Comments of the Natural Resources Defense Council on the Massachusetts Revised Proposed Changes to Alternative Portfolio Standard Regulations (225 CMR 16.00)

1. Summary

In 2012, Massachusetts promulgated biomass regulations under its Renewable Portfolio Standard governing biomass eligibility for renewable electricity credits (225 CMR 14.00). These regulations have proven to be robust and scientifically rigorous, and help move the Commonwealth towards its clean energy and climate goals. DOER has now proposed new forestry and greenhouse gas emission regulations for thermal bioenergy under the Alternative Portfolio Standard (APS) that are far weaker than those under the 2012 RPS electricity standard, and fundamentally undermine Massachusetts' clean energy and sustainable forestry goals.

The proposed regulations should be consistent with and meet the standards in existing RPS biomass regulations, and reflect the legislature's intent to narrowly limit eligibility of biomass fuels and technologies that may qualify for subsidies. Yet the agency has not provided a rationale or justification why credits to thermal bioenergy under the APS should fall under different, weaker regulations for forest protection and greenhouse gas emissions. Moreover, inconsistent standards across programs as DOER is proposing will create regulatory confusion and implementation inefficiencies. Accordingly, we urge DOER to remove "Eligible Biomass Woody Fuel," "Manufactured Biomass Fuel," "Thermal Waste-to-Energy" and the related proposed changes from the draft regulations until these shortcomings are remedied.

2. Sustainability Standards for Forestry

The proposed regulations lack forestry standards found under the existing RPS regulations

Forestry "residues" – the tops and limbs left over after harvesting of more commercially valuable parts of a tree – are central in DOER's existing biomass regulations. In those regulations, the agency treated residues as an eligible biomass fuel, but recognized that leaving adequate residues onsite following harvesting is essential to preserving soil fertility, preventing erosion, and maintaining wildlife habitat. In addition, the legislature made it clear that forest sustainability is a prerequisite to receive APS subsidies under the amended legislation, stating "facilities using biomass fuel shall be low emission, use efficient energy conversion technologies and fuel that is *produced by means of sustainable forestry practices*."[1] (emphasis added).

DOER's summary of the 2012 biomass regulations, below, describes the RPS provisions restricting forest-derived materials. They provide numeric standards that limit biomass residue removals based on site conditions, and specify sustainability criteria under which no removals are allowed under any circumstance:

[1] https://malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter25A/Section11F1~2

DOER's summary of forest protections under the 2012 biomass regulations[2]

Limitations of Forest-Derived Supplies

Forest products harvest and Eligible Biomass Removal is prescribed by Forester in *Eligible Forest Biomass Tonnage Report* (Guideline).

- Soils within harvest site identified using USDA, NRCS soil maps.
- Poor Soils are identified based on either of the following criteria:

  1) Shallow-to-bedrock; 2) Dysic histosols (organic wetland soils, low nutrients, low pH); 3) Dry, nutrient-poor sandy soils

Allowable Biomass removals depend on Soil Conditions

Soil Restrictions (based on USDA NRCS Criteria)	Good Soils	Poor Soils
Percent of Tops and Branches of Forest Products Harvested that must be retained on site	25%	100%
Percent of Weight of Forest Products Harvested that may be removed (as Residues or Thinnings) as Eligible Biomass Woody Fuel	30%	30%

Additional Forest Sustainability criteria must be met on harvest site

- No removals from old growth forest stands, or from steep slopes
- Retention/protection of forest litter, forest floor, stumps/roots
- No removal of naturally down woody material
- Retention of adequate supplies of den trees, snags for ecological needs

Creating A Cleaner Energy Future For the Commonwealth

DOER Massachusetts Department of Energy Resources

Essential components of the 2012 biomass regulations are the tracking of biomass shipments with a certificate system and the documentation in a Tonnage Report that only eligible biomass is being used in facilities. The importance and centrality of the forestry restrictions and a rigorous certificate system was demonstrated in the 2012 regulations.

