



Minnesota
Forest
Resources
Council

Representing:
Commercial Logging
Contractors
Conservation
Organizations
County Land
Commissioners
Department of
Natural Resources
Environmental
Organizations
Forest Products Industry
Games Species
Management
Labor Organizations
Minnesota Indian
Affairs Council
Nonindustrial Forest
Landowners
Research and
Higher Education
Resort and
Tourism Industry
Secondary
Manufacturing
USDA – Forest Service

January 28, 2025

Commissioner Katrina Kessler
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

Commissioner Kessler,

Please accept the following input on the Climate Action Framework on behalf of the members of the Minnesota Forest Resources Council (MFRC). The MFRC is statutorily charged with advising the governor and federal, state, county, and local governments on sustainable forest resource policies and practices. The following comments focus entirely on the role of Minnesota's forests in helping achieve the desired outcomes of the Climate Action Framework.

The MFRC recently released the results of a commissioned study entitled, *"Estimating current and future carbon stocks and emissions in Minnesota forests and forest products under multiple management scenarios."* This innovative research provides a current assessment of carbon storage and emissions in Minnesota's forests and forestry sector and simulates their changes over 100 years under four forest management scenarios while holding forested acres, harvest rates, and climate constant. The simulation shows the highest forest carbon storage and sequestration rates occur from 2025 to 2050, contributing to the state of Minnesota's target to achieve statewide no-net atmospheric carbon (CO₂) emissions by 2050. All management scenarios modeled in the research projected long-term increases in carbon storage both within forests and in harvested wood products.

We strongly encourage the Climate Action Framework planners and modelers to closely examine the study. It provides a higher estimate of our forest's net atmospheric carbon removal than other sources. It also provides a Life Cycle Assessment of Harvested Wood Products (HWP) manufactured in Minnesota that may be informative.

Key Findings Include:

Forests are key to achieving Minnesota's climate action goals. Minnesota's forests and forestry sector play an important role in the state's goal to achieve net-zero emissions by 2050, helping reduce the severity of future climate-change impacts. Related details include:

- Minnesota's forests absorb about 27 million metric tons (MMT) of atmospheric carbon (CO₂) each year, offsetting about 15 percent of the state's annual greenhouse gas emissions as estimated by the Minnesota Pollution Control Agency (146 MMT CO₂).
- Minnesota's forests may be offsetting more greenhouse gas emissions than previously understood. The amount of carbon stored by Minnesota forests has increased in recent

years¹ and, the carbon study's simulation projects carbon storage will continue to increase in the future. The magnitude and longevity of future increases will be dependent upon management actions and the severity of climate change.

- Of Minnesota's eight economic sectors, forestry is the only sector that offsets greenhouse gas emissions. Minnesota's forests are a net carbon sink (i.e., store more carbon than they release) due to their ability to absorb atmospheric carbon and convert it into wood, where it is stored in the forest and in harvested wood products.

Sustainable forest management helps keep forests healthy and can promote carbon sequestration and storage. Sustainable management of Minnesota's forests conserves and increases forest cover and maintains a balance of young, middle-age, and old forests over time. Generally, young forests sequester carbon at a faster rate than old forests, but old forests store more carbon than young forests. Both are important for forests' ability to adapt and be resilient to climate changes.

- We modeled the carbon stored and sequestered in Minnesota's forests and forest products under four management scenarios, which projected long-term increases in carbon storage to varying degrees within forests and in harvested wood products. These four management scenarios include:
 - No management: No management treatments were applied in this scenario. While this model projected an increase in the amount of carbon stored within Minnesota's forests, it showed a decline in carbon storage rates over time. No management can compromise the forest's ability to adapt and be resilient to climate changes.
 - Business as usual (BAU): Silvicultural prescriptions (i.e., a planned treatment of a forest site designed to change current stand structure or condition to meet management goals) were identified according to typical management strategies used in Minnesota. Harvests occurred at a rate identified by historical timber harvests. The BAU scenario incorporates the other three management scenarios (i.e., no management, climate-adapted, economic intensive) to the extent they are currently being applied on Minnesota's forests.
 - Climate-adapted: Silvicultural prescriptions (i.e., a planned treatment of a forest site designed to change current stand structure or condition to meet management goals) were identified for each forest type that sought to promote forest resilience under an adaptive silviculture strategy. Characteristics included tree planting, shorter entry periods (i.e., the interval between harvesting operations), and managing for diverse species and stand ages.
 - Economic intensive: Silvicultural prescriptions were identified that sought to maximize economic return from forest management activities. Characteristics included shorter rotation ages and increased harvest intensities.

