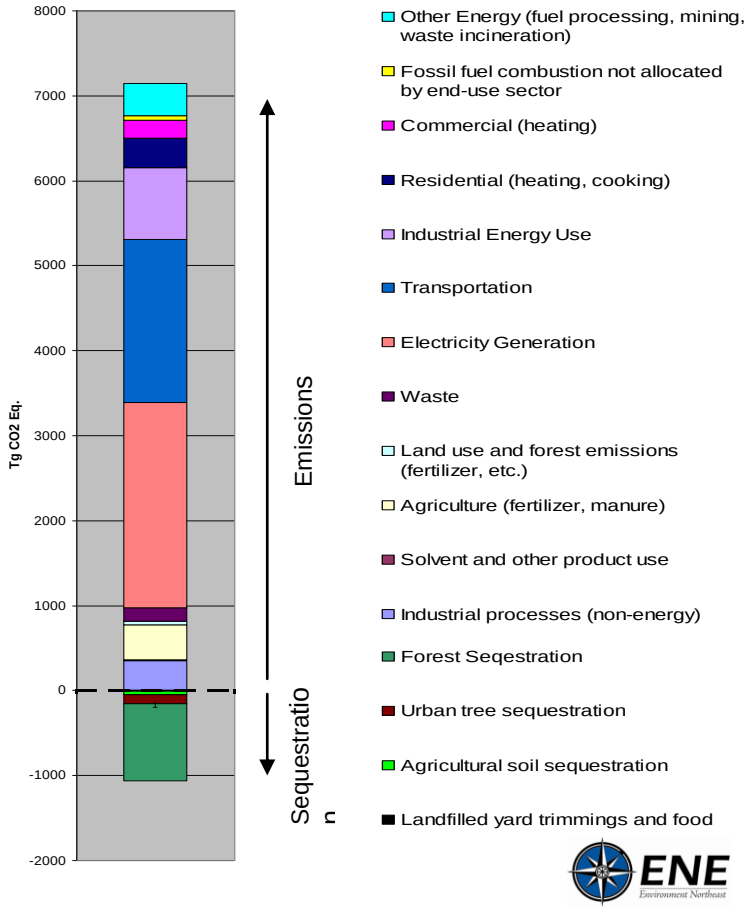
The Importance of Forest Carbon in Climate Change Policy

Forests play an important role in the global carbon cycle. Trees and other plants remove carbon dioxide (CO_2) from the atmosphere through the process of photosynthesis, and store it as carbon in their biomass (trees, leaves, roots, etc.) and surrounding soils. Forests thus act as natural "sinks" that help mitigate climate change. Forests can also be sources of greenhouse gas (GHG) emissions. This occurs through natural decay, storm damage, forest fires, and management activities such as harvesting and prescribed burning, as well as clearing for cropland or development.

According to the Intergovernmental Panel on Climate Change (IPCC), the total carbon stored globally in forests was 638 Gt in 2005, more than the amount of carbon in the entire atmosphere. During the 1990s, it was estimated that global deforestation contributed to approximately 20 percent of annual greenhouse gas emissions. The destruction of large areas of rainforest in Brazil and Indonesia has attracted significant attention worldwide as an important source of global emissions, and U.S. climate change legislation has sought to address this deforestation through significant proposed funding for international conservation efforts.

Figure 1. US Emissions and Sequestration 2007



However, it is also important to recognize the significant role forests play in the United States, both as a major carbon sink and a rising source of emissions. The most recent U.S. Greenhouse Gas Inventory estimates that sequestration from the nation's grasslands, cropland and forests currently offsets 14.9% of our annual GHG emissions. Of this sequestration, 86% (darker green bar in sequestration portion in *Figure 1*) is delivered by forestlands, including vegetation, soils and

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harvested wood products. In other words, U.S. forests sequester an impressive 13% of all our GHG emissions on an annual basis.

The significance of this national carbon sink for federal climate policy cannot be understated. To put it in perspective, U.S. annual carbon sequestration (-1,062.6 Tg CO_2 eq.) is more than half of annual transportation emissions (1,919.8 Tg CO_2 eq), and larger than emissions from passenger cars alone (621.8 Tg CO_2 eq.). But the U.S. EPA estimates that total carbon stored in forests will *decrease* almost 10% over the next 20 years at current trends – increasing global warming. Forest carbon loss could in reality be far greater, given the lack of up-to-date land use data or comprehensive information on forest carbon stocks and sequestration rates.

