



RSG

the science of insight

Air Quality Progress Update for the Biomass Sector

April 25, 2017

Overview

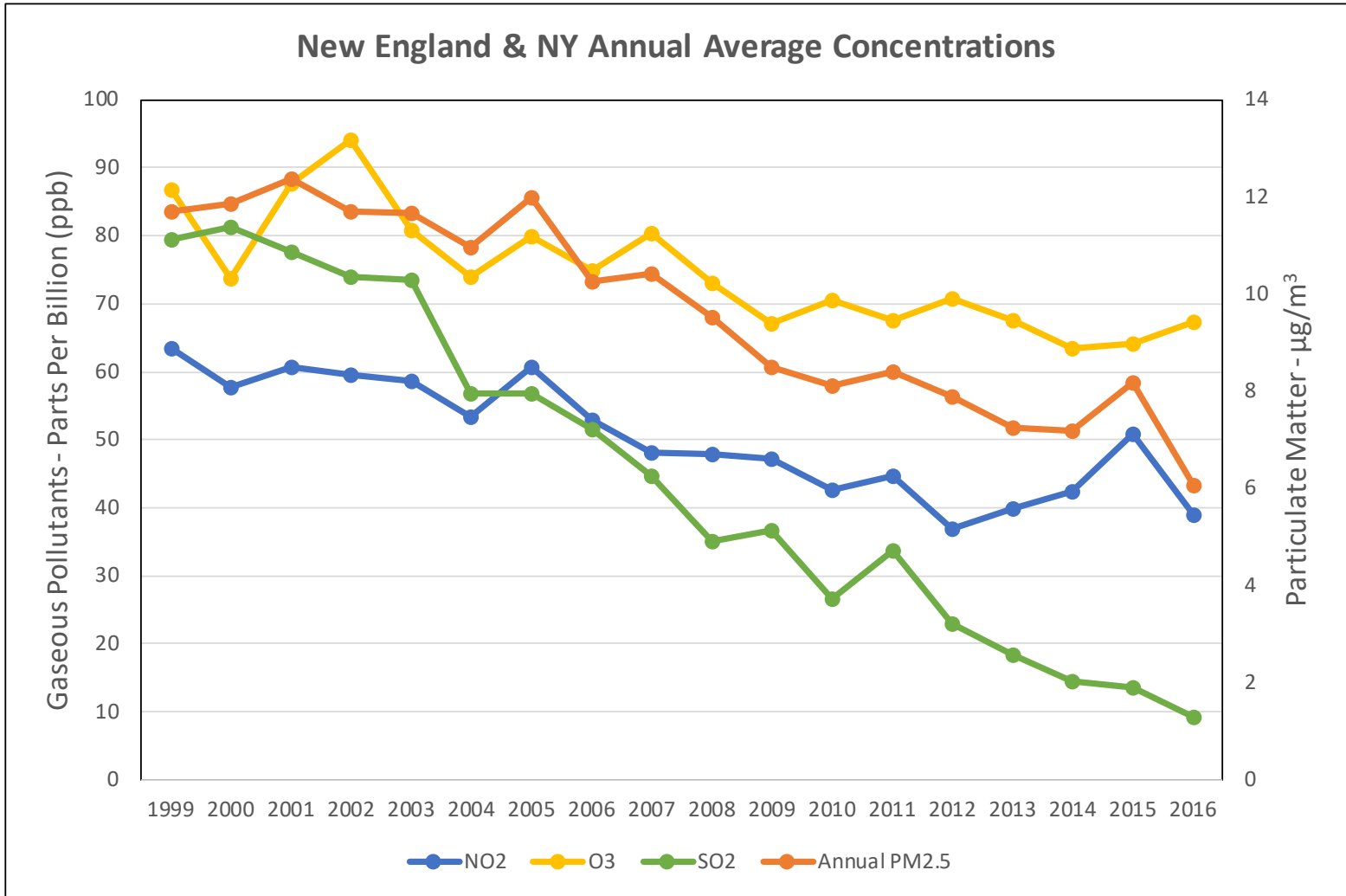
- Air quality trends
- USFS study
- The Boiler MACT Rule
- New emissions data
- Summary & Recommendations