¹ USDA-FIA 2024, EPA 2024, USDA Forest Service, Forest Inventory and Analysis Program, *Forest Inventory EVALIDator web-application Version 2.1.2*. St. Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station, <https://apps.fs.usda.gov/fiadb-api/evalidator>.

Grant M. Domke, Brian F. Walters, James E. Smith, Eric J. Greenfield, Courtney L. Giebink, Stephen M. Ogle, John Steller, Kenna Rewcastle, Jonathan A. Knott, John W. Coulston, Kelly A. Heilman, Ashley K. Lang, [Greenhouse gas emissions and removals from forest land, woodlands, urban trees, and harvested wood products in the United States, 1990–2022](#) (2024).

- Results from the four management scenarios investigated in the research suggest how forest management activities might be adjusted to increase the carbon storage potential of forests. It should be noted that all four scenarios are in play on varying acreages in Minnesota based on ownership and management directive.
- The model used for this research did not account for climate change, including large events that can disrupt the forest like wildfire or an increase in tree mortality. Such events could contribute to the release of stored carbon back into the atmosphere and reduce the amount of carbon sequestration and storage.
- This model held the proportion of Minnesota’s forests subjected to management constant at current (2020) levels but adjusted the silvicultural treatments and management intensity on those acres. As a result, under all scenarios the overall forest age and forest carbon storage increased. As forest age increases beyond maturity, growth tends to decline and emissions from mortality and decomposition increase. Forest management can be used to regulate the age structure and species composition of the forest to sustain future growth and carbon storage rates. The study highlights a variety of silvicultural treatments and regimens capable of sustainably increasing the ability of Minnesota’s forests to help achieve climate goals.

Minnesota has a time-sensitive opportunity to increase our forests’ ability to help achieve the state’s climate action goals. Minnesota’s forests are currently growing faster than removals, thus sequestering and storing more carbon than they emit. However, the research model predicts a turning point in the rate of growth and an increase in natural mortality levels over time. We have an opportunity now to manage our forests to help them remain vigorous and be more resilient to the changing climate.

- After 2100, the research model projected annual carbon sequestration by Minnesota’s forests slows (managed scenarios) or declines (unmanaged). Adjusting forest management approaches, increasing forest area, and increasing the total acreage of active forest management are good strategies that can increase carbon sequestration beyond this period.
- Research from the MFRC-commissioned study reinforced the need for policies and economic opportunities that will help Minnesota sequester and store more carbon by:
 - Keeping forestland forested
 - Planting trees and increasing forest cover
 - Managing forests
 - Supporting forest product markets
 - Using wood-based products instead of high carbon-emitting alternatives
 - Balancing forest ecological, economic, cultural, and social benefits
 - Increasing use of climate-adapted forest strategies; and
 - Investing in research and the development of forest resources data that can help inform cost and benefits of climate adaptive forestry strategies moving forward.

There is largely untapped potential to grow our state’s clean economy with innovative, energy-efficient, low-carbon forest product markets that offer environmental benefits and provide family-sustaining job opportunities.

- Research shows that the increased sequestration rates of young forests combined with the overall long-term storage of sequestered carbon in forests and harvested wood products offsets carbon emissions associated with logging, hauling, and manufacturing of forest products, and supports the management for continued health and vigor (i.e., growth) of the forest.

Further research is needed to determine if there is even more that our forests can do to address climate change. We believe we can reduce emissions from wildfire and decomposition through management; increase the area of forest through planting, and the sheer number of trees by increasing stocking rates in some stands; increase carbon absorption through thinning and regenerating decadent stands; and increase in-stand storage by maintaining longer-lived forest types.

Climate adaptation and carbon management are two of a myriad of services our forests deliver. Our forests supply habitat for a broad array of life that requires very diverse habitats and conditions. They provide recreational opportunities and cultural needs that support the human condition. They support good-paying jobs in rural communities and forest products that we need every day. And they are the source of clean water and air for all life. Sustainable forest management balances all forest resources, which are defined in [Minnesota Statute 89.001](#) as “natural assets of forest lands, including timber and other forest crops; biological diversity; recreation; fish and wildlife habitat; wilderness; rare and distinctive flora and fauna; air; water; soil; climate; and educational, aesthetic, and historic values.”

Following are comments on Climate Action Framework Initiatives and Sub-initiatives where we feel the forestry sector can play a role.

