PCWP MACT for Composite Panels

*RTO Costs and Challenges*

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PCWP MACT Regulatory Impact Analysis

• Estimated Emissions Reductions
  - -27,000 TPY VOC (-13,000 MDF/HB/PB)
  - -11,000 TPY HAPs (-7,000 MDF/HB/PB)
  - -11,000 TPY CO
  - -13,000 TPY PM_{10}
  - +7,000 TPY NO_{x}

Net Reduction of 59% Total HAPs for MDF, PB, and HB facilities
EPA’s Projected Cost to Industry PCWP MACT

• Total capital costs of $479 million (58% of burden to fall on MDF/HB/PB).
• $143 million in additional compliance burden, controls, monitoring, and recordkeeping (1999).
• $135.1 million in social costs.
• Impact of 0.9-2.5% production costs and reduction of 0.1-0.7% output.
Using baseline of 2002-2007, PB/HB/MDF were 52% of total reported HAPs emissions for NAICS 321 and since 2008 mills have reduced total HAPs emissions by 70% (2009-2014). Other industries combined for 59% reduction in total HAPs per year.

MACT is not the only story in 2008... *Economic downturn, ATCM, and inaccurate reporting.*
Control Device Installations

**Hardboard, MDF, PB**

<table>
<thead>
<tr>
<th>Process Control Scenario</th>
<th>Equipment with CD Strategy Baseline 1999</th>
<th>Equipment Controlled ’99-’16</th>
<th>Equipment Currently Operating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press Oxidizer</td>
<td>12</td>
<td>+11</td>
<td>18</td>
</tr>
<tr>
<td>Press Bio-unit</td>
<td>3</td>
<td>+22</td>
<td>18</td>
</tr>
<tr>
<td>Dryers Oxidizer</td>
<td>23</td>
<td>+6</td>
<td>24</td>
</tr>
<tr>
<td>Dryers Bio-unit</td>
<td>0</td>
<td>+17</td>
<td>13</td>
</tr>
<tr>
<td>Other Technology</td>
<td>0</td>
<td>+5</td>
<td>2</td>
</tr>
</tbody>
</table>

- Based on Title V operating permits, PCWP Background Document, and industry interviews.
Market Changes

Larger Automated Mills, Imports, Recession, Decreased Demand

- 2015 shipments of HB/PB/MDF were ~70% of 2005 (pre-recession peak).
- Only 49% of facilities remain from 1997 regulatory impact analysis.
- Average PB facility is 42% larger than 1997 RIA.
- Average MDF facility is 68% larger than in 1997 RIA.
NAF or CARB Phase II UF resins are now capable of complying with press production based compliance option (0.3 lbs HAPs/MSF).

HAPs reduction target of 90% in MACT is more challenging with 3X (or more) lower inlet concentrations from press exhaust due to non-detect outlets or BDL for sampling methods. Processes that are indirectly affected by resin (i.e. particleboard dryers) also have reduced HAPs emissions.
New green rotary dryer at PB plant. Starting up dryer and commissioning RTO gave us opportunity to test inlet/outlet emissions at different temperatures to setup unit for compliance temperature testing.
Expected Annual Operational Costs

*New Green Rotary Dryer RTO*

- NG $\rightarrow$ 37,000 MMBTU/yr in gas = +$170k
- Electricity $\rightarrow$ 1.3 MMkWhr/yr = +$80k
- New thermocouples per year = +$2k
- Maintenance Labor TBD
- Media Rebuilds TBD
- Social Costs...?
# Destruction Efficiencies

## Across New RTO

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Net ± in lbs/hr</th>
<th>95%</th>
<th>90%</th>
</tr>
</thead>
<tbody>
<tr>
<td>THC (as propane)</td>
<td>-95%</td>
<td>-90%</td>
<td></td>
</tr>
<tr>
<td>NOx</td>
<td>+244%</td>
<td>+177%</td>
<td></td>
</tr>
<tr>
<td>CO₂</td>
<td>+31%</td>
<td>+14%</td>
<td></td>
</tr>
</tbody>
</table>

**Note 1:** Methane destruction 75% across RTO, CO destruction ~25%

**Note 2:** HAPs concentrations outlet tested BDL of Method 320 so HCHO and MeOH DRE were not reflective of actual DRE.
Emission Intensity Increases

Across New RTO

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<th>Pollutant</th>
<th>95% THC</th>
<th>90% THC</th>
</tr>
</thead>
<tbody>
<tr>
<td>THC (as propane)</td>
<td>-3.89</td>
<td>-3.40</td>
</tr>
<tr>
<td>NOx</td>
<td>+0.21</td>
<td>+0.16</td>
</tr>
<tr>
<td>CO$_2$</td>
<td>+123</td>
<td>+66.8</td>
</tr>
</tbody>
</table>

For example, a facility that produces 150 MMSF/year at 1.25 ODT/MSF would decrease THC emissions by 45 TPY, increase NOx emissions by 4 TPY, and increase CO$_2$ emissions by 5,000 TPY increasing a green dryer RTO from 90 to 95% THC destruction.
RTO control devices significantly increase NOx emissions for the tested facility (natural gas fired facility).
Conclusions and Discussion

- MACT combined with CARB’s ATCM, closures, and facility improvements resulted in MACT goal of final total HAPs emissions reductions and reduction efficiency for HAPs per plant.
- RTO technology emphasized in initial HAP background information significantly increases NOx emissions for a plant site. GHG emissions increased by ~23% when controlling dryers with RTO.
- PSD BACT determinations for new/modified sites need to consider implications of additional GHG and NOx. New combustion controls could result in conflicts between MACT, PSD, and O₃ NAAQS.
- Current oxidizer technology will struggle with >90% HAPs control requirements due to lowered inlet concentrations from MDF/PB presses and dryers. Low emitting sources will be very challenging to comply with 90% HAPs reduction (blenders/formers).