CCX Forestry Carbon Offset Programs
Status of the U.S. Carbon Market

- A developing, voluntary market
- No national, regulatory greenhouse gas reduction scheme … **YET!**
- Many local, state, and regional systems and registries for reducing greenhouse gas emissions exist
  - Regional Greenhouse Gas Initiative in several northeastern states
  - Department of Energy National Voluntary Reporting of Greenhouse Gases Program
  - California Climate Action Registry
  - Georgia Carbon Sequestration Registry
The Chicago Climate Exchange (CCX)

- North America’s only active, voluntary and legally-binding GHG trading system
- Began GHG trading operations in 2003
- CCX membership system
  - CCX members make a voluntary, but legally binding commitment to meet annual GHG emission reduction targets of 6 percent by 2010
  - GHG trading among members
  - Large forest landowners can be a member
  - Small forest landowners can participate in providing offsets through an aggregator: An aggregator is a CCX-registered entity that pools smaller projects to allow them to be marketed on the exchange
  - Forestry is one of several types of CCX offset projects
CO₂ Equivalents – The Carbon credit

• Computing CO₂ equivalents (CO₂e)
  – Carbon weight (C) = Tree Biomass dry weight/2
  – CO₂e = C*3.67 (based on molecular weights of C and O)

• 1 metric ton CO₂e is about 92% of 1 ton of green wood

• 100 MT CO₂e = 1 CCX CFI (trading unit)
Historical Price Trends of CCX CFIs

Price ($ / metric ton CO$_2$e)

Dec-03 May-04 Oct-04 Mar-05 Aug-05 Jan-06 Jun-06 Nov-06 Apr-07 Sep-07 Feb-08 Jul-08
The Texas Players

• Aggregators
  • Agragate Climate Credits Corporation
  • Delta Institute
  • F&W Forestry Services

• Associate Aggregators
  • The Carbon Group
  • Dogwood Carbon Solutions

• Verifiers
  • American Forest Management
  • Larson & McGowin
  • Texas Forest Service
Three CCX Offset Forestry Protocols

• Afforestation Protocol

• Sustainably Managed Forests Protocol

• Long Lived Wood Products Protocol
Afforestation – Eligibility

• Planted land that was not forested prior to January 1, 1990

• **Trees may not be cut for 15 years**

• Carbon credits are awarded based on annual increases in carbon stocks as determined by
  • CCX carbon accumulation tables
  • Direct measurement / modeling

• Carbon credits back dated to 2003
Sustainably Managed Forests - Eligibility

• Evidence of sustainable forest management (SFI, Tree Farm group certification, FSC)
• Forests do not need to be afforested from non-forest lands
• Owners must make a 15-year commitment of sustainable management
• Owners must provide documentation of net increases in carbon storage
• A baseline of carbon storage must be established in order to measure / model annual net increases
Long Lived Wood Products - Eligibility

- Evidence of Sustainable forest mgt – certification
- Must have exclusive right to sequestered carbon – **Timber sale contracts must be explicit!!!**
  - Exclusive contract w/ aggregator
- Net carbon increases are determined by % carbon remaining in wood products at the end of 100 years
- Participants report harvest quantity and % product class category (i.e. % softwood pulpwood)
- Using DOE guidelines, CCX developed factors that convert volume of wood harvested in each category to the quantity of carbon in use at the end of 100 years
Special Circumstances

Catastrophic Loss

Acquisition / Disposition of Forest Land

Harvesting

Switching between protocols
Reduced Credits from Catastrophic Loss

- CCX Forest Carbon Reserve Pool
  - 20% of earned offsets are put into the Reserve Pool
  - Credits from the Reserve Pool can be used to compensate for catastrophic losses
  - Remaining credits in the Reserve Pool shall be released to forest owners near the end of the market period
Land Acquisitions / Dispositions

– Credits adjusted annually to account for forestland acquisition / disposition
– May enroll acquired forest land if it meets protocol criteria – added to baseline
– Disposed land may have to forfeit credits back to CCX unless:
  – New landowner enrolls land in CCX program
  or
  – Maintains forest certification through commitment period and ensures that carbon stocks are non-decreasing from purchase through market period
Reduced Carbon Credits from Thinning