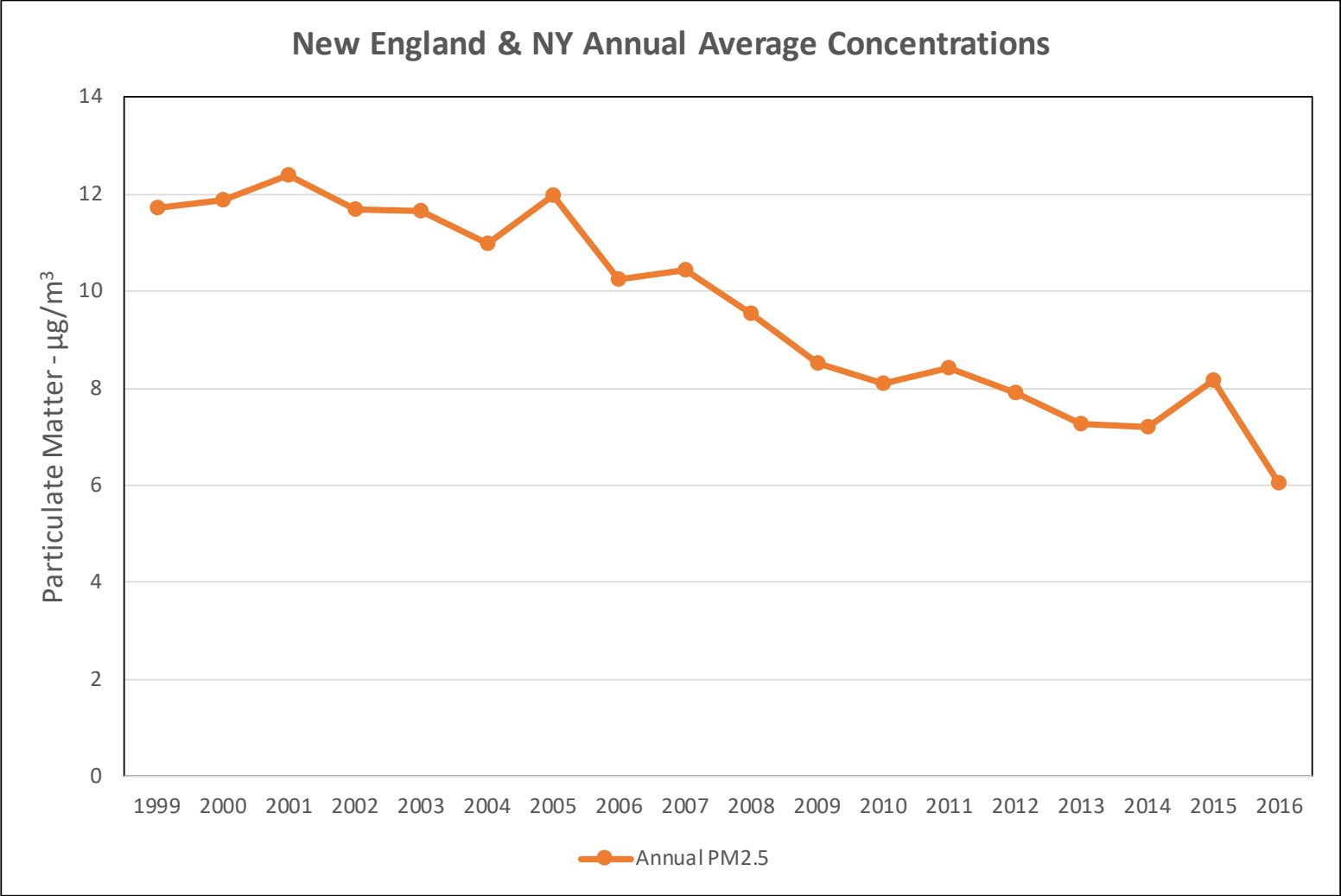


Air Quality Trends

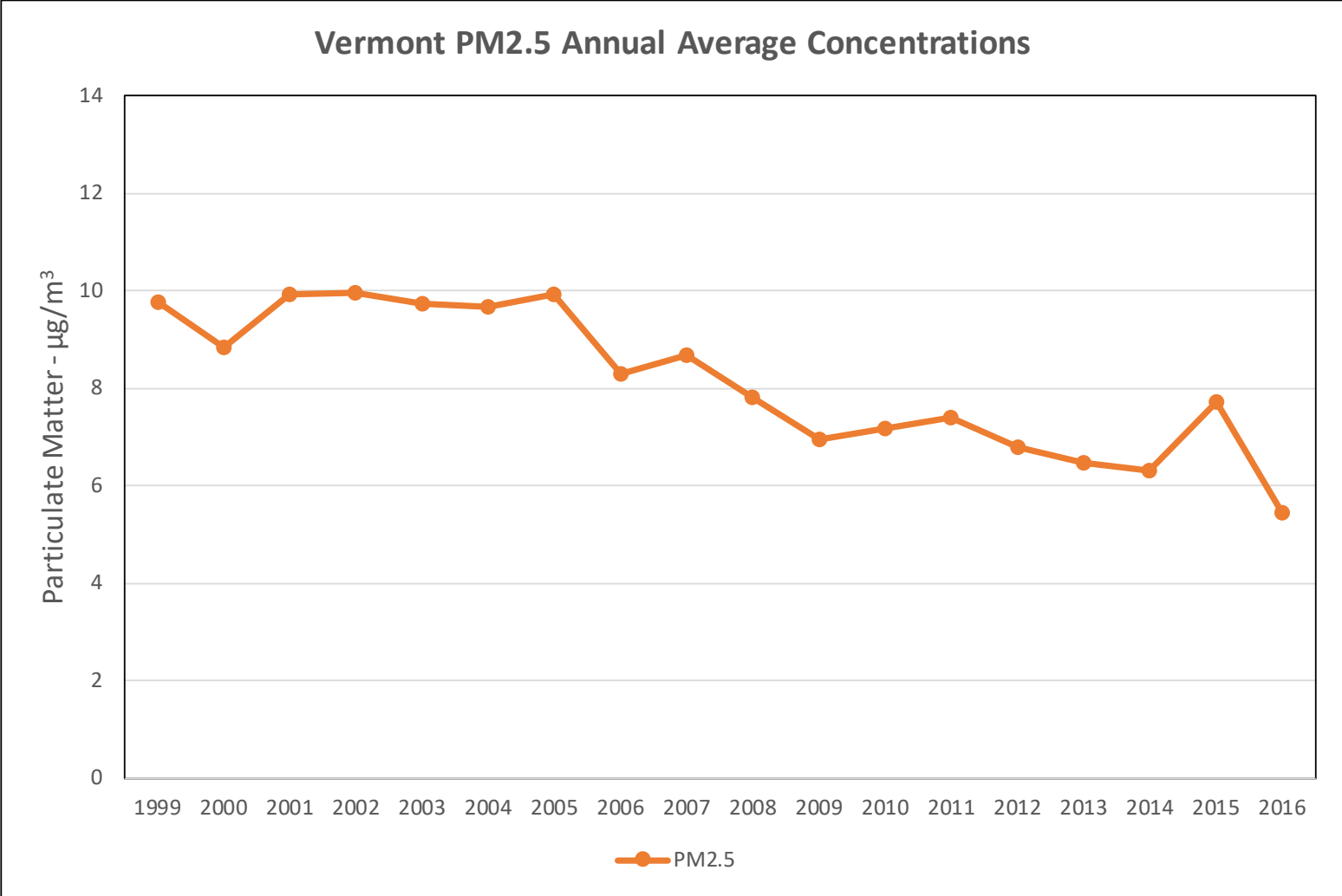
Air Quality Trends



Air Quality Trends



Air Quality Trends



Air Quality Trends

Why has air quality improved?

- New fuel standards
- New wood stove emission limits
- Wood stove changeout programs
- New wood boiler emission limits
- Renewables (solar, wind)
- Energy efficiency
- Fuel switching
- Many more reasons!





USFS Study

USFS Study



Emission Controls for Small Wood-Fired Boilers

Prepared for:

United States Forest Service,
Western Forestry Leadership
Coalition

May 2010

DATA ■ ANALYSIS ■ SOLUTIONS



USFS Study

What are the PM emissions from existing boilers?



Emission Controls for Small Wood-Fired Boilers

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USFS Study

What are the PM emissions from existing boilers?

Can new boilers meet anticipated federal PM limits without additional control?



Emission Controls for Small Wood-Fired Boilers

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USFS Study

What are the PM emissions from existing boilers?

Can new boilers meet the anticipated federal PM limit without additional control?

Is there cost-effective pollution control equipment that will meet the federal PM emission limit?