> *For Forest Derived Residues and Forest Derived Thinnings, the Eligible Forest Biomass Tonnage Report shall also include a certification from the professional forester that no more than the allowable per cent of the total weight of all forest products harvested from a given forest harvest site is prescribed to be removed for utilization as an Eligible Biomass Woody Fuel. The professional forester shall also certify that the prescribed harvest meets the forest sustainability thresholds provided in the Biomass Eligibility and Certificate Guideline. The Eligible Forest Biomass Tonnage Report shall also include (1) the total tons of Eligible Biomass Woody Fuel prescribed for harvesting under the category of Forest Derived Residues, and (2) the total tons of Eligible Biomass Woody Fuel for harvesting under the category of Forest Derived Thinnings. The total weight of the forest products shall be calculated utilizing weight standards by species provided in the Biomass Eligibility and Certificate Guideline. The allowable percent removal limit shall be determined as prescribed in the Guideline to protect soil nutrient retention in varying soil conditions. (*14.05(8)(a)(5), page 21 of 37*)*

In contrast, the APS regulations now under consideration have none of these requirements and instead state that "*Forest Derived Residues and Thinnings shall only be sourced from forests meeting Sustainable Forestry Management practices, as independently verified through the attestation of a licensed forester or independent certification"* (225 CMR 16.05(4)(g)(2).

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[2] http://www.mass.gov/eea/docs/dcr/stewardship/forestry/ma-forestry-bmp-manual-rd.pdf

This generic and overly-broad definition of sustainability will not provide a sufficient standard for approving eligible biomass fuels. In the absence of the 2012 sustainability standards, it represents a significant weakening of the protections necessary to ensure that forest biomass is sustainably sourced.

According to the accompanying *Guideline on Biomass, Biogas, and Biofuels for Eligible Thermal Generation Units*, the following options are sufficient to demonstrate Sustainable Forest Management, both of which are wholly inadequate:

Option 1*: A licensed forester attests there is a long term forest management plan and best management practices that implement Forest Guild biomass harvesting guidelines. Massachusetts forests need to have a DCR cutting plan under long term management option.*

The Forest Guild guidelines are no substitute for the 2012 biomass sustainability guidelines, which refer to Massachusetts-specific soils and ecosystem types to set allowable residue removal levels. In fact, the Forest Guild guidelines state "[w]e encourage states to identify low-nutrient soil series where biomass harvesting should not occur and those soil series where biomass harvests require particular caution**.**"

Moreover, Massachusetts long-term management plans and cutting regulations do not articulate the protections provided by the 2012 biomass regulations, which expressly set numeric standards limiting removal of residuals site condition and expressly prohibiting removals under certain conditions. Long-term management plans are therefore not a surrogate for retention standards, especially the express prohibitions found in the 2012 sustainability standards.

Option 2*: Fuel suppliers can show independent certification through the Forest Stewardship Council (FSC), or the Program for Endorsement of Forest Certification, which includes the Sustainable Forestry Initiative and the American Tree Farm System.*

These certification systems do not address retention standards at the level of specificity needed.[3] For instance, certification under FSC involves auditing forest management, including harvesting, for 10 principles[4] and 57 criteria; however, none of these appear to make specific recommendation on residue retention and soil fertility in Massachusetts. Additionally, the FSC itself acknowledges that its assessment approach is not relevant for greenhouse gas accounting, stating, "*Overall, the carbon impacts of biomass production and use will remain beyond the scope of FSC certification, in particular emissions from production processes beyond the forest*."[5][6]

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[3] Stupak, I., B. Lattimore, B. D. Titus and C. Tattersall Smith (2011). "Criteria and indicators for sustainable forest fuel production and harvesting: A review of current standards for sustainable forest management." Biomass and Bioenergy 35(8): 3287-3308.

