

Sustainability Issues for Bioenergy in the Northeast

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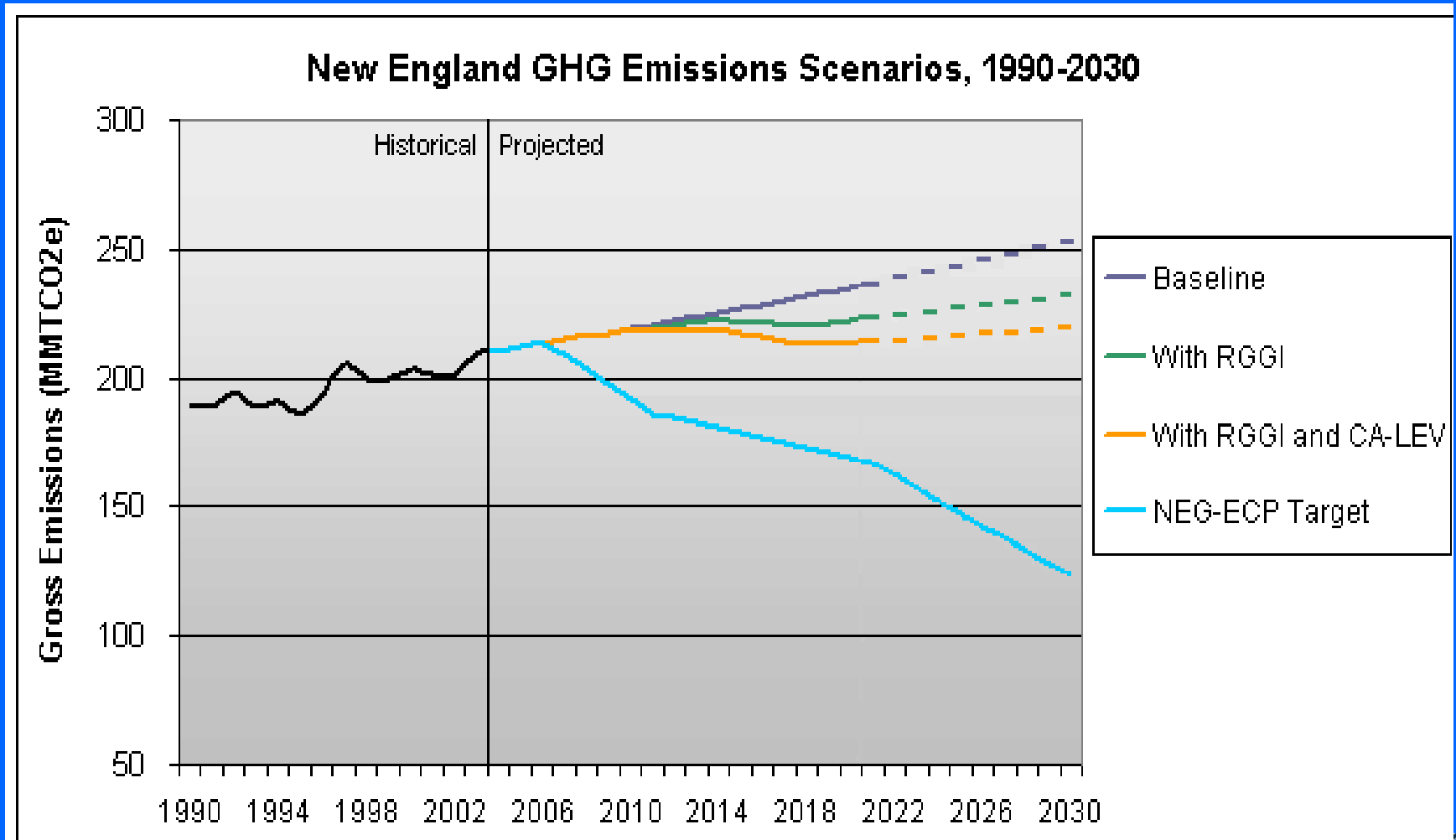


Who is NESCAUM?

