Biomass Task Group
Findings, Recommendations and Rationales
7 October 2022

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The Biomass Task Group met for over eight months to learn about, discuss, debate, and develop recommendations regarding primarily the use of wood biomass for electricity production in Vermont. The full scope of the task group also included considerations related to wood procurement for electricity generation, and some of the broader implications for thermal applications. The group heard presentations and reviewed additional papers from over a dozen experts in forestry, biomass, carbon accounting, public health, and air quality. We sought advice from experts here in Vermont as well as in the U.S. and Canada broadly. An engaged public attended almost all meetings. There was at times vigorous debate, hard questions, and complicated issues to ponder, to understand, and to consider. The group was comprised of members from the Cross-Sector Mitigation, Agriculture and Ecosystems, Science and Data, and Just Transitions Subcommittees.[1] The Vermont Climate Council's Subcommittees and members held a wide range of views on this topic.

At its essence, burning wood to create electricity releases a large pulse of CO2 and other pollutants at the time of combustion. Over time, as living trees slowly grow and photosynthesize, CO2 can become resequestered.

The group learned that analyzing biomass for electricity production and GHG emissions is complex. Rather than a single issue, the use of biomass is a story about our electricity sources, public health, air quality, timescales, wood feedstock, land uses and forests, economy, tradition, communities forced to live on the margins, and carbon inputs into the atmosphere. What has confused many people is that in global climate accounting in the 1990s, there was an international analytical decision about on what side of the sectoral "ledger" biomass belongs. The Intergovernmental Panel on Climate Change (IPCC) chose back then to record sequestration and releases of carbon due to burning wood biomass in the "land use sector" (*i.e.*, removing biomass that is storing and sequestering carbon) and then accounted for biomass used in the "energy sector" as "carbon neutral." This has created confusion and misinterpretation that biomass is inherently a carbon neutral form of energy production.

Comparing electricity production from burning biomass to other forms of electricity production is dependent on several choices and assumptions as to the counterfactual or "as compared to

[1] Members of Task Group from the respective Subcommittees include Liz Miller and Adam Sherman for Cross-Sector Mitigation, Megan O'Toole and Richard Hopkins for Science and Data, Chase Whiting for Just Transitions and Billy Coster, Judy Dow, and Charlie Hancock for Agriculture and Ecosystems.

what." Comparisons relevant to biomass in the electricity sector, for example, should include questions such as: which energy source is biomass displacing, avoiding, or discouraging from being developed (*e.g*., coal, oil, natural gas, wind, solar, hydro); what co-pollutants are associated with those energies; what wood feedstock is being used to power the biomass facility; what additional "upstream" emissions are associated with that feedstock; and what timescale are we using to measure greenhouse gas emissions from that facility.

Timescales are especially important because achieving GHG emissions reductions in line with the GWSA will require significant reductions in the short-term. Questions pertaining to the "land use side of the ledger" include: what happens to forests, carbon storage, and forest management if wood biomass is removed; what would happen to forests, carbon storage, and forest management if wood biomass is not removed; actual and potential future land uses given various levels and methods of removal and post-removal forest management; what would be the disposition of residual wood (remain in the forest to decay slowly, provide habitat, but also release carbon slowly or be sold in other states' or countries' biomass fuel markets); what are the various GHG benefits and co-benefits of forests and forest management if biomass is not used for fuel; and how long it will take for the forest to replace the carbon removed, through natural processes.

Despite this complexity, the Biomass Task Group is pleased to share the following recommendations to the Vermont Climate Council

1. New electric generation biomass facilities in the State of Vermont should not be utilized (i.e., proposed, permitted, and built) as they will not decarbonize the State's electricity generation.

2. The two existing biomass electricity facilities should not be expanded to generate more electricity than current production allows. The only potential exception to this is with respect to the development of a thermal application at McNeil, which is referenced below in 4(a).

3. The Vermont Climate Council should commission an evidence-based study by an independent third-party expert that would be managed within the Climate Action Office. The study should include traditional ecological knowledge and should investigate if, when, and how to phase out Vermont's two existing biomass electricity facilities; how a phase out or lack thereof could impact Vermont's 2025, 2030, and 2050 GWSA greenhouse gas emission reduction requirements; the health, climate, and financial costs and benefits that could accrue to different sectors and constituents (*e.g*., local communities, s, land owners, etc.), and the alternative revenue streams and opportunities for the rural working economy, land owners, and others to pursue a just transition. The study should clearly look at the timeline of a phase out and the attendant ramp-up of clean energy replacements that would be needed.