[4] https://us.fsc.org/en-us/what-we-do/mission-and-vision

[5] https://us.fsc.org/en-us/newsroom/newsletter/id/793

[6] Moreover, The Forest Guild guidelines are no substitute for the 2012 biomass sustainability guidelines, which refer to Massachusetts-specific soils and ecosystem types to set allowable residue removal levels. In fact, the Forest Guild document states, "We encourage states to identify low-nutrient soil series where biomass harvesting should not occur and those soil series where biomass harvests require particular caution."

3. Greenhouse Gas Emissions

DOER's proposed GHG accounting overlooks important lifecycle emissions

The APS statute requires a *"50 per cent reduction in life-cycle greenhouse gas emissions compared to a high efficiency unit utilizing the fuel that is being displaced or, for a new load, a high-efficiency natural gas unit, if natural gas is available at reasonable cost to the site or otherwise the fuel that is most likely to be utilized*."[7] Lifecycle emissions are all GHG emissions associated with growing, harvesting, transporting, and transforming a fuel, as well as the emissions from burning that fuel. In the case of biomass, "net" lifecycle emissions can also be calculated over time, including crediting regrowth of forests with taking up carbon, or, crediting emissions that would occur "anyway" if forestry or mill residues were left to decompose instead of being burned for energy.

The regulations advance at least five different types of biomass fuels that will be eligible to receive subsidies – wood pellets, wood chips direct from forestry sources (encompassing "residues" and whole tree "thinnings"), wood chips from non-forestry sources, cordwood (which is most likely to be from whole-tree harvesting), and liquid biofuels made from wood feedstock (which could be of any origin). (225 CMR 16.02). These fuels differ in their lifecycle greenhouse gas emissions, not only because they require differing amounts of fossil fuel inputs to bring them to their final state where they are usable as fuel, but because they have different characteristics that affect their net emissions over time.

DOER's *Guideline on Reduction of Greenhouse Gases for Eligible Renewable Thermal Generation Units Using Eligible Woody Biomass*, an Excel spreadsheet workbook for calculating biomass greenhouse gas emissions, however, does not account for the differing lifecycle emissions of various fuels – unlike the GHG analysis workbook issued with the 2012 biomass regulations,[8] which *does* account for lifecycle emissions of differing fuels. Instead the APS workbook uses a *single emissions figure*[9], which represents the combustion emissions and other lifecycle emissions from harvesting green wood chips – a figure that, according to literature values, likely underrepresents even these emissions.[10]

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[7] https://malegislature.gov/Laws/GeneralLaws/PartI/TitleII/Chapter25A/Section11F1~2

[8] Spreadsheet at http://www.mass.gov/eea/docs/doer/renewables/biomass/ma-rps-regulation-overall-efficiency-and-ghg-analysis-guideline-doer-081712.xlsx. The section accounting for lifecycle GHG emissions is on the "GHG Analysis" sheet, cell C-23 to F-25. This section does not appear in the current workbook for GHG analysis under the APS.

[9] Cell D-11 at the "Parameters" sheet of the *Guideline on Reduction of Greenhouse Gases* workbook.

[10] Manomet's table (6-6) estimates that lifecycle emissions of harvesting and transporting chips represents around an additional 1 - 2 percent of emissions on top of stack emissions from combusting the wood. A variety of other studies examining use of green chips for biomass suggests that the estimate is closer to 4 percent and above (See, eg, Domke, G. et al (2012). "Carbon emissions associated with the procurement and utilization of forest harvest residues for energy, northern Minnesota, USA." Biomass and Bioenergy 36: 141-150.; Ortiz, C. A. et al (2016). "Time-dependent global warming impact of tree stump bioenergy in

DOER's assumptions regarding residue decay underestimate net GHG emissions

Forestry residues are treated by the GHG analysis workbook as a fuel that would decompose anyway if they were not burned for energy. The decomposition rate is represented by the "k-constant."