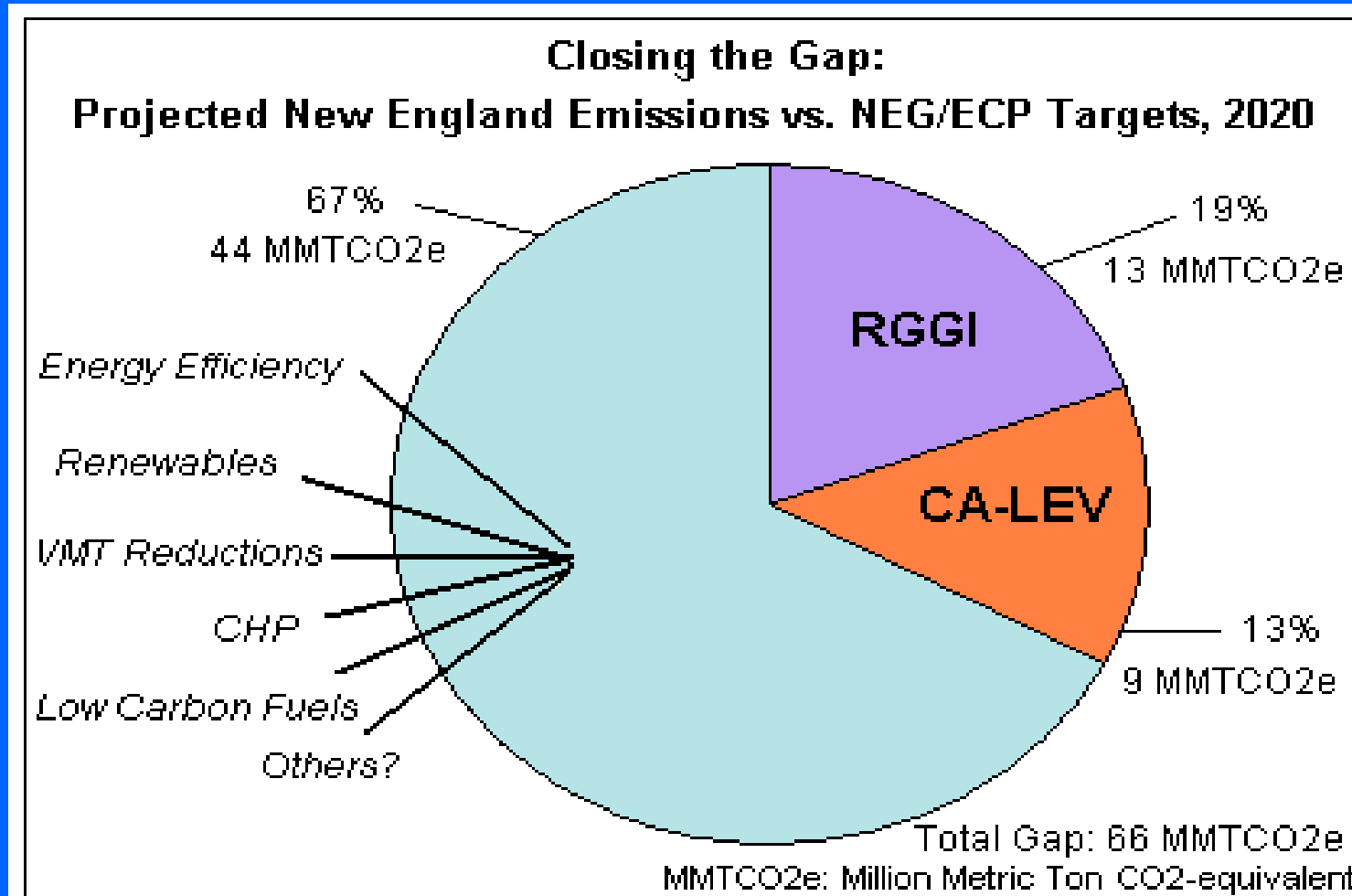
- Northeast States for Coordinated Air Use Management (NESCAUM) was formed in 1967 by the region's Governors
- Nonprofit association of environmental agencies in the 6 New England states, New York & New Jersey
- NESCAUM provides technical and policy analysis and guidance to member states on air quality, climate change, and energy issues
- NESCAUM is leading a study of a Low Carbon Fuel Standard (LCFS) for the Northeast, modeled after CA LCFS



Regional GHG Goals



New England: 33% toward 2020 GHG Goal



Today's Presentation

NESCAUM's study is examining the following policy questions to support LCFS implementation in the Northeast:

- What is the potential role of biomass to support the in-region production of Low Carbon Fuels in the Northeast?
- What are the immediate sustainability concerns surrounding the use of low carbon biomass and biofuels in the Northeast?
- Does a LCFS have built-in safeguards for sustainability?



