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The Washington Post and 65 “Experts” that Wrote a Letter to Congress Are Wrong about Biomass for Energy

By William Strauss, PhD

May 2, 2016

On an April 28, 2016 the Washington Post published an editorial, “Dear Congress: Burning wood is not the future of energy,”¹ which was based on a recent written “warning” to the US congress² by “65 research scientists and practitioners who study energy, soils, forested and wetland ecosystems and climate change”.

The experts who signed the letter to congress and the Washington Post editorial’s understanding of carbon accounting as it pertains to using wood for energy is wrong. The letter to Congress and the Post editorial contain inaccuracies. This paper will explain why they are wrong.

We agree that their motive for writing the letter is sound. The opening paragraphs of the letter to congress reference the US Senate’s Amendment 3140 to the Energy Policy Modernization Act³. We agree that biomass for energy should not be unilaterally labeled as carbon neutral. Carbon neutrality depends on how the stock of carbon in the forest is maintained. If the stock of wood (and therefor carbon) is reduced by using wood for energy, then there is net new carbon added to the atmosphere. However, as this paper will show, if the stock of carbon in the forest is not reduced, then the combustion of wood for energy is carbon neutral.

Therefore, we strongly disagree with the experts’ characterization in their letter to Congress that biomass is never carbon neutral.

¹ https://www.washingtonpost.com/opinions/burning-wood-is-not-the-future-of-energy/2016/04/28/9cd9376c-08b9-11e6-bdcb-0133da18418d_story.html

² http://www.eenews.net/assets/2016/04/20/document_cw_03.pdf

³ <https://www.congress.gov/amendment/114th-congress/senate-amendment/3140/text>



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The Foundation for Carbon Neutrality is Sustainability

Amendment 3140 states that biomass is carbon neutral, "...provided the use of forest biomass for energy production does not cause conversion of forests to non-forest use." That language is, in our opinion, short of what is necessary to define carbon neutrality and sustainability. As we will show below, the foundation for carbon neutrality and sustainability is that the forest growth rate has to be greater than or equal to the harvest rate. Using wood for energy has to be part of a system that includes independent auditing that assures that the stock of carbon held in the forests is not depleted.

Concerns about deforestation are well-intentioned: No one in the renewable energy sector and no one concerned about mitigating carbon dioxide emissions would support any policy that promotes the loss of forests and the important carbon sinking function they perform. But deforestation is not consistent with the rigorous requirements for sustainability and the preservation of carbon sinks that are at the foundation of the policies that support the substitution of coal by wood pellets in power plants⁴.

The limits to the use of wood for energy are defined by the natural growth rates of working forests.

Those limits can be quantified and they do set boundaries for forestry that cannot be crossed. The testimony to Congress reference in the Post editorial is right on one thing: there is nothing close to enough sustainable wood supply in north America to replace all the coal used for power generation. But as transition fuel, industrial wood pellets can play an important role as one of many options for taking us from a heavily geologically carbonized energy sector to a future in which combustion of fuels made from geologic carbon is no longer allowed. FutureMetrics has several papers on this topic including one titled "A Rational and Pragmatic Off-Ramp to a Decarbonized Future"⁵.

Understanding how wood pellets can be an important part of the "off-ramp" starts with understanding how forest products are derived.

The authors of the letter to Congress, and the editorial board of the Washington Post, do not appear to grasp the size, scope, and dynamic nature of North America's forest products industry. Hundreds of millions of acres of land in the US and Canada are forested. About 60% of those US forests are "working forests" that have been managed for generations to produce the raw materials for lumber, paper, and, more recently, wood pellets.

