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## Theme C: Energy & Climate Change

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### **GOAL**

**BIOMASS: Forests provide raw materials for energy and traditional forest products at a level that sustains forest ecosystems and the productive capacity of the land. Use of woody biomass for energy is done in a way that produces a high energy return on biomass input.**

### *DESCRIPTION OF GOAL*

Using wood for energy provides significant opportunities for the state in terms of reducing greenhouse gas emissions, reducing our reliance on fossil fuels, producing more of our energy here at home, creating new bioenergy industries and providing associated economic benefits. For these reasons, encouragement of new renewable energy industries is appropriate. This new demand also benefits sustainable forest management since along with the demand created by traditional wood products, it helps ensure that there is the need and incentive to sustainably manage our forests and keep them in forest

However, care must be exercised since the sharp increase in demand could create significant pressure on the forest resource above existing demand from traditional wood products. It is vitally important that the increase in demand not cause the state's forests to be managed in an unsustainable manner. High demand could not only cause changes in forest management, but also in land use such as conversions of grassland to short rotation woody biomass crops. We need to be mindful that such changes consider the environmental, economic and social implications.

Additionally, wood can be used for many purposes: lumber, furniture, paper, fuel and energy, just to name a few. To maximize the return from our wood resource, woody biomass used for energy should target processes that produce a high energy return. Caution needs to be exercised to ensure that our valuable forest resource is being used in a manner that best produces the array of economic, environmental, social benefits we derive from forests.

### **STRATEGY**

26. Collect information and develop policy to ensure efficient and sustainable use of our forest resources in regards to energy production.

The state of biomass research and knowledge grows daily. In order to ensure best and sustainable use of our forest resources in regards to energy production, the first step is to collect and synthesize information that can be used for policy development. There are many variables, such as production, species, location, and alternative sources, which can affect what is the best and most sustainable use.

Possible Actions:

- Conduct life cycle analysis of wood products to determine value provided in terms of energy efficiency, environmental impacts and reduction in greenhouse gases.

- Determine the environmental impacts and benefits of various methods of biomass production (harvesting from naturally managed forests vs. plantations vs. short rotation woody crops).
- Provide guidelines for determining preferred species, locations and methods for growing woody biomass. Monitor effectiveness of existing guidelines for harvesting woody biomass.
- Analyze the various policies for agroforestry produced biomass and subsequent policy implications.

## **STRATEGY**

27. Encourage establishment of sustainable renewable energy industries (or use of renewable energy by industries) which use woody biomass while improving or maintaining the health of the existing forest products industry.

Wisconsin has a goal of generating 25% of its electric power and transportation fuels from renewable resources by 2025, capturing 10% of the emerging bioindustry and renewable energy market by 2030. It is also leading the nation in groundbreaking research that will make clean energy more affordable and will create good paying Wisconsin jobs. In order for forestry to contribute to this goal, biomass must be available for industry (either new or current) to use. These are new markets and new technologies that businesses must learn and policy makers must understand in order to make the process sustainable.

Possible Actions:

- Develop a Forest BioEconomy Strategic Map that provides clarity and direction to ensure timely and sound development of the forest biomass resource by, 1) Providing market participants with sound information on the size and nature of the forest biomass supply, 2) Providing policy makers with recommendations to expand the supply of biomass in ways that are complimentary to the policy framework, 3) Evaluating bioenergy market opportunities and their contribution to Wisconsin, 4) Providing policy makers with recommendations to advance priority bioenergy market opportunities. Identify regions where bioenergy industry is lacking, but resource is available.
- Increase amount of readily available biomass from non-industrial private forests, plantations, reforestation, under-utilized species, commercial thinning, urban/waste sources and hazardous mitigation projects in WUI areas.

## **GOAL**

ADAPTATION: Forests are established and managed in a manner that increases their resilience and ability to facilitate adaptation of associated species and communities to changing climatic conditions.

## **DESCRIPTION OF GOAL**

Because of the uncertainty of future climate conditions, different approaches to forest management will be needed to adapt to new and changing conditions (Swanston and

Janowiak, 2009). Whether the forests change as a result of climate change, they will be stressed and need to adapt. Adaptation actions can moderate the vulnerability of forests to climate change and position forests to become healthier, resistant, and resilient (Spittlehouse and Stewart, 2003). There is not one right way to adapt. This will be highly dependent on landowner objectives and location.