Biomass Supply in the Northeast

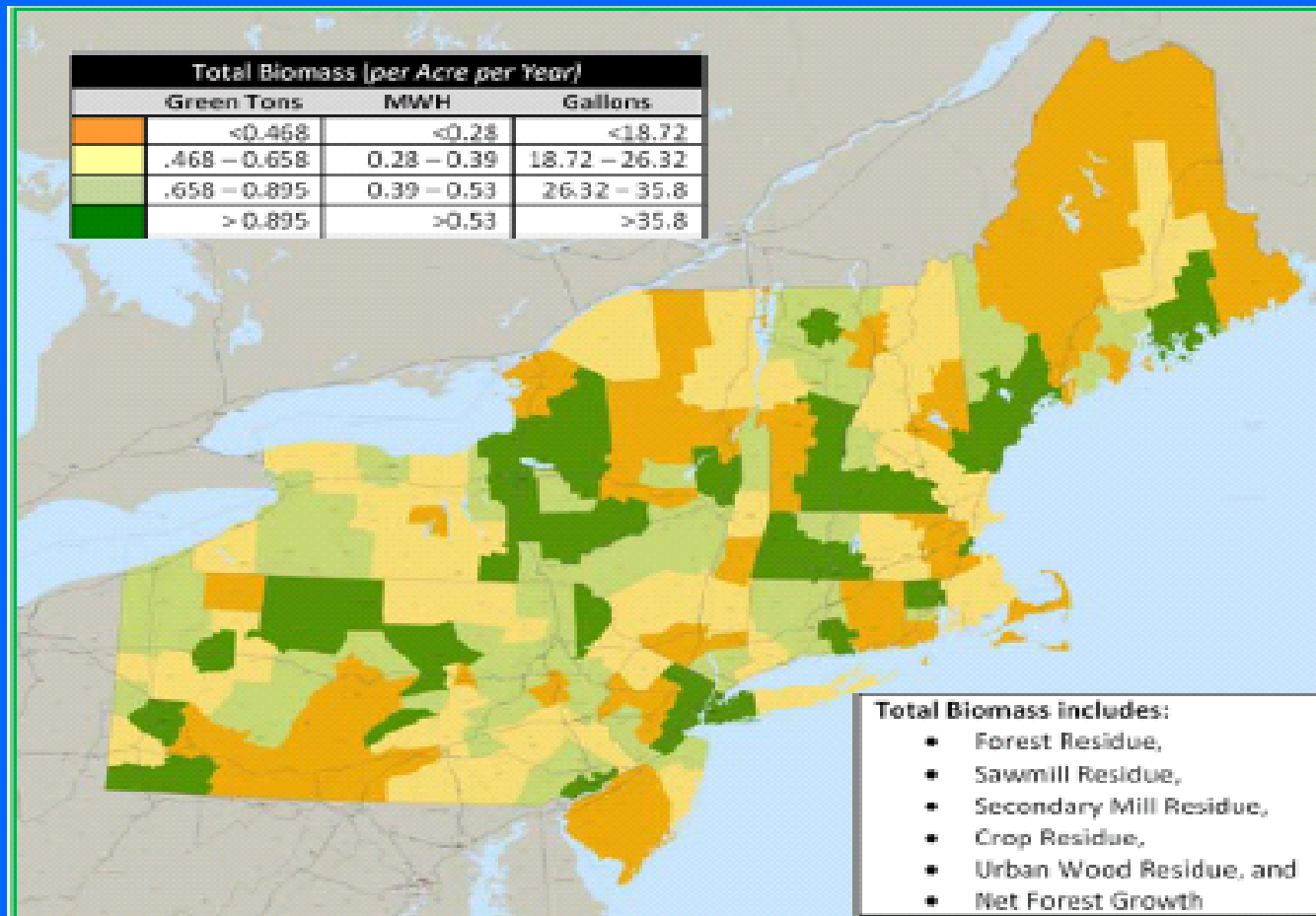
NESCAUM's LCFS study includes 5-yr and 20-year estimates of the potential supply of biomass feedstocks in the Northeast:

