Carbon and Sustainability: Forest biomass updates

Thomas Buchholz[a,b], John Gunn[c], David Saah[a,d]

[a] Spatial Informatics Group
[b] University of Vermont, Gund Institute for Ecological Economics
[c] Natural Assets Laboratory
[d] University of San Francisco, Geospatial Analysis Lab

SIG

USF UNIVERSITY OF SAN FRANCISCO

GUND INSTITUTE FOR ECOLOGICAL ECONOMICS

Geospatial ANALYSIS LAB

signal

The Washington Post

Health & Science

How Europe's climate policies led to more U.S. trees being cut down

A logging truck loaded with freshly cut hardwoods enters the Enviva wood-pellet plant in Ahoskie, N.C. (Joby Warrick/The Washington Post)

OAK CITY, N.C. — For the sake of a greener Europe, thousands of American trees are falling each month in the forests outside this cotton-country town.

Every morning, logging crews go to work in densely wooded bottomlands along the Roanoke River, clearing out every tree and shrub down to the bare dirt. Each day, dozens of trucks haul freshly cut oaks and poplars to a nearby factory where the wood is converted into small pellets, to be used as fuel in European power plants.

Forbes | New Posts +7 | Most Popular | Lists | Video | 2 FREE Issues of Forbes | Searc

Log in | Sign up | Connect

Tom Zeller Jr. Contributor

Minding the collision of business, energy, science & the environment.

Opinions expressed by Forbes Contributors are their own.

FOLLOW

ENERGY 5/18/2015 @ 4:20PM | 2,300 views

Wood Pellet Power: A Climate Threat?

+ Comment Now + Follow Comments

Much ado has been made of late about the advantages and, increasingly, the potential disadvantages of using wood to create energy. Figuring out what's what on that front has taken on new urgency, with renewable energy policies in Europe driving an unprecedented boom in the use of manufactured wood pellets to generate electricity.

The New York Times

LOG IN

BUSINESS DAY

Climate Change Calls for Science, Not Hope

JUNE 23, 2015

Eduardo Porter
ECONOMIC SCENE

Email

Save

Is the American approach to combating climate change going off the rails?

Last year, President Obama set a goal of reducing carbon emissions by as much as 28 percent from 2005 levels by 2025, only 10 years from now.

Now, environmental experts are suggesting that some parts of the strategy are, at best, a waste of money and time. At worst, they are setting the United States in the wrong direction entirely.

That is the view of some of the world's top environmental organizations, including Greenpeace, Friends of the Earth and the Sierra Club. On Tuesday, they argued in a letter to the White House that allowing the burning of biomass to help reduce consumption of fossil fuels in the nation's power plants, as proposed by the Environmental Protection Agency, would violate the Clean Air Act.

It's also the view of economists from the University of Chicago and the University of California, Berkeley, who on Tuesday released the disappointing results of a field test of the federal Weatherization Assistance Program, the government's largest effort to improve residential energy efficiency.

Efficiency Gains Slow

The energy intensity of the global economy — the amount of energy needed to produce a given amount of economic output — has been improving for decades, as the world's economies have become more energy efficient. But those gains have slowed in recent years.

WORLD ENERGY INTENSITY

It turns out that burning biomass — wood, mainly — for power produces 50 percent more CO_2 than burning coal. And even if new forest growth were to eventually suck all of it out of the atmosphere, it would take decades — perhaps more than a century — to make up the difference and break even with coal.


npr
stations
donate
shop
sign in/register
news ▸ science ▸ energy
Report Challenges Environmental Friendliness Of U.S. Pellet Industry
JUNE 02, 2015 4:43 PM ET
Listen to the Story
All Things Considered
4:49
+ Playlist
Download
Embed
Transcript
NPR's Audie Cornish speaks with *Washington Post* reporter Joby Warrick about how the burning of wood pellets instead of coal has led to increased deforestation in the U.S.

Daily Mail .com

The UK's £1billion carbon-belcher raping US forests...that YOU pay for: How world's biggest green power plant is actually INCREASING greenhouse gas emissions and Britain's energy bill

- Drax power station in Yorkshire uses wood pellets to create electricity
- The move from coal was considered to be environmentally friendly
- But far from cutting emissions, change is actually increasing them
- In turn, it is adding millions of pounds to Britain's electricity bills

By DAVID ROSE FOR THE MAIL ON SUNDAY

PUBLISHED: 18:35 EST, 6 June 2015 | **UPDATED:** 06:42 EST, 7 June 2015

196
View comments

It is touted as the flagship of Britain's energy future: the world's biggest green power plant burning wood pellets to generate renewable biomass electricity that will safeguard the planet for our children.

King Introduces Bills to Promote Biomass and Hydropower Electricity Production in Maine

Thursday, May 14, 2015

WASHINGTON, D.C. – U.S. Senator Angus King (I-Maine), a member of the Senate Energy and Natural Resources Committee, announced today that he has introduced two pieces of legislation that would encourage and safeguard the use of Maine's natural resources to generate renewable electricity. *The Working Forests for Clean Energy Act* would ensure that emissions generated from sustainably-harvested biomass would be considered carbon neutral under the President's proposed Clean Power Plan, and *the Small Hydropower Dependable Regulatory Order (Small HyDRO) Act of 2015* would streamline a cumbersome federal licensing process for hydroelectric dams.

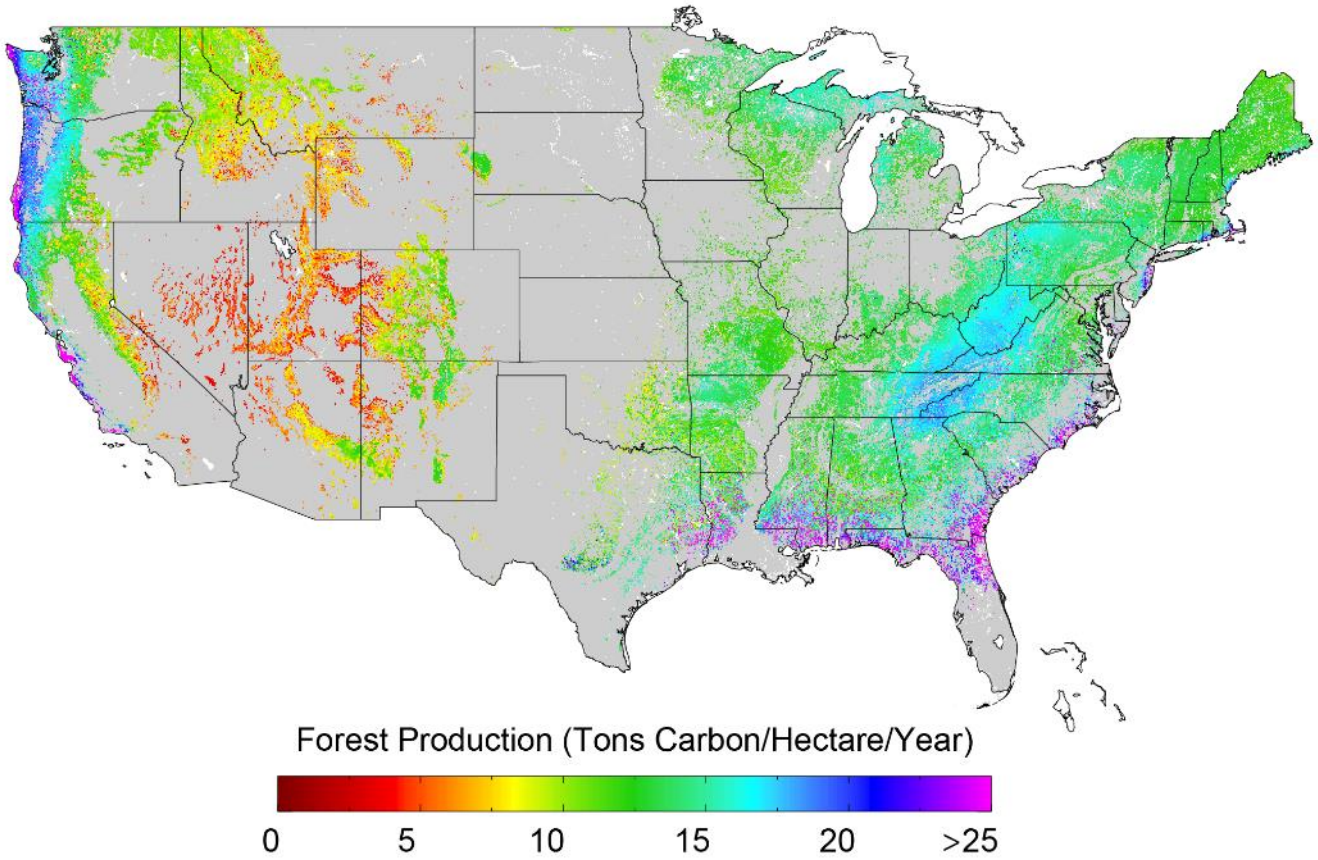
"Maine's natural resources offer promising opportunities to generate clean, renewable electricity," Senator King said. "But the success of those opportunities depends on the effectiveness of federal policies and, right now, policies from Washington are hurting more than they're helping. By setting an appropriate carbon standard for biomass and by streamlining the burdensome licensing process for dams, these bills would give badly-needed certainty to states and help preserve and create home-grown, diverse, and sustainable energy resources."

