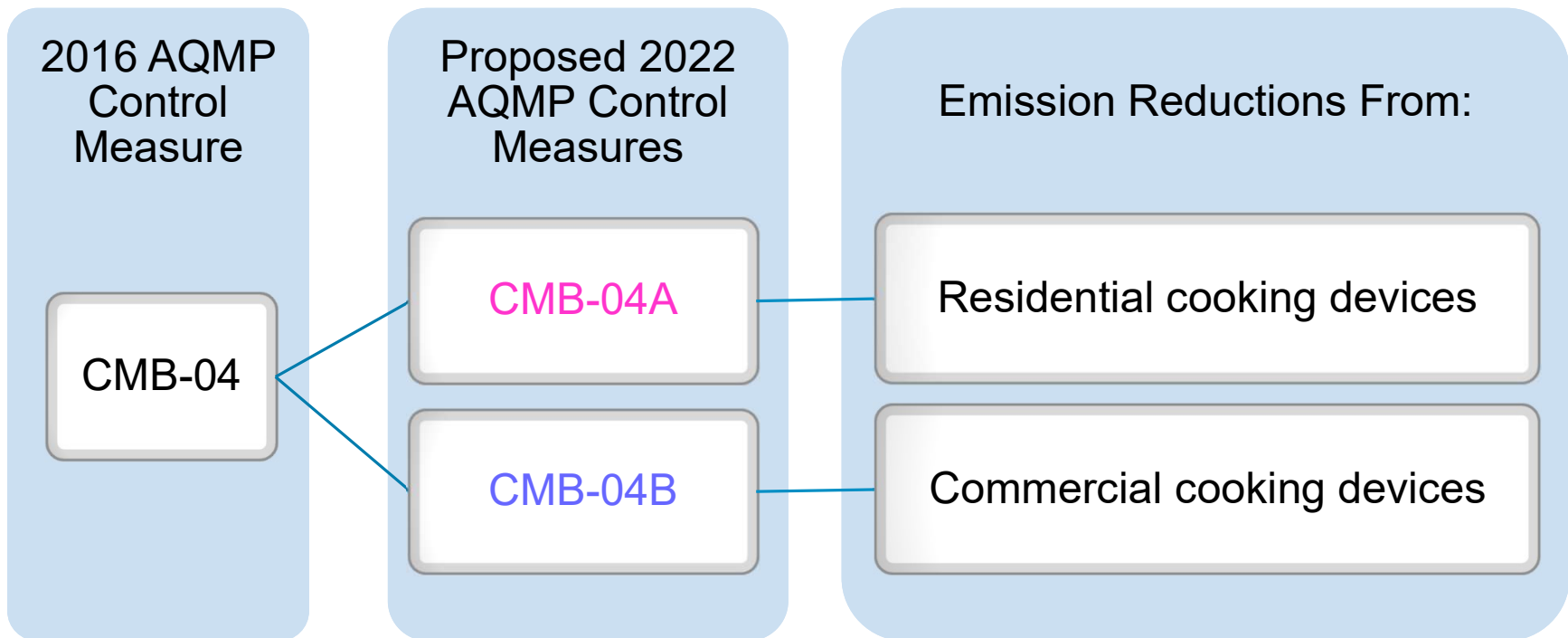
- Developed draft test protocols for nine types of commercial cooking devices
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2016 AQMP CMB-04

Source Categories



Proposed 2022 AQMP Control Measures Based on CMB-04



2022 AQMP Initial Concepts for CMB-04A

Emission Reductions From Residential Cooking Devices

Applicability

- Residential cooking devices:
 - Fryers
 - Roasters
 - Griddles
 - Broilers
 - Cooking stoves
 - Others

Background

- No regulation for NO_x emissions
- Subject to energy efficiency requirements
- Incentives for high energy efficiency units may be provided by some organizations

Emission Inventory

- 2.2 tons per day NO_x emissions (2018 inventory)

Technology Assessment

- Ultra low NOx burner developed by Berkeley Lab could be adapted for commercial and residential cooking devices
- Estimating up to 80 percent NOx emissions reduction compared to conventional technology

Implementation Approaches

- Two step approach
 - Step 1: Conduct a technology assessment that includes emissions testing of various type of cooking devices to establish an emissions
 - Step 2: Based on the results of Step 1 develop a rule that applies to manufacturers, distributors, and installers establishing emission limits and explore use of incentivize to encourage use of near and zero emission technologies

Estimated Emission Reductions

- Up to 1.8 tons per day (80 percent emission reduction) if the new technology would be commercialized and fully implemented

2022 AQMP Initial Concepts for CMB-04B

Emission Reductions From Commercial Cooking Devices

Applicability

- Commercial cooking devices that are not regulated by any other South Coast AQMD rule (e.g., Rule 1153.1)
 - Fryers
 - Roasters
 - Griddles
 - Broilers
 - Cooking stoves
 - Others

Background

- Rule 1153.1 for permitted in-use cooking devices may address some commercial cooking devices
- Most of commercial cooking devices may be area sources that do not require a South Coast permit
- Incentives for high energy efficiency units may be provided by some organizations

Emission Inventory

- To be determined

Technology Assessment

- Ultra low NOx burner developed by Berkeley Lab could be adapted for commercial and residential cooking devices
- Estimating up to 80 percent NOx emissions reduction compared to conventional technology

Implementation Approaches

- Two step approach for new cooking devices
 - Step 1: Conduct a technology assessment that includes emissions testing of various type of cooking devices to establish an emissions profile
 - Step 2: Based on the results of Step 1 develop a rule that applies to manufacturers, distributors, and installers establishing emission limits and explore use of incentivize to encourage use of near and zero emission technologies
- For permitted in-use cooking devices subject to Rule 1153, conduct an assessment for an updated Best Available Retrofit Control Technology

Estimated Emission Reductions

- To be determined

Summary of Control Measures Development

- Separate control measures CMB-02 and CMB-04 into sub-control measures by source categories
- Incorporate new proposed strategies
- Continue discussion to identify additional sources and establish new control measure(s) as needed
- Potential new control measure(s) would be focused on direct NO_x emissions reduction
- Energy saving programs are addressed by control measures for co-benefit

Next Steps

- Continue to identify low-emission and zero-emission technologies and implementation approaches
- Seek opportunities to incentivize new technologies
- Establish partnerships with other entities to develop or implement programs
- Continue preliminary write up of a residential/commercial building control measures for 2022 AQMP and provide to WG for input

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