- For each stand, reduced carbon credits from thinning needs to be accounted for financially.
- For a carbon pool, hopefully there is enough growth in other non-thinned stands to offset the credit loss from thinned stands so an actual refund of carbon credits will not be necessary.
- If the whole carbon pool is from a single landowner, maintaining a net carbon credit gain each year could be added into management objectives to avoid a need for refund of carbon credits.
Switching from Afforestation to Managed Forest

• Projects can switch from afforestation to managed forest despite the 15 year required commitment of afforestation protocol
• One reason to switch is to thin before age 15
• Costs of switching
  – Documentation and certification for sustainable management
  – Forest inventory to establish a carbon baseline and modeling of carbon increases each year
  – Forest inventory for any changes of carbon stock due to thinning and other harvest
Carbon Verification

• All aggregated pools must obtain verification by a third-party
• CCX-approved independent verifier: Texas Forest Service is 1 of 13
• Verification ensures that project protocols are properly followed and that the appropriate volumes of carbon dioxide are being recorded
• All offset projects are subject to an initial verification and subsequent annual verifications
How Do I Sign Up?

- Contact appropriate organization
  - CCX – only projects > 10,000 MT CO₂e
  - Aggregator
  - Associate aggregator / consulting forester

- Calculate annual net change in carbon stocks
  - Accumulation tables / Conversion factors
  - Direct measurement / Modeling

- Agree to terms of contract, sign

- Verification

- Maintain forest land / records
Estimated Fees

• Aggregator – 10%

• Associate aggregator – 10%

• Verification – $.20/credit

• CCX Transaction fees - $.20/credit

• Reserve – 20% of credits held back
An Example of Potential Additional Return from CCX Forest Offset Programs
Assumptions

• One acre loblolly pine plantation
• Site Index (Base 25) = 60
• Trees per acre @ age 1 = 750
• Thinning and Final Harvest

<table>
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<tr>
<th>Year</th>
<th>Intensity</th>
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<tr>
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<tr>
<td>31</td>
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Cumulative Carbon Credits from a Loblolly Pine Plantation in East Texas by Offset Protocol

- Age 1-15 Afforestation
- Age 16-30 Managed Forest
- Age 16, 23, and 31 Thinning & final harvest, long lived wood products
Incremental Carbon Credits from a Loblolly Pine Plantation in East Texas by Offset Protocol

-25 -20 -15 -10 -5 0 5 10 15 20 25 30

Year

CO2e (metric ton/acre)

-25 -20 -15 -10 -5 0 5 10 15 20 25

• Age 1-15 Afforestation
• Age 16-30 Managed Forest
• Age 16, 23, and 31 Thinning & final harvest, long lived wood products
Carbon Revenue by Program

- Assuming $5/CO2e
- Thinning has negative effect on carbon revenue
- Final harvest has positive effect on carbon revenue
Costs and Timber Revenue

- Site establishment costs: $227/ac
- Annual cost: $16/ac
- Thinning cost: 14% of thinning revenue
- Final harvest cost: 9% of final harvest revenue
- Carbon monitoring and trading cost: 25% of carbon revenue
- First thinning revenue: $212.50/ac
- Second thinning revenue: $586.40/ac
- Final harvest revenue: $2,904.80/ac
## Financial Returns for One Rotation

<table>
<thead>
<tr>
<th>Scenario</th>
<th>NPV</th>
<th>IRR</th>
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<tr>
<td>With Carbon</td>
<td>$520.49</td>
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<tr>
<td>Without Carbon</td>
<td>$364.73</td>
<td>7.9%</td>
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Substantially Improve Financial Returns

NPV

Carbon Price ($/Ton)

$0 $5 $10 $15 $20

$200 $300 $400 $500 $600 $700 $800 $900 $1,000 $1,100

NPV

IRR

Carbon Price ($/Ton)

$0 $5 $10 $15 $20

0% 2% 4% 6% 8% 10% 12% 14% 16%

IRR