- Woody biomass*
- Municipal solid waste (MSW) (*in progress*)
- Agricultural and energy crops (*in progress*)

(We are also doing an analysis of electricity as a low-carbon fuel for PHEVs (*in progress*))



Available Woody Biomass Supply in the Northeast



Source: INRS, LLC and NESCAUM (2008)

Biomass Quantities and Applications, 5-Yr. Timeframe

WOODY BIOMASS, QUANTITIES AND APPLICATIONS: NEW ENGLAND AND MID-ATLANTIC						
Maximum Tons	Crop Residue	Forest Residue	Sawmill Residue	Secondary Mill Residue	Urban Wood	Net Forest Growth
	dry	green	green	dry	dry	green
Total Tons Tons Captured, 5 Years	154,900	2,410,000	1,476,000	94,000	1,246,000	2,751,000
Products, 5 year Total	10% MW Electricity	20% MW Electricity	20% Pellet Homes	40% Pellet Homes	20% MW Capacity	10% Pellet Homes
	21	180	136,667	15,667	167	254,722

Low-end Estimates, 5-Yr. Timeframe:

Total Electricity: ~370MW

Total Homes: ~400,000

Cellulosic EtOH and gasification are potentially important applications over the 20-yr timeframe



Woody Biomass Market in the Northeast

- Market for woody biomass in NE is very geography-specific
- Current infrastructure not necc. sufficient for new markets
- Forward prices for wood not available, making long-term contracts challenging
- Private ownership dominates, so landowner preferences will be critical to how much wood eventually comes to market in the Northeast



Key Environmental Concerns Associated with Biomass and Biofuels in the Northeast

Ecological concerns associated with **biomass harvesting** include:

- Nutrient cycling and retention/soil quality
- Streamflow and water quality
- Maintenance of high carbon sequestration rate
- Habitat fragmentation and biodiversity
- Loss of other ecosystem services

Other environmental concerns associated with **biomass transport, processing, and use** include:

- Air quality
- Water quality and use
- Full lifecycle GHG impacts

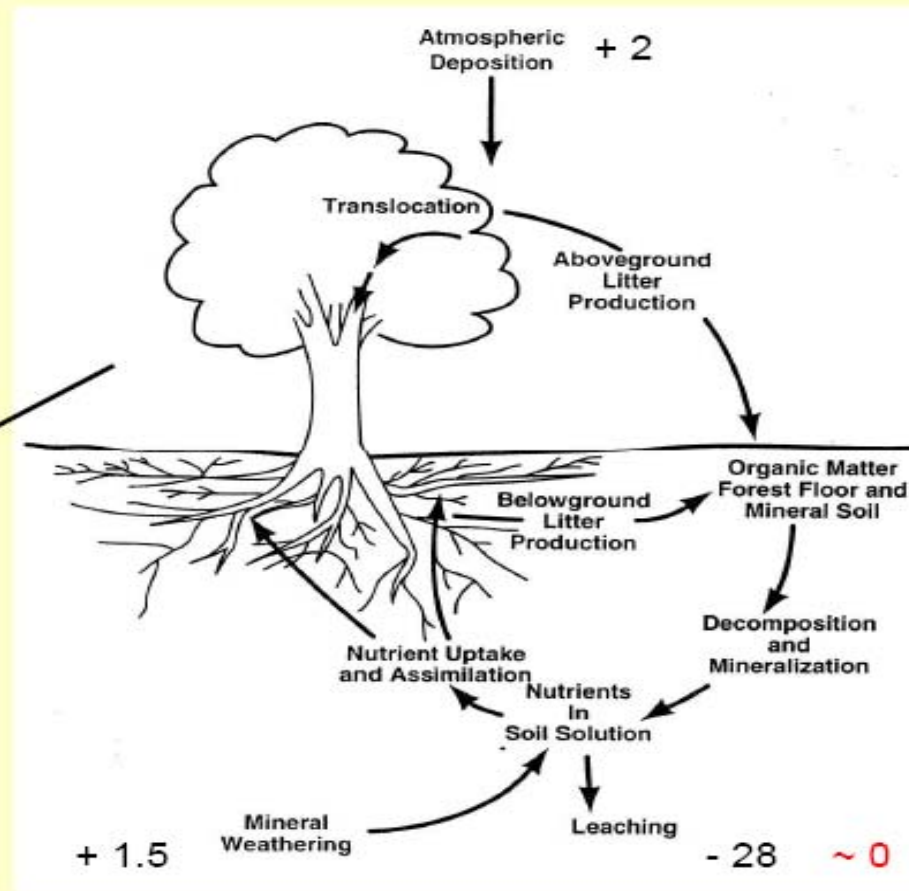


Potential for Nutrient Losses

Calcium loss from clearcut and thinning harvests
(units are kg/ha)

