IMPLEMENTATION STATUS OF RULE 1111

NOX EMISSIONS FROM NATURAL-GAS-FIRED, FAN-TYPE CENTRAL FURNACES

TASK FORCE MEETING
APRIL 27, 2017
SCAQMD HEADQUARTERS
DIAMOND BAR, CALIFORNIA

AGENDA

- Summarize Rule 1111 background
- Discuss implementation status and product availability
- Recommendations provided by the Manufacturers
- Rule 1111 considerations
- Future activities and schedules
RULE 1111 BACKGROUND

- Applies to residential and commercial natural gas-fired fan-type central furnaces
- Regulates manufacturers, distributors, sellers and installers of these units
- NOx emission reductions needed to achieve compliance with the ambient air quality standards
SUMMARY OF CURRENT RULE 1111 COMPLIANCE DATES WITH MITIGATION FEE OPTION

<table>
<thead>
<tr>
<th></th>
<th>Condensing (High Efficiency)</th>
<th>Non-condensing (Standard)</th>
<th>Weatherized</th>
<th>Mobile Home</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance Date</td>
<td>April 1, 2015</td>
<td>October 1, 2015</td>
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<td>October 1, 2018</td>
<td>October 1, 2019</td>
<td>October 1, 2021</td>
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<tr>
<td>Mitigation Fee (per unit)</td>
<td>$200</td>
<td>$150</td>
<td>$150</td>
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MEETING WITH MANUFACTURERS

- 14 ng/J emission standard and compliance dates were established as part of the 2009 amendment
- Rule 1111 was amended in 2014 to:
  - Postpone the compliance date for condensing units; and
  - Add a mitigation fee option for all units
- In April 2016, stakeholders requested to amend Rule 1111 stating that compliance cannot be achieved
  - In response staff conducted a survey with manufacturers in May – July, 2016 and have been closely monitoring the technology development status
MEETING WITH MANUFACTURERS - continued

- In March – April, 2017, staff met individually with 8 original equipment manufacturers (OEM), 2 burner manufacturers, and 1 burner technology institute (Individual meetings were needed to maintain confidentiality regarding development status)
- Purpose of the individual meetings was to obtain information regarding:
  - Development status of achieving the 14 ng/J emission standard
  - Products under development
  - Issues encountered
  - Mitigation fee
  - Compliance schedule

IMPLEMENTATION STATUS

- One OEM has a certified standard unit
- Some OEMs have demonstrated compliance with Rule 1111 NOx limits with field tests underway for standard units, applications for certifications expected
- Compliant furnaces have not been introduced into the market to meet Rule 1111 NOx emission limit; however, commercialization schedules have been proposed by some of the OEMs
- Alternative compliance option (paying mitigation fee for up to 3 years post compliance date) being utilized by all:
  - Condensing (mitigation ends on 3/31/2018): 2 years mitigation utilized
  - Non-condensing (mitigation ends on 9/30/2018): 1 year mitigation utilized
IMPLEMENTATION CHALLENGES

- Temperature management: Heat exchanger temperature control and fatigue
- Reliability and safety: high temperature may result in material and system leakage, which can cause further problems, such as flash back and high CO or NOx emissions, depending on the place of leakage
- Ignition: to assure good ignition, a premix burner may need to start with rich burn, which could cause NOx emission spikes
- Noise
- Narrow band of operation
- Shorter run time in Southern California climate
- Interference with other regulations: counter to Department of Energy (DOE) regulation for fan energy rating (FER) (effective 7/3/2019)
- Low market for high efficiency unit

PRODUCT AVAILABILITY

<table>
<thead>
<tr>
<th>Product Availability by Burner Manufacturers</th>
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<td>October 1, 2018</td>
<td>October 1, 2019</td>
<td>October 1, 2021</td>
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<tr>
<td>Burners available for Licensing</td>
<td></td>
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Product Availability In Other Nations

- A series of furnaces by one manufacturer meet Rule 1111 NOx ≤14 ng/J limit
- On the market last August in Belgium and Netherlands and in the process to UK market.
- Available capacities: 34,000 btu/hr, 51,000 btu/hr, 68,000 btu/hr, 102,000 btu/hr, 136,000 btu/hr, and 170,000 btu/hr.
- Offering technology to US OEMs.
MANUFACTURERS’ RECOMMENDATIONS

- Emission limit and mitigation option extension
  - All OEMs target the 14 ng/J standard for their furnace development, but one OEM recommended 20 ng/J emission limit, one OEM recommended 29 ng/J, and two OEMs recommended 30 ng/J. No distinction made for which type of furnace.
  - With the 14 ng/J standard for condensing units, two OEMs recommended one year extension for mitigation option while two other OEMs recommended two years extension.
  - With the 14 ng/J standard for non-condensing units, one OEM recommended no change for mitigation option, one OEM recommended one year extension, and another OEM recommended two years extension.
  - With the 14 ng/J standard for weatherized units, three OEMs recommended one year extension for mitigation option.
  - One OEM recommended two years extension for a 30 ng/J emission limit and another OEM recommended three years extension for the 14 ng/J limit. Neither OEM made a distinction for which furnace type.

- Mitigation fee change
  - One OEM recommended $150 for all furnace types.
  - Two OEMs recommended phased approach for mitigation fee for limit from 40 to 30 then 14 ng/J.

STAFF CONSIDERATIONS REGARDING RULE 1111

- OEMs who have developed compliant standard units need assurance that the Rule 1111 emission limit of 14 ng/J is maintained so that they have the proper incentive to proceed with the capital investment to commercialize their units.

- Continue to maintain a competitive market among OEMs and burner manufacturers; this will help ensure more reasonably priced units for the consumers.
STAFF CONSIDERATIONS REGARDING RULE 1111
- continued

- Ensure that the compliant products adequately cover the size ranges
- Ascertain the impacts of extending and/or adjusting the amount of the mitigation fee; currently the OEMs have passed the cost of mitigation fee to the consumer
- Make sure that there is a clear path for the augmentation of the higher efficiency furnaces; the application of high efficiency equipment is in line with the 2016 AQMP goal

FUTURE ACTIVITIES AND SCHEDULES

- Continue stakeholder meetings
- Next Task Force meeting
  - May 25, 2017
- Staff recommendations
  - Stationary Source Committee – June 16, 2017