

UNIVERSITY OF MINNESOTA

**EXTENSION**

# **Combining Carbon Payments with Biomass Harvest**

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Fueling the Future: The Role of Woody Biomass for Energy Workshop

April 2, 2009

Brainerd

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# Combining Carbon Payments with Biomass Harvest:

## Issues and Opportunities

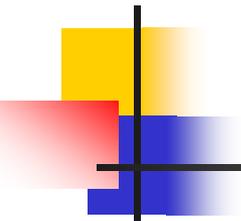
**Fueling the Future—The Role of Woody Biomass for Energy**

**Thursday, April 2, 2009**

**The Northland Arboretum, Baxter, MN**

Dean Current, Program Director, Center for Integrated and Natural  
Resources Management, University of Minnesota

Diomy Zamora, Extension Educator/Assistant Extension Professor,  
University of Minnesota Extension

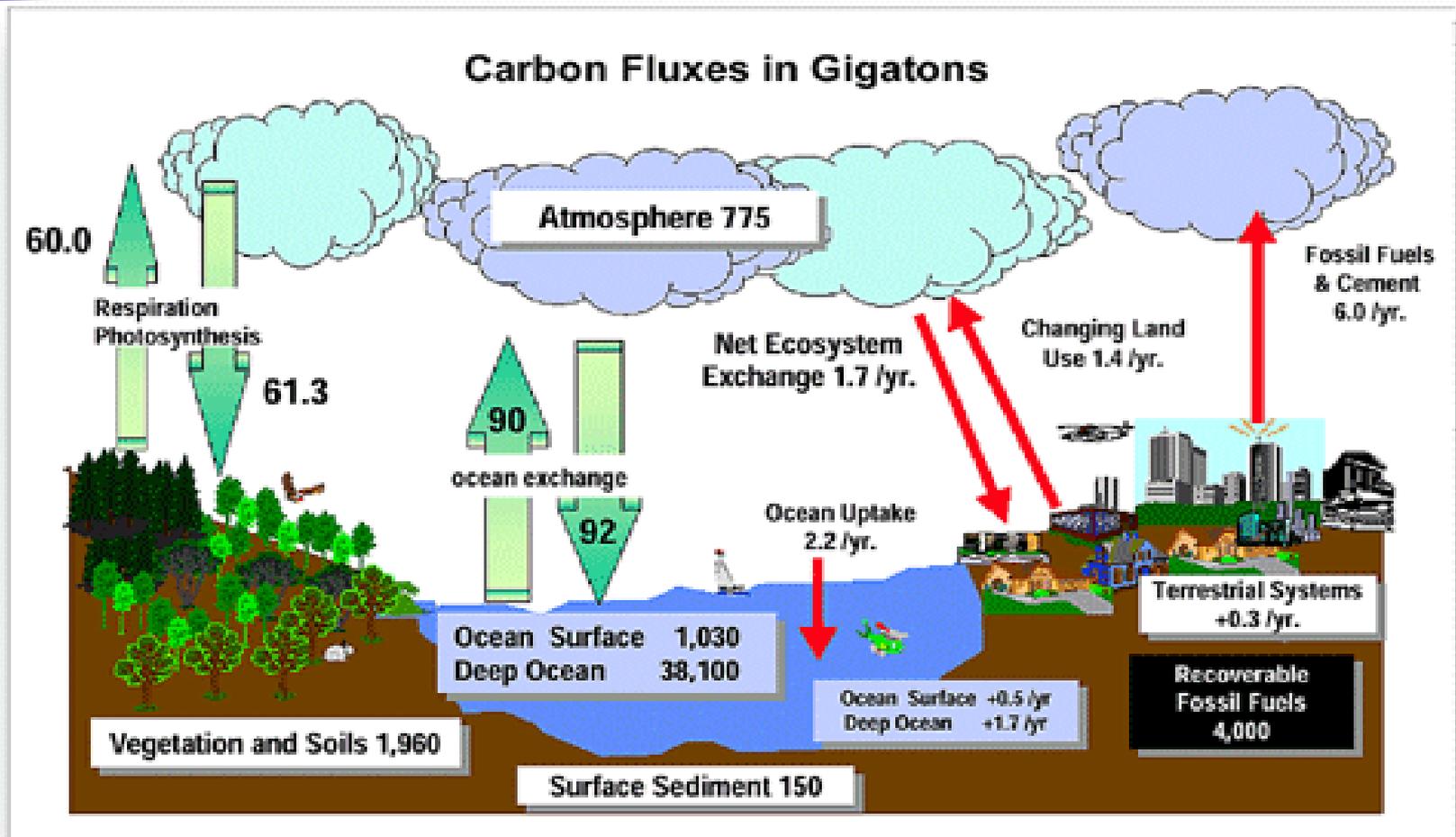


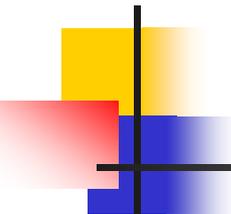
# Content

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- Carbon credits
- Carbon markets
- Options for forestry
- Options for biomass utilization combined with carbon credits
- Issues and future work

