Biomass and Carbon Markets for Private Landowners: Promise or Peril?

Don Arnosti

Institute for Agriculture and Trade Policy

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Special thanks to John DuPlissis

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Program Outline

- Background
- Biomass Harvest and Markets
- Carbon Markets
- Do Bioenergy or Carbon Markets Help the Private Forest Landowner?

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Background

- Institute for Agriculture and Trade Policy
  - International NGO founded in 1986
  - Promotes resilient family farms, rural communities and ecosystems around the world through research and education, science and technology, and advocacy.

Background

- The Community Forestry Resource Center
  - Established in 1998 by the Institute for Agriculture and Trade Policy
  - Received its FSC certificate in 2003; renewed in 2008
  - Works with forestry cooperatives and private landowners

Our Mission

CFRC promotes responsible forest management by encouraging the long-term health and prosperity of small, privately-owned woodlots, their owners and their communities

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Our Partners

- **CFRC works with many regional partners to facilitate our certification program:**
  - Living Forest Coop (WI)
  - Kinnickinnic River Land Trust (WI)
  - Cook County Sustainable Forestry Coop (MN)
  - Hiawatha Sustainable Woods Coop (MN)
  - Prairie's Edge Cooperative (IA)

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Biomass Markets

How do they work?

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Energy from Wood

- Interests are shifting away from fuels that are:
  - Foreign
  - Polluting
  - Climate-changing
- Wood is experiencing a renewed interest

www.sciencemaster.com

Energy from Wood

Energy from wood is an old concept...

What's different now?

www.crossingworlds.com

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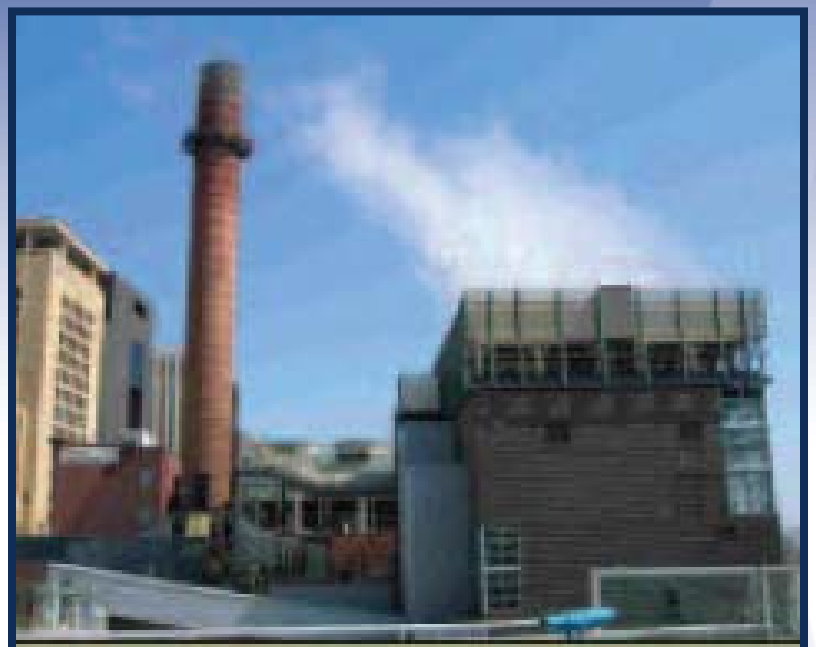
Bioenergy Markets



District Energy provides heat and power to downtown St. Paul, MN.

- District Energy provides heat and power to 80% of downtown St. Paul
- The facility displaces coal
- District Energy captures energy through direct combustion

Energy from Wood

- Gasification
  - Uses high temps and restricted oxygen to create synthetic natural gas
  - Immediately available technology
  - Can replace natural gas and be used in cars

