BOILER ELECTRIFICATION

NJ PACT: STATIONARY SOURCE

Presented by: Christopher Schwalje, Division of Air Quality
INTRODUCTION

• Christopher Schwalje
  • Environmental Engineer 2
  • Bureau of Stationary Sources/Title V
  • 16 years in DEP
OVERVIEW

• New Jersey Energy Master Plan Strategy 4
  • Reduce Energy Consumption and Emissions from the Building Sector
• Boilers and emissions generated
• Fossil fuel vs electric boilers
• Boiler fleets (military and university)
• Implementation and future
  • What can DEP do to help meet EMP goal?
  • What is technically feasible?
  • How to ensure industry flexibility
“Space heating, water heating, appliances, and industrial use account for 28% of New Jersey’s [GHG] emissions, including 15.2 MMT of CO2e in the residential sector, 9.4 MMT of CO2e in the commercial sector, and 7.2 MMT of CO2e in the industrial sector. Buildings are also responsible for a combined 62% of the state’s total end-use energy consumption, including similar energy consumption in commercial buildings (26%) and residential buildings (25%), followed by the industrial sector (12%).” (EMP, pg. 157)

“Modeling results from the Integrated Energy Plan suggest it would be most cost effective to begin constructing all-electric buildings by 2025 and to begin transitioning existing building stock during natural stock rollover events beginning in 2030.” – (EMP, pg. 167)
BOILERS

- Equipment used for generating steam or hot water
- Fossil fuel combustion (oil/propane/natural gas)
- Size variability
  - Residential/commercial sources typically less than 1 MMBTU/hr (Exempt sources per Subchapter 8, Insignificant sources per Subchapter 22)
  - Industrial sources often greater than 1 MMBTU/hr (permitted as significant sources per Subchapter 8 and 22)
FOSSIL FUEL BOILER EMISSIONS

- Greenhouse Gas Profile

<table>
<thead>
<tr>
<th>Fuel</th>
<th>lb. of CO$_2$ per MMBTU</th>
</tr>
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<tbody>
<tr>
<td>Heating Oil</td>
<td>161.3</td>
</tr>
<tr>
<td>Propane</td>
<td>139</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>117</td>
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- Criteria pollutants including nitrogen oxides, sulfur oxides, and particulate emissions, including black carbon. (EMP, pg. 159)
FOSSIL FUEL VS ELECTRIC

• Decarbonization through use of electric boilers
• Used in laundries, food processing, and hospitals
• Technical Concerns
  • No maintenance/simpler design
  • 100% efficiency
  • No direct source emissions, but generated from power source
  • Size limitations
  • Cost
• Permitting
  • Electric boilers are exempt from permitting
  • Facility could claim shutdown credits from actual emissions
  • Title V permits could become Synthetic Minor
BOILER FLEETS

• Fleet: multiple sources at a single facility
• Info on fleets at military and university facilities
  (Data source: NJ Data Miner search from April 2020)

  • As many as 79 sources at a university and 80 sources at a military base.
  • Boilers range from 0.04 MMBTU/hr to approximately 10 MMBTU/hr
    (not including CHP and large auxiliary boilers)
  • Approximately 2,550 MMBTU/hr at facilities with multiple boilers
  • Dorms/residencies, administrative, and classroom buildings
WHAT CAN DEP DO TO REDUCE GHGs IN BUILDING SECTOR?

- Encourage natural stock rollover & set market expectations
- Permitting Options
  - Prohibit installation of new fossil fuel boilers
    - What date can this take place? All at once or sliding scale?
    - Based on size/availability?
    - Are waivers allowed based on alternative emission reductions, economic feasibility, technical and safety issues?
  - Deny renewal of existing fossil fuel boilers
    - What date can this take place?
    - Based on age/size?
    - Alternative compliance for facilities with boiler fleet?
- General Permit availability?
OPTIONS FOR FLEETS

- Fleet standard?
- Allow owners of fleets to keep some fossil fuel boilers beyond deadline if emissions are averaged with electric units?
  - What if averaged with electric and energy efficiency improvements?
  - What if averaged with on-site Green Energy (solar/wind)?
  - What if averaged with emission reductions from transportation control measures (i.e. bus retrofit)?
REQUEST FOR COMMENTS

• By September 17, 2020, please send comments and/or technical support information to: NJairrulesstationary@dep.nj.gov

• Please use the following heading in the Subject Line of the email:
  “NJ PACT: Boilers”