1. Clean transportation

Connect and serve all people through a safe, equitable, and sustainable transportation system.

1.2. Clean and efficient vehicles: accelerate the transition to electric vehicles (EVs) or zero emission vehicles (ZEVs) and advanced clean fuels.

1.2.1. Reduce the carbon intensity of transportation fuels. Biofuels manufactured from woody feedstocks have lower carbon intensity and GREET Model scores than any other feedstock. MFRC supports reducing the carbon intensity of fuels so long as it does not diminish our forests’ health, habitat, water quality, recreation, cultural importance, and other ecosystem services.

2. Climate-smart natural and working lands

Enhance climate benefits by absorbing and storing carbon, reducing emissions, and sustaining resilient landscapes.

2.1. Carbon sequestration and storage in forested lands, grasslands, and wetlands: manage forests, grasslands, and wetlands for increased carbon sequestration and storage.

2.1.1. Maintain, expand, and actively manage forestlands. Reducing forest conversion, planting trees, and active management of diverse forest types and age classes can increase carbon absorption, decrease carbon emissions, and increase the amount of carbon stored in-forest and in wood products.

2.1.4. Encourage individual actions that increase carbon storage. Public and private forest landowners make decisions on forest outcomes every day. MFRC encourages continued support of public and private forest landowners through policy decisions and financial incentives that encourage proper sustainable management.

Per [MRFC Resolution 2022-2](#), we support expanding state and private seedling production of bare root and containerized seedlings to historical levels of 10 million seedlings produced per year and incentivizing private land tree planting through cost-share programs, partnerships, and projects to fully utilize planned increases in nursery stock.

2.2. Resilient landscapes and ecosystems: enhance the ability of plants and animals, including crops, to adapt to the effects of climate change.

2.2.1. Conserve and enhance biodiversity. Prioritize active forest management that helps provide the diversity of forest types and age classes necessary to support a diverse array of life with appropriate attention to conserving biodiversity (e.g., adjust management where necessary to conserve rare species).

2.2.3. Promote the benefits of natural lands in climate adaptation. Natural forest lands with a variety of species and age classes are well suited for climate adaptation.

2.4. Sustainable landscapes and water management: reduce greenhouse gases and improve landscape resiliency through multi-purpose water storage and management practices that protect farmland, water supplies, and infrastructure.

2.4.3. Consider adding the following sub-initiative: “*Manage forested landscapes to hold water and reduce runoff.*” It is the same as the ag-related 2.4.2, but forests are already a major source of clean water, as well as water-absorbing landscapes that reduce runoff. That may become strained under some climate change predictions, hence the need for the sub-initiative.

2.5. Investments in emerging crops, products, and local economies: support emerging agricultural and forest technologies and products that reduce waste, create jobs, and expand economic opportunities.

2.5.2. Promote forest products that store carbon and reduce GHG emissions. All harvested wood products store carbon but for different lengths of time.

2.5.4. Reduce waste and promote beneficial use of materials. Paper products already have a high recycling rate; however, as is the case with all commodity sectors, there is room for improvement. When considering “beneficial use of materials” we urge the state to fully consider the substitution effect of selecting materials that are less carbon

intensive than others. The MFRC study analyzed the substitution effect of harvested wood products over things like concrete and steel in construction. By comparison wood has far lower embodied carbon and is renewable.

[MFRC Resolution 2022-1](#) recommends that Minnesota should support development of markets for forest products mill residues and forest management residuals to reduce waste, add value to the forest economy, improve forest health, and improve carbon management.

3. Resilient communities

Provide each Minnesota community with tools to plan for and become resilient to its specific climate impacts.

3.1. Climate-prepared communities: build Minnesota communities' capacity to protect against and withstand the effects of climate change.

Consider adding sub-initiative 3.1.4. "Reduce wildfire risk in the Wildland Urban Interface of rural forested communities." Climate change predictions include longer drought periods, which increase the likelihood of forest wildfires. Many forested rural communities need to be better prepared to protect themselves from this climate change-related threat. In northern Minnesota especially, healthy and resilient communities depend on healthy and resilient forests and the myriads of benefits they provide residents and visitors.

4. Clean energy and electricity

Expand the use of carbon-free energy sources.

4.1. Clean energy sources: accelerate deployment of carbon-free energy.

4.1.1. Support clean energy siting and build community acceptance. Converting traditional energy sources to less carbon intensive sources (including woody biomass) will require public support for investments and policies necessary to making the transition.