Promoting Effective Solutions

It is vital that we develop climate strategies that include mechanisms to prevent loss of forest carbon and encourage practices that increase carbon storage and appropriately utilize wood as an energy source. The U.S. Forest Service projects that forest carbon sequestration could almost double through additional forest conservation and modified management practices. Improved forest management and permanent forest conservation also have substantial benefits in the form of clean water, biodiversity protection, recreation, and healthier forests that are more resilient in the face of pollution, climate change and other stresses. There are four complementary approaches to optimizing forest carbon storage as part of U.S. climate strategy:

1. Increase Carbon Stored in Existing and New Forests: Create effective incentives for landowners to modify forest management practices to increase carbon storage. Practices such as longer harvest rotations that retain older trees in the forest will improve forest carbon storage on the landscape. Afforestation (planting trees on unforested land) is another form of land management that increases carbon sequestration.

2. Reduce Emissions through Forest Protection (Avoided Deforestation): Provide the means to protect and enhance the capacity of our forests to sequester carbon by maintaining forests as forests. Permanent conservation easements are one proven voluntary method for protecting forest cover in perpetuity even as development pressures increase.

3. Require Mitigation for Forest Loss: Account for and mitigate forest carbon loss from development that does occur. This could be done onsite, through changes in subdivision design, or offsite, through requiring equivalent offsite forest protection or other forms of mitigation.

4. Forest Utilization for Renewable Energy: Use wood waste and sustainably harvested biomass feedstocks to create new, renewable energy sources. Woodchips and wood pellets, for example, can be used as fuels for electricity and heat generation instead of oil, but safeguards must ensure that forests are sustainably harvested and that other important forest values including water protection, biodiversity, and forest resilience are not compromised as pressure to harvest for biomass increases.

Policy Tools and Trends

Emissions and sequestration in the forest sector can be addressed through funding and policy mechanisms at all levels of government: federal, regional, state and local. Strategies must be supported by increased monitoring and tracking of forest carbon at the state and federal levels so that we better understand ongoing gains and losses and can devise effective strategies to conserve and enhance our valuable forest carbon as a key climate change strategy.

1. Forest Offsets: Offset programs provide funds for activities that produce enhanced carbon

sequestration or decreased emissions (such as forest conservation) and thus "offset" GHG emissions elsewhere. A number of voluntary programs have sprung up to help individuals and businesses offset their carbon footprints, and these vary in quality. In addition to these voluntary markets, rigorously quantitative offset programs can be used in mandatory "cap and trade" emissions reduction programs to provide flexibility regarding how regulated emitters (*e.g.* power plant operators) can meet emission reduction requirements. Emitters are allowed to purchase offsets as an alternative to a percentage of the emissions reductions required, as long as the reductions are equivalent. Having an offset program as part of a cap and trade program provides welcome flexibility for emitters, and some valuable cost-containment as it can allow more time to achieve pollution reductions at the source. Categories of forest activities that have been considered in offset programs include:

1) Afforestation: planting trees on lands not previously forested;
2) Forest Management: changing forest practices to increase carbon storage, such as longer rotations and lower impact logging; and,
3) Avoided Deforestation (forest conservation): protecting forests that are under threat of land conversion by development or timber harvesting.

The 10-state Regional Greenhouse Gas Initiative (RGGI), for example, currently includes afforestation as an offset category, and ENE, the Maine Forest Service and others have submitted a detailed proposal recommending that RGGI add forest management and avoided deforestation. The climate bill passed by the U.S. House of Representatives in June (the *American Clean Energy and Security Act* or ACES) would allow use of a broad range of forest and agricultural offsets, including all three of the above categories.

The availability of forest offsets will encourage landowners to conserve their forests as forests, increase sequestration, and give them entry into the new low carbon economy. However, because offsets in a cap and trade program represent a substitute option for regulated entities to meet required emissions reductions, it is crucial to the success of the program that standards for offsets be rigorously crafted and monitored so that real emissions reductions occur. ACES allows for a large number of forest offsets, and it is ENE's position that the offsets standards must be significantly strengthened in the final bill.

In Canada, the proposed federal climate program will also include the use of offsets. While the government has recently released draft rules for offsets, the rules for how emissions will be regulated in the country may not be decided until the end of 2010. The government will likely implement a hard cap on emissions in the electricity sector, but is also considering an intensity-based goal for other sectors. The differences between the Canadian and American systems present potential barriers to trading both offsets and allowances.