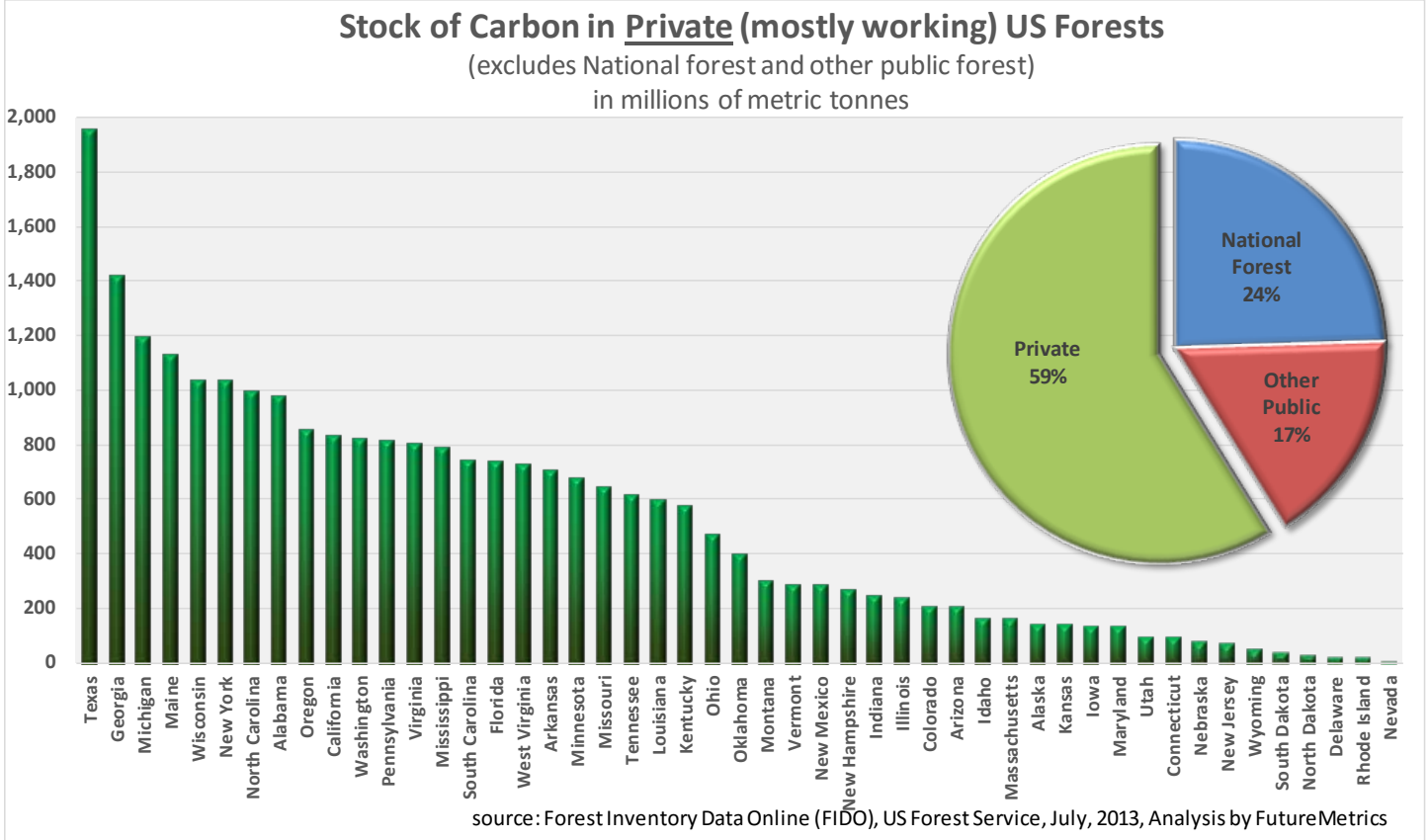
⁴ <http://www.sustainablebiomasspartnership.org/>

⁵ www.FutureMetrics.com



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The Post editors (who are dependent on paper for the production of their newspaper) appear to be unfamiliar with how those products are derived from the forest and the impact that the loss of market for paper, including newsprint, is having on the forest products industry. We are sure that they are acutely aware of the decline in newspaper circulation, but also suspect that they are not familiar with consequences of the decline in the pulp and paper industry; Washington DC is far removed from the vast working forests of the US and Canada.