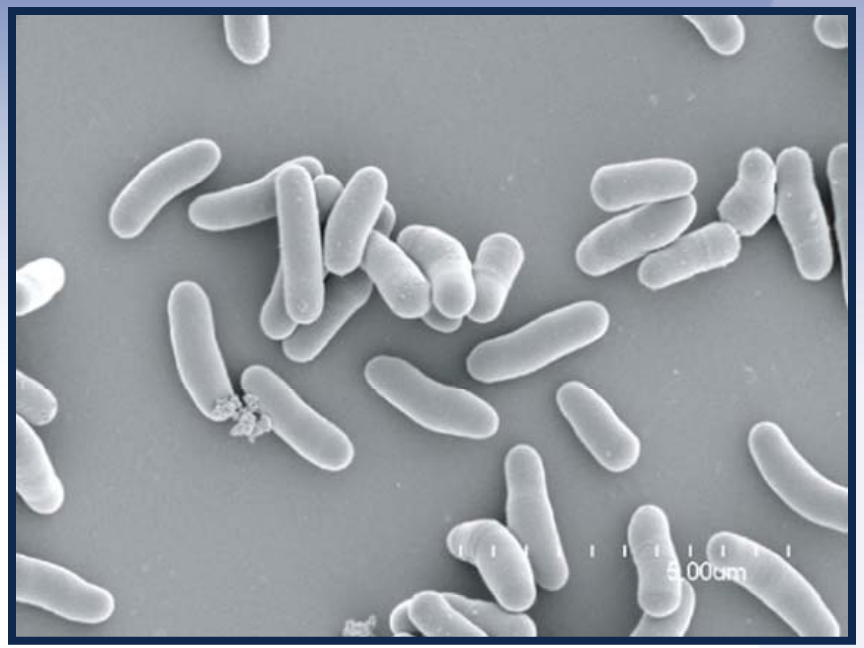
www.sc.edu

Energy from Wood

- Example:

  Central MN Ethanol, Little Falls, MN
  - Utilizes over 7.5 million bushels of corn annually
  - Produces over 15 million gallons of ethanol per year

Energy from Wood



world.honda.com

- Cellulosic
  - Chemical processes break down cellulose into simpler sugars
  - Variety of chemical/bacterial processes in development
  - Huge potential in WI and MN

Energy from Wood

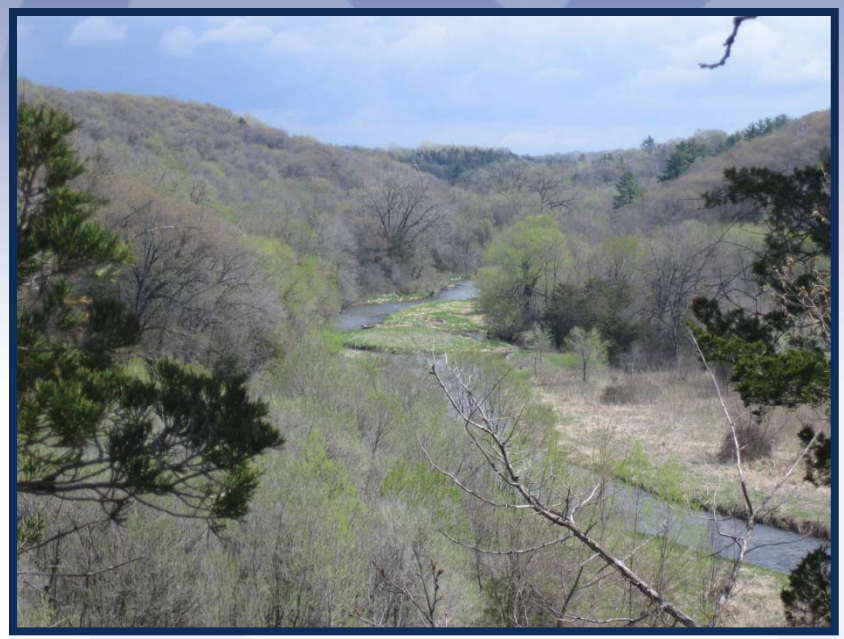
- Example:

  Flambeau River Biorefinery, Park Falls, WI
  - Pulp mill coupled with cellulosic ethanol plant
  - Production of paper
  - Estimated output of 20 million gallons of cellulosic ethanol per year
  - First in the nation

Credit: A.M. Kelley

Private Land Certification and Biomass

- Kinnickinnic River Demonstration Site
  - Certified through our group umbrella
  - Located in Western Wisconsin
  - Biomass Harvest