2. Supplemental Incentive Programs for Landowners: Additional policy initiatives are needed to enhance forest carbon in the United States because not all carbon enhancement activities will be able to meet the strict standards necessary for an offset program. A supplemental incentive program funded through allowance revenues from a cap and trade program could provide important support for such forest carbon enhancement initiatives. Any reductions achieved through such a program would *supplement* reductions achieved under the cap, unlike offsets, which are alternative compliance mechanisms that help emitters reach the cap requirement. A program to help forestland owners enhance carbon storage through funding permanent conservation easements and/or 20-year carbon contracts would allow the participation of millions of small, private landowners who may not be able to join the offsets program because of cost, scale or rigor, but whose forest carbon conservation activities are important to meeting U.S. climate goals. (For a sense of the potential participation level and impact of such small-scale programs, consider that one-half of all family forestland in the U.S. is in tracts of less than 100 acres.) ACES included a small agriculture incentive program that should be significantly expanded in Senate climate legislation.

3. Quantifying and Minimizing Forest Carbon Loss from Development: Consideration of GHG emissions should be institutionalized as part of state and local regulations related to land use and development planning. While many agencies are beginning to consider long-term climate change in their planning, this needs to be done consistently and systematically, as changes that happen today may have impacts that last 50 years or more. These assessments must include mechanisms to avoid and mitigate carbon emissions associated with permanent forest loss. Studies have shown that forest loss could be reduced 41% through cluster zoning and other means, eliminating some immediate carbon loss and also increasing annual carbon storage through forest retention. States in the Northeast that have added quantification of GHGs to their environmental impact assessments (NY and MA) have not included forest carbon. However, Maine is considering legislation that requires minimization of forest loss in development and mitigation for forest loss that does occur. This is significant as Maine alone loses up to 10,000 acres annually to road clearing and development - or the equivalent of the annual emissions from 200,000 cars.

4. Sustainably Harvested Wood Energy: All New England states have Renewable Portfolio Standards (RPS) that require an increasing percentage of electricity to be generated from renewable sources. A federal Renewable Electricity Standard was included in ACES. Biomass, including wood chips, is eligible as a renewable fuel in these policies, but there are varying definitions of exactly what qualifies. Many policies require biomass to be "sustainable," but this provision is often vaguely defined or loosely enforced. The definition of renewable biomass has also been debated in the context of liquid fuels. Federal law requires an increasing percentage of biofuels in gasoline (known as the Renewable Fuel Standard), and Massachusetts recently passed a bill requiring liquid fuels in the state to meet minimum blending requirements for biofuels. At the federal level, different definitions for "sustainable biomass" have been incorporated into the most recent Farm Bill, Energy Bill, and ACES. Debated issues include whether biomass from forests converted to plantations, old growth forests, or federal and state wilderness areas can appropriately be considered to be sustainable.

A large shift from other forestland uses such as sawtimber or pulp and paper production to biomass production could entail significant and widespread changes on the forested landscape. Pressure to meet renewable energy requirements and otherwise increase biomass production could lead to harvesting of wood for fuel that threatens other important forest values including biodiversity, wildlife protection, recreation, watershed protection, aesthetic beauty, and forest resilience if rules are not carefully crafted and enforced. It is essential that state and federal incentives and regulations related to biofuels are designed to ensure net greenhouse gas reductions and to avoid or minimize negative climate or ecosystem impacts.

5. Monitoring: Forest carbon incentives and policies at the project level are important, but they must take place within a framework of greater understanding of our valuable forest carbon resource. Adequate funding should be provided for forest carbon measuring and monitoring in order to develop meaningful state baselines for forest carbon stocks and to help states maintain and exceed that baseline for the long-term. This should include funding to: 1) expand the U.S. Forest Inventory and Analysis program to increase sample sizes and intensify measurements; 2) allow states to update growth and yield data to improve future projections of forest carbon; 3) research the impacts of harvesting regimes on forest floor and soil carbon; and 4) conduct remote sensing and improved monitoring to develop statewide trends on forest conversion and reversions. This program funding is essential in order for the states and the U.S. as a whole to develop the knowledge base, framework, and tools to protect and enhance our forest carbon resources over time.