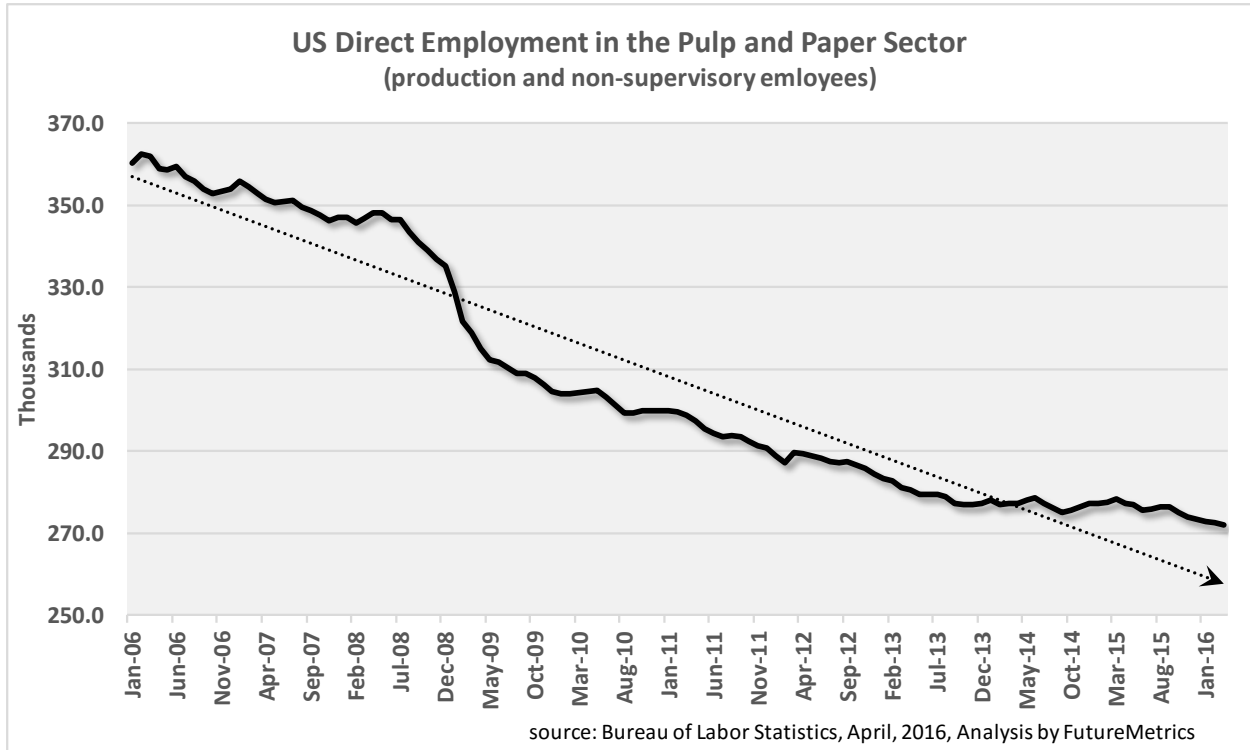
For example, in Maine, five large pulp and paper mills have permanently closed in the last two years as the demand for printed media like newspapers has declined. As a result, one of the major economic sectors of Maine has experienced a loss of many of thousands of jobs. Those jobs are not only in the pulp and paper mills but also are the jobs that cultivate, harvest, and transport the raw materials to the mills⁶.

⁶ The five closures have reduced demand in Maine by about 2.2 million tons per year out of a total annual harvest of about 16.5 million tons per year. Maine's forests' growth rate is far in excess of 16.5 million tons per year. Data provided by the Maine Forest Service, April, 2016.



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The authors of the Congressional letter and the Post editors seem to think that forests that are not used will be left to grow and sequester carbon. There are two fallacies in that thinking: Forests reach a growth and mortality equilibrium after which the net carbon stock remains constant; and Forests that do not have markets for their wood are pressured to be converted to other uses which would remove the carbon sinking function of that lost forestland.

Managed working forests are dynamic systems that are in a continuous state of growth and harvest. In any given year only a small portion of the forest landscape, depending on the growth rate of the trees, is harvested. Depending on the location and species, the areas of harvest are replanted or allowed to naturally regenerate. All medium to large forest landowners have forestry plans that define the annual allowable cut. The strategy is to have a continuous supply of healthy fully grown trees that provide large diameter logs that are desirable to the sawmilling sector⁷.

For generations the owners of the working forests throughout the US and Canada have supplied a continuous flow of wood to sawmills, paper mills, and more recently to pellet mills. The only way mills receive a continuous flow is if the resource is managed sustainably so that the supply of wood never runs out.

No one would build a 200-million-dollar mill with the idea of deforesting the land. Those mills, whether sawmills, pulp mills, or pellet mills, need to procure wood continuously. Hauling wood is costly so the mills need to be sized to match the sustainable daily harvest that is available within a reasonable radius from the mills (usually less than 75 miles). Mill demand cannot exceed the sustainable supply of raw material.

⁷ Well cared for stands are thinned several times over a growth rotation for the health and quality of the stands.



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Tree Farming is Not Different than Food Crop Farming (it just takes longer!)