4. The Task Group recommends that two matters require further exploration:

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- Any expansion to the McNeil facility to accommodate additional wood combustion for co-generation of heat must be specifically investigated. The investigation must examine possible impacts on the health of residents of the adjacent communities. It must also determine whether such an expansion would extend the operating life of a facility and therefore, cause health burdens to be borne longer-term. Additionally, it must look at the expansion considering Vermont's 2025, 2030, and 2050 GWSA emission reduction requirements. An expansion of electricity production for the viability of the thermal application must be considered by conducting a life-cycle analysis which would clearly demonstrate that the GHG emissions caused from the expansion of the biomass burned are significantly less than the GHG emissions avoided from the thermal application displaced, and on an adequate timescale.

- Biomass for Heat at a Residential and Commercial Scale and the impact on Vermont's forests bears further exploration as a climate solution. The Vermont Climate Council should consider forming a new task group to consider this topic explicitly, the right composition needed to do so, and the right process to ensure a clear directive and the capacity to support the task group. If a new task group is formed, members from this task group should be invited to participate so that the learning done through this process is carried forward into the new work. Additionally, consideration should be given to including representation from outside state government and the Climate Council process to have diverse opinions represented.

5. GHG emissions from wood biomass electricity generation should be assessed at the point of combustion and GHG sequestration should be assessed in the Carbon Budget, so that those different numbers can be compared accurately over time. The Task Group also recommends that a lifecycle GHG assessment provide sensitivity analysis around wood biomass GHG emissions relevant to the 2025, 2030, and 2050 timelines required by the GWSA.

6. Engagement must occur with the residents of Burlington's Old North End, Winooski, and other neighborhoods whose residents have been exposed to smokestack emissions and other adverse exposures related to the plant for some time. Adverse impacts to public health, cultural resources, and quality of life should be assessed and quantified. The Just Transition Subcommittee, in partnership with the Biomass Task Group, should lead such efforts in a respectful, consistent, and ongoing manner and consider the range of issues and needs for these communities that may extend beyond biomass.

7. More public health monitoring must occur in and around the neighborhoods adjacent to McNeil and cited in the areas most sensitive to pollution. The Inflation Reduction Act makes funds available for such monitoring and should be utilized. Public health impacts should be an indispensable component of any future actions taken regarding biomass electricity generation in Vermont.

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Broad Findings which informed the Recommendations

Electricity Biomass and GHGs

- While biomass may compare favorably to coal as a less GHG intensive source of electricity, Vermont does not rely on coal as it used to. Vermont acquires most of its electricity from hydroelectric dams, nuclear power, solar, wind, and biomass. Biomass should be compared to those other sources. When compared to New England's other energy sources, which Vermont utilities also draw upon, natural gas is the most likely fossil fuel comparison, at least for the next 5 to 10 years, but emissions from biomass plants do not fare better against gas generators' emissions from purely a GHG perspective. Ongoing life-cycle analysis of Vermont's energy sector being conducted by the Agency of Natural Resources will further inform this conversation when completed.

- There is also a current proposal to co-generate thermal heat at the McNeil plant. The Task Group is concerned that thermal expansion will increase toxic air emissions, require a footprint expansion of the plant, located on a designated cultural resource site, disruption to overburdened communities from construction of a distribution system to the UVM Hospital, impacts on cultural resources currently undisturbed. Such thermal expansion will provide few direct benefits to the communities that would bear the bulk of the air pollution impacts of the expansion ifor example, the air pollution is adjacent to their homes but heat does not serve them, instead serving an institution outside the neighborhood).

- The retirement of the facilities would be a loss of production to Vermont and New England's power generation, may have ratepayer impacts, and could have other adverse consequences such as loss of a market for wood residuals for Vermont landowners, the rural working economy, and sawmills. More study would be needed on what, when and how alternative sources would replace these losses were they to close.