The previous version of the workbook, issued with the 2012 biomass regulations, employed a k-constant of 0.126 for forestry residues, which represents a half-life of around 5 years for "low-diameter" residues –meaning leaves, twigs, needles, up to branches that are approximately 1 -2 inches thick. The APS workbook has adopted this k-constant, as well. However, this value is not necessarily appropriate for many residue materials burned in thermal wood chip boilers for heat that are derived from larger diameter materials. In most cases, thermal units require very "clean" woodchips such as are derived by chipping larger diameter, debarked materials. To be treated as "residues," they must be assigned a lower k-constant that reflects their actual decomposition dynamics. Various studies from the Northeast find much lower decomposition rates for larger-diameter materials, for instance 0.0063[11] to 0.031[12] to 0.096.[13] The decomposition constants used in modeling EPA has conducted for New England were 0.053 for softwoods and 0.069 for hardwoods.[14] Using these constants in the DOER GHG calculations increases the carbon debt and timeframe for achieving reductions in net emissions compared to fossil fuels.

Using accurate k-consants is especially important because pellet and chip manufacturers often argue that they are only using residues - even when they are demonstrably using high-diameter materials that would probably not be simply left in the field if there were no biomass market.

The timeframe for assessing net bioenergy GHG emissions is too long

Calculating net greenhouse gas emissions from bioenergy, as the DOER *Guideline on Reduction of Greenhouse Gases* workbook does, requires assessing change over time. The 2012 biomass RPS regulations (225 CMR 14.00) set a 20-year timeframe for reducing biomass GHG emissions compared to fossil fuels. However, the *Guideline on Reduction of Greenhouse Gases* workbook

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Sweden." Forest Ecology and Management **371**: 5-14; Laganière, J., et al (2017). "Range and uncertainties in estimating delays in greenhouse gas mitigation potential of forest bioenergy sourced from Canadian forests." GCB Bioenergy **9**(2): 358-369.) .

[11] Means, J. E., K. Cromack Jr and P. C. MacMillan (1985). "Comparison of decomposition models using wood density of Douglas-fir logs." Canadian Journal of Forest Research **15**(6): 1092-1098.

[12] Foster, J. R. and G. E. Lang (1982). "Decomposition of red spruce and balsam fir boles in the White Mountains of New Hampshire." Canadian Journal of Forest Research **12**(3): 617-626.

[13] Arthur, M. A., L. M. Tritton and T. J. Fahey (1993). "Dead bole mass and nutrients remaining 23 years after clear-felling of a northern hardwood forest." Can. J. For. Res. **23**.

[14] Beach, R. H., et al (2010). Model Documentation for the Forest and Agricultural Sector Optimization Model with Greenhouse Gases (FASOMGHG). Prepared for Sara Bushey Ohrel, U.S. Environmental Protection Agency. RTI International, Research Triangle Park, NC 27709

proposes a timeframe of 30 years for the APS, which ensures that more biomass carbon pollution can be released the atmosphere under these rules than if the RPS standard of 20 years had been maintained.

Reducing greenhouse gas emissions in the short term is critical from both a scientific and policy perspective. The potential impact of CO_2 emissions in the short term on climate tipping points have been shown to be significant,[15] and limiting temperature increase to 2°C above pre-industrial levels requires large and immediate greenhouse gas emissions reductions. For example, Ricke and Caldeira (2014) recently found that the median time between an emission and maximum warming is 10.1 years.[16] Carbon emissions reductions must therefore be realized within short timeframes – measured in years, not decades - that are relevant to climate policy imperatives.

Accordingly, the standard for the APS must be set at no more than 20 years, and should in fact be even shorter, given the many deficits in accounting for the full GHG impact of bioenergy. We propose a timeframe of 10 years for net bioenergy carbon accounting to be calculated.

