

F-1. Improved Forest Health

Mitigation Option Description

[Insert text here]

Mitigation Option Design

[Insert text here]

- **Goals:**
- **Timing:**
- **Coverage of parties:**
- **Other:**

Implementation Mechanisms

[Insert text here]

Related Policies/Programs in Place

[Insert text here]

Types(s) of GHG Reductions

[Insert text here]

Estimated GHG Savings (in 2020) and Costs per MtCO₂e

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

[Insert text here]

Feasibility Issues

[Insert text here]

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD



F-2. Reduced Conversion to Nonforest Cover

Mitigation Option Description

Reduce conversion of forest lands to non-forest cover and to reduce the rate at which forested tracts are parceled and/or fragmented. The conversion of forestlands to other uses is a direct cause of carbon emissions due to the loss of biomass and soil disturbance. Non-forested areas contain lower amounts of biomass and associated carbon reserves. These areas also have less capacity to sequester carbon dioxide than forested areas.

Implicit with in this mitigation option is the recognition that forests, depending on how they are managed, may be a net source or a net reservoir of CO₂. This proposed option will promote the development of incentive programs that maintain forestland by reducing conversion and promoting forests' ability to continue to sequester carbon.

Mitigation Option Design

- **Goals:** Reduce the rate of total acres of forestland expected to be lost to non-forest uses by XXXX. By XXXX, achieve no net loss of forested lands across all types.
- **Timing:**
- **Coverage of parties:**
- **Other:** Since the 1930's, Washington State has lost 2 million acres of timberland to other uses. But the trend has accelerated, over the next several years, 300,000 acres of Western Washington timberland is likely to be converted to other uses (Alig et al, 2003).

Two demographic surveys conducted by Washington State University (WSU) and the Washington Farm Forestry Association also revealed that the average age of small forest landowners is between 57 – 67 years old. These figures imply that a large percentage of this land base will change hands within a generation, likely leading to increased fragmentation and conversion.

Implementation Mechanisms

- State level goals for maintaining overall forestland on public and private forestland acres.
- WA to participate in the development of a regional regulatory Cap and Trade system that recognizes forestry projects that could provide carbon sequestration offsets, including avoided deforestation of forestland.
- Encourage conservation easements used to maintain working forestland that are threatened with conversion
- The expansion and development of Transfer of Development Rights (TDR) a market-based mechanism that promotes responsible growth, while conserving more sensitive areas such as our working forest lands.

- Implementation of the Rural Villages concept will provide an alternative to large lot development. Each rural village, a receiving site for development right transfers, will permanently protect working forests by transferring currently allowed development potential to compact developments.
- New tax incentives that encourage forest management for greater forest sequestration and avoid conversion.
- Changes to project environmental review requirements (e.g. SEPA) to require analysis and mitigation of climate impacts, including those related to possible depletion of forest carbon stocks.
- The state to provide more analysis to help identify rates of conversion on a county by county level and credit the amount of carbon associated with maintaining the forest land cover as a percentage of the rate of conversion in the area (see CA Forest Protocols as reference).

Related Policies/Programs in Place

[Insert text here]

Types(s) of GHG Reductions

[Insert text here]

Estimated GHG Savings (in 2020) and Costs per MtCO_{2e}

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

[Insert text here]

Feasibility Issues

[Insert text here]

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

F-3. Enhanced Carbon Sequestration in Forests

Mitigation Option Description

Washington forests have a significant role to play in decreasing net emissions of carbon dioxide (CO₂) and removing CO₂ from the atmosphere. Our forests are among the most productive in the world, and programs designed to encourage management of our forests for increased overall forest carbon stocks can be an important part of the state's climate action strategy. Special programmatic emphasis should be placed on opportunities to increase and maintain overall carbon storage in the most stable reservoirs in the forest environment, especially stems, roots, and soils.

This mitigation option is designed to promote the removal and storage of additional CO₂ from the atmosphere by increasing and maintaining overall carbon stocks in Washington forests relative to a "business as usual" baseline. The net positive storage of forest carbon is affected by many factors, including the conversion of forests to non-forest uses, forest health, harvest practices, and the wood products manufacturing process. These and other important issues related to enhanced carbon sequestration in Washington forests are addressed in other forestry mitigation options. In addition, this mitigation option includes as a policy goal the preservation of our state's public and private working forests.

Mitigation Option Design

- **Goals:** Increase and maintain absolute levels of sequestered carbon in Washington forests relative to the business as usual baseline by __ percent by ____ and by __ percent by ____.
- **Timing:**
 - Undertake and complete analysis necessary to determine business as usual baseline by _____.
 - Develop accounting protocols to measure absolute changes in overall carbon stocks by _____.
 - Adopt legislation and rules necessary to implement programs and incentives for healthy, native forests that support environmental values by _____.
- **Coverage of parties:** Washington Governor; Washington Legislature; Executive Departments (e.g. Ecology, DNR, CTED; OFM; Revenue); Climate Action Challenge stakeholders; large and small forest landowners; foresters and climate scientists; and general public.