The Working Forests for Clean Energy Act

In June 2014, the Environmental Protection Agency (EPA) proposed the Clean Power Plan, an initiative that sets federal standards for states to achieve a 30 percent reduction in carbon pollution from the power sector by 2030. However, in considering sources of carbon emission, the EPA did not definitively address biomass, which is used to generate nearly one-third of electricity in Maine. And while a non-binding EPA memo did indicate that the agency may consider biomass emissions carbon neutral, it has not codified any rules that would provide certainty needed for states or the forest products industry.

To address that, *the Working Forests for Clean Energy Act* would provide a straightforward standard to account for emissions from biomass sources. Under the legislation, provided that a federal analysis determines that national forest stocks are stable or increasing, biomass emissions would then be considered carbon neutral. Additionally, biomass derived from mill or harvest residuals, or waste from forest management activities, would also be considered carbon neutral. The standard will provide certainty to states and the forest products industry, helping ensure that a diverse market for domestic forest products can continue while also safeguarding against the widespread harvesting of forests to create electricity without any regard to the sustainability of the stock.

Forest Growth Provides an Important Carbon Sink



Source: National Climate Assessment; Running et al., 2004.

King Introduces Bills to Promote Biomass and Hydropower Electricity Production in Maine

Thursday, May 14, 2015

WASHINGTON, D.C. – U.S. Senator Angus King (I-Maine), a member of the Senate Energy and Natural Resources Committee, announced today that he has introduced two pieces of legislation that would encourage and safeguard the use of Maine's natural resources to generate renewable electricity. *The Working Forests for Clean Energy Act* would ensure that emissions generated from sustainably-harvested biomass would be considered carbon neutral under the President's proposed Clean Power Plan, and *the Small Hydropower Dependable Regulatory Order (Small HyDRO) Act of 2015* would streamline a cumbersome federal licensing process for hydroelectric dams.

"Maine's natural resources offer promising opportunities to generate clean, renewable electricity," Senator King said. "But the success of those opportunities depends on the effectiveness of federal policies and, right now, policies from Washington are hurting more than they're helping. By setting an appropriate carbon standard for biomass and by streamlining the burdensome licensing process for dams, these bills would give badly-needed certainty to states and help preserve and create home-grown, diverse, and sustainable energy resources."

The Working Forests for Clean Energy Act

In June 2014, the Environmental Protection Agency (EPA) proposed the Clean Power Plan, an initiative that sets federal standards for states to achieve a 30 percent reduction in carbon pollution from the power sector by 2030. However, in considering sources of carbon emission, the EPA did not definitively address biomass, which is used to generate nearly one-third of electricity in Maine. And while a non-binding EPA memo did indicate that the agency may consider biomass emissions carbon neutral, it has not codified any rules that would provide certainty needed for states or the forest products industry.

To address that, *the Working Forests for Clean Energy Act* would provide a straightforward standard to account for emissions from biomass sources. Under the legislation, provided that a federal analysis determines that national forest stocks are stable or increasing, biomass emissions would then be considered carbon neutral. Additionally, biomass derived from mill or harvest residuals, or waste from forest management activities, would also be considered carbon neutral. The standard will provide certainty to states and the forest products industry, helping ensure that a diverse market for domestic forest products can continue while also safeguarding against the widespread harvesting of forests to create electricity without any regard to the sustainability of the stock.

BIOMASS
MAGAZINE

OMB weighs in on biomass language included in appropriations bill

By Erin Voegele | July 01, 2015

The White House Office of Management and Budget has published a statement of administration policy that details its opposition to several components of an appropriations bill pending the in the U.S. House of Representatives, including a provision related to biogenic carbon emissions.

The Department of Interior, Environment, and Related Agencies Appropriations Act, 2016, also known as H.R. 2822, includes language that would categorize air emissions from forest biomass as carbo neutral. The text of the bill would req the administrator of the U.S. EPA to " agency policies and actions regarding emissions from forest biomass includin but not limited to, air emissions from

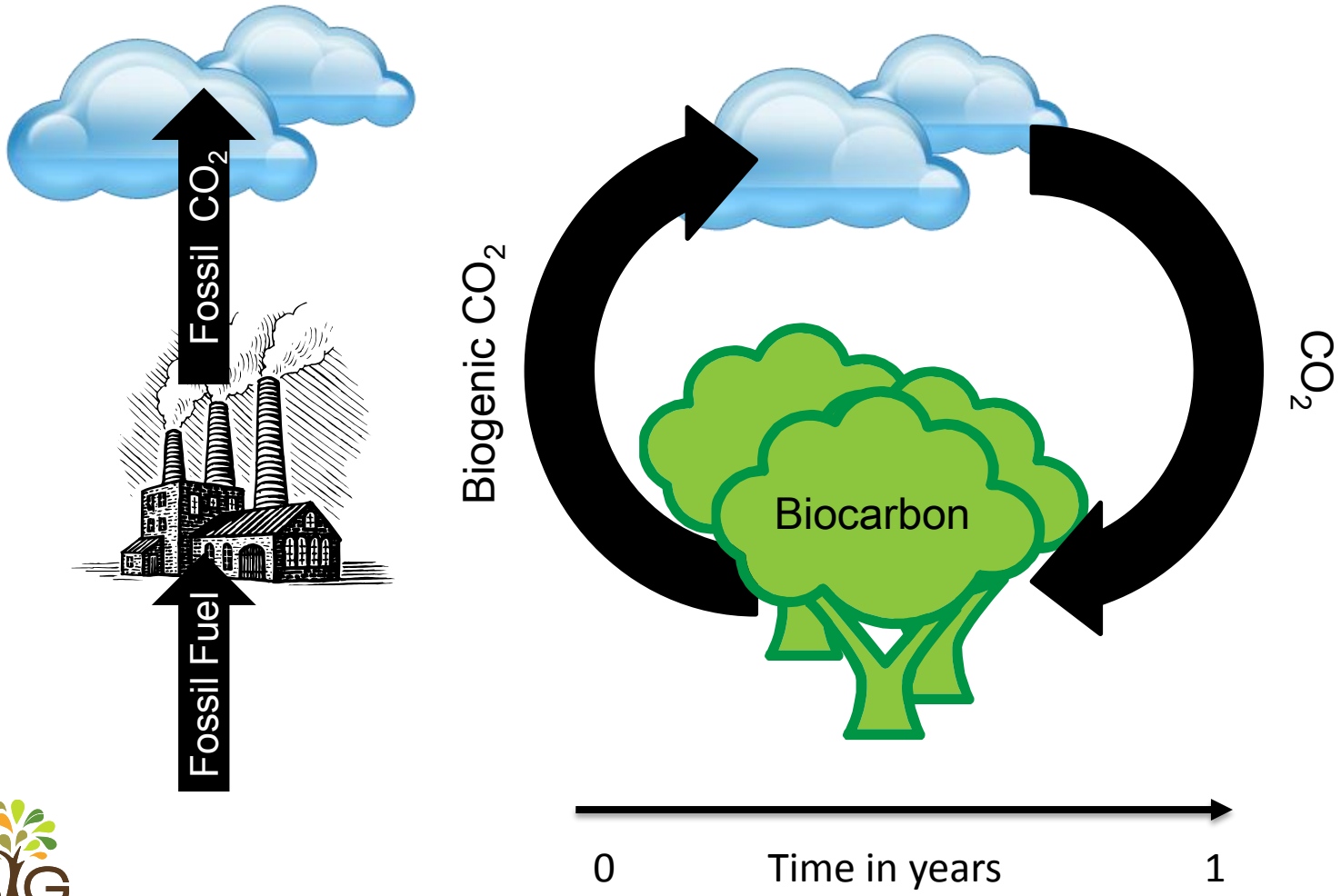
On June 25, Rep. Don Beyer, D-Va., introduced an amendment that aimed to strike the biomass provision from the bill. However, the amendment was withdrawn.

