Forest Fuels Reductions and Biomass-to: *energy or fossil intensive products?*

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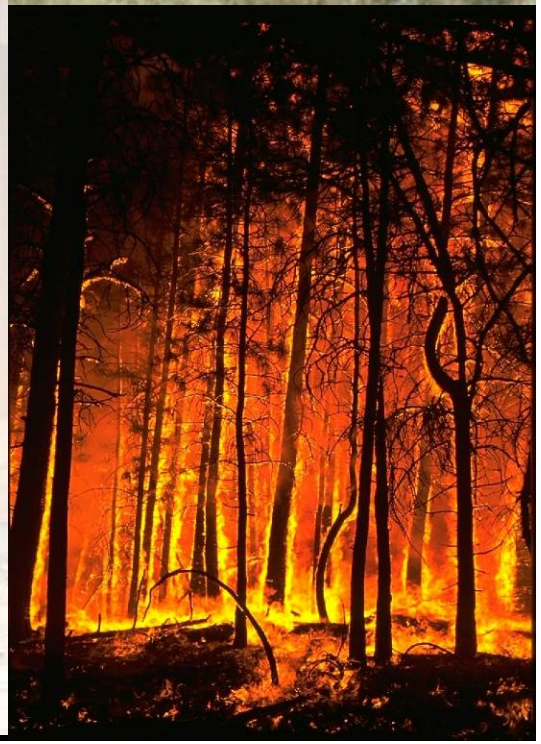
May 2, 2006

Forest Fuels Reductions

This

Or

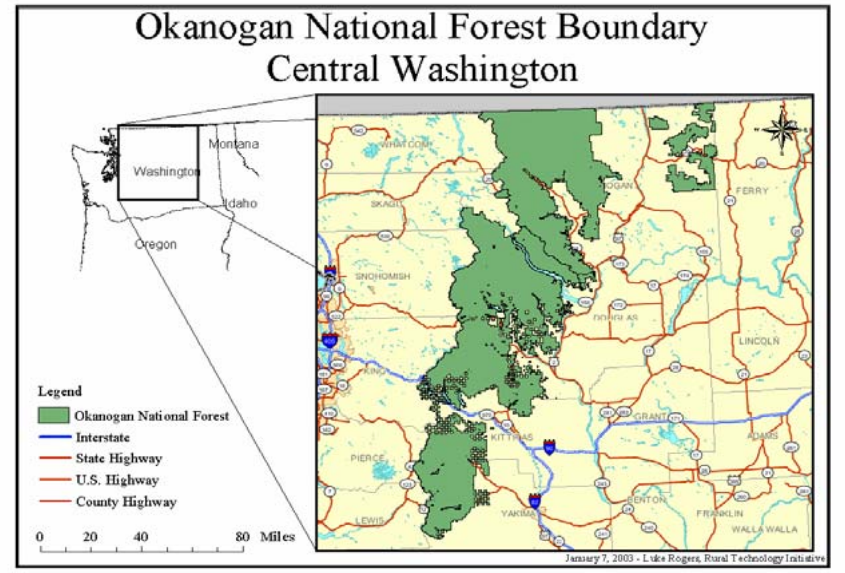
This



- **Okanogan National Forest - WA**

•586,323 acres

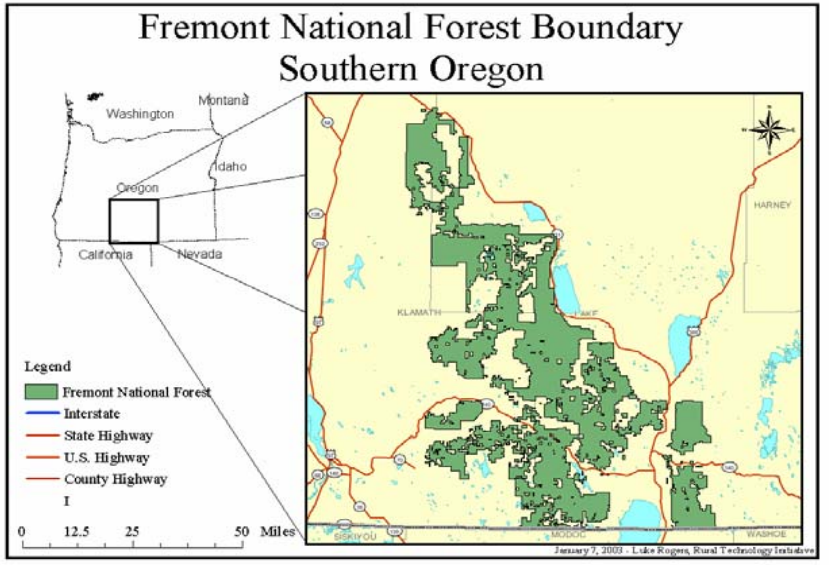
•Moderate to High Risk of Crown Fire (77%)