Most forest landowners should be thought of as tree farmers with crops that take 15 to 50 years to grow. The primary product they are growing are sawlogs; which are the larger diameter and straight lower sections of a tree that are used to make lumber. When a tree is harvested, the landowner is counting on the sawlog portion of that tree for the majority of their income. The middle part of the main tree stem, the pulpwood and/or pellet feedstock portion of the tree, is less valuable. The upper parts of the tree have very little value and are often left on the forest floor.

The image below shows a typical example of how a ready to harvest tree is categorized. It also shows how thinnings are categorized. The chart shows a typical example of how most of the revenue from forestry operations are generated by the larger diameter logs that become lumber⁸.

Pulpwood in the image below is also “pelletwood”. The same part of the tree that used to go to the pulp and paper mills in many locations where pulp and paper mills have closed is now going to industrial pellet mills.

The industrial pellet industry is keeping the demand for lower value forest products alive and is sustaining the jobs that traditionally have existed to satisfy the demand for paper.

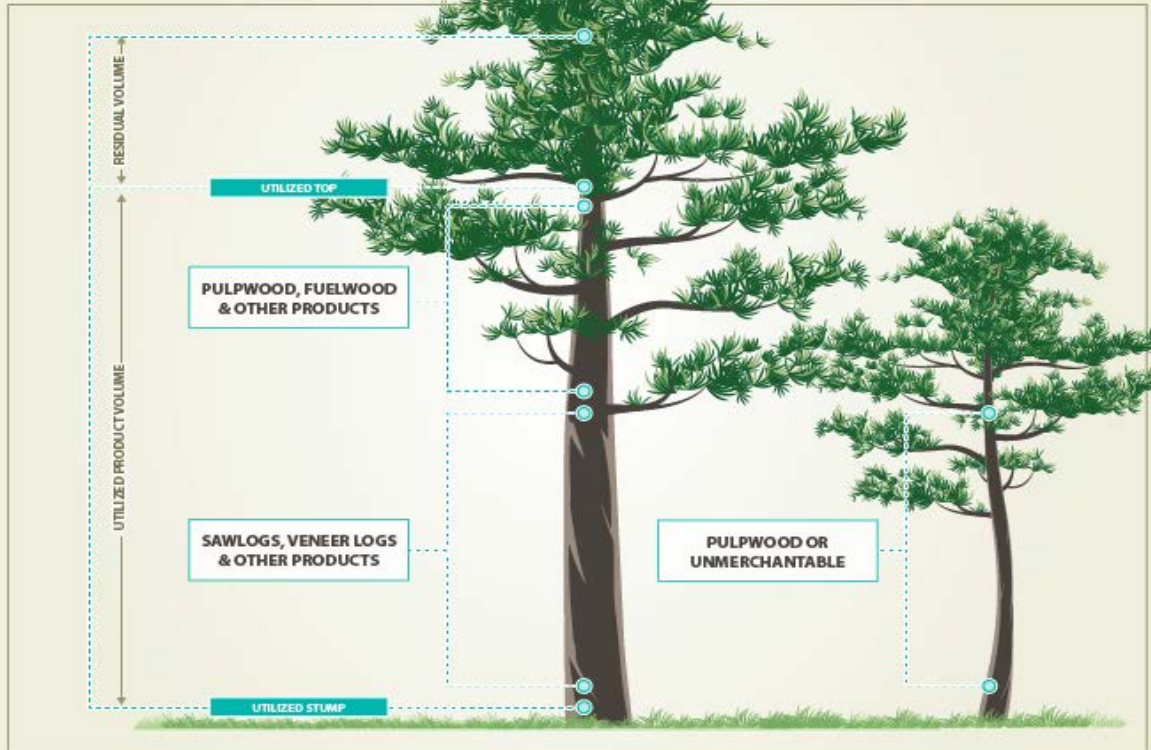
⁸ The image of the tree is from Forest2Market. The income chart data is from Innovative Natural Resource Solutions. The proportions shown in the image will vary but they are representative of a typical breakdown. For pre-commercial thinning the sawlog component is missing. The volume and revenue data is based on data from New Hampshire.