Emission Controls for Small Wood-Fired Boilers

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United States Forest Service,
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DATA ■ ANALYSIS ■ SOLUTIONS



USFS Study

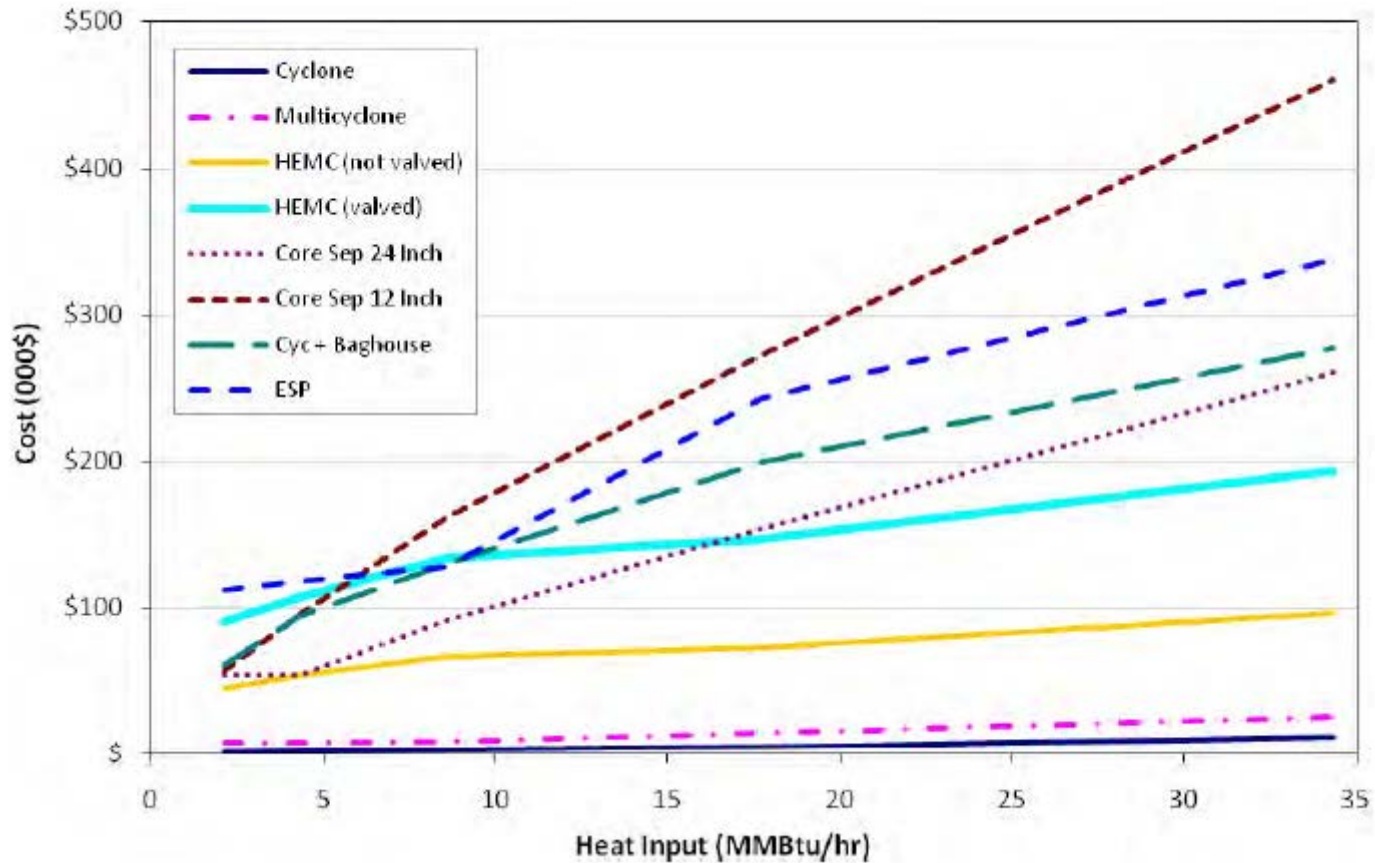
Table 5: Summary of 24 Particulate Matter Stack Emission Tests