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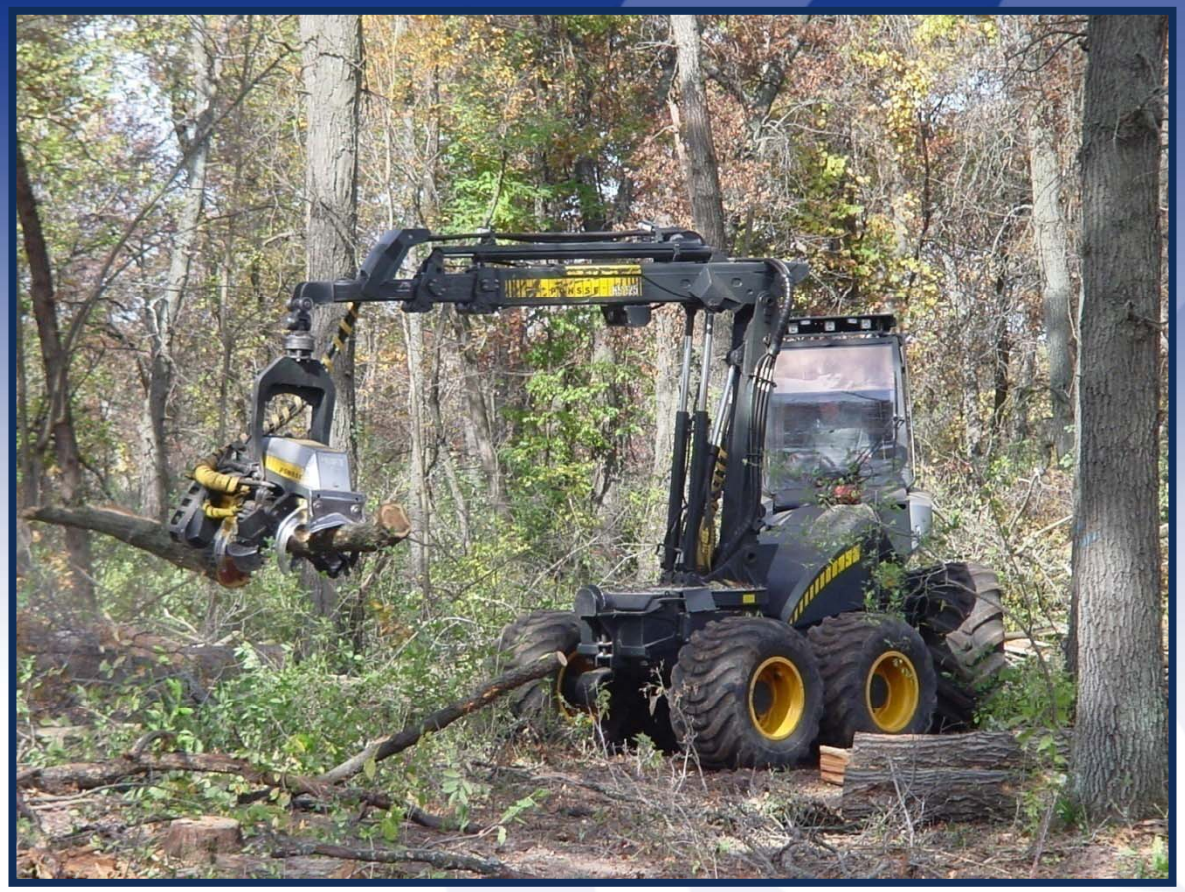

Harvesting on the Kinnickinnic River Property

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Biomass Harvesting on the Kinnickinnic River Demonstration Property

Well-managed private forests provide an opportunity for biomass production as a result of good management practices.

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Biomass for the Private Landowner

- Biomass can be a byproduct of good land management and there is a growing demand in the marketplace
- Prices are volatile: some recent markets $0/ton on-site piled, up to $40/ton for delivered chipped material.