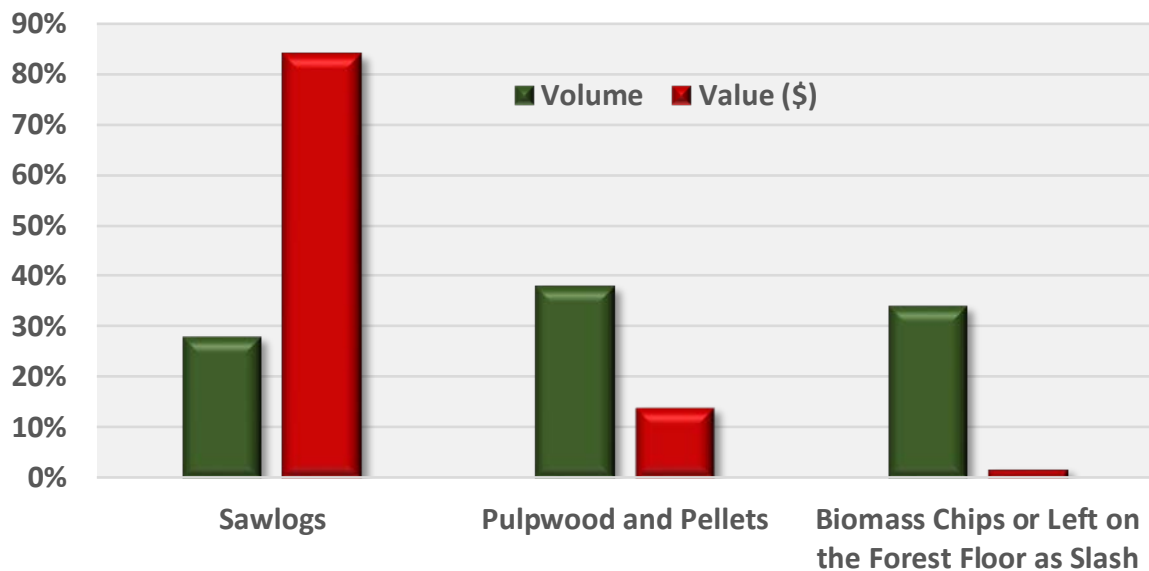
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F2M TREE UTILIZATION CHART



Typical Volume and Revenue from a Harvest



source: INRS



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Industrial pellets are able to use some of the tops and branches (depending on tree species) along with the center portion of the stem that traditionally went to the pulp mills for paper making. Forest landowners have no economic motive to sell sawlog quality roundwood to a pellet mill and no pellet mill can afford to pay for feedstock at sawlog prices.

Some of the wood fiber used to make pellets is from sawmill residuals (sawdust and other byproducts from cutting logs into boards, and board shavings). Some of the feedstock for pellet mills comes from that middle portion of the tree; wood that used to be used to make pulp for paper making.

Another important feedstock for pellet mills are so-called pre-commercial thinnings. These are small diameter younger trees that are too small for sawlogs but perfect for pellets. Imagine trying to grow food crops without managing the soil and minimizing invasive plants and pests. Productivity would be very low. That same logic applies to working forests. Selective thinning improves the growth rate and health of the remaining trees. It also mitigates wildfire risk⁹. And the thinnings are no longer “pre-commercial” if the pellet mill is ready to buy the wood. Higher value to the forest landowner results in better managed forests.

The Post editors and the Congressional letter authors seem to have ignored the entire tree farming sector. Working forests are not old growth stands and they are not part of our national, state, and local park systems. They are managed and nurtured to maintain or increase the stock of trees over time and provide a sustainable source of materials to the forest products industries (including the pellet sector).

Wood Pellets are not made from Old Growth Trees

Pellets for Power do not Increase the CO₂ Levels in the Atmosphere

The letter to Congress says the following:

“Burning forest biomass to make electricity releases substantially more carbon dioxide per unit of electricity than does coal. Removing the carbon dioxide released from burning wood through new tree growth requires many decades to a century, and not all trees reach maturity because of drought, fire, insects or land use conversion. All the while the added carbon dioxide is in the atmosphere trapping heat. Right now, large areas of American forests including old growth trees are being cleared for pellets that are shipped to Europe and burned to produce electricity that is counted there as zero carbon.”

The statement is bordering on propaganda¹⁰. It is a bit surprising to see 65 scientists sign onto a document with such loaded and inaccurate statements. It is too bad that the Post did not ask some of the many other

⁹ See numerous studies at the Ecological Restoration Institute (Arizona State University) on these topics.