In its statement of administration policy, the OMB indicated that the administration objects to the bill's representation of forest biomass as categorically carbon-neutral. "This language conflicts with existing EPA policies on biogenic CO2 and interferes with the position of states that do not apply the same policies to forest biomass as other renewable fuels like solar or wind. This language stands in contradiction to a wide-ranging consensus on policies and best available science from EPA's own independent Science Advisory Board, numerous technical studies, many States, and various other stakeholders," said the OMB in the statement.

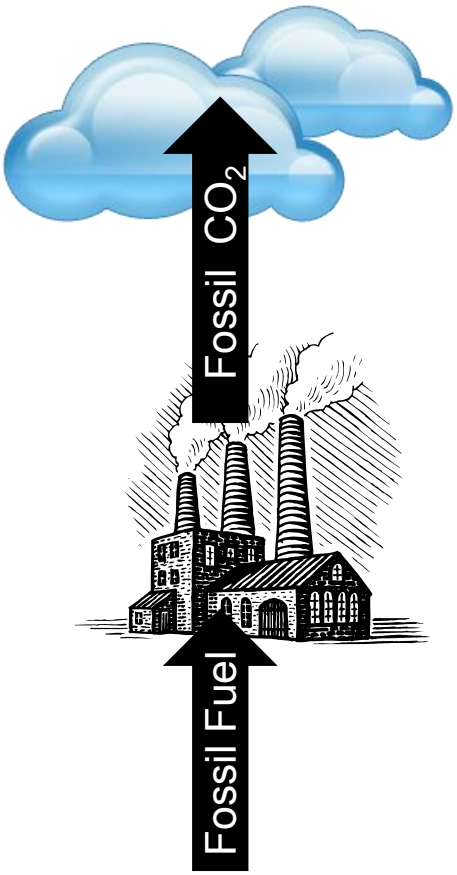
Two major scientific challenges

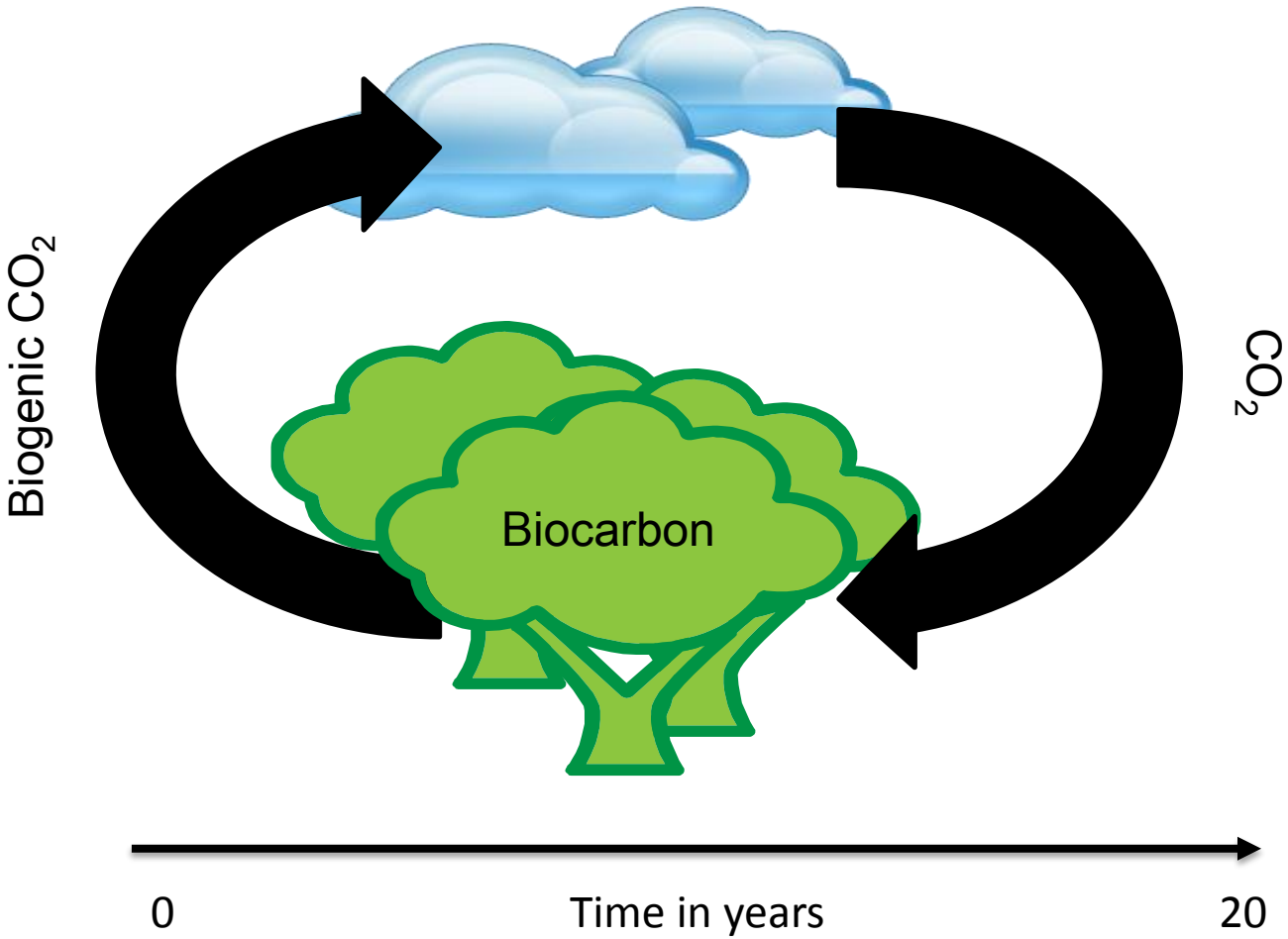
- Timing of emissions
- Baseline assumptions