Verification standards for pre-approved biomass suppliers are lacking

While DOER states that for the time being, it will collect information on sources of chips burned by individual units, the department is abandoning this approach for pellets. The *Guideline on Biomass* states, "[a]ll Generation Units which purchase fuel from a fuel supplier on the Department's Biomass Suppliers list are assumed to have met the requirement for a 50% reduction in lifecycle GHG emissions and are not required to provide any further analysis, unless requested by the Department."[17]

DOER has provided a table for wood pellet manufacturers specifying fuel mix DOER will approve as meeting the GHG criteria – Table 1, showing "Minimum combined percentage of Forest Derived Residues, Non-Forest Derived Residues, and Forest Salvage." But DOER has not shown how they will verify the true sources of wood used for pellet manufacture. DOER's procedure for verifying and monitoring the sources of wood remains unspecified and penalties for misrepresenting wood sources are altogether absent.

Credits should not be granted to low efficiency units

The APS statute specifically articulates the need to restrict eligible biomass to efficient applications, stating "facilities using biomass fuel shall be low emission, use efficient energy conversion technologies and fuel that is produced by means of sustainable forestry practices." The APS guidelines, however, set an efficiency level of only 40 percent for a renewable thermal

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[15] Executive Office of the President of the United States, *The Cost of Delaying Action to Stem Climate Change,* 2014.

[16] Ricke, R. L. and K. Caldeira, 2014. *Maximum Warming Occurs About One Decade After a Carbon Dioxide Emission,* Environ. Res. Lett. 9 124002.

[17] *Guideline on Biomass, Biogas, and Biofuels for Eligible Thermal Generation Units*, p. 4.

generation unit that is a combined heat and power facility to be eligible for Alternative Energy Credits (*Guideline on Metering and Calculations for Intermediate and Large Units*, at page 10). This standard falls far short of what would be considered an "efficient" bioenergy technology. As EPA states in a publication on biomass combined heat and power, "[b]y using waste heat recovery technology to capture a significant proportion of heat created as a byproduct in electricity generation, CHP systems typically achieve total system efficiencies of 60 to 80 percent for producing electricity and thermal energy."[18]

In addition, the 40 percent criteria does not reach the standard set by the 2012 biomass regulations, which established that to be eligible for renewable electricity credits, a biomass unit must operate at 50 percent efficiency or above (40 percent for "Advancement of Biomass Conversion" units). Setting the efficiency standard at 40 percent under the APS will simply funnel public subsidy funds to low-performing units, the exact opposite of what a program that is legally mandated to incentivize 'best in class" units should do. The degradation in the efficiency standard relative to the 2012 biomass regulations represents a weakening of environmental protections because it will serve to increase the amount of air pollution and GHG pollution emitted per unit of useful energy, compared to emissions under a more rigorous efficiency standard.

Credits should not be granted for co-firing

The APS regulations provide a "co-firing waiver" that allows a generation unit that uses an APS ineligible energy source to receive AECs under certain circumstances when co-firing with another fuel. The most recent proposed revisions to the regulation have added useful thermal energy produced from co-firing as potentially eligible to receive AECs, in addition to the electricity from co-firing that was previously eligible (225 CMR 16.05(2)).

The co-firing waiver for electricity is a holdover from the 2009 version of the APS regulations, when units burning "paper-derived fuel" were still eligible to receive AECs. Paper-derived fuel has been removed from the APS, and the co-firing waiver should be, too. The statute makes it clear that "facilities using biomass fuel" (which would include fossil-fired facilities co-firing biomass) "shall" be subject to the requirements above. Since it is both obsolete and counter-productive, DOER should remove the co-firing waiver from the regulations entirely, rather than expand it to include useful thermal energy.

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[18] Energy and Environmental Analysis, Inc. and Eastern Research Group, Inc. Biomass Combined Heat and Power Catalog of Technologies, U. S. Environmental Protection Agency Combined Heat and Power Partnership. September, 2007.