<http://nau.edu/ERI/>

¹⁰ “Ideas or statements that are often false or exaggerated and that are spread in order to help a cause, a political leader, a government, etc.” From Merriam-webster dictionary.



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forestry experts that have peer reviewed research in a deep literature on forest health about the results of good silviculture¹¹.

More below on the carbon fallacy in the statement, but first, is the pellet industry destroying old growth trees?

“Old” trees in working forests are being harvested; but old trees are harvested every day from working forests. When a stand is mature, it is time for the landowner to harvest their crop.

Furthermore, as noted above, the business model for any large industrial mill that uses trees for feedstock cannot be based on deforestation. For generations, paper mills have sustainably sourced wood to make paper.

Where is the outcry over the harvest of trees to make newsprint, packaging, toilet paper, etc....? Now that the pellet industry is using pulpwood in some locations, how can a logical thinking scientist delink that supply chain and suddenly find outrage?

The pulp and paper industry is still, by a large margin, the primary user of pulpwood.

The table below¹² shows forest inventory and harvest data over 15 years for the Atlantic and Gulf regions (where all of the large industrial pellet mills in the US are located).

¹¹ Silviculture is the practice of controlling the establishment, growth, composition, health, and quality of forests to meet diverse needs and values.

¹² Data is from “Wood Supply Trends in the US South 1995-2015”, November, 19, 2015, by Forest2Market.
<http://www.theusipa.org/Documents/USSouthWoodSupplyTrends.pdf>



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Year	Atlantic Region					Gulf Region				
	Pulpwood			Total Pine		Pulpwood			Total Pine	
	Inventory	Removals for Pulp Mills	Removals for Pellet Mills	Inventory	Removals	Inventory	Removals for Pulp Mills	Removals for Pellet Mills	Inventory	Removals
	(million tons)	% of Inventory	% of Inventory	(million tons)	% of Inventory	(million tons)	% of Inventory	% of Inventory	(million tons)	% of Inventory
2000	490.7	7.80%		1,362.90	5.30%	517.2	11.20%		1,654.60	7.40%
2001	490.4	7.50%		1,365.70	5.10%	522.9	11.00%		1,670.90	7.30%
2002	496.1	8.10%		1,385.60	5.20%	529	10.60%		1,697.10	7.10%
2003	495.5	8.70%		1,387.70	5.40%	536.5	10.00%		1,729.10	7.00%
2004	505.6	8.60%		1,418.20	5.30%	544.4	10.50%		1,768.00	7.10%
2005	505.4	8.50%		1,443.80	5.30%	548.8	10.90%		1,800.20	7.30%
2006	505.9	9.00%		1,454.50	5.30%	555	11.10%		1,839.80	7.00%
2007	512.4	9.20%		1,483.50	5.40%	563.8	11.30%		1,857.60	6.80%
2008	516.1	9.40%		1,503.60	4.90%	567.6	11.10%	0.00%	1,875.50	5.80%
2009	512.5	9.40%	0.00%	1,516.90	4.60%	573.8	10.60%	0.00%	1,902.70	5.30%
2010	504.7	10.00%	0.00%	1,539.70	4.80%	586.1	11.30%	0.10%	1,949.30	5.50%
2011	503.3	10.00%	0.20%	1,573.40	4.80%	607.1	10.30%	0.10%	2,014.60	5.30%
2012	506	10.10%	0.30%	1,619.50	4.90%	623.6	10.20%	0.10%	2,073.70	5.30%
2013	517.9	9.80%	0.40%	1,678.60	4.80%	641.5	10.20%	0.20%	2,146.60	5.30%
2014	524.6	10.00%	0.30%	1,732.20	4.80%	653.9	10.00%	0.30%	2,219.10	5.30%
Increase in Inventory from 2000 to 2014 =>	6.91%			27.10%		26.43%			34.12%	

Two facts that the 65 experts seem to have ignored are evident.

- The forests are not shrinking. In both the Atlantic and Gulf regions total inventories have increased significantly.
- Demand for wood for pellet making is a very small proportion of the total demand for wood. The industrial wood pellet sector is a marginal participant in the demand for wood.

The forest carbon sink is not reduced by using trees harvested from sustainably managed forests.

Perhaps some people living in urban environments cannot envision the vast forested lands in the US and Canada that have for generations been producing wood fiber for everything from lumber to paper to packaging to pellets. These forests are in many stages of growth. There are new young trees replacing a recent harvest, and there are trees of all ages up to mature trees that are ready to provide their benefit to the end users of forest products with things that many take for granted such as lumber, cardboard boxes, and tissue paper. Those forests also provide benefit to the landowners, forestry workers, and mill workers by providing jobs and income.