Location	Design Heat Input (MMBtu/hr)	Comb. Type	Fuel Burned	Emission Control	PM10 Emissions (lb/MMBtu)	PM2.5 Emissions (lb/MMBtu)	Condens. PM Emissions (lb/MMBtu)
Glocester, RI	4.6	CCG	Mill chips	HEMC	0.016	0.014	
Middlebury, VT	29.0	CCG	Bole chips	MC + FF	0.019		
Dillon, MT	19.0	CCG	Bole chips	MC	0.052		
N. Scituate, RI	9.1	CCG	Mill chips	HEMC	0.058	0.054	0.007
N. Scituate, RI	9.1	CCG	Mill chips	HEMC	0.066	0.066	
Thompson Falls, MT	2.2	CCG	Bole tree chips	Cyclone	0.070		
Brattleboro, VT	6.9	CCG	Wood chips	Core Sep.	0.078		
Greenfield, NH	5.7 & 11.4	SA	Bole chips	MC + FF	0.078	0.062	0.014
Newport, VT	15.6	CCG	Bole chips	MC	0.101		0.006
Peterborough, NH	2.8	SA	Pellets	MC	0.101		
Bennington, VT	16.8	SP	Whole tree chips	2 MC	0.140		
Darby, MT	3.3	SA	Bole chips	None	0.156		
Victor, MT	2.6	SA	Bole chips	None	0.166	0.098	0.009
Springfield, NH	15.5	SA	Sawdust	None	0.168		
Hinesburg, VT	6.5	SA	Bole chips	Cyclone	0.171	0.147	0.012
Brattleboro, VT	10.0	SA	Mill chips	Core Sep.	0.172	0.162	0.012
Burlington, VT	10.0	SA	Mill chips	MC	0.187		0.015
Darby, MT	3.3	SA	Bole chips	None	0.192	0.110	0.015
Bismarck, ND	1.0	SA	Muni. veg. & pallets	None	0.199	0.151	0.077
Burlington, VT	10.0	SA	Bole chips	MC	0.257		0.017
Townsend, MT	0.75	SA	Pellets	None	0.305	0.133	0.036
Bennington, VT	16.8	SP	Whole tree chips	2 MC	0.382	0.267	0.014
Council, ID	1.9	SA	Whole tree chips	None	0.506	0.179	0.039
Dillon, MT	19.0	CCG	Bole chips	MC		0.188	