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Potential Constraints

- Ecological
- Social
- Economic

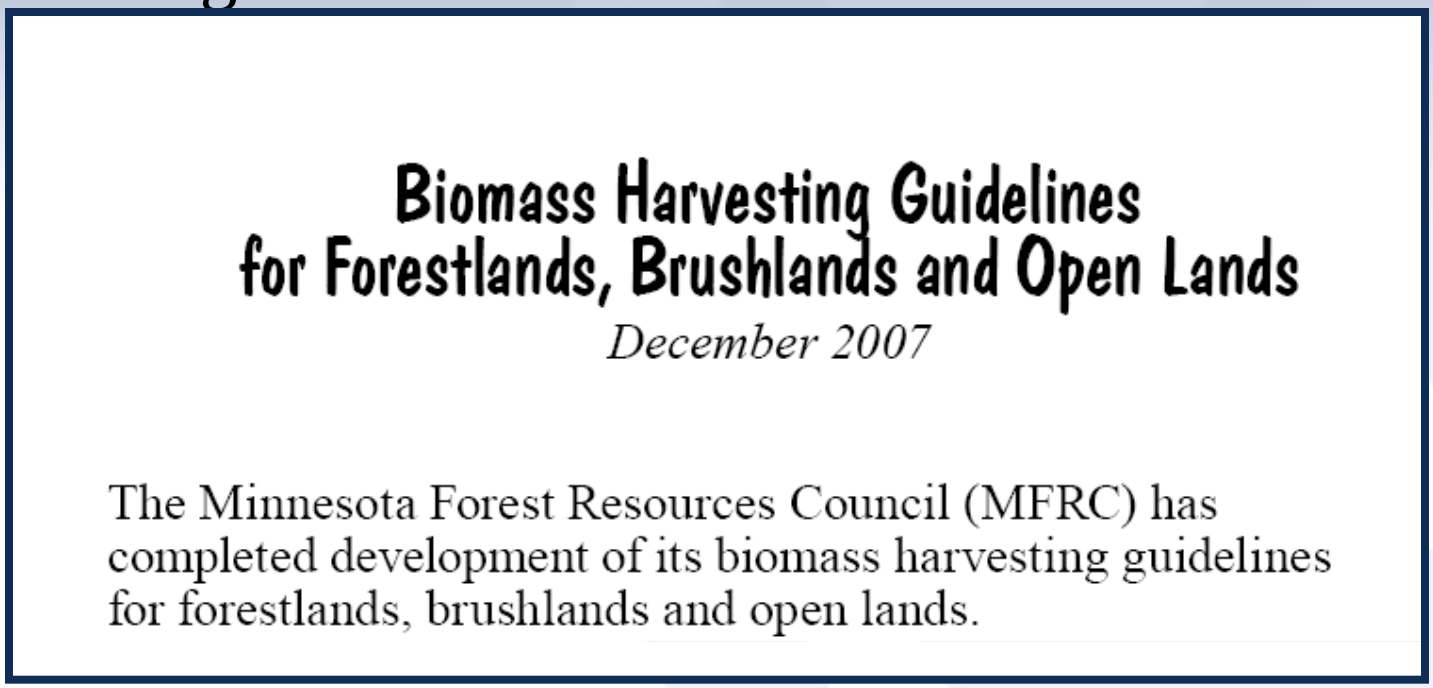
Potential Constraints

- Ecological
  - Volume of material needed
  - Impacts on wildlife habitat, water quality, soil nutrients

www.herpnet.net

Minnesota Biomass Guidelines

- The MN Forest Resource Council published these guidelines



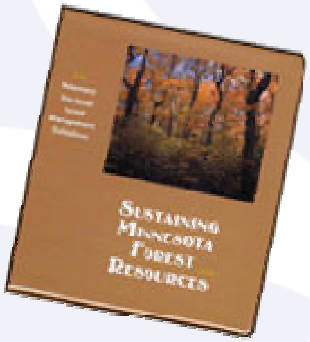
Biomass Harvesting Guidelines for Forestlands, Brushlands and Open Lands

December 2007

The Minnesota Forest Resources Council (MFRC) has completed development of its biomass harvesting guidelines for forestlands, brushlands and open lands.

Harvesting Standards - Promise

- DNR Ecological Services, Fish and Wildlife and Forestry combined with Minnesota Forest Resources Council have developed guidelines for the sustainable harvest of woody biomass
- Integrated guidelines for brushland and forestland
- Focus on practices in northern and central MN that conserve
  - Soil productivity
  - Biological diversity
  - Wildlife habitat



Harvesting Standards - Peril

- Deleted from final standards:
  - Biomass Harvest for Salvage Following Blowdown or Fire when No Roundwood Harvest is Occurring
  - Retain reserve patch(es) that total at least 25% of the harvest unit
  - When present, retain at least 10 snags >12-inch dbh per acre out side reserve patches (if fewer large snags are present, retain 10 snags per acre of the largest dbh). These do not have to be evenly distributed.
  - Avoid harvest of woody biomass within Sites of High or Outstanding Biodiversity Significance [with exceptions for ecological management]

Progress in Wisconsin

- The WI Council on Forestry began work on biomass standards for the state in mid-2007
- The Woody Biomass standards are expected to be completed by Dec. 2008

Potential Constraints

www.forestry.ubc.ca

- Social
  - Amount of harvesting needed to reach high levels of production may not be socially acceptable
  - Multiple Use mandates often exist

Scramble for the Resource

- Currently in Northern Minnesota 4 wood pellet projects and 1 new 25 MW power plant are proposed.
- Region already has 4 existing power plants.
- Total new capacity would be 2 million cords of harvest.

Potential Constraints

- Economic
  - Less dense than coal/fuel oil
  - Transportation over 50-100 miles is not economical or energy efficient

agnews.tamu.edu

Cutting Costs and Reducing Forest Fire Hazards Through Biomass Harvest

By Don Arnosti,
Institute for Agriculture and Trade Policy

Dr. Dalia Abbas,
University of Minnesota, Center for Integrated Natural Resource and Agricultural Management (CINRAM)

Dr. Michael Demchik,
University of Wisconsin-Steven's Point

What Bioenergy Markets Mean for Private Landowners

- Low payments for poorest material in your woods.
- Opportunity to support part of management cost by improving poor quality forests – *long term return*.
- Biomass payment like a cost-share for timber stand improvement.
- Think long-term, use BMP's to safeguard your forest qualities
- Don't let market demand drive your management!

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What Bioenergy Markets Mean for Private Landowners

- Bioenergy is not a “silver bullet”, it is more like a silver BB

www.uwsp.edu

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Carbon Markets

Does money really grow on trees?

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Overview

- What is carbon sequestration anyway?
- How is this converted to a carbon credit?
- How do we value ecosystem services?
- Just how big will the check be?

