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Comments on: Economic Analysis of the Northeast/Mid-Atlantic Low Carbon Fuel Standard: Draft Data and Assumptions, Parts I and II NESCAUM

August 27, 2010

Dear Mr. Dick,

These comments are offered in response to an invitation to stakeholders to review the draft data and assumptions, Parts I and II, for the economic analysis of a regional Low Carbon Fuel Standard for Northeast and Mid- Atlantic states. The Wilderness Society is the leading American public-lands conservation organization working to protect wilderness and inspire Americans to care for our wild places. We recognize that climate change is the primary environmental challenge for this century, and that public and other conserved lands may contribute to a renewable energy future. However, new renewable energy policies, including expanded use of woody biomass from our forests, must protect the broader environmental values provided by our open lands. Because of our interest in healthy forests that provide the full array of ecosystem services and are resilient in the face of coming climate stresses, our comments here focus on model assumptions about woody biomass feedstocks sourced from the region's forests.

As the Low Carbon Fuel Standard analysis proceeds, it is clear that many of the options for low-carbon transportation fuels (including natural gas from wood via thermal gasification and electricity with biomass as part of the mix) depend upon wood as a significant portion of biomass feedstocks (wood is 24 to 33% of total biomass available, with 45 to 53% from solid waste). While un-utilized sources of waste wood do exist that could be converted into liquid or gas fuels or into electricity to fuel electric vehicles, these sources are very limited, are challenging to collect and transport, have low energy conversion ratios, and have competing uses that may be of greater climate benefit. Once locally-accessible waste sources are tapped out, the biofuels industry will turn to wood from expanded live tree harvests, producing chips that are physically indistinguishable from residues of pre-existing harvest activity. These live-tree sources will have a higher carbon-intensity because of the impacts of increased harvest on carbon stocks over time.

We fully support the goal of reducing transportation-related greenhouse gas emissions in the U.S. Northeast and MidAtlantic states. Due to limitations of technology and raw material supply, however, it is possible that a low-carbon fuel standard will play a limited role in lowering transportation emissions in our region, and that we must rely more heavily on reducing miles driven and increasing vehicle fuel efficiency as approaches to reducing transport emissions. Modeling should help policy-makers strike the right balance by using a reasonable range of assumptions.

We therefore encourage the inclusion of sensitivity tests with more realistic assumptions about the availability and carbon intensity of wood feedstocks, and that consider unintended consequences for thermal wood uses, as well as broadening the cost-benefit analysis to include a qualitative assessment of environmental costs as well as benefits.

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Wood Feedstock Supply

The wood supply study conducted for the northeast LCFS used relatively optimistic assumptions about the technical supply of various wood sources[1]. The authors of the wood supply study recognized that much of the technical supply would be impractical or unwise to collect and burn, unlikely to be harvested due to landowner preferences, and/or subject to increasing demand from other users (including electricity and thermal energy). For this reason, estimates of "likely" available supply included a small portion of the technical supply total (between 10% and 40%, depending on the source, with most sources at 20%). Yet the "low availability" assumptions proposed in Table 5 –NEMA Biomass Availability assume utilization rates of 15% (for new forest growth) and 50% (for all other sources). The table below compares estimates of likely wood supply from the original study with revised assumptions proposed for the "low availability" range for LCFS impact modeling. The difference in assumptions amounts to 6 million dry tons per year; proposed assumptions for *low* availability are more than *twice* the amount previously proposed for *likely* availability. **The lower bound modeled for each wood source should be at least as low as the "likely availability" estimate from the supply study**.