- **Other:**

Implementation Mechanisms

The design for this mitigation option includes the development of greenhouse gas accounting protocols to quantify and verify real, additional and durable emission reductions that exceed business as usual forest management. Utilizing existing data (e.g. FIA data and available forest growth models) as well as new analyses determined helpful, this mitigation option includes the development of a “business as usual” forest management baseline projection for Washington forest landowners/managers, and takes into account forest carbon stocks pursuant to existing regulatory regimes. The accounting protocols would 1) quantify annual increases and decreases in forest carbon stocks above the baseline (live and dead carbon pools), 2) secure/account for the protection (i.e. “permanence”) of overall carbon stocks and 3) quantify and verify removals/reductions of CO₂ based on stock change accounting.

State level goals for enhanced overall forest carbon stocks on public and private forest lands would be established by the State of Washington. An array of public policy tools and incentives to help achieve these goals would then be developed based on the conclusion that management for forest climate benefits is optimal in healthy, native forests that are managed to protect the environmental integrity of the landscape. In other words, healthy, well-managed forests attain additional benefits for the climate while also providing other important public benefits, including durable wood products, fish and wildlife habitat, species biodiversity, clean and adequate supplies of water, and recreational opportunities.

Any or a combination of the following (or other identified) forest management practices would be implemented to increase and maintain overall forest carbon stocks in Washington forests:

- Increased lengths of harvest rotation.
- Harvest limitations.
- Restocking of under-stocked areas/Reforestation of non-forested areas that were historically in forest cover, both utilizing native tree species.
- Appropriate thinning of over-stocked areas.
- Avoidance of conversion to non-forest uses.
- Widening of forested riparian corridor buffers.

Programs and incentives in support of these methods of practice could include:

- Participation in the development of regional and national carbon markets that allow participation by large and smaller forest landowners.
- Increased use of conservation easements to maintain working forests managed for enhanced carbon sequestration and environmental values.
- New tax incentives that encourage forestry and management for greater forest carbon stocks and that avoid conversion.

- Other identified forest landowner incentives that protect and preserve our forests and address the reality of increased ownership fragmentation.
- Changes to development project environmental review requirements (e.g. SEPA) to require analysis and mitigation of climate impacts, including those related to possible depletion of forest carbon stocks.
- Development fees that fund on-site and/or off-site mitigation for identified climate impacts of projects.
- New “Green Building” (e.g. LEED) standards that require use of wood products from managed and sustainable forestland sources that store additional carbon.

Additional analysis is needed to determine which combination of these or other programs and incentives would yield the most cost effective and environmentally sound absolute increases to levels of sequestered carbon in Washington forests.

Related Policies/Programs in Place

[Insert text here]

Types(s) of GHG Reductions

[Insert text here]

Estimated GHG Savings (in 2020) and Costs per MtCO₂e

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

[Insert text here]

Feasibility Issues

[Insert text here]

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

F-4. Expanded Use of Wood Products for Building Materials

Mitigation Option Description

This policy seeks to enhance the use of long-lived wood products as a climate change strategy. Wood products not only store significant amounts of carbon but they are also less energy intensive to manufacture than substitute materials. The climate benefits of using wood products as opposed to substitute materials have been documented in numerous life cycle assessments.

Mitigation Option Design

- **Goals:** To expand the use of wood products by 10% over current levels
- **Timing:** Increase usage by 5% by 2010 and 10% by 2020, above current trends
- **Coverage of parties:** Builders, building material suppliers, wood product industries, recycled building material sellers, home improvement stores and consumers. All state agencies should lead through example
- **Other:** Wood products not only serve as long-term carbon storage but also they require much less energy to manufacture than substitute materials such as concrete or steel. This difference in energy use is so significant that one study found a substitution for steel and concrete framing representing 6 to 8 percent of the total house weight resulted in an increase in greenhouse gas emissions of 26 to 31 percent respectively¹. Other studies have echoed these same results. Eriksson's (2003) compilation of building life cycle assessments (LCAs) concluded that using wood-framed housing in the 1.7 million housing starts in Europe² would save 35-50 million mt CO₂e, which would be enough to contribute 11-16% of the emissions reduction needed for Europe to meet the Kyoto requirement. Buchanon and Levine (1999) report that a 17% increase in wood usage in the New Zealand building industry could result in a reduction of 484,000 mt CO₂e. This reduction is equivalent to a 20% reduction in carbon emissions from the New Zealand building industry and roughly a 1.8% of New Zealand's total GHG emissions. Miner et al (2006) report that, according to the CORRIM work, if 1.5 million housing starts in the U.S. used wood framed houses rather than non-wood building systems, 9.6 million metric tons (mt) CO₂e per year would be kept out of the atmosphere. This savings is equivalent to keeping roughly two million cars off the road for one year.