- **Fremont National Forest - OR**

•721,344 acres

•Moderate to High Risk of Crown Fire (78%)

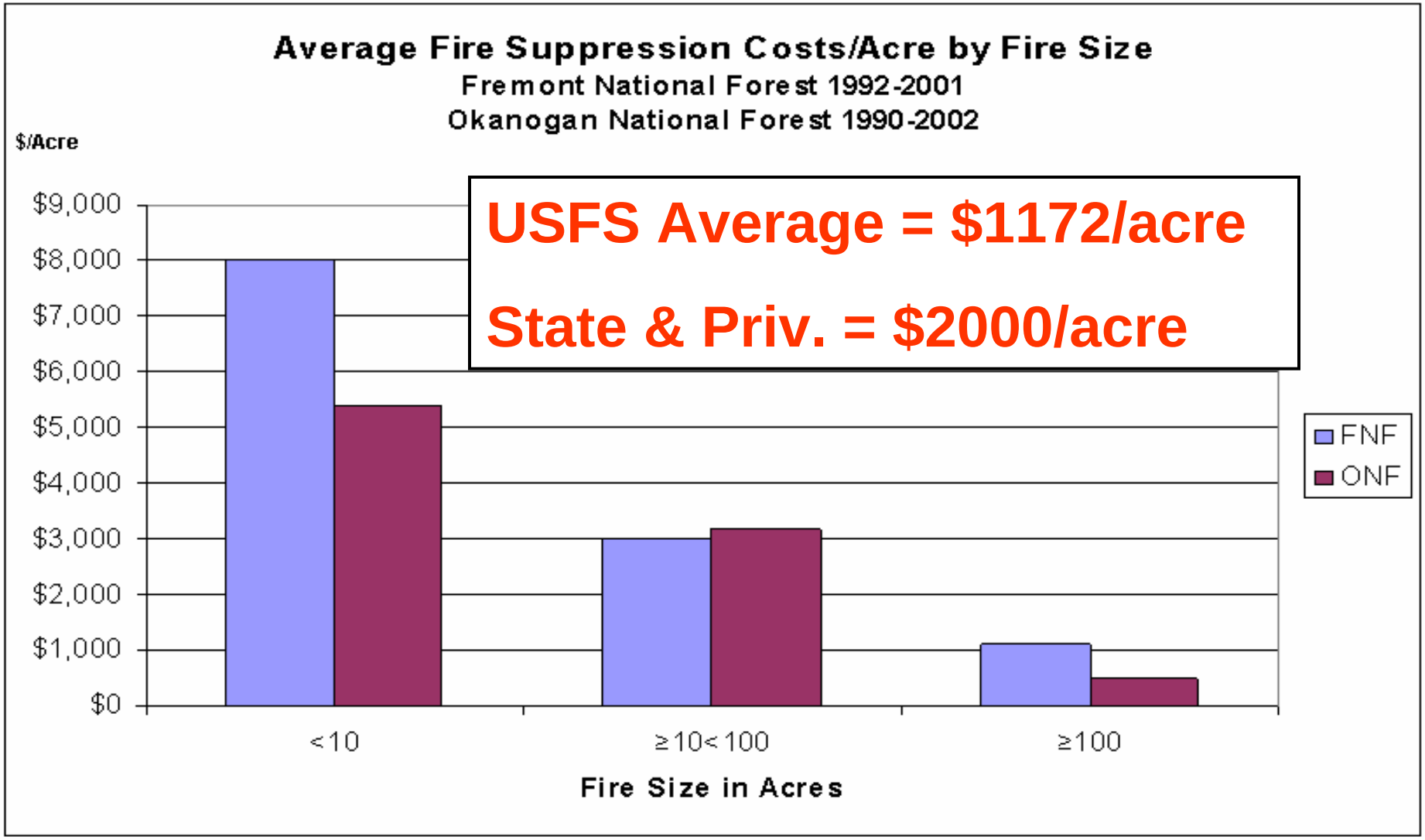


The Rhetorical Problem

Small Diameter Fuels Removals are costly; the market value less than the cost.

However!!

There are many values other than net log returns that should be considered…


Average Fire Suppression Costs/Acre by Fire Size
Fremont National Forest 1992-2001
Okanogan National Forest 1990-2002
$/Acre
$9,000
$8,000
$7,000
$6,000
$5,000
$4,000
$3,000
$2,000
$1,000
$0
<10
≥10< 100
≥100
Fire Size in Acres
FNF
ONF
USFS Average = $1172/acre
State & Priv. = $2000/acre


Fire fighting is expensive and dangerous

Non-market valuation of avoided costs

$$V_0 = \frac{V_n}{(1+i)^n}$$

Where:

V_0 = present value at time 0

V_n = future value after n periods (years)

i = interest rate

n = number of periods (years)

Parametric Present Value Estimations of Fire Risk Costs with Assumptions of $1000/acre to Fight Fire and 5% as the Discount Rate.