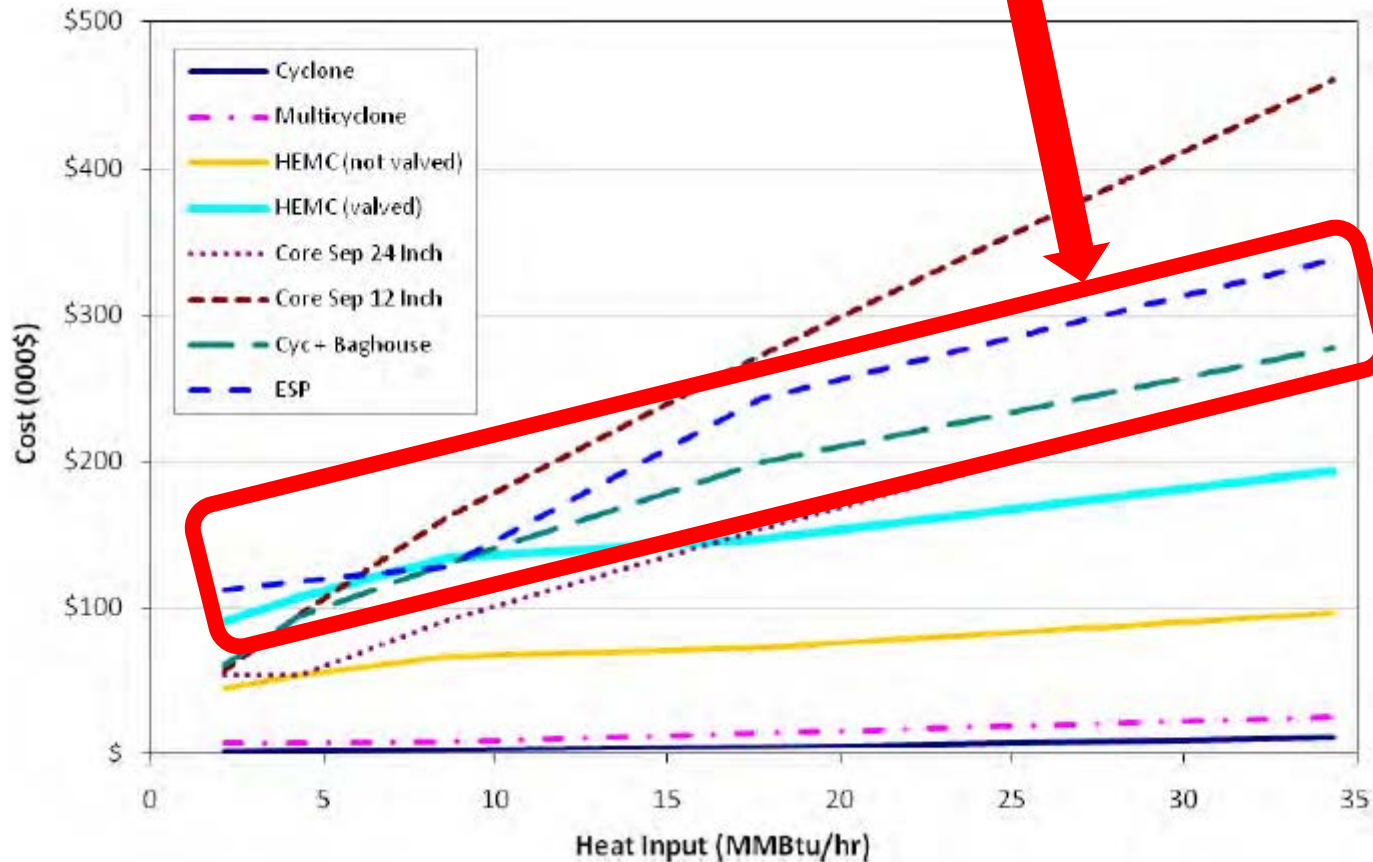
USFS Study

Figure 1: Particulate Matter Add-On Emission Control Costs



USFS Study

Figure 1: Particulate Matter Add-On Emission Control Costs





The Boiler MACT Rule

The Boiler MACT Rule

National Emission
Standards for Hazardous
Air Pollutants (NESHAP)

**Area Sources
Industrial, Commercial,
and Institutional Boilers**

40 CFR Part 63 Subpart JJJJJJ



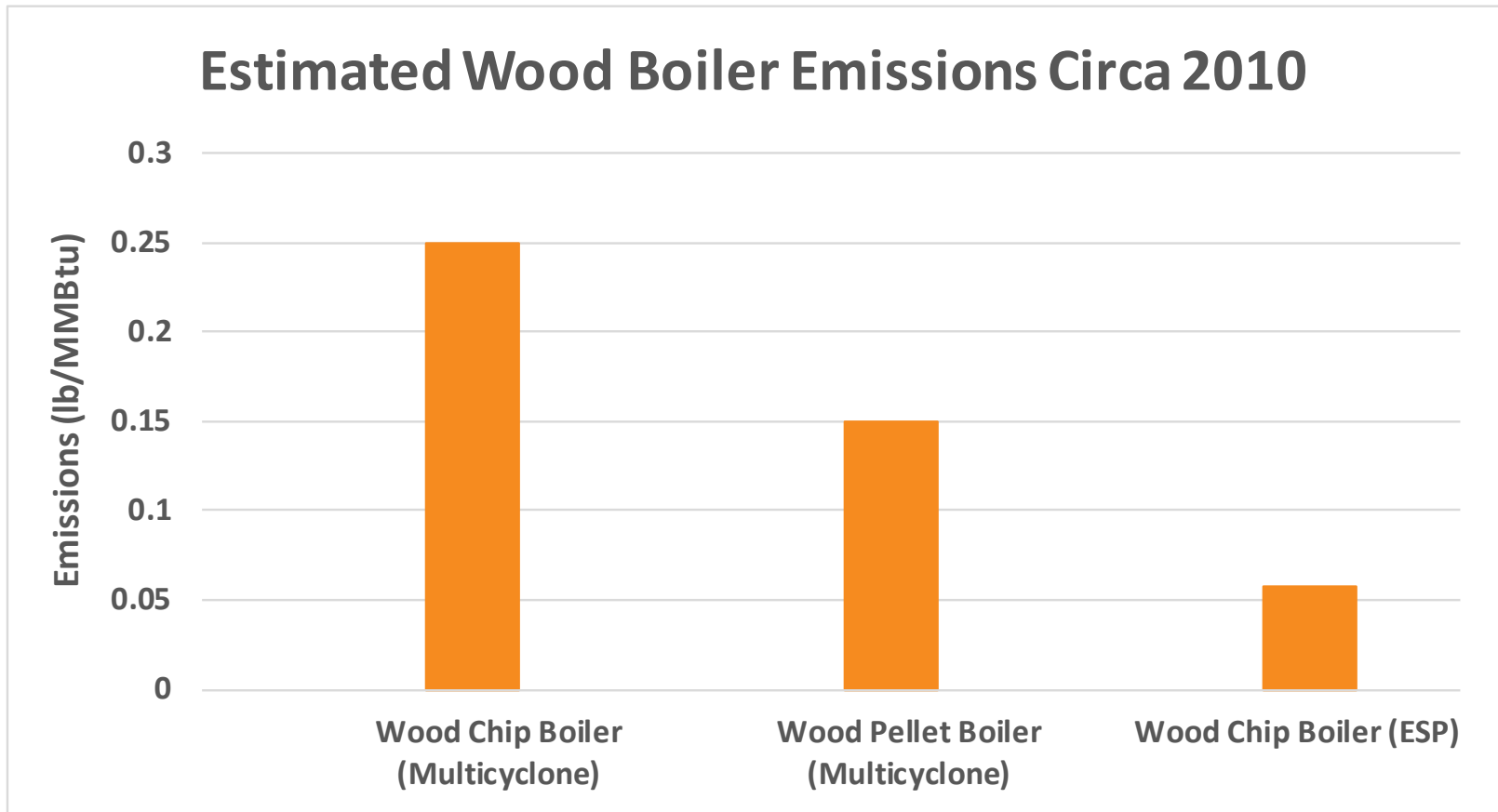
FINAL RULE
March 21, 2011 (76 FR 15554)

