

*Emissions Control Technologies for
Wood-Fired Boilers
(from a consultant's perspective)*

Prepared for:

*National Workshop on Implementing Biomass Boiler Systems
"Making Wood Work: Local Energy Solutions"*

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Overview

- 1) Inherently lower emitting processes and practices
- 2) Add-on pollution control devices
- 3) Technical and financial feasibility of pollution controls
- 4) Trade-offs between add-on controls and stack height
- 5) Stack Emission testing



Inherently Lower Emitting Processes and Practices

- Using cleanest available fuel (clean, green chips without bark)
- Good combustion conditions (high combustion temp., proper air/fuel mix, sufficient residence time)
- Automated combustion controls
- No fly ash re-injection
- Plume opacity observations (EPA Method 22) or opacity measurements (with stack opacity monitor)
- Regular maintenance (grate cleaning, soot blowing, annual tune ups)
- Combustion efficiency testing (degree of combustion completeness, not thermal efficiency)



Add-On Pollution Control Devices

- Should be considered for all institutional wood-fired boilers
- Mechanical collectors – inertial separation
 - Single cyclones
 - Multi-cyclones (“floor” in Vermont)
 - High efficiency multicyclones (BACT in RI, but not demonstrated)
 - Core separators
- Baghouses – fabric filtration
- Electrostatic precipitators (ESPs) – electrostatic attraction
- Venturi scrubbers



Cyclone and Multicyclone



Photos provided by the
Biomass Energy Resource Center (BERC)

Core Separator™

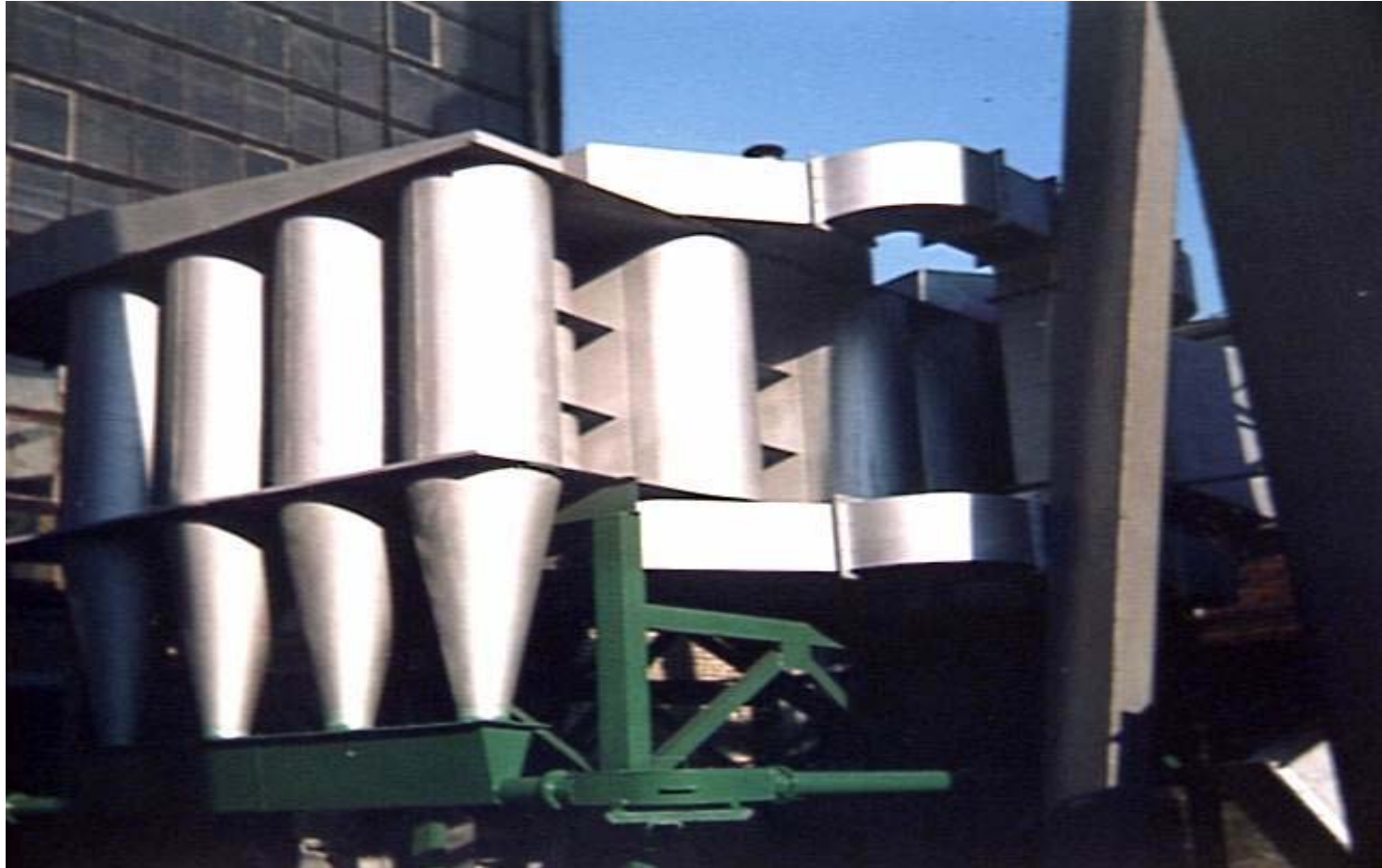


Photo provided by Easom Consulting



Technical and Financial Feasibility

- All mechanical collectors widely considered *technically* feasible
- Not all mechanical collectors are widely considered *financially* feasible
- Baghouses, ESPs and scrubbers are considered feasible for large systems (> 10 MMBtu/hr)



Trade-Offs Between Pollution Controls and Stack Height

- Taller stack not a preventative measure
- More control = shorter stack (typically)
 - Caveat: taller stack does not solve problems for all weather conditions
- Pollution control more effective than a taller stack during a thermal inversion



Stack Emission Testing

- Needed to confirm pollutant emission levels are controlled as proposed.
- Is it necessary? At minimum, for sources which are poorly understood.
- What pollutants should be measured?
 - PM2.5, PM10, CO, CO2, NOx, HAPs
- What are the costs?
 - A matter of how many pollutants tested.
 - Have seen costs range from \$2,500 for a simple PM10, CO and CO2 test to \$33,000 extensive testing for air toxics.

