Topics

• Background
• Key Elements of the Draft Model Rule
  • Emission limits set by schedule or formula
  • Emission limits
  • Timing
• Q&A, Feedback and Discussion
• Next Steps
Background
Why a model rule for water heaters?

- States’ experiences – successful rule examples
- Consistency for manufacturers
- History of success in the Northeast in particular
Exhibit 1

US gas appliance pollution rivals or exceeds gas power plant pollution

NOx (tons)

<table>
<thead>
<tr>
<th></th>
<th>Appliances</th>
<th>Power Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOx (tons)</td>
<td>321,151</td>
<td>144,997</td>
</tr>
</tbody>
</table>

Direct PM$_{2.5}$ (tons)

<table>
<thead>
<tr>
<th></th>
<th>Appliances</th>
<th>Power Plants</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM$_{2.5}$ (tons)</td>
<td>6,271</td>
<td>24,243</td>
</tr>
</tbody>
</table>

Source: RMI
Existing NOx Emissions Limits for Natural-Gas Fired Water Heaters

- Texas
- Utah
- Bay Area AQMD (CA)
- South Coast AQMD (CA)
- San Joaquin Valley APCD (CA)
- Ventura County APCD (CA)
Existing Standards Vary by Type of Water Heater and/or Size

Types:
• Storage
• Tankless/instantaneous
• Specialty (mobile, pool, spa)

Sizes:
• ≤ 75,000 BTU/hr
• 75,000 – 400,000 BTU/hr
• 400,000 – 2,000,000 BTU/hr

Limits expressed in different units:
• 10-40 ng/J heat output
• 15-55 ppmv at 3% O₂
BAAQMD *Proposed* Zero Emissions Rule

Gas-Fired Water Heater Phaseout:

- **1/1/2027** => 0 ng/J for water heaters ≤ 75,000 BTU/hr
- **1/1/2031** => 0 ng/J for water heaters 75,001 - 2,000,000 BTU/hr
Actual NOx Emissions Data

There are two general designs of natural gas combustion systems that are used to meet current 20 ppm NOx emission limit:

- Atmospheric burners (e.g., in-shot burners)
- Fuel air premix

Staff reviewed 181 source tests conducted in 2017 - 2021 for models certified at 20 ppm for NOx emissions:

- 50 models were tested <12 ppm
- 25 models were tested <10 ppm

Source: SCAQMD
Equitable Solutions Required

END SYSTEMIC RACISM!
2 Key Elements of the Draft Model Rule
How does the model rule work?

• Prohibits sale or installation of water heaters that don’t meet an emissions limit
• Establishes the emissions limit using either:
  ➢ a *schedule* of limits for future years, or
  ➢ a *formula* through which emissions limits are updated over time
• Manufacturers required to submit 3rd party emissions testing of their water heaters and apply for certification of makes/models
Applicability

- Water heaters with a rated heat input capacity of ≤2MMBTU/hour
  - Exemptions:
    - Water heaters designed for use in “recreational vehicles”
    - Water heaters manufactured or sold for use in other jurisdictions
- Category 1 Water Heaters: fossil gas-fueled
- Category 2 Water Heaters: propane- or oil-fueled
## Standards: Schedule Option

<table>
<thead>
<tr>
<th>Year</th>
<th>Category 1 emissions limit (ng/J heat output)</th>
<th>Category 2 emissions limit (ng/J heat output)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 years after rule promulgation</td>
<td>14</td>
<td>28</td>
</tr>
<tr>
<td>2030</td>
<td>8</td>
<td>17</td>
</tr>
<tr>
<td>2035</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

The years and emissions limits in the model rule will be [bracketed] to indicate that jurisdictions can insert different values if they desire, without having to write a new rule from scratch.
Standards: Formula Option

- Year 1 emissions limits same as Schedule Option for all categories
- Future (Year X) emissions limits calculated by a formula:

\[
EL_{\text{category,yearx}} = EL_{\text{category,[year1]}} \times \frac{EF_{\text{yearx}}}{EF_{\text{[year1]}}}
\]

- \( EL \) = Emissions limit
- \( EF \) = Annual average NOx emissions rate for electric power
Projected Values for “$EF_{yearx}$”

3 Q&A, Feedback and Discussion
Highest Priorities for Feedback

- Equity/Affordability – complementary policies?
- Applicability/Exemptions/Categories – esp. covered fuels
- Form of the Standard – schedule or formula or something else
- Emissions Limits – esp. initial limits but also final limit under schedule option
What’s next?

• Additional research/outreach: USEPA, NEEP, manufacturers, electrification experts

• 2\textsuperscript{nd} draft of model rule

• Final round of external peer review

• Publish model rule - Summer 2022
About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

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Research and Outreach Since January

• Conversations – Utah, Bay Area, South Coast
  • Emission limits, Timing, Outreach
• Presentation - WESTAR
• Research – South Coast test data, AP-42, E-Grid
• Other