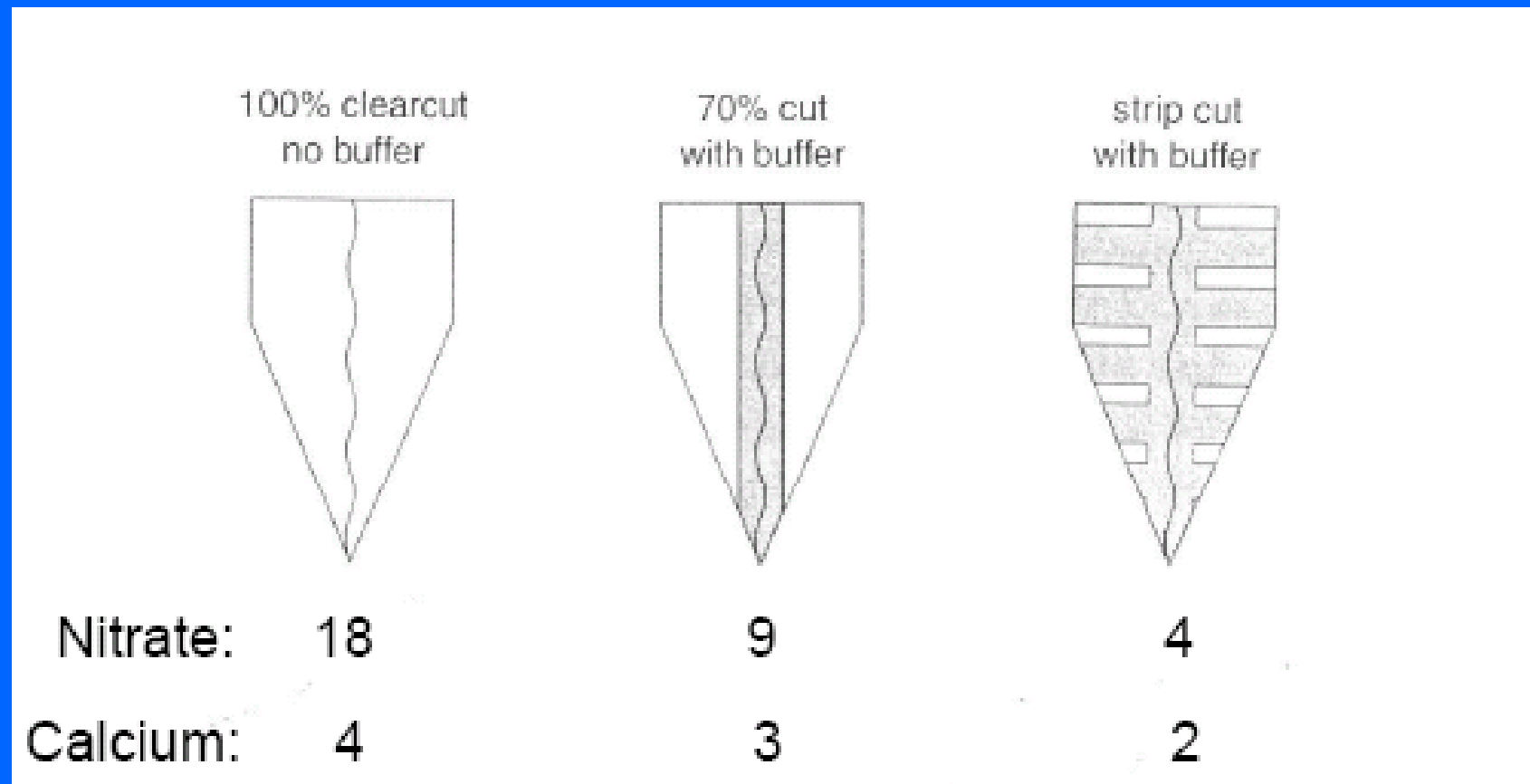
Clearcut harvest removal
- 530

Thinning harvest removal
- 250



Source: Kelty, UMass (2008)