### **STRATEGY**

28. Seek to understand the probability and severity of future climate change impacts.

Climate change has the possibility of increasing forest productivity (e.g. longer growing seasons, increased precipitation, and CO<sub>2</sub> fertilization) but also stressing forests (e.g. acclimation to CO<sub>2</sub> fertilization, extreme weather events, longer growing seasons, species range shifts, expanded pest and disease ranges, decreased snow pack and early thaw). Gaining knowledge of the probability and severity of these localized changes is critical to make appropriate management decisions. As this knowledge grows, it is important to communicate this to the public.

Possible Actions:

- Develop mapping tools and models and monitor sensitive sites for early climate change impacts.
- Promote an understanding of characteristics that would impact forest vulnerability (e.g. genetics, seed transfer, site, and fire severity).
- Facilitate regional collaboration, sharing of information, and recommendations for adaptation strategies for climate change.
- Model the impacts of adding canopy cover to urban areas on a 5% additive increase to 100% canopy cover to assess the mitigation value versus cost at various levels.
- Integrate state actions with regional and national adaptation activities.
- As knowledge is gained regarding the impacts of climate change, communicate with the public and educate them on adaptation measures.
- Evaluate the costs of policy choices in terms of risk mitigation (i.e. cost of doing nothing and/or cost of being wrong).

### **STRATEGY**

29. Attempt to improve the defenses of the forest and increase the resilience of natural systems to future climate change impacts

Just as our current best defense against climate issues such as drought, or insect infestations is to improve the resilience of the forest against effects of change (Millar et al. 2007, 2008), so to should our future strategies. Rare or threatened forest communities may need special attention or extra management to insure they can accommodate change.

Possible Actions:

- Evaluate the resilience of high conservation value forests and their ability to persist in climate change.

- Promote the use of existing forest management best practices that improve the current vigor of forests.
- Increase diversity (age, species evenness) in urban and rural forests.
- Facilitate rapid regeneration for appropriate forest types following disturbance or harvest.

### **STRATEGY**

30. Intentionally accommodate change and enable forest ecosystems to adaptively respond.

A more aggressive approach to climate change is to intentionally accommodate change. This may require assisting seed migration to more northern locations or re-evaluating site management goals based on future climate predictions.

Adaptation management tools can be an important tool in making management decisions with incomplete information and high levels of uncertainty under climate change. The flexibility of adaptive management allows landowners and managers to continually acquire new information for decision-making without indefinitely postponing needed actions (Association of Fish & Wildlife Agencies, 2009).

Possible Actions:

- Evaluate whether the various actions, policies or laws regarding managing forests for adaptation and mitigation, biomass, energy, etc conflict with one another.
- Promote system connectivity to provide migration (seed) routes or evaluate assisted species migration.
- Develop, utilize and track seed zones in producing and distributing forest seedlings.
- Encourage a re-evaluation of site management goals to accommodate species diversity and adaptation to a changing climate.

### **STRATEGY**

31. Realign forest ecosystems to new conditions caused by climate change.

For severely changed or disturbed systems, it may be necessary to allow for readjustment to new conditions instead of returning it to its previous condition. For example, a raised water table in a lowland forest may render it too wet to support tree cover, whereas a lowered water table may result in succession to a different forest ecosystem.

Possible Actions:

- Develop protocol for managing areas that can no longer sustain forest cover types due to climate change (e.g. tamarack swamp).

## **GOAL**

**MITIGATION: Forests will increasingly be used as a tool to mitigate climate change.**

### *DESCRIPTION OF GOAL*

US forests annually sequester the equivalent of 10% of US carbon dioxide emissions from burning fossil fuels (Swanston, 2009). Carbon and methane stored in soils, forests, wetlands and solid wood products have the potential to rival large scale industrial emissions if released through large scale fire, disease or land use conversion events. Promoting the use of solid wood products from harvesting, and planning for rapid regeneration following disturbances will conserve forest carbon pools.

### **STRATEGY**

32. Manage forest ecosystems (rural and urban) to sequester additional carbon while retaining the abundance of other benefits forest provide.

Increasing stand stocking and productivity has the potential to add to the 8 million tons of net CO<sub>2</sub> reduction benefits provided by Wisconsin forests. Not all forests sequester the same amount of carbon. Managing certain areas for greater carbon may not maximize production of durable wood products at the same time – tradeoffs that should be evaluated. Forest landowners have opportunities to earn money for sequestering carbon but access to these markets is challenging to navigate and returns are not guaranteed.

Possible Actions:

- Increase and maintain existing urban tree canopies (this is for both carbon sequestration and mitigating heating/cooling).
- Facilitate partnerships between public and private sectors that foster initiatives for increasing carbon sequestration while supporting other sustainable forest management goals.
- Connect landowners with incentive programs for forest management that include ecosystem services.
- Establish a balance of forest vigor and the production of durable wood products.
- Quantify stormwater mitigation from urban forests.
- Identify appropriate land areas where forest carbon sequestration can be easily increased (e.g. increase stocking, afforestation).