# Global Carbon Cycle

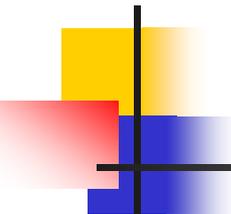




# Carbon Sequestration

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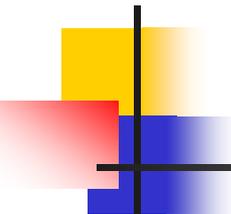
- Carbon sequestration can be defined as the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere.
- Growing plants sequester carbon from the atmosphere and release it when they decompose unless converted



# Trees and Forests as “Sinks”

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- While growing trees absorb CO<sub>2</sub> and release oxygen
- Faster growing trees will sequester a greater amount of carbon in a given time
- New plantings provide a “net gain” in carbon sequestered
- Managed forests maintain a carbon “stock”



# What are Carbon Credits?

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Carbon credits encompass two ideas:

- Prevention/reduction of carbon emissions produced by human activities from reaching the atmosphere by capturing and diverting them to secure storage.
- Removal of carbon from the atmosphere by various means and securely storing it.

# Offsets for Carbon Credits



Afforestation (e.g., Pine Plantation)



Tree Plantings (e.g., Hybrid Poplar)



Agroforestry Practices (e.g., Riparian Buffers, Windbreaks, Alley Cropping)

1-3 mT/Acre



Sustainably-Managed Forest

**Forestry, Tree Plantings, Agroforestry**

# Soil and Grassland Offsets



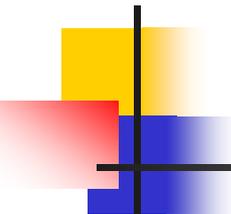
**Wetland Areas  
(1.0 mT/Acre)**



**No-Till or Strip Till (0.4 or 0.6 mT/Acre)**



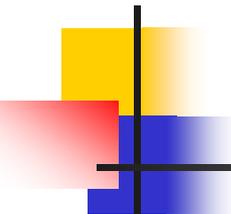
**Grassland/Grass Plantings (1.0 mT/Acre)**



# Credit

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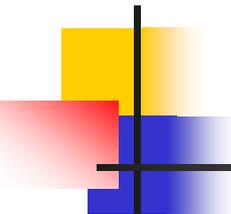
- For carbon sequestered and stored for a defined period of time (15-100 years)
- Forestry credits – net sequestration
  - Carbon sequestered (tree growth, soil storage)
  - Carbon emitted (mortality, harvest, etc.)
  - = Net carbon sequestration (basis for payment)
- Payments based on no. of tons of CO<sub>2</sub> equivalent per year



# Opportunities related to biomass fuels

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- Net sequestration in Biomass plantations
- Substituting renewable fuels for fossil fuels
- If integrated with timber production, credit for forest management and long-lived products



