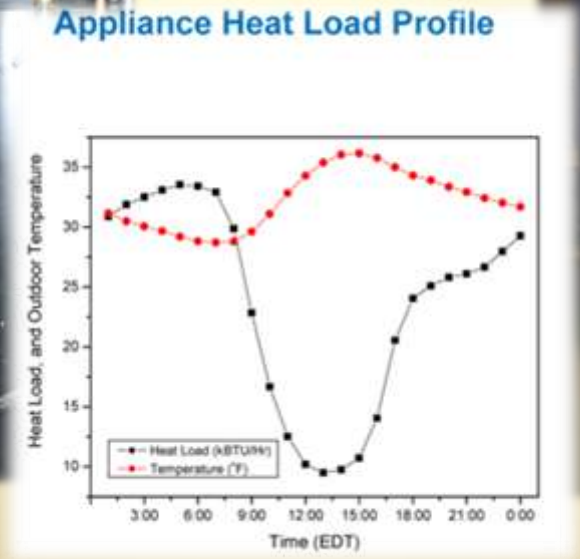
Smaller Biomass Boiler Load Matching/De-coupling



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WHY DO WE CARE?

- Biomass burns better when it burns constantly and consistently.
- We are energy experts who have chosen biomass as a fuel for all of its benefits. We are not representing heating as usual. Someday the majority of the heating profession will rise to our level.
- We encourage burning trees, which a lot of people don't like. We owe it to ourselves and our communities to make the best use of those trees.

Attractive Means for Load Matching and De-Coupling with Biomass Boilers:

Load Matching

- Single base load boiler with redundant, peak load, oil or gas Boiler.
- Cascaded boilers plus peak load oil or gas boiler.
- Cascaded boilers all of one size.
- Cascaded boilers with off season and mid season sized boilers.
- Active decision to use biomass only during peak heating months.

Load De-Coupling

- Thermal Storage
- Power Production to grid

Less Attractive Means for Load Matching and De-Coupling with Biomass Boilers:

Load Matching

- Single automatic biomass boiler cycled on/off
- Adjusting loading of hand fired cord wood boilers
- Single biomass boiler used throughout the calendar year without thermal storage
- Turning boiler(s) on only during high diurnal demand periods
- Burning bigger, smaller, wetter, or drier cord wood.

De-Coupling

- Allowing broad temperature swings
- Dumping heat

Thinking about Heating Loads-The Art Part

- Building improvement vs. boiler sizing
- Building addition vs. Boiler sizing
- Regional and geographical adjustments
- Use patterns of the building or thermal output
- Type of biomass fuel available and capabilities of boiler operator.
- Availability of service and repair.
- Cost.

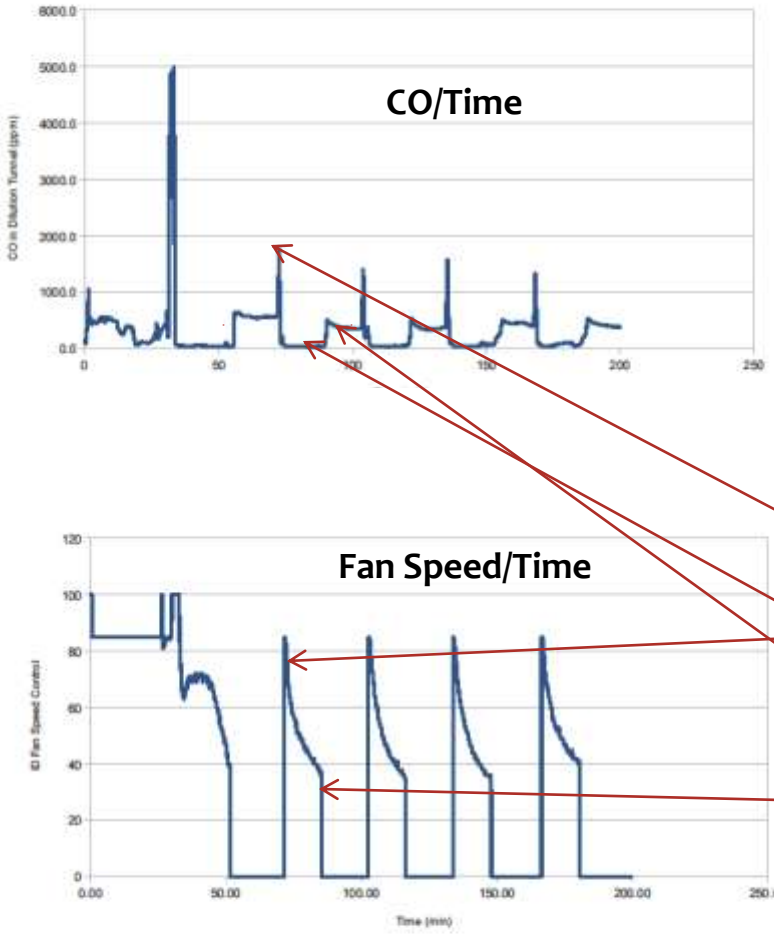
60% reduction in on/off cycling with thermal storage.

Without Thermal Storage, 1700 on/off cycles per year

Recommend 30 gallons per 10,000 Btu of boiler output for automatic stoking boilers and 80 gallons per 10,000 Btu for Cord wood boilers.

With Thermal Storage, 700 on/off cycles per year

The Carbon Monoxide Example, Cordwood Boiler



Each time the boiler turns off, CO drops. When the fan comes back on CO rises dramatically before it then begins to settle downward rapidly.

Some Advantages of Cascading

- Reduce installation cost
- Increase utilization
- Add redundancy
- Match seasonal and diurnal variation

A 10% turndown ratio.

A single 600,000 Btu boiler may reduce its output by 70%.

A cascaded installation of three 200,000 Btu boilers may reduce total output by 90%

Other Reasons to Load Match and De-couple:

- Reduce installation and operation costs.
- Faster heating response, especially in antiquated distribution systems, process water, and water to air systems.
- More comfort for building occupants.
- Stabilize chimney performance.
- A professional approach. It isn't good enough to just sell an alternative energy product.

Parting Words:

Whenever possible, get away from these and other rules of thumb for boiler sizing:

1. 3 Btu/cubic foot
2. 30 Btu/ square foot
3. Counting radiators
4. "The last building I did…"
5. Size of the existing boiler
6. Number of gallons burned last year
7. Burn time

Even taken all together, an accurate heat loss can not be made with rules of thumb!

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