Biocarbon Cycle and Fossil Carbon Emissions



Biocarbon Cycle and Fossil Carbon Emissions



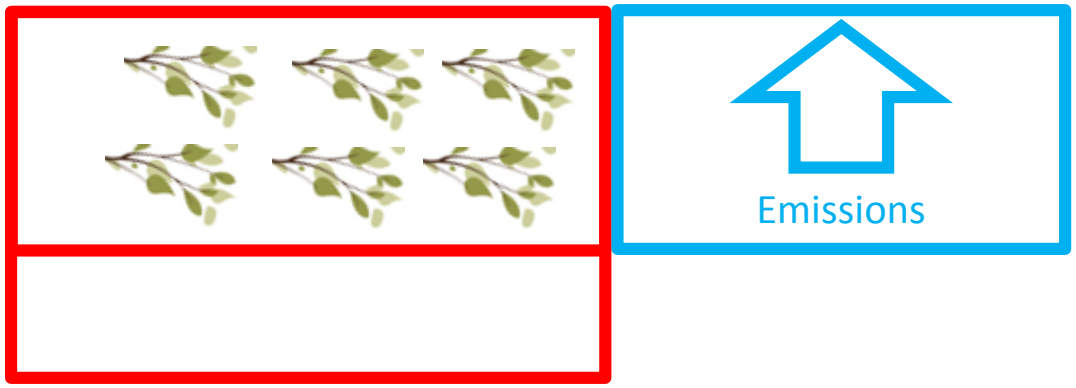


Timing of emissions: dead biomass

Dead biomass carbon pool

Biomass decay

Timing of emissions: dead biomass

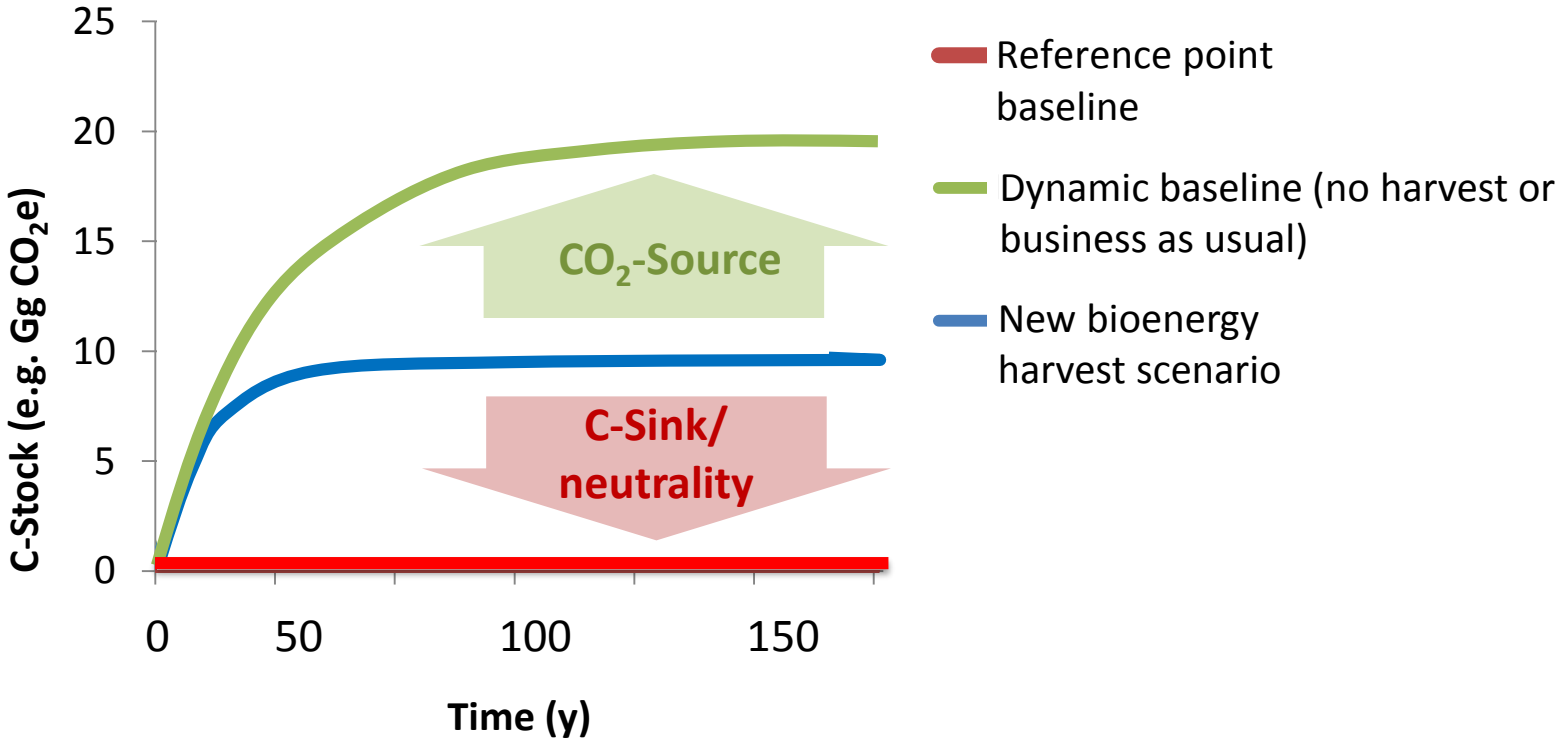


Dead biomass carbon pool

Biomass decay

Residues used for energy: emitted immediately

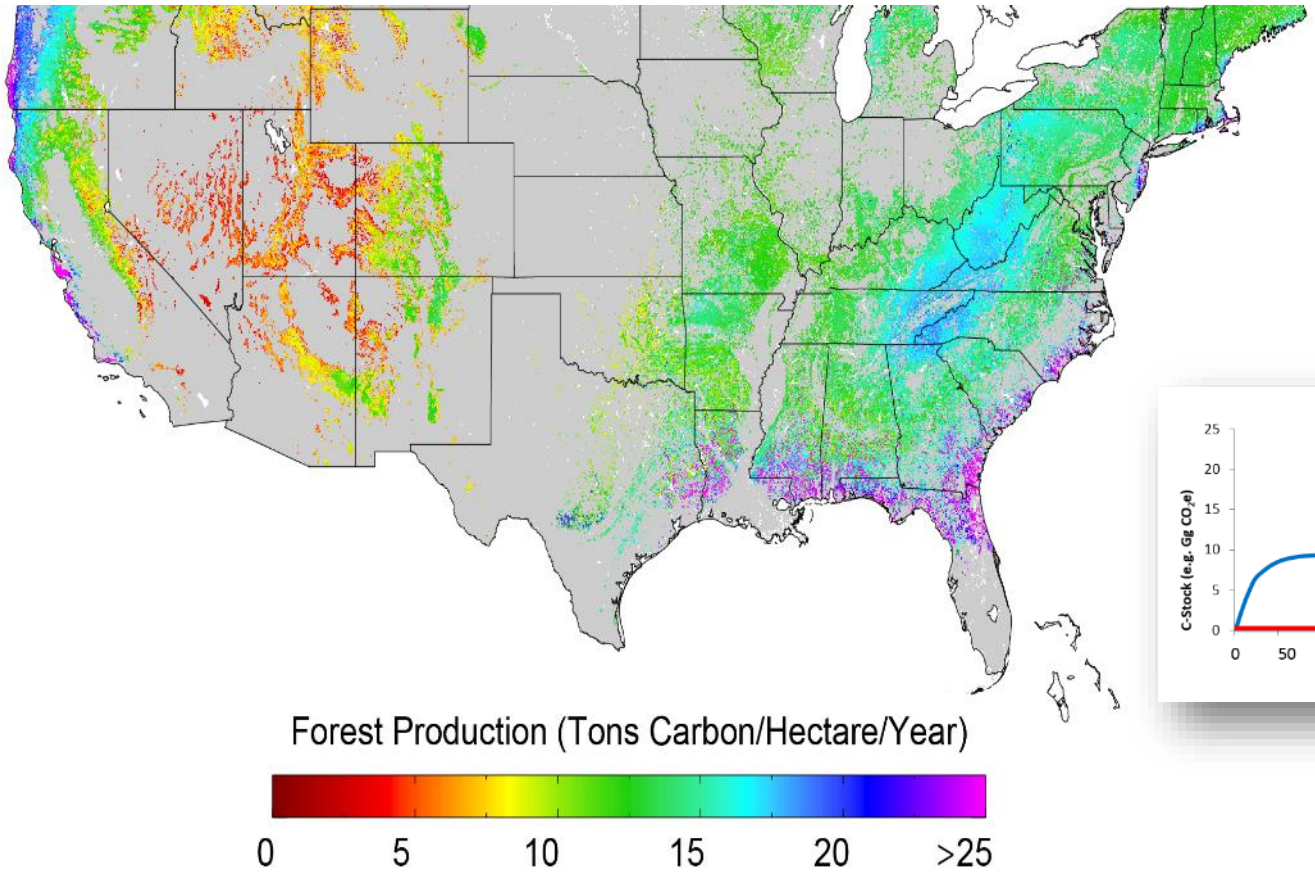
Forest stock baseline choices

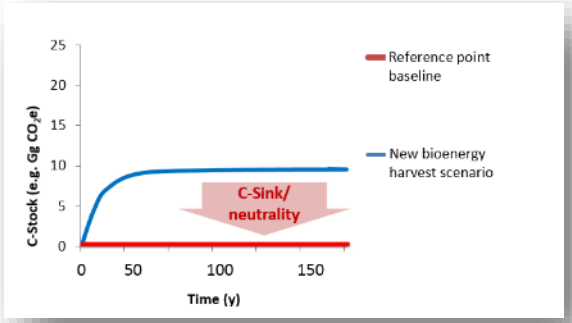


Baselines: Major challenges

- How to balance different carbon pools:
  - Example: How to account for declining dead biomass pool due to logging residue removal when overall forest carbon stock is increasing?
- How to draw meaningful boundaries:
  - Example: One forest region (softwoods, public land, etc.) is increasing in carbon stock, another one (hardwoods, private land, etc.) is decreasing due to increased biomass harvest
  - Focus on ‘working forests’?