By harvesting a stand of trees that is ready for the markets, the forest does not lose any of its sequestered carbon.



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To illustrate the logic for why a sustainably managed forest maintains its stock of carbon and why wood pellets are carbon neutral in combustion, we can look to how the real world of working forests supplying an industrial pellet mill operates.

The fundamental criteria for carbon neutrality in combustion is that the stock of carbon in the atmosphere cannot be increased by the combustion of the fuel.

Here is how that works for industrial wood pellets:

- The source of material for producing the pellets has to be a forest that is certified to be managed sustainably. There has to be independent certification that at aggregate inventory of wood, and therefore the inventory of carbon, is not depleted and therefore that use of the material for fuel does not increase net atmospheric carbon.
- Sustainable management means that the stock of wood in the forests cannot be allowed to shrink in size.
- A forest that does not shrink in size also means that the stock of carbon held in the forest does not shrink.
- For example, the raw materials for the pellet production plant are procured from tree plantations that produce new growth at a rate of 1,000,000 tons per year¹³.
- In this example, the forester determines an annual allowable harvest rate that is about 80% of the actual growth rate to make sure there is a buffer between growth and removal.
- 800,000 tons per year divided by 365 is about 2,200 tons per day that can be sustainably harvested. Given the buffer, daily growth exceeds daily removal.
- Those tons are converted to roughly 1,100 tons per day of industrial pellets (about 400,000 tons per year – which is about the size of some of the industrial pellet mills located in the Southeast US pine plantations).
- Those pellets are co-fired in a pulverized coal power plant as low carbon fuel. The supply chain carbon still counts for pellets just as it does for coal; but the net is that pellets produce about 80% to 90% less carbon emissions than coal for the same production of megawatt-hours.
- The carbon released by the combustion of 1,100 tons of pellets is absorbed contemporaneously by 2,740 tons of new growth **that same day**. Since the forester in this example harvested at less than the growth rate, more carbon is sequestered than is released per day. The system is a net carbon sink and the forest inventory is increasing.
- Since the carbon released that day is less than the carbon sequestered that day, there is no net new carbon added to the atmosphere.

If that power plant were not using pellet fuel, every ton of coal used to generate power would add carbon to the atmosphere. The only solution would be to have more and more forests absorbing carbon. But there are

¹³ Depending on climate and species, an average tree farm will grow about 2 tons per acre per year.



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two problems with that supposed solution: (1) Forests reach a growth equilibrium, and, (2) unless there is money to be made in forestry, some forested lands will be converted to other uses and those carbon sinks will be forever lost.

How many years into a growth cycle it takes before a forest stops increasing its storage of carbon depends again on climate and species. But they all reach a point where growth and mortality equal out. At that point the only way to increase the carbon sink is to make more land into forest. But if there is no forest products industry, exactly the opposite is likely.

In North America, the industrial wood pellet sector has the potential to replace the steadily declining pulp and paper sector. By providing a market for the medium value parts of the trees, the pellet sector will contribute to keeping forested land as forested land.

Conclusion

It is unfortunate that flawed logic and factual errors are used when discussing the carbon benefits of using wood for energy. It is particularly unfortunate that a lot of PhD's would sign onto a two-page document that uses hyperbolic language to supposedly make a scientific point. And it is too bad that the Washington Post did not do its homework.

We all agree on the need for sustainability, for renewable energy, and for mitigating carbon emissions.

What we do not agree upon is that fact that industrial wood pellets deliver on all three. This white paper has used facts and logic to show how the industrial wood pellet sector is good for the environment and good for the forests.

There are significant carbon benefits to the power production industry (and all of the planet's stakeholders) from substituting some or all of the coal used for generation at some of the world's coal fired power plants with wood pellets produced from continuously renewing forests. The strategy of co-firing pellets with coal to lower CO₂ emissions should be an important component of any country's strategy for dealing with climate change.

At the foundation of the such a strategy is the necessary condition that our working forests are managed sustainably so that they can provide beneficial products to society forever. Cycling non-geologic carbon through the working forest system in the form of wood pellets for power to mitigate the release of geologic carbon in to the atmosphere is one of the many benefits sustainable forests provide.