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So where did all this start?

- The United National Framework Convention on Climate Change, commonly known as the Earth Summit, held in Rio de Janeiro in 1992 was where it all started.

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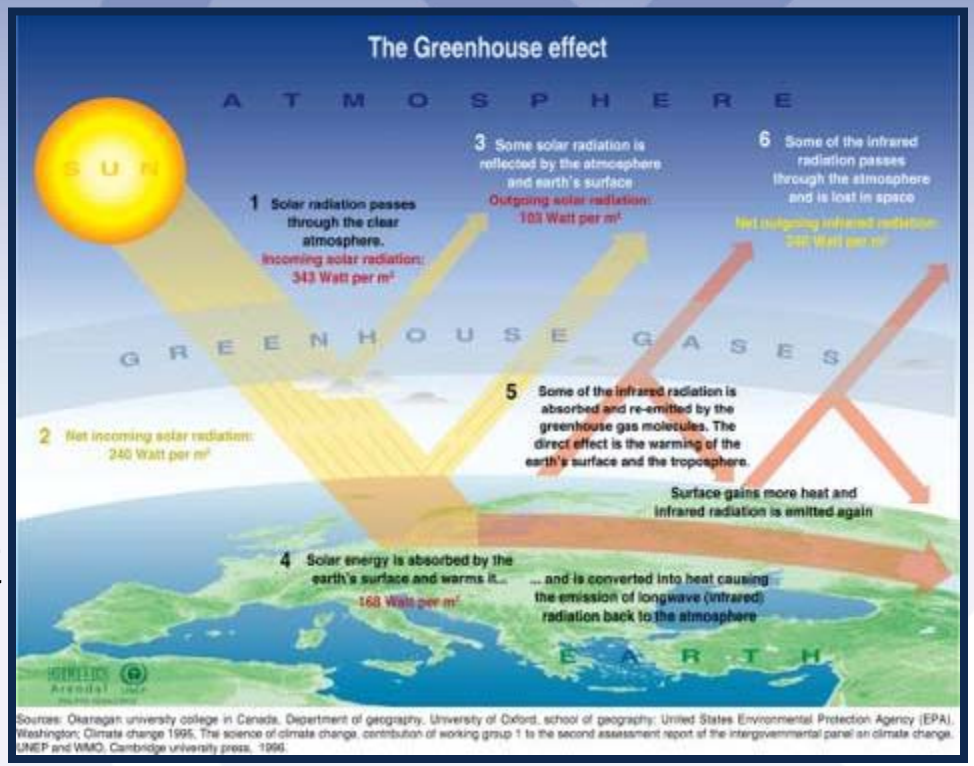
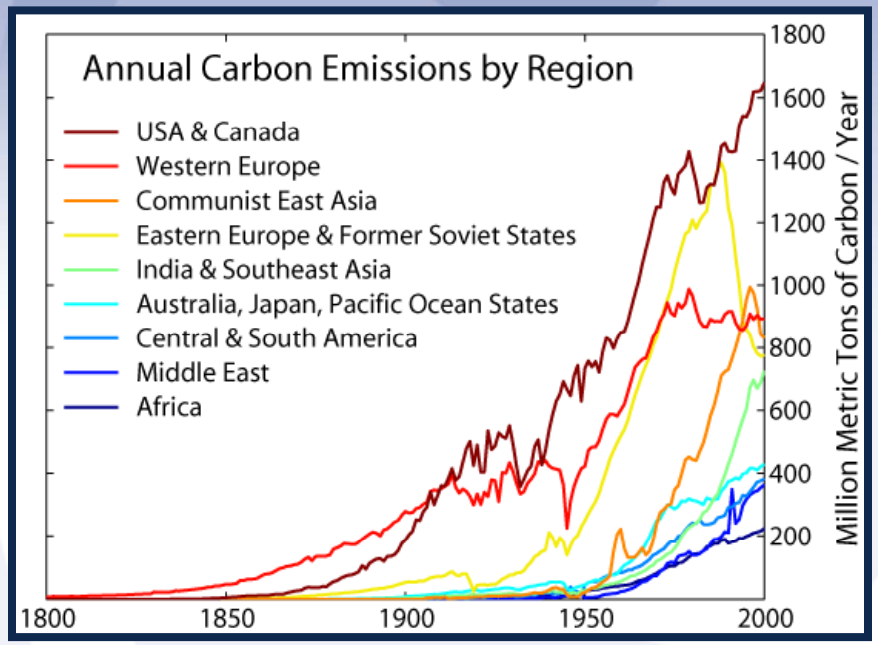
Greenhouse Gases

- Greenhouse gases, which include water vapor (H_2O), ozone (O_3), carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_20), are able to absorb and re-emit infrared radiation, while not blocking visible light.