FINAL RULE AMENDMENTS
February 1, 2013 (78 FR 7488)
September 14, 2016 (81 FR 63112)

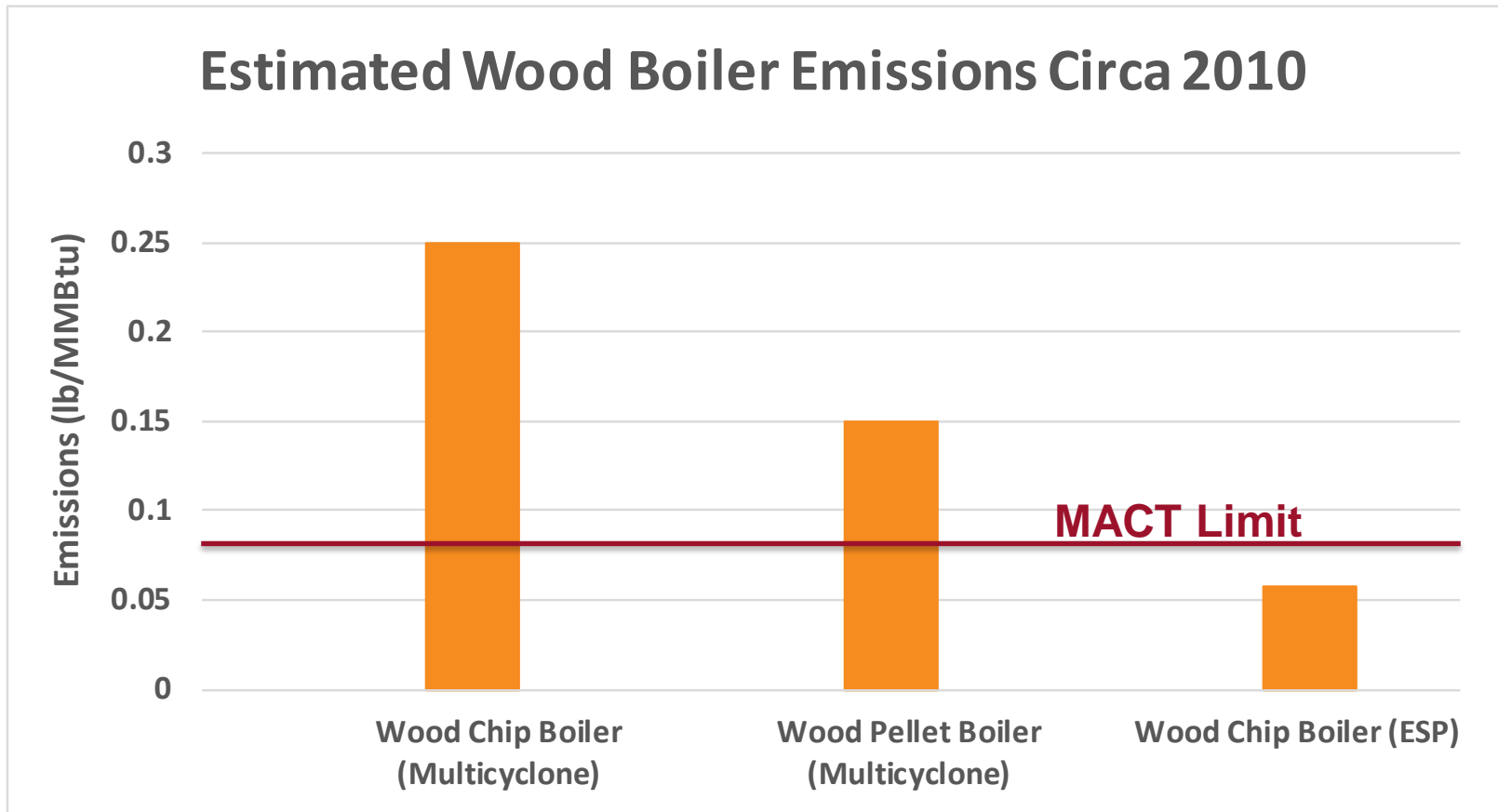
Available at https://www.epa.gov/sites/production/files/2016-10/documents/areaboilerbrochure_oct2016.pdf