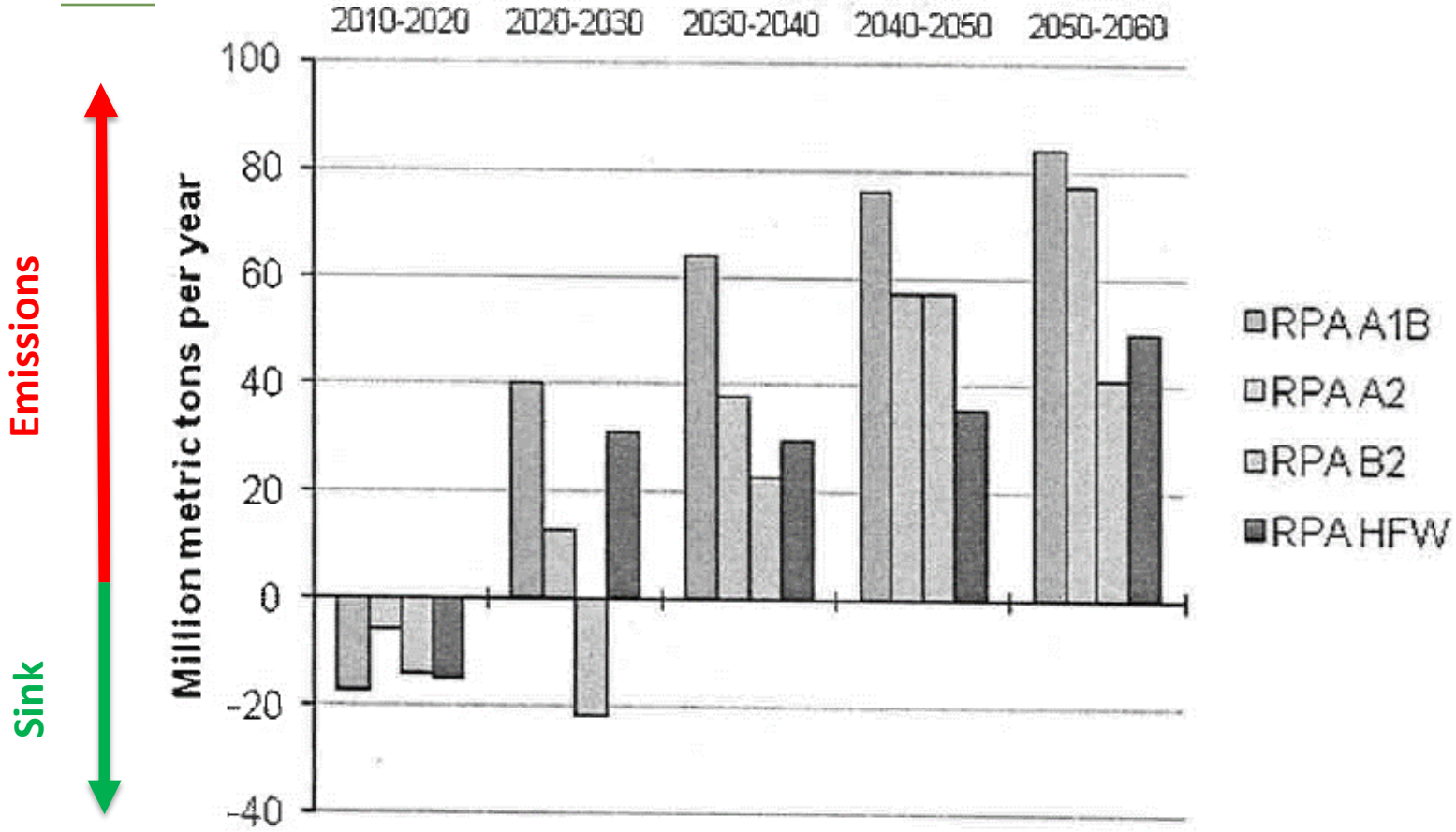
Example: Reference point baseline





Source: National Climate Assessment; Running et al., 2004.

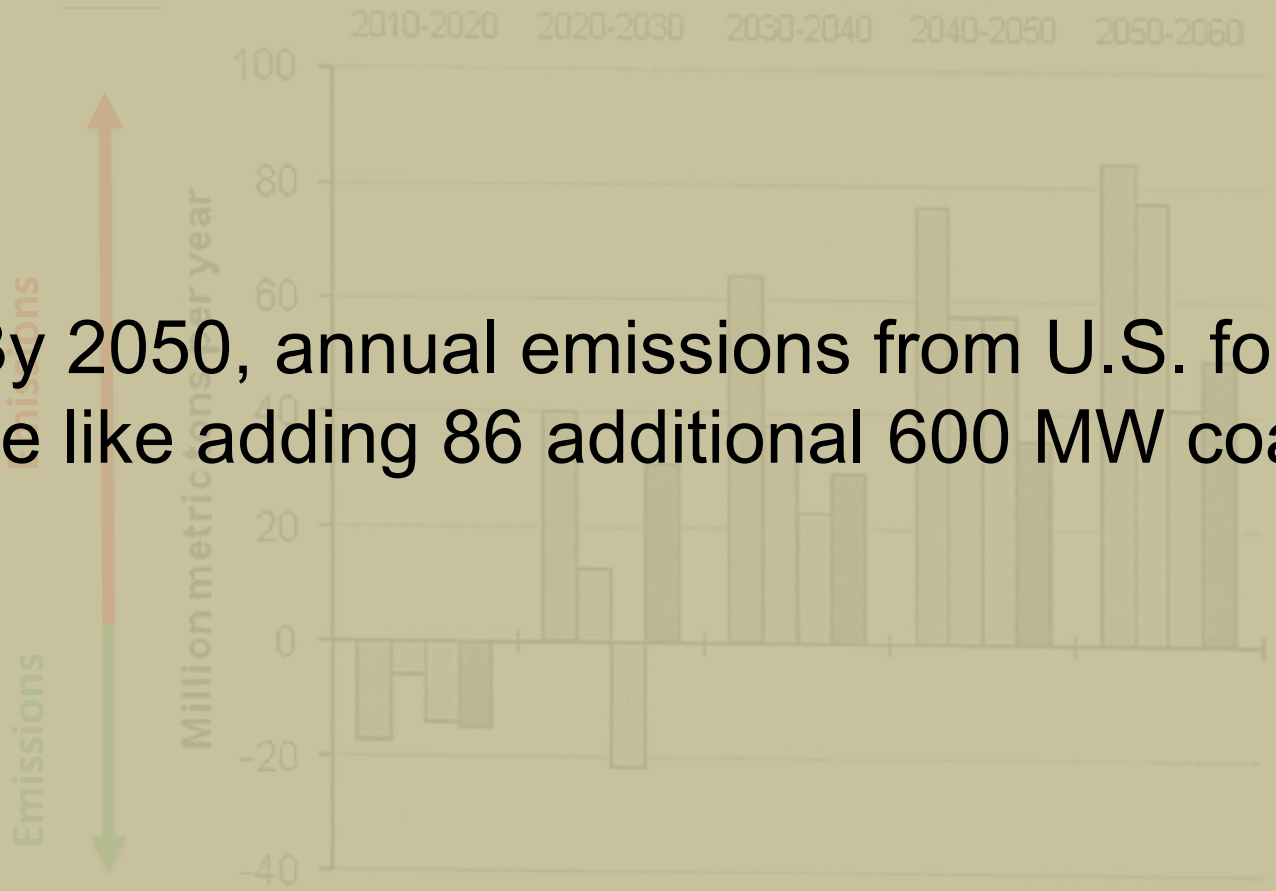
US Forests—Switching from Sink to Source?



Total carbon flux in conterminous U.S. forests by decade by RPA scenario - 2010 RPA Assessment

Slide provided by: Brian Kittler, Pinchot Institute for Conservation

US Forests—Switching from Sink to Source?