4.1.3. Accelerate the growth of large-scale renewable energy generation. There is a sustainable supply of forest biomass that could be used for reliable base-load renewable energy generation. MFRC forest management guidelines provide safeguards that ensure that sufficient biomass is retained in the forest to provide wildlife habitat, prevent erosion, and maintain soil productivity. Another source of biomass is mill residue that otherwise is left to decompose. Sometimes residue is left from forest disturbances (e.g., wildfire, blow down, insect/disease, etc.) and can be salvaged to prepare sites for reforestation. Using this forest biomass supply for renewable energy generation can benefit forest health, increase carbon sequestration, reduce emissions, and in some cases, reduce wildfire risk. MFRC has provided comments on Minnesota Public Utilities Commission Docket #E999/CI-23-151 supporting the determination of

energy from woody feedstocks qualifying under the Carbon Free Standard set in Minn. State 216B.1691

4.1.4. Retire and/or repurpose fossil-fuel-fired facilities. Existing fossil fuel-fired facilities can be relatively easily and inexpensively repurposed for combusting woody biomass instead of coal. In the not-too-distant past Minnesota relied more heavily on woody biomass as an energy source. Adding carbon capture and storage technology could further reduce emissions.

5. Healthy lives and thriving communities

Protect the health and well-being of Minnesotans in the face of climate change and advance environmental justice and equity.

5.1. Healthy communities: protect and improve Minnesotans' health and reduce health disparities from climate impacts.

5.1.3. Prevent respiratory and cardiovascular impacts from increased air pollution, wildfire smoke, and pollen. Active forest management can regenerate highly flammable forest cover, reducing wildfire risk and providing firebreaks that allow agencies to more readily control fire events. Wildfire releases millions of tons of CO2 and particulates in a very short amount of time, creating health hazards as well as contributing to climate change impacts.

5.1.5. Prevent illnesses from contaminated drinking and recreational water caused by climate impacts. Forests help provide a clean, reliable supply of water for human and ecological needs.

6. Clean economy

Build a thriving carbon-neutral economy that produces goods and services with environmental benefits and equitably provides family-sustaining job opportunities.

6.1. Low-carbon, sustainable industrial and commercial businesses: integrate and stack innovative technologies to reduce and remove greenhouse gas emissions and reduce waste.

6.1.1. Increase industrial decarbonization efforts using currently available methods such as energy efficiency, electrification, and carbon capture, utilization, storage, and sequestration. As previously noted, Minnesota's forests sequester 15% of the carbon emitted by all economic sectors annually. That carbon is stored in several forest carbon pools as well as in harvested wood products. There are many opportunities to increase that sequestration rate, the amount of storage, and reduce forest-related emissions.

6.1.3. Advance economic policies to transition Minnesota's economy toward a net-zero future while maintaining economic competitiveness. Much of the active forest management performed in Minnesota is because it has a vibrant forest products industry to provide the economic engine for that management. But there have long been concerns about Minnesota's competitiveness in this global economic sector. MFRC

has published an updated [Report on the Competitiveness of Minnesota's Primary Forest Products Industry](#) as recently as December 2014. As we transition to net zero it is imperative that we maintain the forest products industry competitiveness so we can use the power of our forests to reduce atmospheric carbon levels.

6.2. Clean fuel and technology innovation: increase production of alternative, low-carbon fuels and the development and adoption of new decarbonization technologies.

6.2.1. Advance low-carbon fuel production and processing of feedstocks, deploying technologies such as hydrogen production and anaerobic digestion. Consider adding a specific reference to wood-based sustainable aviation fuel (SAF). The legislature and governor have made it clear through policy and appropriations that they want Minnesota to be a leader in SAF production. Wood-based SAF has a carbon intensity six times lower than ag-based SAF, providing an efficient pathway to decarbonizing the aviation industry. MFRC Resolution 2022-1 recommends support for new and expanded Minnesota markets for forest and mills residuals, and other types of sustainably harvested woody biomass.

6.2.2. Support technological innovation of new industrial decarbonization methods. Wood-based SAF is technologically feasible but may require policy and financial support to produce in the state of Minnesota.

7. Efficient and resilient buildings

Build and maintain healthy, comfortable, efficient, and resilient buildings that are cheaper to operate, pollute very little, and support grid stability.

7.1 Decarbonized residential and commercial buildings: reduce energy use, carbon emissions, and embodied carbon in buildings and building materials.