The Boiler MACT Rule



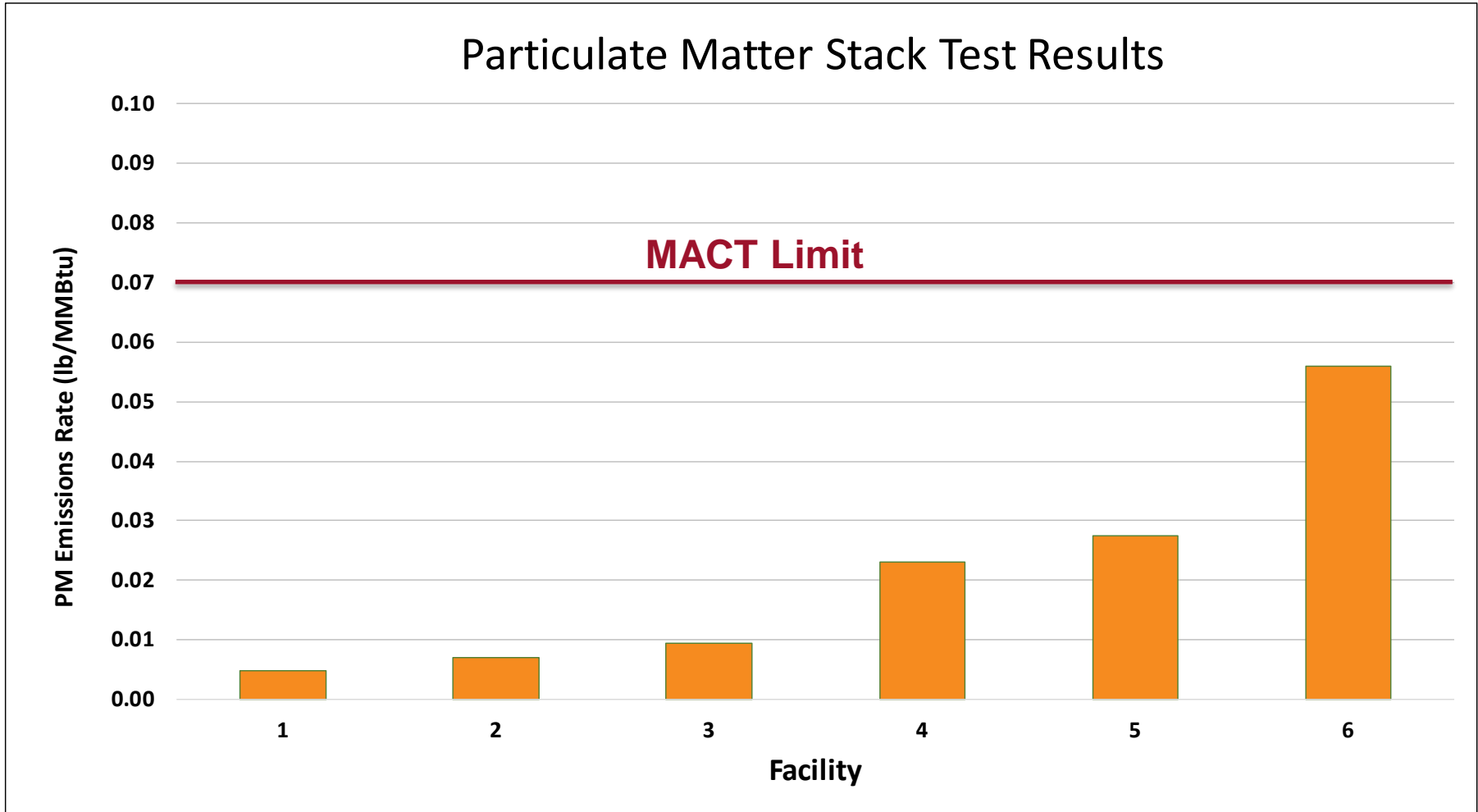
The Boiler MACT Rule





New Emissions Data

New Emissions Data





Summary and Recommendations

Summary & Recommendations

- Air quality and emissions are headed in the right direction!
- The biomass sector is successfully meeting Boiler MACT emission limits.
- ESPs have emerged as a demonstrated technology for meeting emission limits with small wood-fired boilers.
- Create an updated version of the USFS study.



Thank you!

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