[1] Introducing a Low Carbon Fuel Standard in the Northeast: Technical and Policy Considerations, Appendix D, July, 2009. Data from Integrated Natural Resource Solutions, LLC (INRS). June 2008. Biomass Availability and Utilization in the Northeastern United States, prepared for Northeast States for Coordinated Air Use Management, Boston, MA

Supply estimates matter because overly-optimistic assumptions about waste wood sources (which have lower carbon intensities than wood from new live-tree harvest – see below) may overestimate actual GHG benefits and underestimate actual economic and ecological costs. Wood-based biofuels plants built in response to LCFS incentives will increase wood demand, raise prices, and compete with existing users and new sources for limited supplies. If the wood is drawn primarily from expanded harvesting, rather than primarily from residuals as modeled here, the GHG benefits will be much lower than expected and the costs much higher.

Comparison of Woody Biomass Supply Assumptions
INRS Supply Study and LCFS Part II Data and Assumptions Table 5

	Maximum Available (green tons) from INRS Table D-3	Maximum Available (dry tons[2]) from INRS	Likely Available % from INRS	Likely Available from INRS Table D-3 (dry tons[3])	Low Available % from Model Table 5	Low Available (dry tons[4]) from Model Table 5	Excess of model "low" estimate above INRS "likely" estimate (dry tons)
Sawmill residues	7,380,000	4,132,800	20%	826,560	50%	1,911,820	1,085,260
Secondary mill residues		470,000	40%	94,000 (188,000*)	50%	257,277	163,277 (69,277*)
Urban wood residues[5]		6,230,000	20%	1,246,000	50%	3,507,561	2,261,561
Forest residues	12,000,000	6,720,000	20%	1,344,000	50%	3,142,098	1,798,098
Net forest growth (green)	27,510,000	15,405,600	10%	1,540,560	15%	2,349,127	808,567
Totals		32,958,400	**15%** average	**5,051,120** (5,145,120*)	**34%** average	**11,167,882**	**6,116,762** (6,022,762*)

*First number from Table 5-2 of July, 2009 Technical Report. Numbers in parentheses from Table D-3 of that report.

[2] Green tons converted to dry tons using factor of 0.56.
[3] Multiple maximum by available percent and convert green tons to dry tons using factor of 0.56.
[4].Green tons converted to dry tons using factor of 0.50.
[5] Includes C&D waste (which may not be permitted as a feedstock in some states), as well as used shipping materials, material from tree trimming, clearing rights of way. There may be some double counting with waste material estimates.

Carbon Intensities and Scenario Definitions

More information on the derivation of carbon intensities would be helpful (the EPA RFS 2022 life-cycle assessments cited appear not to include computations for wood biomass sources, for instance). Table 10A – Carbon Intensity Values for Econ Analysis provides carbon intensity values by fuel end product, without clearly distinguishing among pathways using different feedstocks, other than differentiating residual and virgin stocks for some pathways.

- The distinct CI values for residual and virgin sources are a step in the right direction, as residual materials often have lower carbon intensities than virgin sources. But even within these broad categories there are important differences among feedstocks, particularly for wood-based fuels. For instance, cellulosic ethanol from residuals might draw upon crop residues, material reclaimed from the municipal solid waste stream, mill and urban wood waste, or logging residues. Cellulosic ethanol from virgin materials might draw upon dedicated energy crops (e.g. switchgrass or willow plantations) or expanded forest harvesting. These different materials will have very different carbon intensities and environmental impacts[6]. If EPA's national carbon intensities for corn stover or switchgrass were applied to the entire mix of cellulosic ethanol feedstocks in this region, where wood and waste sources predominate, modeled GHG impacts would be unrealistic. It would be helpful to **further disaggregate fuel pathways by types of feedstock and provide CIs appropriate to each**.
- The low-end carbon intensities for cellulosic ethanol from both residuals and virgin materials are negative. As the science of GHG accounting evolves and incorporates land-based impacts of biomass use – including both direct and indirect land use changes and impacts on carbon stocks that fall short of actual land use change – negative CIs for the cellulosic pathways may increasingly be called into question. More **information about the derivation of these negative CI values** would be helpful to stakeholders who may suggest improved methodologies.