By 2050, annual emissions from U.S. forests could be like adding 86 additional 600 MW coal plants.

Total carbon flux in conterminous U.S. forests by decade by RPA scenario – 2010 RPA Assessment

Slide provided by: Brian Kittler, Pinchot Institute for Conservation

- U.S. is losing ~4 acres of forest and open space per minute.
- Developed lands to increase by 41% by 2060.
- Forested areas will be most impacted by this expansion, with losses ranging from 16 to 34 million acres.

Data Source: 2010 RPA Assessment.

Slide provided by: Brian Kittler, Pinchot Institute for Conservation

King Introduces Bills to Promote Biomass and Hydropower Electricity Production in Maine

Thursday, May 14, 2015

WASHINGTON, D.C. – U.S. Senator Angus King (I-Maine), a member of the Senate Energy and Natural Resources Committee, announced today that he has introduced two pieces of legislation that would encourage and safeguard the use of Maine's natural resources to generate renewable electricity. *The Working Forests for Clean Energy Act* would ensure that emissions generated from sustainably-harvested biomass would be considered carbon neutral under the President's proposed Clean Power Plan, and *the Small Hydropower Dependable Regulatory Order (Small HyDRO) Act of 2015* would streamline a cumbersome federal licensing process for hydroelectric dams.

"Maine's natural resources offer promising opportunities to generate clean, renewable electricity," Senator King said. "But the success of those opportunities depends on the effectiveness of federal policies and, right now, policies from Washington are hurting more than they're helping. By setting an appropriate carbon standard for biomass and by streamlining the burdensome licensing process for dams, these bills would give badly-needed certainty to states and help preserve and create home-grown, diverse, and sustainable energy resources."

The Working Forests for Clean Energy Act

In June 2014, the Environmental Protection Agency (EPA) proposed the Clean Power Plan, an initiative that sets federal standards for states to achieve a 30 percent reduction in carbon pollution from the power sector by 2030. However, in considering sources of carbon emission, the EPA did not definitively address biomass, which is used to generate nearly one-third of electricity in Maine. And while a non-binding EPA memo did indicate that the agency may consider biomass emissions carbon neutral, it has not codified any rules that would provide certainty needed for states or the forest products industry.

To address that, *the Working Forests for Clean Energy Act* would provide a straightforward standard to account for emissions from biomass sources. Under the legislation, provided that a federal analysis determines that national forest stocks are stable or increasing, biomass emissions would then be considered carbon neutral. Additionally, biomass derived from mill or harvest residuals, or waste from forest management activities, would also be considered carbon neutral. The standard will provide certainty to states and the forest products industry, helping ensure that a diverse market for domestic forest products can continue while also safeguarding against the widespread harvesting of forests to create electricity without any regard to the sustainability of the stock.

FutureMetrics LLC
8 Airport Road
Bethel, ME 04217, USA

Debunking two so-called "facts" about Wood Pellets

By William Strauss, PhD, President, FutureMetrics, July 6, 2015

Why there is no carbon debt. If the wood that is used for pellet production comes from working forests in which the aggregated stock of wood held in the forests is not shrinking then the carbon stock

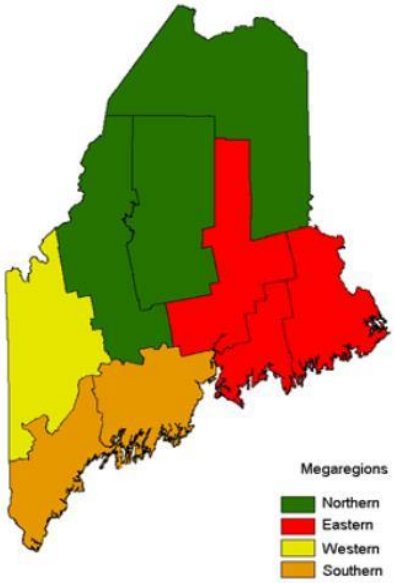
---

[4] The table is based on sub-bituminous. The inputs to the calculation are as follows: higher heating values of wood pellets and coal at 18.5 and 21.5 MJ/kg; carbon content of wood pellets and coal at 50% and 67% respectively; power plant efficiency at 37%. Wood pellets are also lower in CO_2 emissions from combustion than lignite, bituminous, and anthracite.

FutureMetrics LLC
8 Airport Road
Bethel, ME 04217, USA

in those forests is not being depleted. If that constraint is met, then every ton of carbon emitted from the combustion of chips or pellets is absorbed contemporaneously.

Maine's Forests 2015



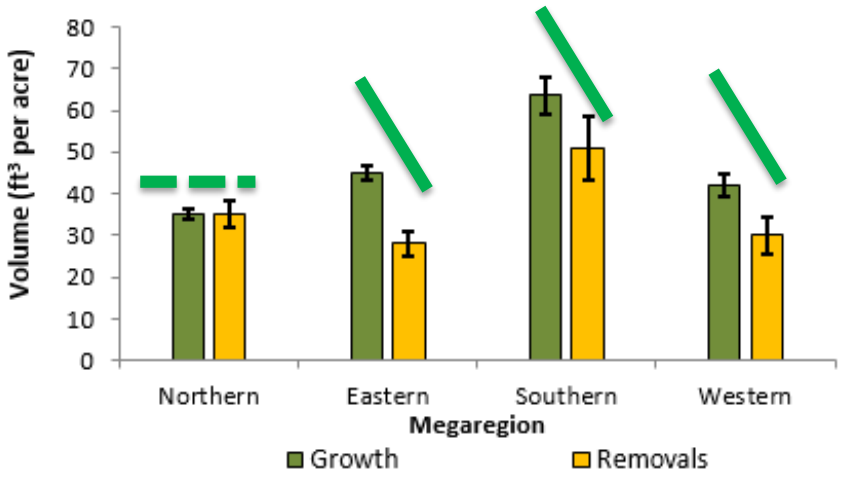
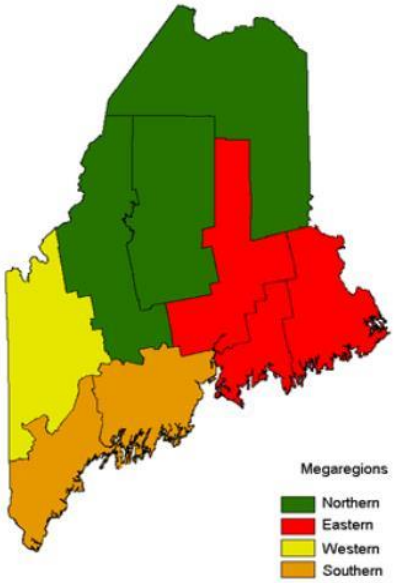


Figure 41. Growth and removals for growing-stock in cubic feet per acre by mega-region in Maine, 2013.

Maine's Forests 2015



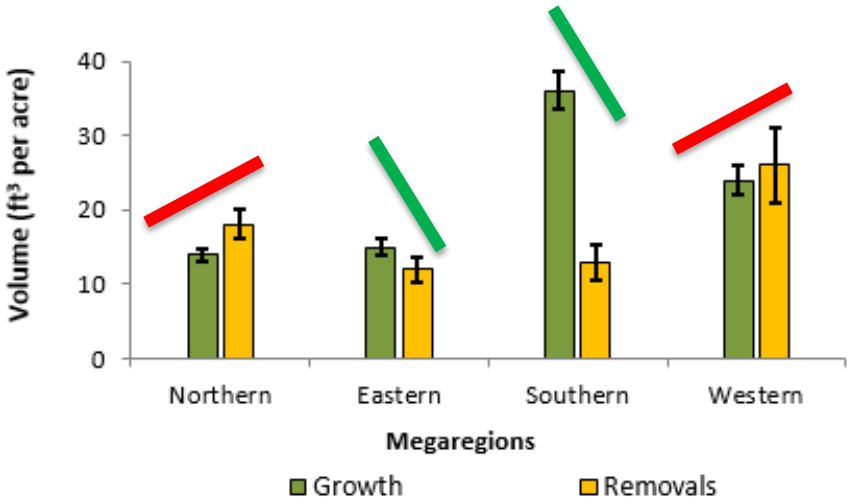


Figure 43. Growth and removals for hardwoods in cubic feet per acre by mega-region in Maine, 2013.

