EPA's Treatment of Biogenic Carbon Dioxide (CO_2) Emissions from Stationary Sources that Use Forest Biomass for Energy Production

Introduction

The use of biomass from managed forests[1] can provide numerous environmental, energy and economic benefits. Specifically, forest biomass use for energy can bolster domestic energy production, provide jobs to rural communities, and promote environmental stewardship by improving soil and water quality, reducing wildfire risk, and helping to ensure our forests continue to remove carbon from the atmosphere.

EPA recognizes the importance of the nation's forest resources and related industries, and the role that biomass can play in renewable energy strategies. These principles are core elements of provisions in the *Consolidated Appropriations Act, 2018*.[2] Those provisions explicitly direct EPA, the Department of Energy and the Department of Agriculture to establish policies that "reflect the carbon-neutrality of forest bioenergy and recognize biomass as a renewable energy source, provided the use of forest biomass for energy production does not cause conversion of forests to non-forest use." Such policies would also be consistent with Executive Order 13783,[3] *Promoting Energy Independence and Economic Growth*, which requires executive agencies to review requirements that may hinder domestic energy production. Furthermore, in response to Executive Order 13777, *Enforcing the Regulatory Reform Agenda*,[4] many forest and forest products industry stakeholders provided comments about uncertainty related to the treatment of forest biomass used for energy in EPA programs. These comments explained that regulatory uncertainty concerning biogenic carbon dioxide (CO_2) emissions from the use of forest biomass for energy has made planning future investments riskier for these industries and forest communities, hindering growth of the U.S. bioeconomy.

To proactively address congressional directives and stakeholder concerns specific to the use of forest biomass for energy, EPA's policy in forthcoming regulatory actions will be to treat biogenic CO_2 emissions resulting from the combustion of biomass from managed forests at stationary sources for energy production as carbon neutral. EPA's ongoing work under the Renewable Fuels Standard (RFS) and Title II will not be impacted by this policy and will continue to be governed by the existing regulatory and statutory process and requirements already in place.[5]

Policy Summary

EPA's rationale and basis for applying this policy is as follows. In treating biogenic CO_2 emissions associated with the use of forest biomass for energy at stationary sources as carbon neutral, the Agency has balanced the Executive Orders and Congressional direction described above with the following considerations:

[1] 'Managed forest' is a forest subject to the process of planning and implementing practices for stewardship and use of the forest aimed at fulfilling relevant ecological, economic and social functions of the forest (IPCC). Also, in this document, it specifically comprises lands that are currently managed or those that are afforested, to ensure the use of biomass for energy does not result in the conversion of forested lands to non-forest use.

[2] https://www.congress.gov/115/bills/hr1625/BILLS-115hr1625enr.pdf

[3] www.whitehouse.gov/presidential-actions/presidential-executive-order-promoting-energy-independence-economic-growth/

[4] https://www.gpo.gov/fdsys/pkg/FR-2017-06-28/pdf/2017-13551.pdf

[5] https://www.epa.gov/renewable-fuel-standard-program/regulations-and-volume-standards-renewable-fuel-standards

- U.S. forests have been historically and are currently a net sink of carbon; in 2015, the forest sector offset approximately 11.2 percent of gross U.S. greenhouse gas emissions.
- Use of biomass for bioenergy can support the management of U.S. forests and can lead to increased carbon sequestration from U.S. forests over time.
- Draft EPA analysis suggests that use of various biomass feedstocks for energy at stationary sources can result in negligible net contribution to atmospheric concentrations of CO_2 depending on factors related to feedstock characteristics, production and consumption, and alternative uses.
- Use of biomass feedstocks from managed forests for energy at stationary sources can provide multiple environmental benefits, such as pest management, improved water and soil quality, and wildfire risk reduction.
- Use of these biomass feedstocks for energy at stationary sources can provide numerous economic benefits to rural communities, including new jobs and income from forest biomass industry and support of existing tourism and recreation industries in forested areas.
- EPA's technical work on a framework for assessing the net atmospheric contribution of biogenic CO_2 emissions from biomass feedstocks used by stationary sources for energy production, includes an ongoing peer review by EPA's Science Advisory Board (SAB). However, this process has not to date resulted in a workable, applied approach.
- Many forest and forest products industry stakeholders view the lack of a clear EPA policy on the treatment of biogenic CO_2 emissions resulting from the combustion of forest biomass for energy at stationary sources as an impediment to the use of biomass from managed forests for bioenergy purposes, thus frustrating the realization of its expected environmental and economic benefits.