Electricity Biomass and Additional Adverse Impacts

- Biomass electricity generating plants create numerous other impacts, ranging from site disturbance to air quality and health adverse impacts, including but by no means limited to particulate matter, of which there is no safe level that does not have an adverse health consequence. Such facilities tend to be sited in areas with low land costs and proximity to transmission, often meaning such facility siting adversely affects already overburdened, poorer communities.

- The existing plants, particularly the McNeil facility, pose and continue to pose air quality and public health hazards to adjacent overburdened communities even though the plants are meeting their regulatory requirements under current law. Closing these plants, particularly McNeil, would reduce or end adverse health impacts on the adjacent

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communities. That said, there could be economic impacts that must be planned for. Impacted communities should be given a chance to weigh in on the outcome.

Electricity Biomass and Forests

- Future management of forest land from which biomass is harvested today is key to minimizing the adverse climate impacts from harvesting the biomass. Furthermore, since much of the source wood comes from adjoining states (as much as 50% or more), Vermont does not have a clear span of control over this important element of biomass electricity production.

- The retirement of the facilities would have adverse impacts on those who are employed directly by the plant and those who more indirectly benefit, such as woodlot owners who sell a portion of their cutting for biomass fuel, foresters, and others. As noted, however, it appears that a majority of the wood combusted at these electrical generating facilities is sourced from outside Vermont. A study is needed to analyze the economic consequences to small woodlot owners and intermediaries who sell a portion of their harvest to the plant, as well as the direct facility employees, and what substitutions are possible and what mitigations or retooling could offset adverse effects brought about by closures. This study should be sure to identify alternative revenue streams and markets, as well as other ways to promote a just transition.

- Regardless of the future of these two facilities, work needs to be done to ensure that there are a host of markets for well-managed forests and their products for private woodlot owners in Vermont and the s and related occupations that service them. That work is an essential aspect of preserving Vermont traditions and ensuring a just transition.

Given the Climate Council had already spoken on biomass for heat outside of electricity production, the Task Group did not explicitly include in its scope an effort to reach recommendations on this topic. However, given the complexity of biomass use and forests broadly, the Task Group could not avoid considering many broader issues. The Task Group notes the following:

- Far more woody biomass is burned for heat in Vermont than to generate electricity, so an exclusive focus on electricity misses some fundamental questions around biomass and the use of Vermont's forests.

- If emissions from wood biomass were included in the GHG emissions inventory for Vermont, the buildings/thermal sector would be larger than the transportation sector.

- We learned that we cannot count just on annual assessments of the amount of standing forest biomass to tell us about the sequestration impact of biomass use for thermal and electricity production—we must know how much was removed and how much for what

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purpose (timber, paper, fuel, chemical industry feedstock, etc.). We also must know whether Vermont is a net importer or exporter of wood burned for heat or for electricity. Ideally, we would assess removals of biomass not just in terms of whether and when the wood gets replaced by new growth in the forest, but how long it takes the forest to reach the amount of carbon stored that it would have had if the biomass had not been removed.

- When wood is removed from a forest and burned (for electricity or heat), the carbon that was stored in that wood is released to the atmosphere as CO2 (and some CO, CH4, and other toxic air pollutants such as PM2.5). Depending on how the forest is managed, it will take decades or centuries (or essentially forever if the forest is replaced by a farm field or a parking lot) for the carbon that was released to be fixed in trees again. In the meantime, the carbon contributes to global warming. Because the next several years are critical to avoiding irreversible climate tipping points, this timeline is an important consideration. We can think of the wood that was harvested and burned as partially renewable. Pertinent to the lifecycle group now working on this issue with a consultant, one of the several reasons that giving the burning of wood a non-zero value for CO2 released is important is that we want increments in amounts of wood burned to add to our accounting of GHG releases.

- Lastly, though the group as composed did not have the time, scope, nor full set of participants to address this, the broad and important issue of Vermont's forest and climate change surfaced numerous times. Questions such as: 1) what is the appropriate balance of managed conservation of forests (allowing or even encouraging logging under appropriate standards) versus preservation of forests as they stand today (no logging); 2) electricity biomass production aside, what is the proper balance of policies that will allow Vermont's forests to be resilient, sustained and thrive, provide for carbon sequestration and storage, traditional uses such as foraging, and recreational uses, generate income for property owners to keep private lands in forest of some kind, and potentially generate carbon-friendly products from manufactured wood for construction to various other wood products.

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