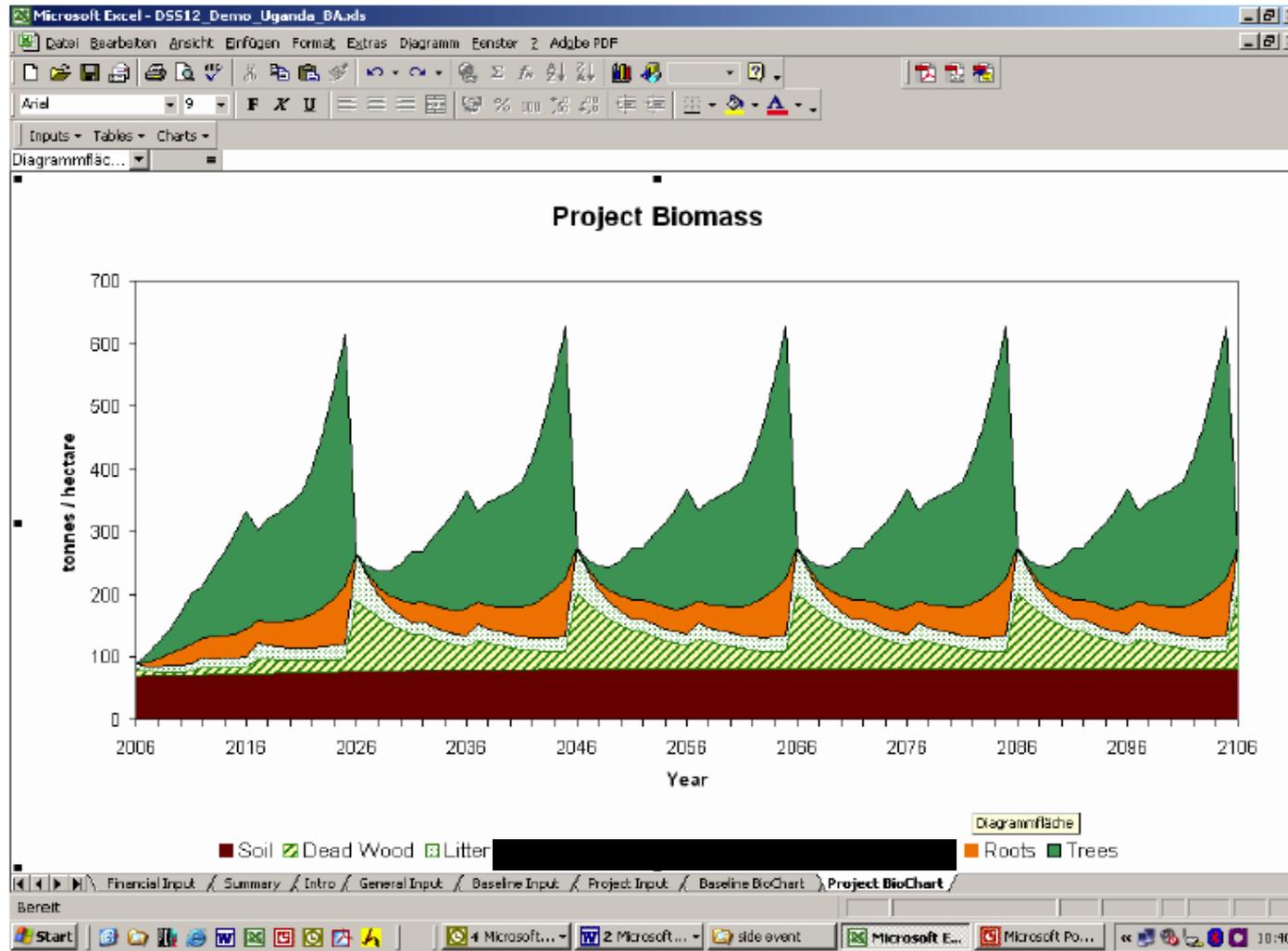
# Net Sequestration in Plantation - rationale

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- If plantation established on previously cropped land:
  - There is a net increase in CO<sub>2</sub> sequestered over the base situation (cropping)
  - Even with harvest, you have a net average sequestration over time
  - The average net sequestration could be eligible for a carbon credit
  - Once plantation established no further payments would be justified