### **STRATEGY**

33. Reduce green house gas emissions by substituting wood for products that have a more energy intensive carbon footprint (i.e. non-wood building materials such as steel and concrete).

There is a growing number of life cycle analyses for wood products that show wood has a smaller carbon footprint than alternative products. Much of the public is unaware of the benefits of using forest products over other sources. While it is important to

recognize these benefits, there are opportunities to minimize carbon output in forest operations and product development.

Possible Actions:

- Develop industry opportunities that produce long-lived, durable wood products, while minimizing the carbon output it takes to get raw products to mills.
- Develop incentive programs that encourage purchasing long-lived products (e.g. tax credits people get when they buy appliances (similar to energy star): "wood credits")

### **STRATEGY**

34. Utilize best management practices to minimize emissions from forest-based activities and production.

Forest management often requires the use of fossil fuels for harvesting, transport and timber stand improvements. The fossil fuels used for these activities decreases the beneficial reduction of emissions that good forest management provides. Reducing these inputs to forest management reduces fossil fuel emissions and increases the net benefit of wood based biomass fuel. Energy minded choices can be made when building processing and manufacturing facilities that considers distance to supply and markets and the energy efficiency of the facility. Policy decisions can be made to influence carbon lifecycle emissions such as reducing forest land conversion and suppressing wildfires.

Possible Actions:

- Advocate for policy choices that minimize carbon lifecycle emissions.
- Reduce the carbon footprint of forest operations through actions such as biofuel alternatives to carbon based fuels and lubricants in equipment.
- Promote the reduced emissions benefits of low impact forest recreational activities.
- Reduce forest land conversions that result in deforestation.
- Aggressively suppress wildfires to reduce carbon emissions.
- Promote the reduced emissions benefits of low impact forest recreational activities.

### **STRATEGY**

35. Increase the awareness of carbon markets by private forest landowners and facilitate their participation in established carbon markets.

Carbon credit programs have the potential to provide benefits to Wisconsin forestland owners (new income stream) and all Wisconsin citizens (clean water and air, etc.). The sequestration of carbon is one of the many ecosystem services which forests have the capacity to provide to the public. However, the forests' ability to provide ecosystem services is influenced by decisions landowners make regarding their land's management and use. Providing new streams of income for services heretofore provided at no cost to the public such as those derived from carbon can, therefore, influence what occurs to and in our forests. It will help landowners keep their forests in forests as well as increase the percentage of forests that are managed sustainably over

the long-term maximizing the benefits they provide. Many carbon markets require landowners have a third-party certification. In Wisconsin it is crucial that private landowners are able to participate in carbon markets because individuals and families hold the largest portion (57%) of forestlands.

Possible Actions:

- Facilitate partnerships between public and private sectors that foster initiatives for increasing carbon sequestration while supporting other sustainable forest management goals.
- Increase non-industrial private forest owner's accessibility to third party certification systems for sustainably managed lands in order to facilitate participating in carbon markets.
- Promote sustainable management including afforestation and planting as a way to participate in carbon markets or reduce GHG impact.
- Increase affordable assistance for non-industrial private forest owners to develop forest management plans at the level of detail needed to participate in carbon markets.
- Increase the capacity of professional foresters to assist landowners in learning about and entering into carbon markets.

### **STRATEGY**

36. Ensure that climate policy reflects the potential positive contributions that forest conservation and sustainable management can make to achieving substantial net reductions in greenhouse gas emissions.

At this time there is not a federal, regional or state carbon offset policy or mandate. However, several of the emerging greenhouse gas reduction programs in the United States have developed or will be developing protocols under which forest carbon credits can be counted as an offset to industrial carbon dioxide emissions. This policy development stage defines how the various forms of carbon sequestered in a forest can become the legal equivalent of a greenhouse gas emissions reduction, and it is the critical step in establishing whether and how forest managers can demonstrate legal equivalency. It is imperative that forestry interests participate in the process of any forestry protocol or carbon offset policy development to establish rules that are scientifically sound and feasible for forest managers.

Possible Actions:

- In order to make the most informed decisions, increase the understanding of forestry organizations and landowners on the items being debated for participation in carbon markets (e.g. additionality, permanence).
- Increase coordination between regional forestry interests (government, partners, and industry) in order to provide recommendations and comments on proposed federal legislation and policies from a regional perspective. (i.e. a unified regional voice)