The Agency's approach is a pragmatic one, promoting the environmental and economic benefits of the use of forest biomass for energy at stationary sources, while balancing uncertainty and administrative simplicity when making programmatic decisions.

This statement of agency policy is not a scientific determination and does not revise or amend any scientific determinations that EPA has previously made. Rather, this statement of policy is intended to: 1) provide clear recognition of the benefits of using forest biomass for energy production at stationary sources; and 2) signal the Agency's intent to treat the biogenic CO_2 emissions associated with the use of forest biomass for energy by stationary sources as carbon neutral in future regulatory actions and in various programmatic contexts, in accordance with the Executive Orders and Congressional direction described above.

This statement of agency policy does not represent a final agency action and does not directly address the treatment of biogenic CO_2 emissions at any particular stationary source or in any specific regulatory context or other EPA program such as voluntary programs. Any changes to the current treatment of biogenic CO_2 emissions at a specific entity or in a specific regulatory program or other context will be accomplished through the appropriate mechanisms, including, as necessary, a notice of any proposed rulemaking, the basis for such changes, and an opportunity for public comment.

Technical Summary

Through photosynthesis, plants absorb CO_2 from the atmosphere and add it to their biomass as carbon, a process referred to as sequestration. When plant biomass is harvested or cleared from the land and burned for energy, used as an input to an industrial process, or biodegraded as part of waste treatment processes, the carbon in biomass is released into the atmosphere as CO_2.

EPA tracks all anthropogenic greenhouse gas (GHG) emissions and sequestration, including those resulting from the use of bioenergy, via the *Inventory of U.S. Greenhouse Gas Emissions and Sinks*. Consistent with Intergovernmental Panel on Climate Change (IPCC) methodologies, the Inventory provides a holistic approach to estimating carbon sequestration and GHG emissions at the national level across all sectors. Biogenic CO_2 emissions related to activities affecting terrestrial carbon stocks, such as harvesting trees, are captured within the land-use, land-use change, and forestry sector of the Inventory, even if a portion of those emissions, such as the CO_2 emissions from biomass combustion, ultimately take place at facilities typically associated with a different inventory sector (e.g., the energy sector). [6] This national land sector inventory approach is well suited to track national trends, but it cannot attribute changes in forest carbon stocks to particular activities, such as the use of forest biomass for energy.

The scientific and technical considerations relevant to assessment of the GHG emissions and other land use-related outcomes from biomass use for energy production can be complex, as there are several interrelated biophysical, energy and market systems underpinning biomass production and use. Beginning in 2010, in response to stakeholder comments, [7] EPA sought to advance the technical understanding for assessing the net biogenic CO_2 emissions associated with the use of biomass at stationary sources. In 2011, as part of this process to advance our technical understanding, EPA submitted for peer review with the EPA Science Advisory Board (SAB) a draft technical report[8] presenting considerations for evaluating the biogenic CO_2 emissions associated with biomass use for energy at stationary sources (2011 Draft Framework). The SAB peer review of the 2011 Draft Framework[9] found that it is not scientifically valid to assume that all biogenic feedstocks are carbon neutral, but rather that the net biogenic carbon profile related to the use of biomass feedstocks depends upon factors related to feedstock characteristics, production and consumption, and alternative uses. The SAB also asserted that use of some biomass feedstocks may have minimal net biogenic CO_2 emissions and others may require more analysis.[10] Furthermore, the SAB also acknowledged that in addition to scientific elements, EPA may need to consider the tradeoffs and benefits of different accounting approaches and other practical implementation issues to inform policy choices when

[6] While included in the reported net carbon sequestration/CO_2 emissions in the land-use sector of the Inventory, the biogenic CO_2 emissions from combustion of biomass for energy are also quantified for informational purposes in the energy sector of the Inventory as a memo item, but are not included in that sector's total to avoid double-counting.

[7] FR Notice [EPA–HQ–OAR–2010–0560; FRL–9175–9], Call for Information: Information on Greenhouse Gas Emissions Associated with Bioenergy and Other Biogenic Sources <https://19january2017snapshot.epa.gov/sites/production/files/2016-08/documents/biogenic_ghg_srcs_cfi_7.15.10_fr.pdf>.

[8] Draft Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources (2011) < https://19january2017snapshot.epa.gov/sites/production/files/2016-08/documents/biogenic-co2-accounting-framework-report-sept-2011.pdf>.