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[6] True wastes are often assumed to be carbon neutral, since much of their carbon would be released in landfills or other waste sites in the absence of energy capture (with the possible exception of materials diverted from the recycling stream or from uses where they would boost long-lived soil carbon). Dedicated energy crops that maintain higher mean carbon stocks over time than the previous land use may also be considered carbon neutral, or even carbon-negative. Forest residues, however, are more of a grey area. In order to be credited with a low carbon intensity, forest residues must consist of only tops, branches, and other currently unused material from pre-existing harvest activity, and removals must be limited to protect site productivity. Verifying these conditions would be very difficult, so it would be reasonable to assume a higher carbon intensity for this source. Wood from newly-expanded harvest of live trees must clearly be assigned a higher carbon intensity to reflect the impact of harvest on forest carbon stocks over time. See Manomet Center for Conservation Sciences. 2010. Massachusetts Biomass Sustainability and Carbon Policy Study: Report to the Commonwealth of Massachusetts Department of Energy Resources. Walker, T. (Ed.). Contributors: Cardellichio, P., Colnes, A., Gunn, J., Kittler, B., Perschel, R., Recchia, C., Saah, D., and Walker, T. Natural Capital Initiative Report NCI-2010-03. Brunswick, Maine.

- Cellulosic diesel is assigned no high-end CI values. Presumably this is because this pathway will be utilized only under the Biofuels Future scenario, which assumes low CI values a priori. If CI values reflect economic forces consistent with each Scenario, as suggested below, **high-end values for cellulosic diesel** would be needed.
- Natural gas carbon intensities are listed for fossil natural gas, landfill gas, and “thermal gasification”. Slide 78 of the Data and Assumptions presentation lists feedstocks for the last of these as: energy crops, agricultural and forestry residue, solid waste, livestock waste and biosolids from wastewater treatment. Emissions associated with biogas from livestock waste or sewage sludge would be very different from those associated with thermal gasification of wood feedstocks, so **if wood is expected to be a significant feedstock source for bio-based CNG a CI should be developed** that is relevant to this particular feedstock.

Ideally, sensitivity tests within each Scenario would allow exploration of **greenhouse gas impacts of different feedstock mixes**, rather than assuming a single mix for each Scenario. Understandably, the team needs to limit its computational burden. At a minimum, the final report should include a **clear explanation of assumptions about feedstock mix, and how divergence from those assumptions may change results**.

Aside from assuring that CIs reflect a realistic mix of feedstocks, CIs should also be consistent with economic forces set in motion under each Scenario. Currently CIs are a priori assumptions for each Scenario, rather than being determined by trends that emerge from modeling. The Biofuels Future, for instance, assumes low CIs for biomass feedstocks. In reality, a thriving biofuels industry would increase wood utilization, quickly tap out the residuals sources, and be forced to turn to higher-CI - and perhaps costlier - sources from new harvest activity. Ideally, CIs for each Scenario would be based on projected proportions of feedstock types, each with their distinct CI value, that will be tapped to reach the target fuel quantity. If this approach would impose an unacceptable computational burden, then **a more realistic a priori assumption for the Biofuels Future would be that CI values will be in the high range** rather than low, as currently assumed. Conversely, the CNG and Electric Vehicle scenarios are less dependent on wood feedstocks, and if initial calculations show that the low-CI portion of wood supply is sufficient to meet the LCFS need, the assumed CI value for wood might be lower for these scenarios.

Assumptions about CI levels assigned to each feedstock, and about what CI level will prevail under each Scenario, are important because underestimates of CI could make the LCFS policy less effective than predicted, at a higher cost. This is particularly worrisome if program regulations adopt the CI values assumed in the modeling with no further monitoring of actual performance (perhaps unlikely, but early assumptions tend to develop their own momentum regardless of validity). Business decisions based on model results could result in excessive investment in biofuels dependent on wood feedstocks. If these high-capital-cost plants draw from new harvest volume rather than waste, and subsequent program monitoring reveals actual carbon intensities lower than those projected, it will be very difficult to change course toward a more effective strategy.