Example: Dynamic baseline


Manomet Center for Conservation Sciences JUNE 2010 NCI-2010-03

NATURAL CAPITAL INITIATIVE AT MANOMET REPORT

MANOMET Center for Conservation Sciences

BIOMASS SUSTAINABILITY AND CARBON POLICY STUDY

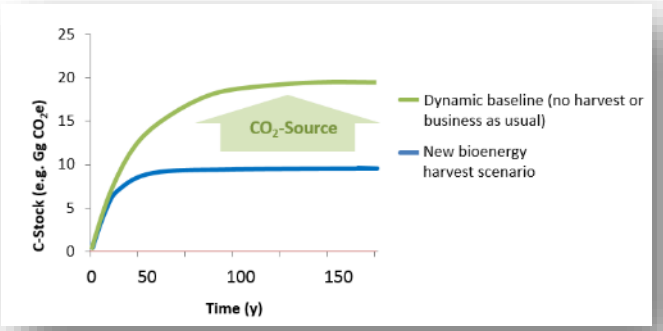
PREPARED FOR:
Commonwealth of Massachusetts
Department of Energy Resources
100 Cambridge Street
Boston, Massachusetts 02114

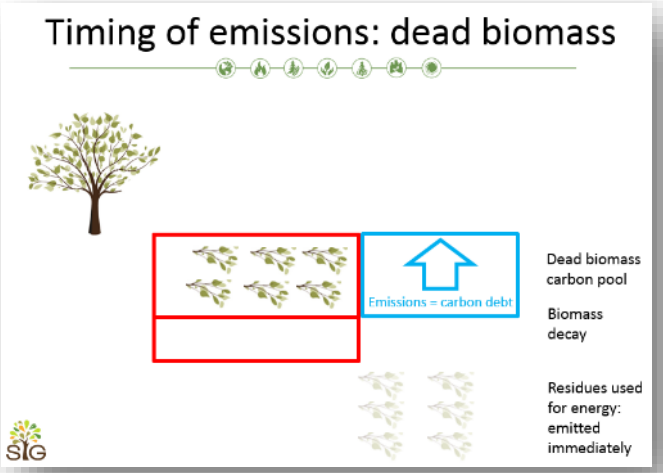
PREPARED BY:
Manomet Center for Conservation Sciences
81 Stage Point Road
P.O. Box 1770
Manomet, Massachusetts 02345
Phone: (508) 224-6521

CONTRIBUTORS:
Thomas Walker, Resource Economist (Study Team Leader)
Dr. Peter Cardellichio, Forest Economist
Andrea Colnes, Biomass Energy Resource Center
Dr. John Gunn, Manomet Center for Conservation Sciences
Brian Kittler, Pinchot Institute for Conservation
Bob Perschel, Forest Guild
Christopher Recchia, Biomass Energy Resource Center
Dr. David Saah, Spatial Informatics Group

CONTACT INFORMATION FOR REPORT:
Manomet Center for Conservation Sciences
Natural Capital Initiative
14 Maine Street, Suite 305
Brunswick, Maine 04011
Phone: 207-721-9040
jgunn@manomet.org

Manomet Center for Conservation Sciences
14 Maine Street, Suite 305
Brunswick, ME 04011
Contact: 207-721-9040, jgunn@manomet.org





Manomet carbon debt study:
Heating (homes) with biomass is highly climate beneficial

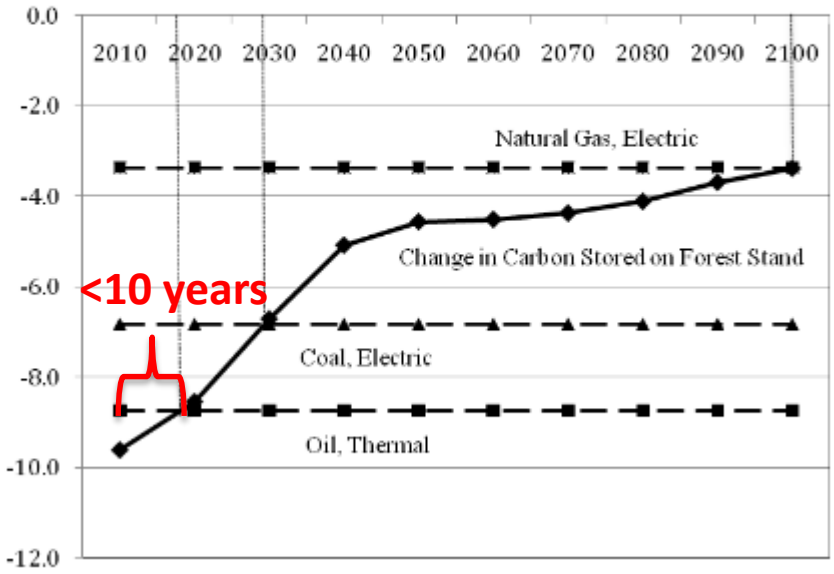
6.3.4 DISCUSSION OF RESULTS

The analyses presented above make clear that technology choices for replacing fossil fuels, often independent of any forest management considerations, play an important role in determining the carbon cycle implications of burning biomass for energy. The choice of biomass technology, and the identification of the fossil capacity it replaces, will establish the initial carbon debt that must be recovered by forest growth above and beyond BAU growth. These carbon debts vary considerably across technologies. For typical existing configurations, replacement of oil-fired thermal systems with biomass systems leads to relatively low carbon debts. Carbon debts for large-scale electrical generation are higher. Because of its much lower GHG emissions per unit of useable energy, replacing natural gas for either thermal or electric applications results in significantly higher carbon debts than incurred in replacing other fossil fuels.[18] The carbon recovery profile for combustion of wood pellets is roughly similar to burning green wood chips in terms of total lifecycle GHG emissions. CHP facilities, particularly those that optimized for thermal rather than electricity applications, also show very low initial carbon debts.

Manomet Center for Conservation Sciences JUNE 2010 NCI-2010-03

NATURAL CAPITAL INITIATIVE AT MANOMET REPORT

Exhibit 6-8(b): Carbon Recovery Rates under Scenario 1
(tonnes carbon)



Sustainability and carbon

- Sustainable forest management ≠ climate-friendly biomass
- Leading initiatives encompassing both carbon and sustainability for biomass:
  - Sustainable Biomass Partnership (SBP)
  - Roundtable on Sustainable Biomaterials (RSB)
  - Dutch Proposal for Biomass Sustainability Criteria

For the pellet industry: Where to go?

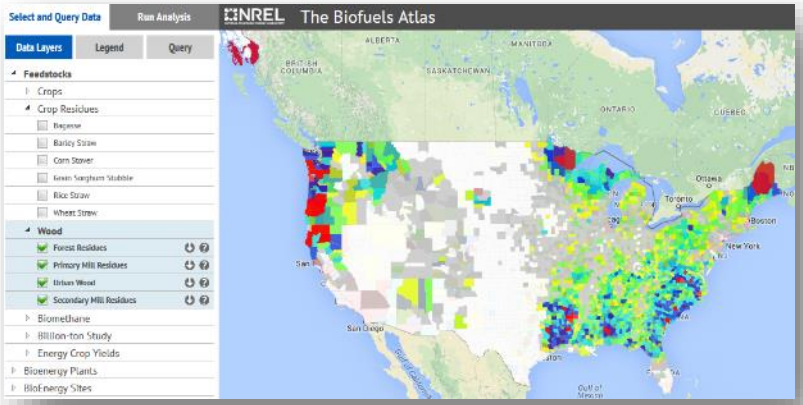
- Facts are uncertain, values in dispute, stakes high, and decisions urgent:
  - Carbon accounting science is not settled
  - Policy frameworks are in flux
  - Current sustainable forest management certification do not include
  - Investment decisions need to be made now

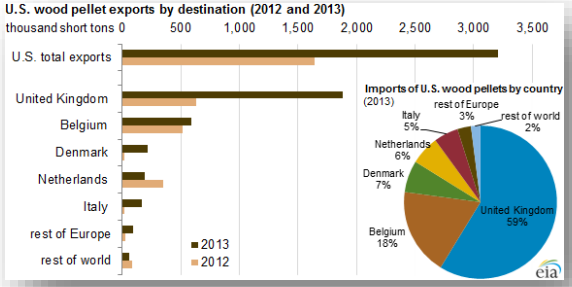
Low-risk biomass sourcing

- What type of biomass is scientifically uncontested in terms of carbon emissions?
  - Mill residues
  - Municipal waste(wood)
  - Biomass being pile burnt or chipped & dispersed
  - Biomass from (forest) restoration efforts
- Potentially low-risk carbon biomass:
  - Logging residues: consider decay rates, alternative fate, and forest health
  - Biomass certified/endorsed by biomass protocols such as Roundtable on Sustainable Biomaterials (RSB) or Sustainable Biomass Partnership (SBP)
  - Shifting harvests from pulp to biomass

Low-risk biomass: Is there enough?