Carbon Sequestration

- One of the main greenhouse gases of concern is carbon dioxide.
- The burning of fossil fuels for energy, heating, and transportation has led to elevated levels of carbon dioxide in the atmosphere.



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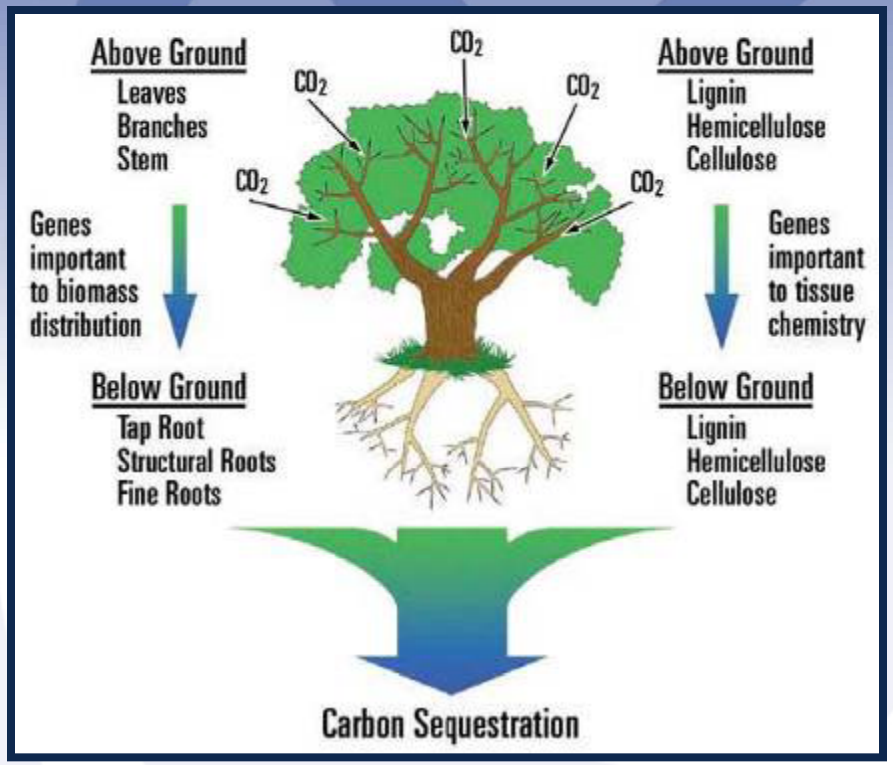
Carbon Sequestration

- Through the process of photosynthesis trees remove and use carbon dioxide to create roots, branches, trunks and leaves.



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Forests Store Carbon

- Trees are a potential solution to help slow global climate change by removing carbon dioxide from the atmosphere and storing (sequestering) it as part of the permanent structure of the tree.

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What does that mean to you?

- Through market mechanisms you have the opportunity to sell the CO_2 that your trees sequester to polluters who need/want to “offset” their CO_2 emissions.

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How is this converted to a Carbon Credit?

- Three types of forest carbon sequestration offset projects.
  - Tree planting
  - Sustainable forest management practices.
  - Long-lived wood products (housing and furniture)

All types of forest carbon credits require:

- Forest land certification
- FSC, SFI or Tree Farm

Tree Planting Projects

- Contracts based on Carbon Accumulation Tables provided by the Chicago Climate Exchange
- Landowners calculate carbon sequestration accomplished by their tree planting project.
- Minimum 15 year commitment

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Sustainable Forest Management Projects

- Landowner must demonstrate what steps are to be taken to increase the growth of your trees (aboveground, woody biomass) through the practice of sustainable forest management that would not have occurred anyway by simply letting nature takes its course.

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Long-lived Wood Products

- Production of long-lived wood products (flooring, windows, furniture, etc.)
- Based on expected percent of the product in use or in landfills at the end of 100 years
- Details forthcoming

Who is interested in buying these credits from you?

- Over-the-Counter - unmonitored
  - Sale of carbon credits between two parties
    - Governor Schwarzenegger
    - Al Gore
- Chicago Climate Exchange - monitored
  - Green Companies
  - Regulated companies under “cap and trade” offset policies (future)

Cap and Trade

- Members reduce the amount of greenhouse gases they release into the atmosphere by a percentage. That limit is the cap.
- Trading takes place when some members release less, and some more than their limit.
- Cap and Trade supported by all three major Presidential candidates

Chicago Climate Exchange

- The Chicago Climate Exchange is voluntary, legally binding, rules-based greenhouse gas emission reduction and trading system.
- It is a voluntary system because the United States has not ratified the Kyoto Protocols.
- US has not (yet) forced industry to reduce greenhouse gas emissions, though recent Supreme Court ruling directs EPA to do so.