[9] EPA Science Advisory Board Review of the 2011 Draft Accounting Framework for CO_2 Emissions for Biogenic Sources Study (2012) <https://yosemite.epa.gov/sab/sabproduct.nsf/0/57B7A4F1987D7F7385257A87007977F6/$File/EPA-SAB-12-011-unsigned.pdf>.

[10] A number of forest biomass feedstocks, such as certain industrial byproducts, have been demonstrated to result in little to negligible contribution to net atmospheric concentrations of CO_2 when used for energy at stationary sources.

assessing biogenic CO_2 emissions from stationary sources.[9] The SAB further acknowledged that accounting for biogenic CO_2 emissions associated with stationary sources involves both scientific and policy considerations, including the policy context in which the accounting is applied.[11]

In November 2014, EPA released a revised second draft of its technical report (2014 Revised Framework)[12], which incorporated input from the SAB's review of the 2011 Draft Framework and stakeholder comments and presented a potential framework for assessing biogenic CO_2 emissions. Final recommendations from the SAB peer review process of the 2014 Revised Framework remain uncertain as there is disagreement among the SAB on specific technical elements.[13]

As a result, while a valuable exercise, the lengthy and intensive process of assessment and discussion, including among the SAB, has not to date resulted in a workable, applied approach for consistently assessing the net atmospheric contribution of biogenic CO_2 emissions at stationary sources. In addition, broader considerations also motivate EPA to establish this policy, including the substantial environmental and economic benefits associated with the use of forest biomass, the benefits of providing clarity to stakeholders, and direction from Congress and relevant Executive Orders.

National Forest Carbon Stocks and the Role of Bioenergy

While it is not possible to discern from national forest carbon stock estimates the effects of a particular stationary source's use of forest biomass for energy, general U.S. carbon stock trends in the land sector, including changes in forest biomass consumption, are captured in the *Inventory of U.S. Greenhouse Gas Emissions and Sinks.* U.S. forested lands currently remove more CO_2 from the atmosphere than they emit (i.e., they are a net sink of carbon); in 2015 the forest sector offset approximately 11.2 percent of gross U.S. GHG emissions.[14] While there is some uncertainty within the scientific community about whether U.S. forests will remain a net carbon sink over the coming years, recent research shows that under current market and environmental conditions, continued forest land investment and management can allow for continued and even increased U.S. forest carbon stocks in the future. Specifically, landowners can anticipate future markets for woody materials and accordingly invest in forested lands.[15]

Changes in demand for forest-derived biomass could influence how U.S. land owners manage forests and the related forest carbon stocks. For example, in the short term, increased biomass demand may

[11] In fact, the SAB acknowledged in its review of both the Draft and Revised Frameworks that it was difficult to conduct a scientific review of the Framework in the absence of information about the applied policy context in which it would be used.

[12] Revised Framework for Assessing Biogenic CO_2 Emissions from Stationary Sources. (2014) < https://19january2017snapshot.epa.gov/sites/production/files/2016-08/documents/framework-for-assessing-biogenic-co2-emissions.pdf>.

[13] Disagreement remains between EPA's Biogenic Carbon Emissions Panel and the EPA Chartered SAB, specifically on the issue of the timeframe for assessment of biogenic CO_2 emissions from the use of biomass at stationary sources. The disagreement is focused on whether the timeframe should be a policy-specific horizon or based on the time horizon in which all terrestrial impacts (positive and negative) associated with biomass use for energy are included.

[14] *Inventory of U.S. Greenhouse Gas Emissions and Sinks*: 1990-2015 < https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2015>.

[15] Tian, Xiaohui, Brent Sohngen, Justin Baker, Sara Ohrel, and Allen A. Fawcett. 2018. *Will U.S. Forests Continue to Be a Carbon Sink?* Land Economics February 2018. 94 (1): 97–113. ISSN 0023-7639.

change forest product market dynamics and how the forest industry sources materials. Stakeholders have raised concerns regarding near term land-use changes in response to increased biomass demand. Over time, stronger markets for biomass from managed lands could potentially bring more added value to forested lands and lead to increased forested lands and carbon sequestration.[16] This market development could help reduce the conversion of forest lands to non-forest uses. EPA recognizes the importance of ensuring the management of forests protects and conserves biologically sensitive areas and, in the ongoing implementation of this policy, will continue to closely monitor overall bioenergy demand and landscape conditions for changes that might have negative impacts on public health or the environment. EPA will continue to evaluate the applicability of this policy of treating biogenic CO_2 as carbon neutral based on relevant information, including data from interagency partners on updated trends in forest carbon stocks. This safeguard, among others, serves to ensure that EPA periodically assesses the need to revisit this treatment in the future.