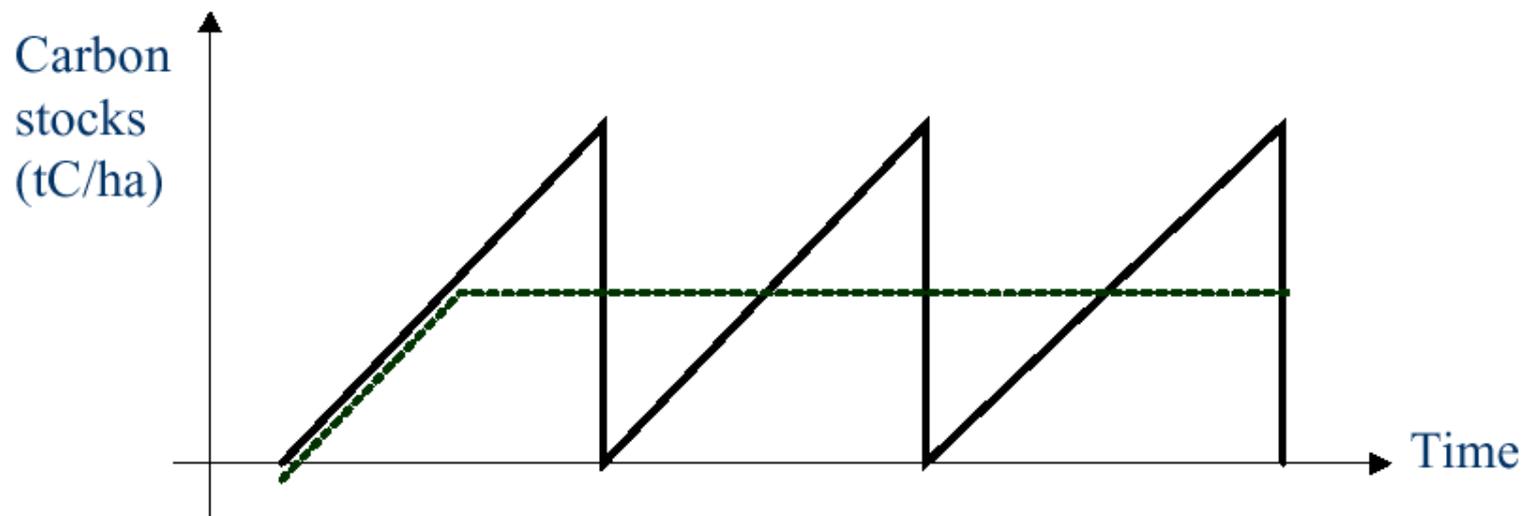
# DSS / Project Biomass Chart

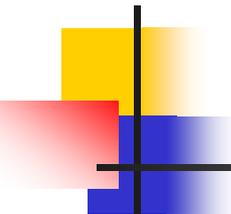
ENCOFOR COP10 Side Event – EU Pavilion/La Rural,  
Buenos Aires, 7 December 2004



# Average Carbon-Stock Accounting

- ◆ Average C stock calculated as the mean C stock over a multiple of one rotation.
- ◆ Any rotations beyond the project end are not included.
- ◆ If baseline is recalculated, average C stock must also be recalculated - for the remaining years.

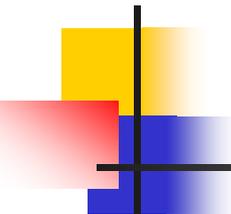




# Substituting renewable fuels for fossil fuels

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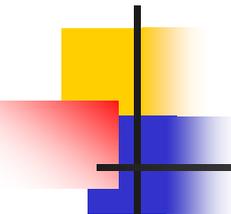
- By using “closed-loop” energy crops net emissions are 0 compared to fossil fuel
- Energy facilities that use renewable fuels are entitled to credits or subsidies
- Credits currently go to facility but:
  - This should allow them to pay higher price
  - Other benefit sharing arrangements could be developed



# Integrated forest management

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- Manage for biomass for energy and other products (pulpwood, sawlogs)
- Material from timber stand improvement can be used for energy
  - Early thinnings increase productivity/sequestration
- Increased stocking can increase sequestration and residues for energy
- Payments for conversion to long-lived forest products.



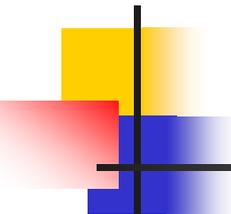
# What's happening in the market?

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- Chicago Climate Exchange, (Voluntary)
- European Climate Exchange (Kyoto)
- Agregators carbon credit trading
- State programs – California
- North East Regional GHG Initiative
- Conservation oriented non-profits
- Movement towards a regulated market

# The Global Market is Growing

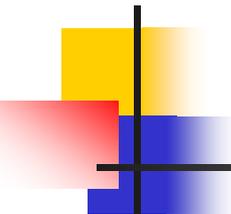
Markets	Volume (MtCO <sub>2</sub> e)		Value (US\$)	
	2006	2007	2006	2007
Voluntary OTC Market	14.3	42.1	58.5	258
CCX	10.3	22.9	38.3	72.4
<b>Total Voluntary Markets</b>	<b>24.6 (1.5%)</b>	<b>65.0 (2.2%)</b>	<b>96.7 (0.24%)</b>	<b>331 (0.5%)</b>
EU ETS	1,1044	2,061	24,436	50,097
Primary CDM	537	551	6,887	6,887
Secondary CDM	25	240	8,384	8,384
Joint Implementation	16	41	141	495
New South Wales	20	25	225	224
<b>Total Regulated Markets</b>	<b>1,702</b>	<b>2,918</b>	<b>40,0723</b>	<b>66,0867</b>
<b>Total Global Market</b>	<b>1,727</b>	<b>2,983</b>	<b>40,169</b>	<b>66,417</b>



# Summary

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- There is a growing market for carbon but still much uncertainty
- Forestry will likely play a role in the market
- There are opportunities to combine biofuel production with carbon sequestration
- Stay tuned – anything could happen!



# Questions?

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## **For additional information contact:**

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<http://www.extension.umn.edu/woodlands/biomass/>