Heating Fuels Sensitivity Test

Heating rivals transportation as a source of GHG emissions for northeastern states. A Low Carbon Fuel Standard that applies to transportation fuels but excludes heating fuels has the potential to increase overall regional GHG emissions significantly compared to a baseline that includes increasing wood heat in response to existing market incentives. Wood is already a viable energy source for heating, with feasible energy conversion efficiency rates of 80% or more given the best available furnace designs, or in combined heat and power applications. In comparison, cellulosic ethanol or bio-oils or bio-gases based on wood feedstocks have conversion efficiencies in the range of 30-50% (though these are somewhat speculative as commercial-scale plants are not yet operational), and require larger scales and longer-distance transport. An LCFS that encourages expanded wood use for transportation fuels could possibly distort wood markets to undercut the competitiveness of wood heat, thus diverting limited material to a use that generates fewer GHG reductions.

The modelers propose to address this concern through a sensitivity test that caps heating oil emissions at the current level, with any reduction creditable as a substitute for reduced GHG-intensity under the LCFS. We would like to see more details about how such a program might operate. It is unclear whether this is an intensity cap or a total emissions cap, nor how equivalence with carbon intensity for a transportation fuels mix would be established. It is also unclear how a heating oil distributor would document or market credits. The LCFS "offset" market would need to provide sufficient incentive for a heating oil handler to subsidize consumer investments that reduce sales volume for its primary business. Presumably some of these households would cease to be customers (unlike electric efficiency programs where the recipient remains a customer and can pay a surcharge to finance the efficiency program). Would credits be restricted to oil distributors who expand their business to offer wood chips, pellets, or cordwood?

In response to a question during the August 12 webinar, it was stated that fuel switching would not be an eligible activity under this theoretical program. Presumably switching from oil or LP gas to cordwood, chips or pellets would in fact be eligible. *If* wood comes from low-carbon-emission sources, such substitutions offer currently-feasible paths to reducing GHG emissions from space heating.

Program complexity and high transaction costs would prevent this approach from fully addressing undesirable GHG consequences of diverting wood away from heating applications and toward transportation fuels. A **more robust sensitivity test that incorporates the heating sector as a full participant** with the transportation sector would provide better guidance to policy-makers interested in avoiding perverse outcomes.

Costs and Benefits

Slides 9 through 11 of the August 12 presentation - Economic Analysis of the Northeast/Mid-Atlantic Low Carbon Fuel Standard: Draft Data and Assumptions, Parts I and III - outline a cost/benefit framework. Benefits include several indirect effects of the program, including reduction in other pollutants, economic activity from expanded regional fuel production, increased innovation and less fuel price volatility. These are important benefits to consider, and will increase the attractiveness of an LCFS program. Costs of the LCFS program should also include at least a **qualitative description of possible negative effects of expanded regional fuel production, including economic impacts on industries competing for raw materials and possible environmental impacts on lands subject to intensified extractive activity**. The federal Biomass Crop Assistance Program provides a cautionary example of a program that unintentionally undercut the viability of competing wood users, necessitating a revamping of program regulations. Acknowledgement of potential indirect costs at this early stage will help policy-makers incorporate safety mechanisms, such as harvest guidelines and general forest sustainability protections, that minimize any negative effects.

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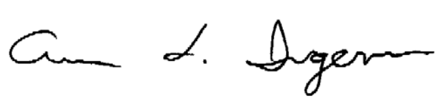
We thank you for the opportunity to comment on data and modeling assumptions, and we look forward to continued discussion as modeling of impacts for the Northeast/MidAtlantic Low Carbon Fuel Standard proceeds. Please continue to keep us informed of opportunities to review and comment. Thank you for your time and consideration.

Sincerely,



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