7.1.6 Reduce embodied carbon in building materials. As noted earlier, wood has much lower embodied carbon than all other common building materials, and it also stores carbon. The growing use of mass timber, glulam, cross-laminated panels and other wood technologies shows great promise in storing harvest wood produce carbon in massive amounts for long periods of time.

Consider adding sub-initiative 7.1.7 "Increase wood use in construction to store carbon for long periods of time." Specifically referencing wood would highlight its carbon storing potential and encourage planners and architects to consider the beneficial substitution effect of this material over others.

7.2 Resilient residential and commercial buildings: integrate innovative technologies, building materials, and design methods in buildings to withstand climate impacts.

7.2.5 Promote the use of healthy building materials. Wood is the healthiest building material. It is natural, organic, sustainably grown, renewable, energy efficient, biodegradable, recyclable, strong, durable, naturally beautiful, and low cost. Harvesting at appropriate levels in accordance with best management practices (e.g., Minnesota

Forest Resources Council site-level guidelines) is not detrimental to the environment. In fact, doing so properly creates wildlife habitat, increases forest health, decreases wildfire risk, and creates recreational hunting opportunities. We have witnessed the negative impact of wildfires in the United States and Canada to our forested landscape, and their significant cost, destruction, and record carbon, particulate, and heat emissions.

Greenhouse Gas Forecasting

The MFRC is very interested in the State's greenhouse gas forecasting exercise and outcomes and offers our Forest Carbon research results for use in refining your data. It was our goal to establish forest carbon baselines on and in Minnesota's forests, soils, and harvested wood products produced by our Forestry sector. We also want to understand what more our forests can do to address climate change. We have involved MPCA and DNR climate specialists in the research process. We are aware that agricultural lands are being modeled as well and look forward to seeing how that sector contributes to the Climate Smart Natural and Working Lands portion of the Climate Action Framework effort. The MFRC Applied Forest Science Coordinator has examined the modeling assumptions used in the Minnesota forecasting update and would be available to engage that process and offer any information of interest from the MFRC Forest Carbon Research.

Other Comments

We agree with and support the following statements:

- "Addressing climate change will not only require near-term strategies to meet our 2030 goals and long-term strategies to meet our 2050 goals; we must also implement strategies that reduce emissions and increase carbon sequestration and storage past 2050, such as peatland restoration and other land-management actions."
- "Of note, some actions we take today – such as restoring wetlands or planting trees – will not realize their full climate benefits until after 2050. Those actions are still critically important for reducing historical and ongoing greenhouse gas emissions even after we achieve net-zero emissions."
- "Emissions and removals by Economic sectors are a helpful way to look at the sources of greenhouse gas emissions and removals to identify strategies to reach our goals."
- "The greatest emissions reductions over our current policies can come from shifting away from the fossil fuels used to generate electricity, power industrial facilities, move people and freight, and serve residential and commercial buildings, and by enhancing carbon sequestration and storage in forests, harvested wood products, and soils or through carbon capture and storage."

However, we are concerned that the Net Zero Pathway shows very little increased carbon removal from Land Use, Land-Use Change, and Forestry (LULUCF) sector. We feel that there is ample opportunity to reduce emissions, increase carbon absorption, and increase storage in several carbon pools, including harvested wood products. We encourage your modeling team to consult with the MFRC Applied Forest Science Coordinator and others on our modeling team at the University of Minnesota to review the model's assumptions and inputs.

Next Steps

MFRC staff and members look forward to continuing engagement with the Climate Change Advisory Group and the Subcabinet as part of our statutory mission. I encourage the Team to work closely with MFRC staff to fully understand the role Minnesota's forests can play in addressing the climate change challenges we face. Thank you for the opportunity to provide feedback on this very important 2025 Climate Action Framework process.

Sincerely,



Pete Aube
MFRC Chairman

cc:

DNR Commissioner Sarah Strommen

DNR Assistant Commissioner Shannon Lotthammer

Commerce Commissioner Grace Arnold (Co-Chair Governor's Advisory Council on Climate Change)

About the Minnesota Forest Resources Council

The mission of the Minnesota Forest Resources Council is to develop recommendations that result in the sustainable management of Minnesota's forest resources while protecting the balance of long-term economic, ecological, and social forest values in accordance with the [Sustainable Forest Resources Act](#). Council members represent a wide range of forest resource interests and hold public meetings every other month to discuss key issues. More information about the Minnesota Forest Resources Council is available at mn.gov/frc/.