Chicago Climate Exchange

- The Chicago Climate Exchange is a stock exchange for pollution.
- It provides a market for businesses to trade on the release and capture of carbon dioxide and other greenhouse gases.

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Chicago Climate Exchange

- The commodity traded at Chicago Climate Exchange is the Carbon Financial Instrument® (CFI™) contract.
- Each contract represents 100 metric tons of CO_2 equivalents.

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Aggregators

- Most landowners will not have an individual project large enough to qualify for direct trading on the CCX (10,000 tons of CO2/year).
- Offset Aggregators assemble pools of credits to trade on behalf of offset project owners (e.g. forest landowners.
- Carbon Financial Instrument® contract = 100 tons of CO2.
- An example of an offset aggregator is the Wisconsin Farm Bureau.

Aggregators, part 2

- Offset Aggregators function like a broker.
- They act as a bridge between the landowner with a small project and the Chicago Climate Exchange serving the needs of both parties.
- Aggregators, as the name implies, work to solicit forestry projects that are not large enough to qualify for a Carbon Financial Instrument on their own and bundle them together with other projects.

Aggregators, part 3

- The offset aggregator is responsible to the Chicago Climate Exchange to
  - administer the project contract,
  - verify that the project information is factual and correct,
  - insure that the project meets Chicago Climate Exchange rules and regulations,
  - make payments to the landowners, and
  - coordinate with Chicago Climate Exchange verifiers.

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CCX and Forestry Offset Projects

- Afforestation
  - Trees planted after January 1, 1990 on land formerly (10+ years) not in forest.
  - Land protected for long-term forest management (conservation easement or contract)
  - Demonstrate Sustainable Forest Management
    - FSC, SFI, American Tree Farm System
  - **No harvesting (including thinning).**
    - **Plantations that have been thinned must be enrolled as a Forest Management project.**
  - Carbon credits for above- and below-ground biomass Credits available for 2003-2010
  - Projects need verification by CCX-approved verifier

Just how big will the check be?

- Example is based on a 40 acre red pine plantation planted in 1995.
- The estimated metric tons (mT) of carbon dioxide sequestered per acre per year are from the Chicago Climate Exchange's Reforestation Carbon Accumulation Tables for dense plantings (>250 stems per acre) of red pine in the Lake States.
- Calculation is based on a contract enrolled in 2008 through the Chicago Climate Exchange's guaranteed contract period ending in 2010.

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Step one…

- Calculate how many metric tons of carbon will be sequestered by your plantation each year.
- The Chicago Climate Exchange's Reforestation Carbon Accumulation Tables estimates that 11 to 15 year-old red pine trees planted at a density of at least 250 trees per acre will sequester approximately 2.56 metric tons of CO_2 per acre per year.
- **40 acres x 2.56 mT/acre = 102.4 mT**

Step two…

- Subtract the total that will go into the reserve pool.
  - **102.4 mT less 20 percent for the reserve pool = 20.5 mT/year goes to the Reserve Pool**
  - **81.9 mT/year are available for annual payments**

Reserve Pool?

- The Chicago Climate Exchange reserves 20 percent of carbon sequestration offsets as an insurance policy against unexpected losses of carbon from your property.
- a drought, insect or disease outbreaks, or a natural disaster like a fire, flood, or windstorm could damage or destroy your woodlands and release the carbon stored in your trees.
- If this should happen then the Exchange deducts credits from the Reserve Pool to compensate for these losses.
- If your losses exhaust what you have set aside in the reserve pool then you may not receive any additional payments until your forest grows to the point where the carbon sequestered is equal to that when you enrolled.

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Step three…

- Multiply the total carbon sequestered available by the market rate for carbon credits. ***Carbon credits were trading for $2.45 per metric ton in January 2008.****
  - **81.9 mT/year x $2.45/mT = $200.66/year**
  - * ($6.15 was a mid- April closing price)

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Step four…

- Subtract the Chicago Climate Exchange and Aggregator fees.
  - **$200.66 less the Aggregator fee of 10 percent = $180.59/year**
  - **$180.59 less the CCX trading fee of $0.20 per metric ton (81.9 mT x $0.20/mT) = $164.21/year**
  - **$164.21 is your annual payment.**

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Step five…

- Now multiply this by two to calculate your income for the two years of the contract.
  - **$164.21/year for 2 years = $328.43**

Finally…

- **At the end of the contract, you are eligible to recover any unused pool credits.**
- **In this example, 2 years of pool credits equals 41 mT x $2.45 = $100.45**
- **Less fees of $18.25**
- **Final payment = $82.20**

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What does it all add up to?