Nutrient losses in streamwater vary with harvest methods (mg/L)



Source: Kelty, UMass (2008)

Potential Water Quality Impacts

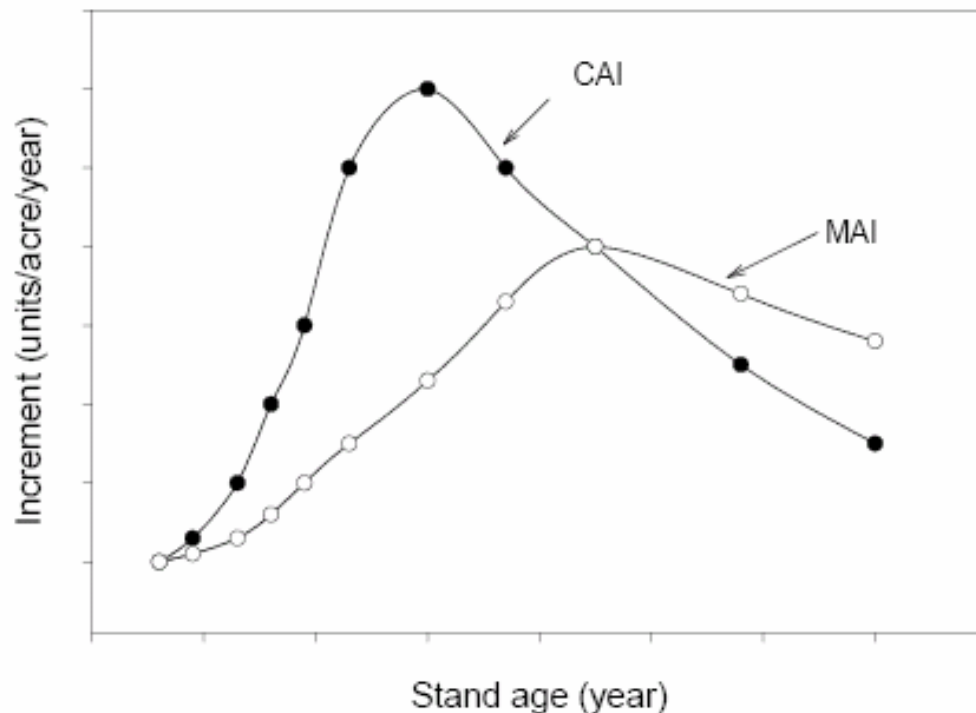


Source: Kelty/UMass (2008)