- Just from forests (logging residues): >35 mio dry tons (NREL 2014)
- Add mill residues (>60 mio dry tons)
- Add urban wood (>40 mio dry tons)
- Replace >15% of coal power
- 2013 US Pellet Production:
  5.7 mio tons
  Export 2013: ~3 mio tons)
- Add biomass from:
  - Invasive brushland
  - Degraded, marginal cropland and pasture
  - Mined lands
  - Salinated lands
  - Etc.

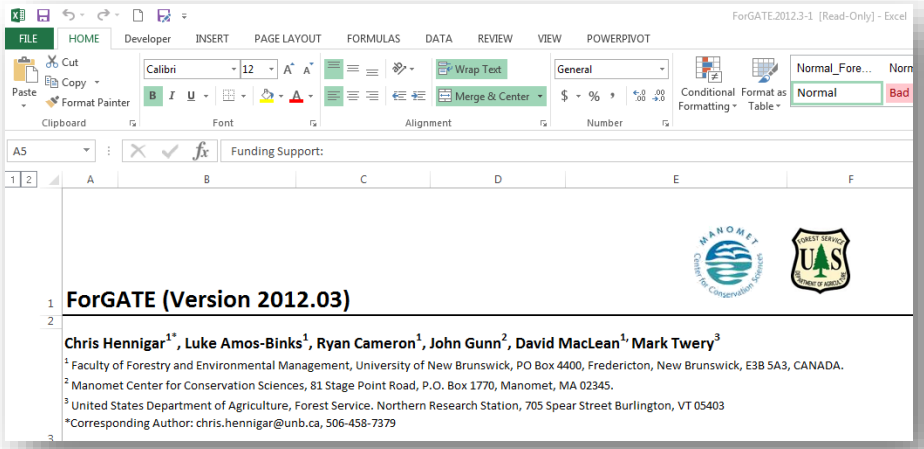




Next steps

- **Residential pellet carbon analysis** for the Northern Forest (Northern Forest Center)
  - Apply Forest Service FORGATE tool
  - Full Life Cycle Assessment
  - Analyze local supply chains
  - Status:
    Funding secured

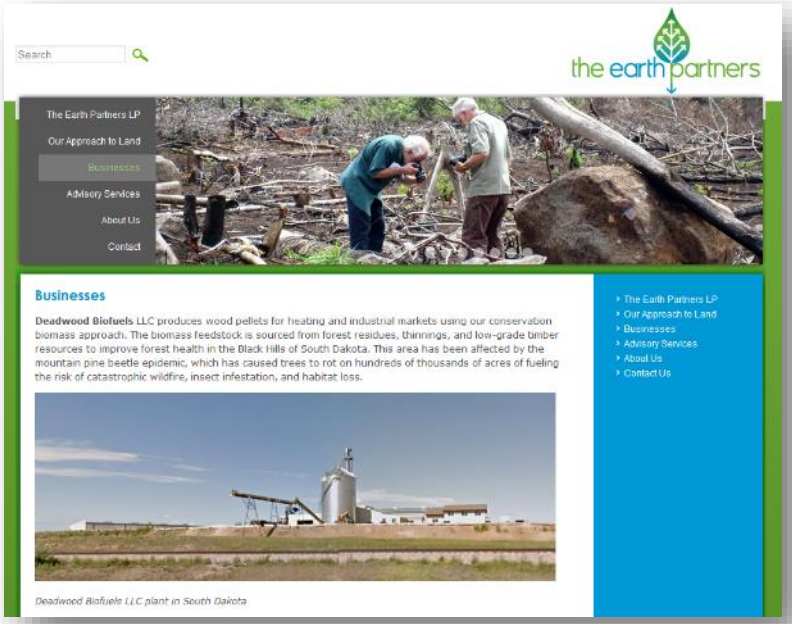
Northern Forest Center
Thriving Communities & Healthy Forests



Next steps

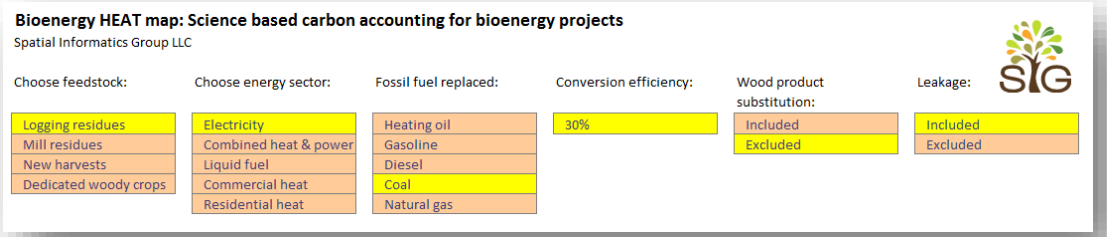
- **OP-ED on low-risk 'conservation biomass'**
  - Led by SIG and The Earth Partners
  - Publicity effort to support carbon-beneficial bioenergy
  - Additional endorsements welcome
  - Status:

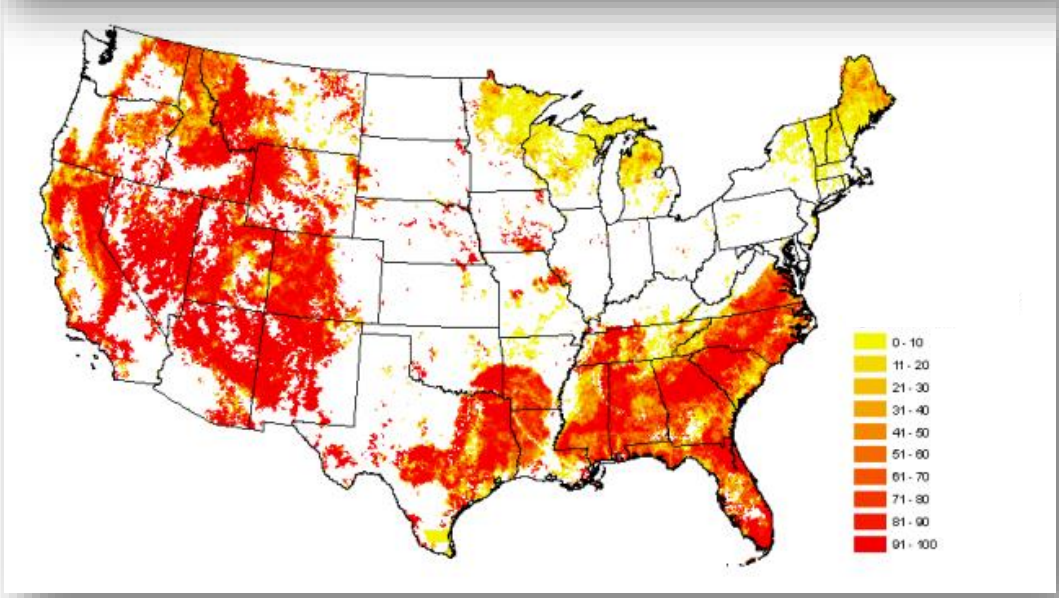
    Release July 30th 2015



Next steps

- **Biomass Heat Map**: Science based bioenergy carbon emission mapping
  - Interactive
  - User-friendly
  - Spatially explicit
  - Status: 50% funding secured





For Questions:

Thomas Buchholz, PhD

Web: sig-gis.com
Email: tbuchholz@sig-gis.com
Phone: 802 881 5590