¹ Taken from the CORRIM study, Perez-Garcia, Bruce Lippke, David Briggs, James Wilson, James Bowyer and Jaime Meil. 2005. The Environmental performance of renewable building materials in the context of residential construction. *Wood and Fiber Science* 37, CORRIM Special Issue: 3-17.

² Currently only 5% of new construction in Europe uses wood framing

Implementation Mechanisms

- Including embodied energy/carbon footprint/life cycle assessment information for building materials in green building standards. This can be achieved through the deployment of material selection LCI tools, such as the GBI's LCA tool for material assemblies (developed primarily for use in GBI's Green Globe environmental assessment and rating system for commercial buildings) or BREEAM (used in Ecohomes, the predominant UK green building standard)
- Include carbon footprint information/literature on materials in building supply and home improvement stores
- State adopted policies: the state should adopt policies that require wood products in the construction and maintenance of all state buildings when those products are feasible and relatively close in price (within 5%) to the alternative. Education/Outreach: Develop information and education programs to promote product substitution (using wood products whenever and wherever feasible) and the benefits gained through carbon sequestration and avoided emissions.
- Promotion of product life-time? (recycled stores, preservatives) New product development?

Related Policies/Programs in Place

[Insert text here]

Types(s) of GHG Reductions

[Insert text here]

Estimated GHG Savings (in 2020) and Costs per MtCO_{2e}

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

[Insert text here]

Feasibility Issues

[Insert text here]

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD



F-5. Expanded Use of Biomass Feedstocks for Electricity, Heat and Steam Production

Mitigation Option Description

[Insert text here]

Mitigation Option Design

[Insert text here]

- **Goals:**
- **Timing:**
- **Coverage of parties:**
- **Other:**

Implementation Mechanisms

[Insert text here]

Related Policies/Programs in Place

[Insert text here]

Types(s) of GHG Reductions

[Insert text here]

Estimated GHG Savings (in 2020) and Costs per MtCO₂e

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

[Insert text here]

Feasibility Issues

[Insert text here]

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD



F-6. Improved Commercialization of Advanced Lignocellulosic Processes

Mitigation Option Description

[Insert text here]

Mitigation Option Design

[Insert text here]

- **Goals:**
- **Timing:**
- **Coverage of parties:**
- **Other:**

Implementation Mechanisms

[Insert text here]

Related Policies/Programs in Place

[Insert text here]

Types(s) of GHG Reductions

[Insert text here]

Estimated GHG Savings (in 2020) and Costs per MtCO₂e

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

[Insert text here]

Feasibility Issues

[Insert text here]

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD



F-7. Enhanced Carbon Sequestration in Harvested Wood Products

Mitigation Option Description

This policy is focused on recognizing and improving the climate benefits of managing forests for wood production. Washington State is uniquely positioned to take advantage of the climate benefits of wood production- the native Douglas-fir forests have high productivity rates and extremely desirable structural characteristics for long-lived wood products. Washington State is in a strategic location to provide efficient sources of raw materials and has the infrastructure to manufacture these materials into products. Climate improvements can be made by incentives for increasing stand productivity, increasing log recovery rates, and increasing recovery rates at mills. In addition, all forest carbon assessments should also include wood product storage as a mandatory pool to recognize the full carbon cycle.

Mitigation Option Design

- **Goals:** To recognize the climate benefits of wood product production and to encourage Washington State wood production increases [of x% by 2020] as the market dictates. This precludes any additional barriers to efficient management of timberlands and to production capacity.
- **Timing:** As the market dictates. The demand for wood products should increase as the climate benefits of using a product with low embodied energy (in many cases a negative carbon footprint) is realized. See F-4 for more information on the expanded use of wood product for building materials.
- **Coverage of parties:**
- **Other:** The long-term carbon storage contribution of Washington State's wood product production is roughly 11.8 million metric tons CO₂e/yr³, which offsets more than 10 percent of Washington's greenhouse gas emissions.

Implementation Mechanisms

- Full carbon accounting: all forestry assessments should include wood product carbon storage as a mandatory pool along with above and below-ground biomass etc... Without recognizing wood product storage as a carbon pool, an incomplete picture of the carbon cycle is given.
- Incentives for increasing productivity on Washington timberlands. These may include
 - Increasing technical assistance for non-industrial private landowners, including funding for writing forest management plans (perhaps through the American Tree Farm System or Washington State's Forest Stewardship Program).

³ From draft of state inventory

- Encouraging smart application of silvicultural treatments such as fertilization, thinning, and pruning.
- Incentives for increasing recovery rates at mills. This would result in more carbon storage in long-term wood products with the same input of raw material. The wood products that result from improvements in recovery rates should be considered additional carbon storage.

Related Policies/Programs in Place

[Insert text here]

Types(s) of GHG Reductions

[Insert text here]

Estimated GHG Savings (in 2020) and Costs per MtCO_{2e}

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

[Insert text here]

Feasibility Issues

[Insert text here]

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD