

Emerging Forest Carbon Offset Markets and Opportunities for Mendocino Landowners

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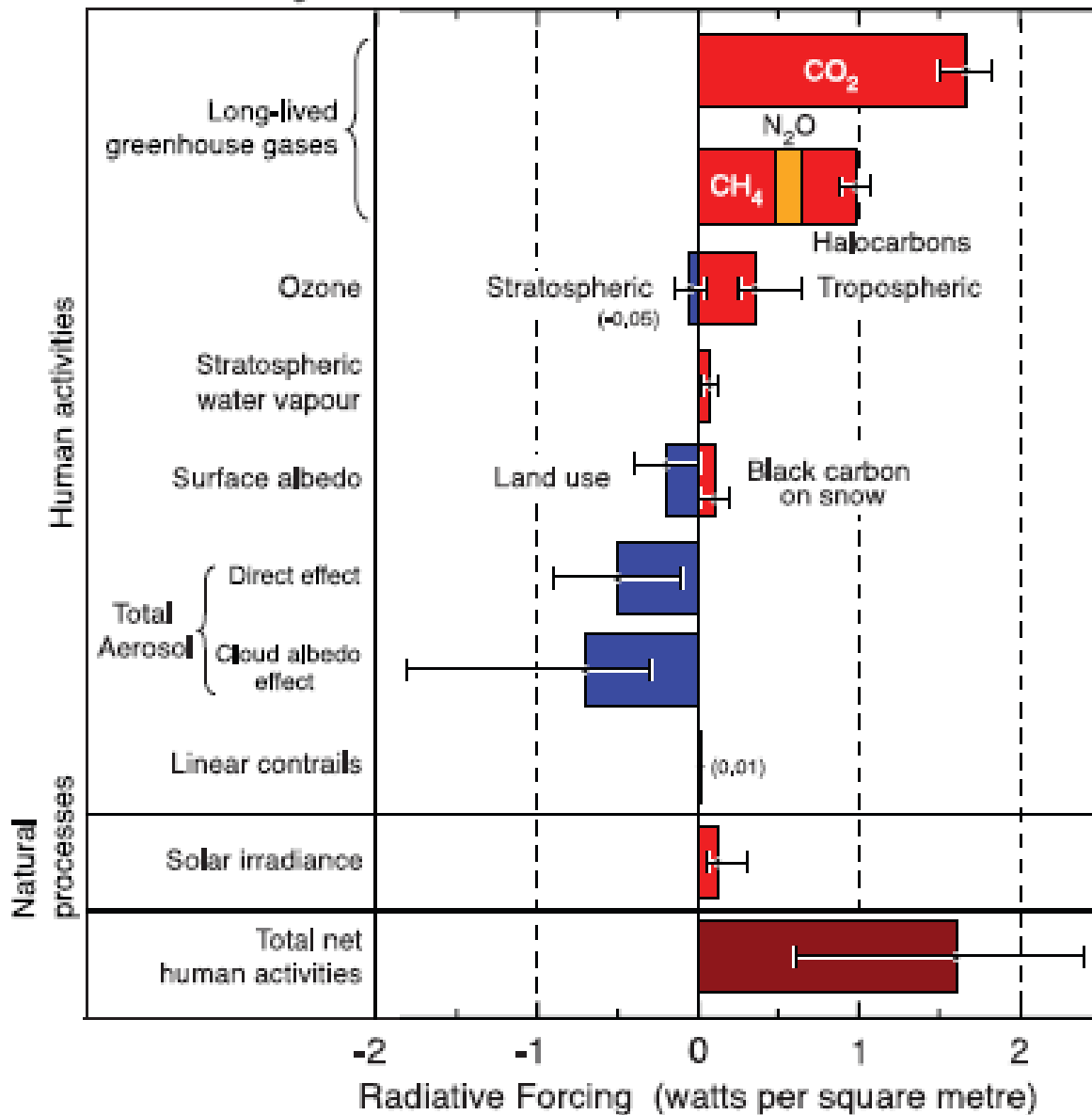
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January 17, 2008



Radiative forcing of climate between 1750 and 2005

Radiative Forcing Terms



How Forests Affect Climate

← Forests

← Forests & Wildfires

← Forests

← Forests

← Tropical Forests

Chart from IPCC Report on Climate Change (2007)



Cost-effective but not Cheap

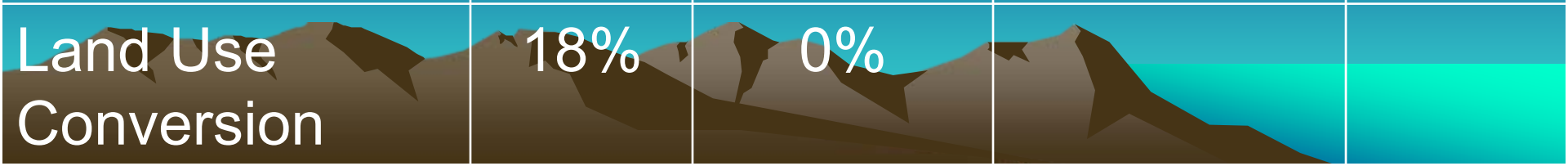
- AB 32 requires massive reductions in CO2 emissions from consumers/businesses
- New investments and new technologies will be needed
- ‘Maximum technologically feasible and cost-effective reductions’ criteria
- AB 32 – minimizing ‘leakage’ means shifting impacts out-of-state is a no-no
- None of this will be cheap or easy





GHG Emissions by Sector and Potential Roles of Biomass and Biofuels to Offset Fossil Fuels

Sector	Global	California	Biomass Electricity & Heat	Liquid Biofuels
Transportation	14%	38%	◆	◆
Electricity	24%	25%	◆	
Industry	17%	20%	◆	
Buildings	8%	9%	◆	
Agriculture	14%	6%		
Land Use Conversion	18%	0%		



Long term technology options for 30% GHG reduction by 2030

More efficient new lighting

Cost per CO2 Ton Pct of Goal

-\$80 10%

More efficient new vehicles

-\$60 17%

More efficient new buildings

-\$40 23%

Cellulosic biofuels

-\$12 27%

Industrial cogeneration (heat & power)

-\$10 30%

Retrofit existing buildings

\$0 43%

Active forest management

\$15 57%

Afforestation and Reforestation

\$20 67%

Renewable Energy and Clean Coal

\$50 97%

Hybrid cars

\$100 \$\$\$

Reducing U. S. Greenhouse Gas Emissions:
How Much at What Cost? Dec 2007

<http://www.mckinsey.com/client-service/ccsi>



Two different types of forestry benefits

No agreed upon ways to measure

❖ Carbon Sequestration

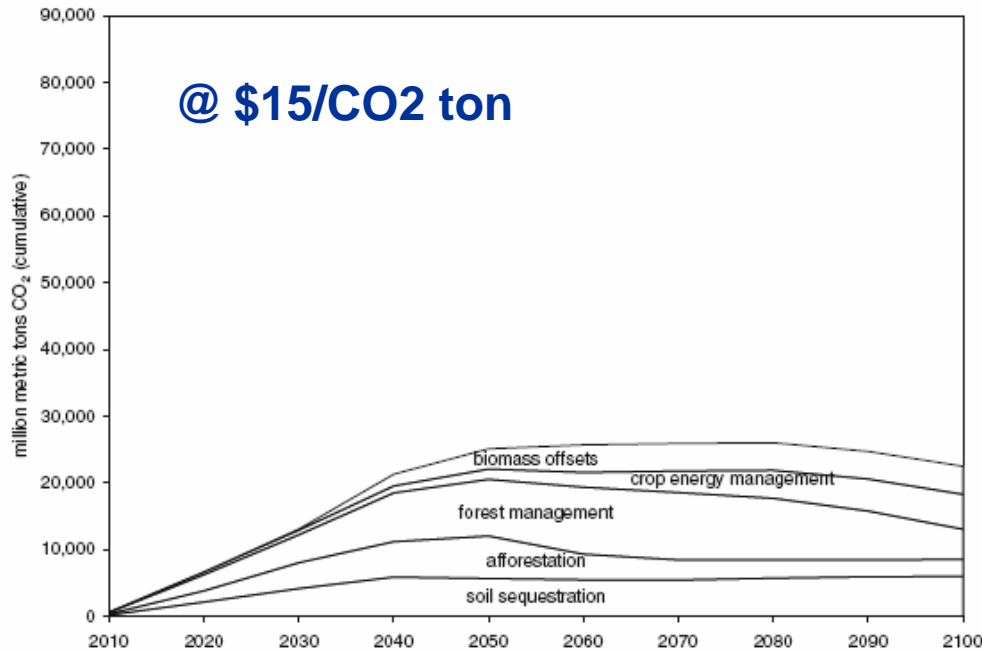
- In the forest
- In wood products during lifetime
- In landfills if they do not rot

❖ Offsetting energy use

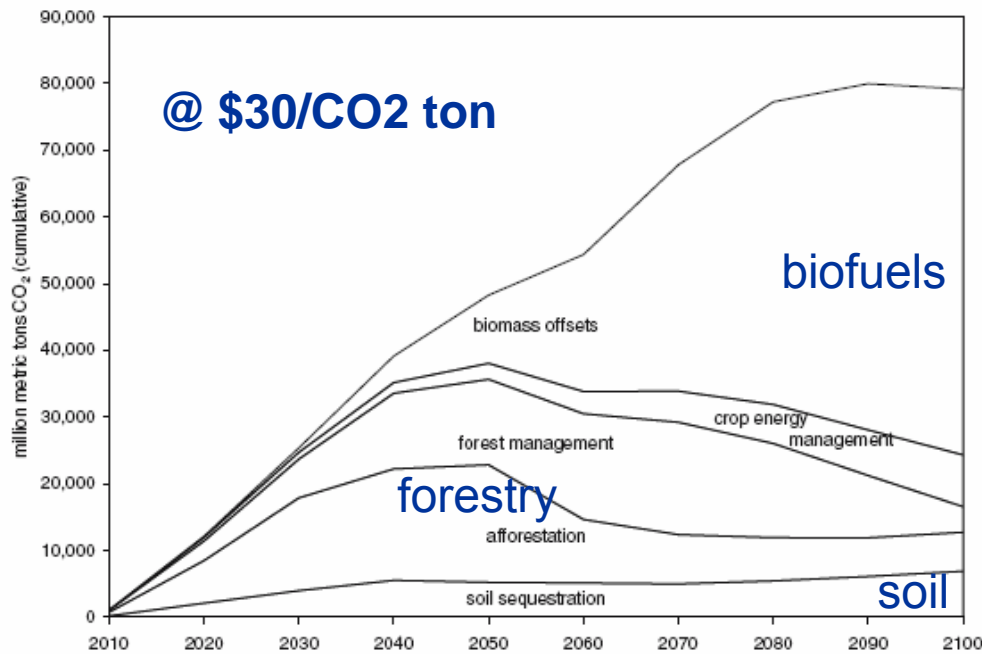
- Biomass for fossil fuel electricity
- Liquid biofuels for gasoline and diesel
- Timber for energy intensive steel and concrete

High quality accounting rules are needed for all benefits

CCAR Round 1 counts only one benefit and values open space more than carbon



(a) CO₂ price equals \$15 per t-CO₂



(b) CO₂ price equals \$30 per t-CO₂

McCarl and Sands
 “Competitiveness of
 terrestrial greenhouse
 gas offsets: are
 they a bridge to the
 future?” in Climatic
 Change (2007)

Low CO₂ offset prices
 will generate limited
 offsets, higher prices
 will generate more

Sequestration in forests
 and agricultural soils will
 peak out but rainfed
 biofuels have are not
 constrained



What do carbon dollars and carbon pennies look like?

- Carbon dollar – 1 ton of avoided CO₂e emissions via 100 yr. storage OR offset
- Carbon penny – 1 ton of CO₂e storage for one year
- Carbon dime – A ten year CO₂ storage contract
- Future pennies, dimes and dollars must account for RISK from fires or rotting

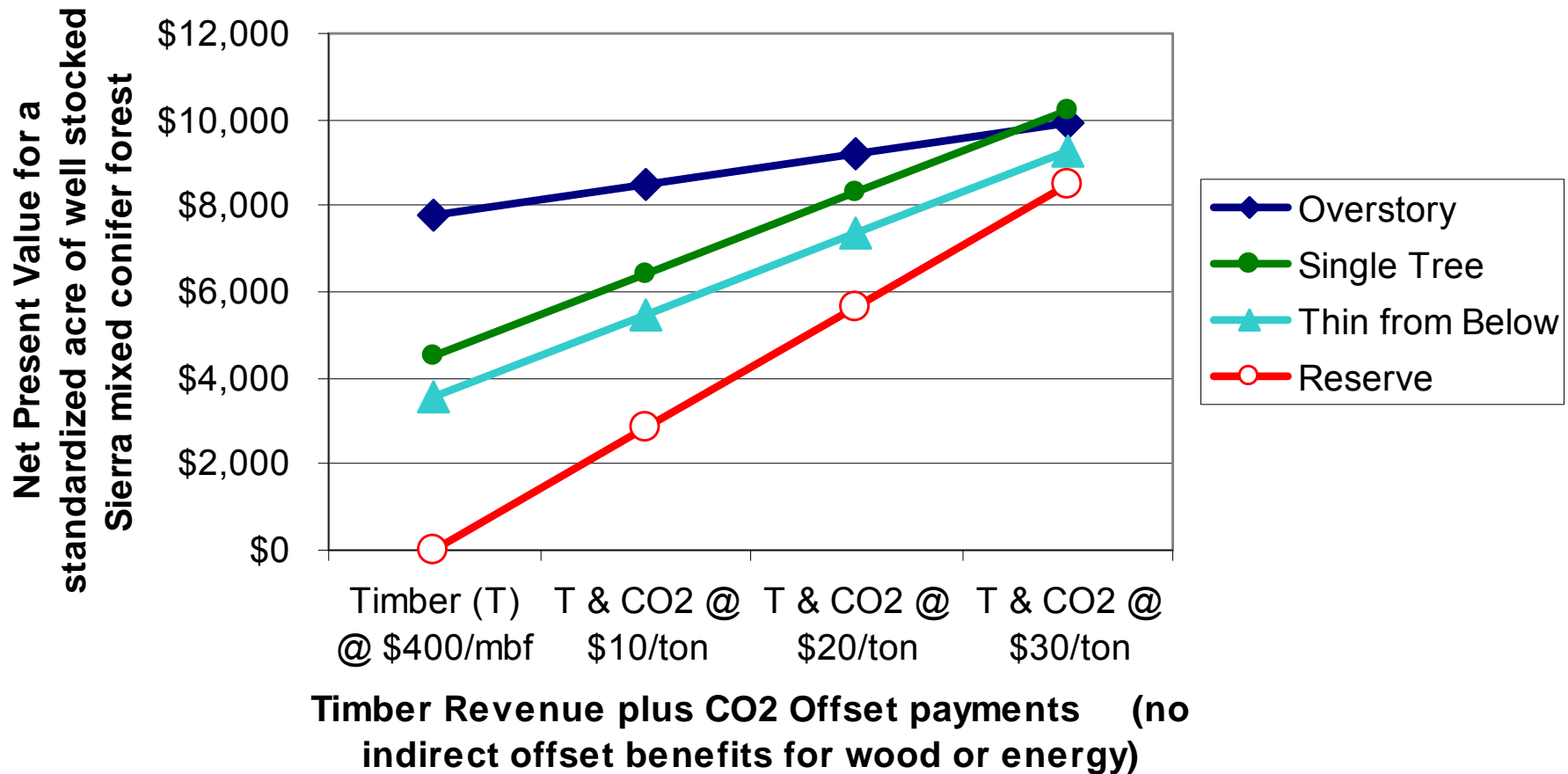


Comparing Timber and CO₂ Stumpage

CA	Southeast USA	\$/mbf	\$/CO ₂ ton	Similar CO ₂ /ton prices
	Pulpwood	50	6	Lowest cost US voluntary offers (unverified)
Firewood	Hardwood	100	13	PGE Climate Smart Pgm request at \$10/ton
Fir - Coast	Pine – chip n saw	150	19	McKinsey (2007) price to drive 20% reduction by 2030
Fir - Sierra	Pine - sawtimber	200	25	Moderate cost investments (IPCC 2007)
Pine-Coast		250	31	McKinsey (2007) price to drive 30% reduction by 2030
Doug. Fir - Coast		300	38	
Redwood		850	106	

How carbon payments could make continuous silviculture regimes more profitable

Net Present Value of Four Forest Management Regimes (UC Blodgett data from stands with ~20 mbf/acre initial stocking and 2 entries over 25 years)





If honest markets develop, then continuous cover forest management looks good

- Need CO2 prices increases
- Higher CO2 prices will also increase market rates for timber and wood chips – the price of competitive products goes up
- Need real buyers of CO2 offsets - not 'green washing' or 'guilt washing'
- Markets to match up buyers and sellers
- Lower cost programmatic standards





Reforestation Afforestation Project Carbon On-Line Estimator

Step 1. Select the project location

Select the state and county where the project will be located. The location is used to determine: (1) the applicable forest types for that region and the rates at which these forest types store carbon; (2) the background rates of possible land-use transitions in that region (based on historic trends), including conversion of cropland and pasture to forest, the carbon effects of which must be deducted from the gross carbon estimates for the planted forest to determine the net carbon that would be considered to be an offset; and (3) the leakage rate.

State: California County: Mendocino

Determining Additionality: Applying the Performance Standard

A performance threshold is used to determine if a given afforestation or reforestation project is additional, or beyond that which would be expected under a "business-as-usual" scenario. For afforestation and reforestation projects, the performance threshold is practice-based, or based on typical practices to convert cropland or pasture to forest, in a given region. The information provided below provides an indication of how common a practice afforestation or reforestation is in this area. If these practices are common, the less likely it is to be additional.

Project Status

Project location:

State: California

County: Mendocino

MLRA: 5

Baseline afforestation rates:

From cropland: 0.00 %

From pasture: 1.06 %

Leakage rate:

24.00 %

Areas planted:

Cropland: 0 acres

Pasture: 0 acres

Simpler and Cheaper CO2 Offset Registers – US EPA

www.ecoserver.env.duke.edu/RAPCOEv1/

County specific estimates of CO2e ton*years of storage from afforestation

Mendocino choices are:

Mixed Conifer

Western Oak

Fir – Spruce



Reforestation Afforestation Project Carbon On-Line Estimator

Net Project Offset Potential

The net project offset potential is calculated as the annual carbon sequestered annually by the project, or the annual flux, less the baseline flux and any leakage. Results can also be viewed as carbon stock accumulation (the sum of fluxes) over the course of the project.

Metric tons (CO2 eqivs.)/ year	Show annual fluxes		Show accumulated stocks	
	Annual flux Years 0-5	Annual flux Years 5-10	Annual flux Years 10-15	Annual flux Years 15-20
Gross CO2 estimate	198	147	147	136
Baseline CO2 deduction	1	4	6	8
Net Additional CO2	197	143	141	128
Leakage deduction	48	35	35	33
NET OFFSET POTENTIAL	149	108	106	95

Project Status

Project location:
 State:
 County:
 MLRA:

Baseline afforestation rates:
 From cropland:
 From pasture:

Leakage rate:

Areas planted:
 Cropland:
 Pasture:

[Gross Carbon](#) :: [Baseline Carbon](#) :: [Land Use Rates](#) :: [Land Use Change](#) :: [Carbon Accumulation](#) :: [Leakage Estimates](#) :: [Net Project Offset Potential](#)

RAPCOE v. 1.0 © 2007

Afforestation is a no-regrets with respect to future options – but don't give away your development rights

Multiple Benefits

- Erosion and pollution reduction
- Wildlife habitat
- Future products sale
- Future carbon storage sale

Californians will pay a lot to live in the forest - what residential forest acreage sells for

260 parcels

Parcel Size

	10-19.9 acres	20-49.9 acres	50+ acres
Santa Cruz	\$ 30,597	\$ 20,124	\$ 35,340
Nevada	\$ 27,049	\$ 15,674	\$ 7,936
Humboldt	\$ 19,169	\$ 10,437	\$ 6,653
Plumas	\$ 30,025	\$ 7,480	\$ 5,506
Siskiyou	\$ 10,103	\$ 7,845	\$ 2,228



Mendocino County
Fire Risk will affect
the true value of long
term forest carbon
storage

Lower risk than the
Sierra Nevada

If Electric Utilities are
going to meet 20%
RPS in 2012, they
need renewable
power on line – such
as wood-fired
cogeneration energy



Using trees before wildfires burn them down can create green jobs, green businesses, and green electric power





Looking to the Future

- Consider future prices and liabilities for any type of forest sequestration contract
- CO₂ prices that will drive economy-wide CO₂ emission reductions will improve the financial returns for mixed harvest/sequestration regimes in some forest types
- Wood products and wood-based energy also have CO₂ emission reduction benefits – but market prices are easier than chain-of-custody accounting for rewarding participants



Any Questions?

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