- **The total value of a contract for a 40-acre red pine plantation in the Lake States signed for two years, assuming that nothing changes, would be worth a total of $410.63 or $5.13 per acre per year.**

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What about Sustainable Forest Management Projects…

- This is a far more complex process.
  - First, you will need to hire a consulting forester who understand how to perform a forest inventory and use growth and yield models to estimate forest productivity
  - Next, you need to have a timber inventory completed for your property.
  - Finally, the consultant will have to determine the total amount of carbon sequestered through management as opposed to what would have occurred naturally (business as usual). This needs to be repeated annually.
  - Projects must be individually approved by CCX.
  - Once you know the amount of extra carbon stored, then the process is the same as described before.

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CCX and Forestry Offset Projects

- Sustainable Forest Management
  - Needs to be based on CCX-approved forest inventory done the year of project initiation or registration.
  - Each project must be CCX-verified, at project cost.
  - Includes entire forest management area.
  - Forest must be certified sustainable by ATFS group certification, SFI, FSC, or other recognized system.
  - Owner grants reasonable access for audits, verification, etc.
  - Protocol for harvested wood products under development. Should be ready soon.

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Do Bioenergy or Carbon Markets Help the Private Landowner?

Proceed with Caution!

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Words of Caution on Biomass Markets

- To provide any economic return to the landowner, biomass markets must be no more than 100 miles away (preferably much closer).
- Biomass markets are irregularly scattered across our region.

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Words of Caution on Biomass Markets

- Size and quantity of biomass, equipment used, and operator knowledge of biomass harvest techniques greatly effect harvest economics.
- All emerging biomass markets are based on the availability of large quantities of cheap biomass materials.

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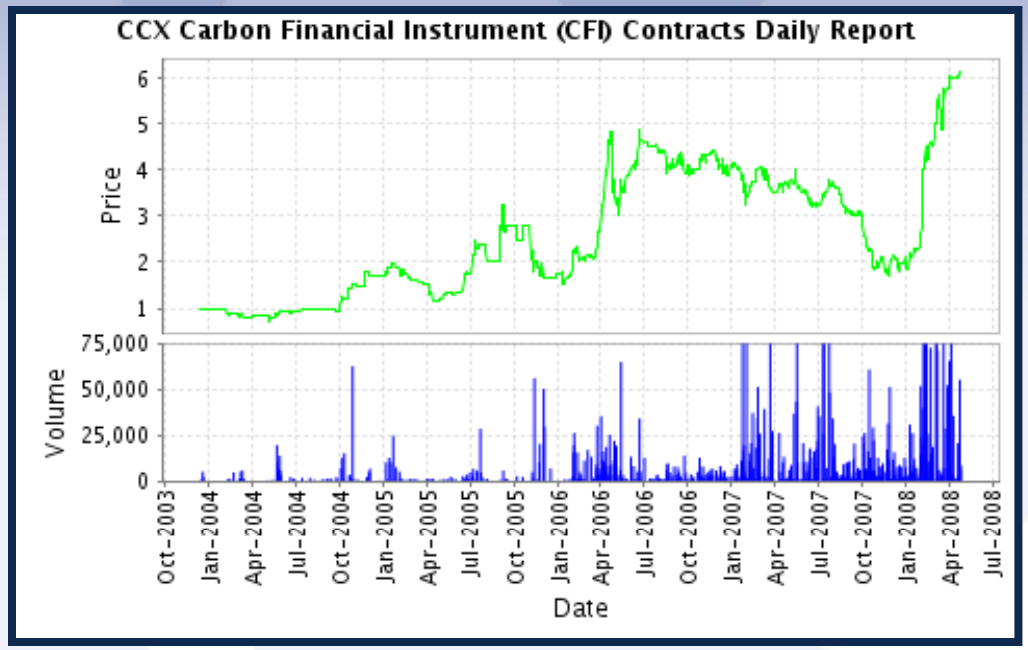
Words of Caution on Carbon Markets

- Only one voluntary market in the US presently
- Market prices are volatile and subject to speculation
- Only one aggregator in Wisconsin
- No competition between markets or aggregators



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Words of Caution on Carbon Markets

- Natural catastrophes in your forest may eliminate your Carbon payment (fire, windstorm, etc.) and may potentially require you to repay the payments you have already received.

- The future will likely hold stronger markets because of political changes

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Please Visit Our Website:

WWW.FORESTRYCENTER.ORG

The material for the Carbon Market portion of this presentation was gathered from the Chicago Climate Exchange website located online at http://www.chicagoclimatex.com/ and from the Center for Integrated Natural Resources and Agricultural Management's publication "A Landowner's Guide to Carbon Sequestration Credits." [WWW document]. URL http://www.cinram.umn.edu/publications/landowners_guide1.5-1.pdf

Special Thanks to John Duplissis – UW Stevens Point

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