Managing for High Rates of Forest Carbon Sequestration

Carbon sequestration in forest stands

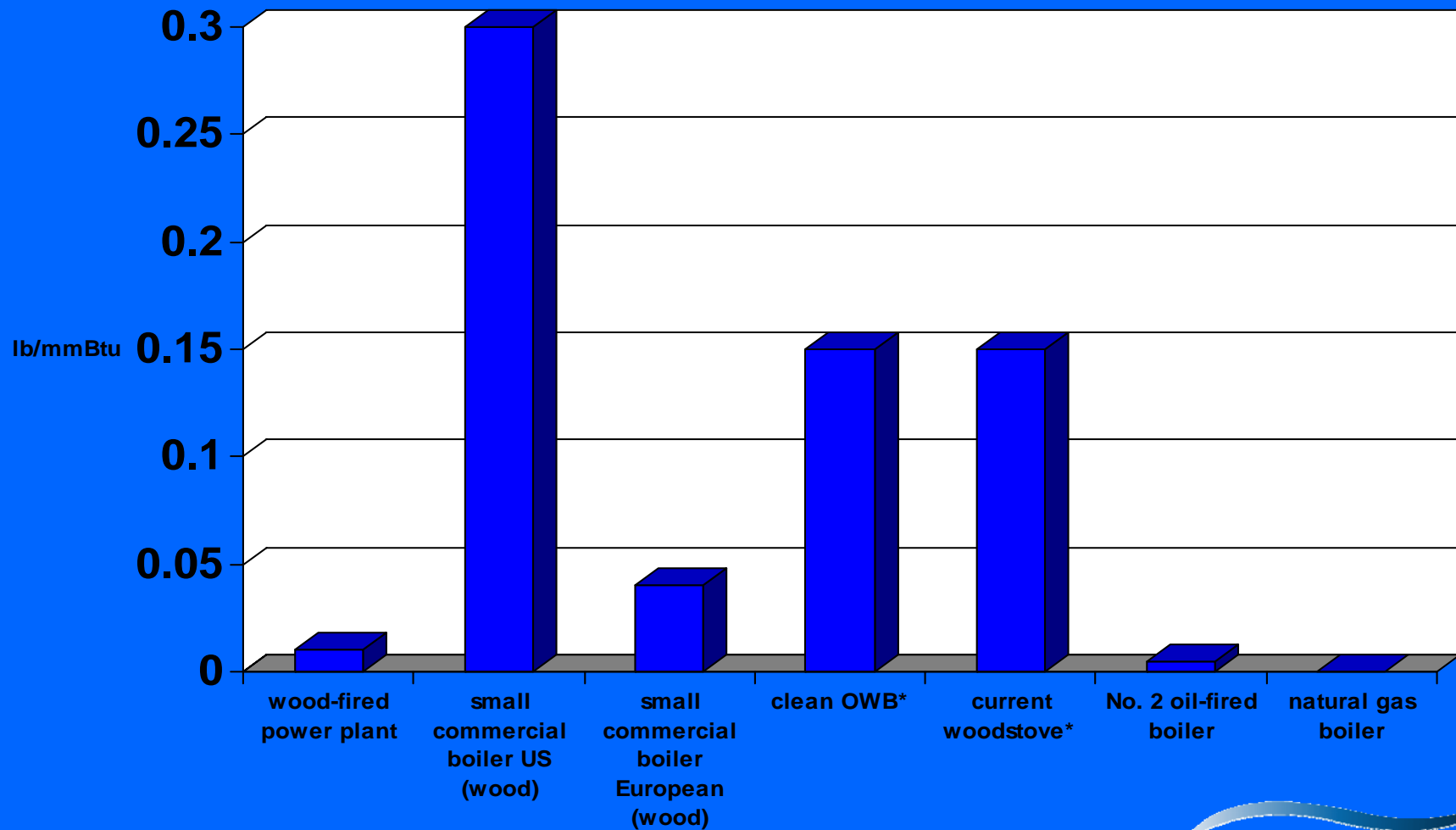


Source: Kelty *et al.* (2008)

Key Air Quality Concerns

- **Particulate Matter** - key regulatory and exposure pollutant is PM with new concern focused on fine fraction of PM (PM_{2.5})
- **Air toxics** – primarily PAHs, toxic metals, condensed and semi-volatile VOCs
 - Magnitude of toxic emissions not certain
 - Recent studies indicate that wood burning may be a source of mercury emissions
- **CO** not a major concern in itself but may be an indicator of VOC toxics
- **NO_x** emissions may be of concern for larger units

PM Emission Comparison scaled to mm/Btu



Source: NESCAUM (2008). *Measurement includes condensable fraction of PM.



Wood Use Is Increasing in the Northeast

- Primary PM emissions from wood-fired units are mostly in fine fraction (less than 2.5 microns or one micron in diameter)
 - estimates are 75% to 95% of PM emissions from these units are fine particles
- PM Control technologies currently in use for small wood boilers (multi clones, cyclones, etc.) do not effectively control fine PM fraction
- We need better emission control options for major pollutants of concern (primary PM and air toxics) given the adverse impacts of PM and the growing use of wood



Outdoor wood boiler, Jericho, VT

Does a LCFS Act as a Safeguard for Sustainability?

- LCFS is a performance standard that will provide incentives for a variety of new fuels, technologies, and applications→ policymakers cannot anticipate all possible sustainability challenges that could arise
- While LCFS provides a clear goal for life-cycle GHG impacts, it is not necessarily protective of other environmental amenities (e.g., biodiversity, air quality)
- LCFS is not the best policy venue to address all of these challenges →policymakers should revisit existing regulations (e.g., forest practices) to consider interactions with LCFS
- In some cases, new regulations will be necessary (e.g., small commercial boilers), but states need to think realistically about enforcement

Thank You! For More Information...

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The Clean Air Association of the Northeast States