Environmental and Economic Benefits of Bioenergy

EPA recognizes it is also important to consider additional roles of biomass and the land sector in GHG mitigation strategies and in the economy. Biomass from forest management activities can provide significant energy, economic, and environmental benefits to the U.S. For example, thinning and fuel treatments in western states can reduce the risk of forest fires, while simultaneously providing an energy source for the electric grid. The use of forest biomass for energy at stationary sources can also provide environmental benefits, such as improved soil and water quality, which help facilitate healthy forests. Healthy forests support outdoor recreation and tourism, bringing much needed income to rural communities. Landowners and communities benefit from the economic gains of their forests, which in turn allows them to invest more in the habitats and ecosystems that sustain these industries. The use of forest-derived bioenergy can also play a role in promoting domestic energy security for the U.S. and provide flexibility for stationary sources to use a variety of feedstock resources, potentially lowering costs. The U.S. has historically had a large forest products industry and continued growth is expected in the bioeconomy.[17] Thus, forest-derived bioenergy can provide new markets and new products to the U.S. bioeconomy.

Currently, many U.S. states recognize the benefit of using biomass as renewable energy in their state electricity generation mixes, as evidenced by the number of state renewable portfolio standards (RPS) that include some biomass as an eligible renewable energy resource. Many international programs also recognize that biomass can have benefits and encourage its use for energy production through national energy policies, such as the United Kingdom Renewables Obligation program.[18] These U.S. state and international programs have shown that diverse energy resources and unique economic, environmental and renewable energy goals can promote bioenergy development, as well as responsible land management. An EPA policy treating biogenic CO_2 emissions from the use of biomass from managed forests at stationary sources for energy as carbon neutral, as presented in this document, will foster the alignment of EPA regulatory actions with the treatment of biogenic CO_2 emissions in U.S. state and

[16] Latta, Greg S., Justin S. Baker, Robert H. Beach, Steven K. Rose, Bruce A McCarl. 2013. *A multi-sector intertemporal optimization approach to assess the GHG implications of U.S. forest and agricultural biomass electricity expansion*. Journal of Forest Economics 19 (2013) 361–383.
[17] Biomass Research and Development Board. 2016. *Federal Activities Report on the Bioeconomy* <https://www.energy.gov/sites/prod/files/2016/02/f30/farb_2_18_16.pdf>.
[18] https://www.ofgem.gov.uk/environmental-programmes/ro

international programs. For example, the California Cap-and-Trade Program[19] and the Regional Greenhouse Gas Initiative (RGGI)[20] among Northeast and Mid-Atlantic states exempt biogenic CO_2 emissions from a compliance obligation, provided that specified types of biomass are used that meet certain requirements. In addition, the European Union Emission Trading Scheme (EU ETS)[21] exempts biogenic CO_2 emissions at stationary sources from a compliance obligation.

Conclusion

For the reasons described above, EPA's policy in forthcoming regulatory actions will be to treat biogenic CO_2 emissions resulting from the combustion of biomass from managed forests at stationary sources for energy production as carbon neutral. Although this policy announcement does not itself alter sources' obligations with regard to GHGs and CO_2 in any particular regulatory program, the Agency is committed to addressing regulatory uncertainty about how it treats biogenic CO_2 emissions in forthcoming actions under various EPA programs. The Agency also recognizes that technical, policy, legal, and Congressional contexts may change over time and plans to revisit this treatment of biogenic CO_2 emissions at stationary sources as necessary. Various tools, including data from our interagency partners, are available to help EPA periodically assess the need to revisit this treatment in the future. For example, the *Inventory of U.S. Greenhouse Gas Emissions and Sinks* can be used to track broad trends in forest carbon stocks over time.

EPA's policy treatment of biogenic CO_2 emissions associated with forest biomass use at stationary sources for energy production aims to provide clarity to forest and forest product industry stakeholders. As directed by Congress and Executive Orders, this policy seeks to ensure that biomass from managed forests plays a key role in addressing the energy needs of the U.S., furthering U.S. energy dominance, in an environmentally and economically beneficial way.

[19] https://www.arb.ca.gov/cc/capandtrade/capandtrade.htm
[20] https://www.rggi.org/
[21] https://ec.europa.eu/clima/policies/ets_en