For this Exercise Assume all High Risk acres burn in 30 years (15 year midpoint) and all Moderate Risk acres burn in 60 years (30 year midpoint).

Year	5	10	15	20	25	30	35	40	45	50	55	60
Method 1. Present cost/ac of a forest fire at specified future year	$784	$614	$481	$377	$295	$231	$181	$142	$111	$87	$68	$54

Other important values can easily be estimated

Timber losses from fire in high and moderate risk areas on the FNF and ONF average $1605/acre.

Treatment Benefits	Present Value per acre	
	High Risk	Moderate Risk
Fire fighting costs avoided	$481	$231
Fatalities avoided	$ 10	$ 5
Facility losses avoided	$150	$ 72
Timber losses avoided	$772	$371
Regeneration and rehabilitation costs avoided	$120	$ 58
Community value of fire risk reduction	$ 63	$ 63
Regional economic benefits	$386	$386
Total Benefits	$1,982+	$1,186+

Treatment costs		
Operational costs	($374)	($374)
Forest Service contract preparation costs	($206)	($206)
Total Costs	($580)	($580)

Positive Net Benefits from Fuel Removals	**$1,402+**	**$606+**

How do we value habitats lost to forest fires?

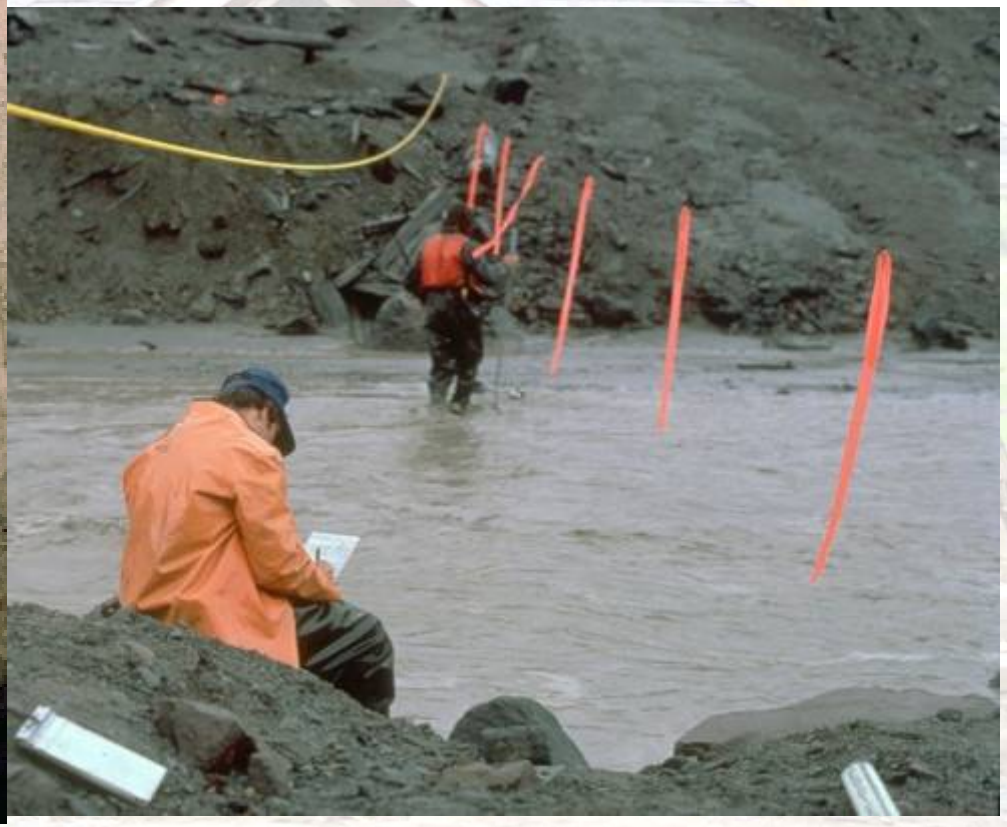
What is the cost of carbon and other pollutants released to the atmosphere?

What value should we place on impacts from Erosion? Sediment? and Debris flows?

North Fork Boise Wildfire,
Boise National Forest

Source: George Ice and Jeff Amoss

The most precious and irreplaceable resources at risk are the soil and water.




Millions of acres of forest need thinning but $25-50/GT?


Mill Residuals are the most cost effective biomass
$0 -$16/GT Delivered

Municipal wood waste, yard clippings, and paper
2.5 lbs/person/day : $10/GT.

Biomass Cost

There's biomass & there's *biomass*

Cost per green ton

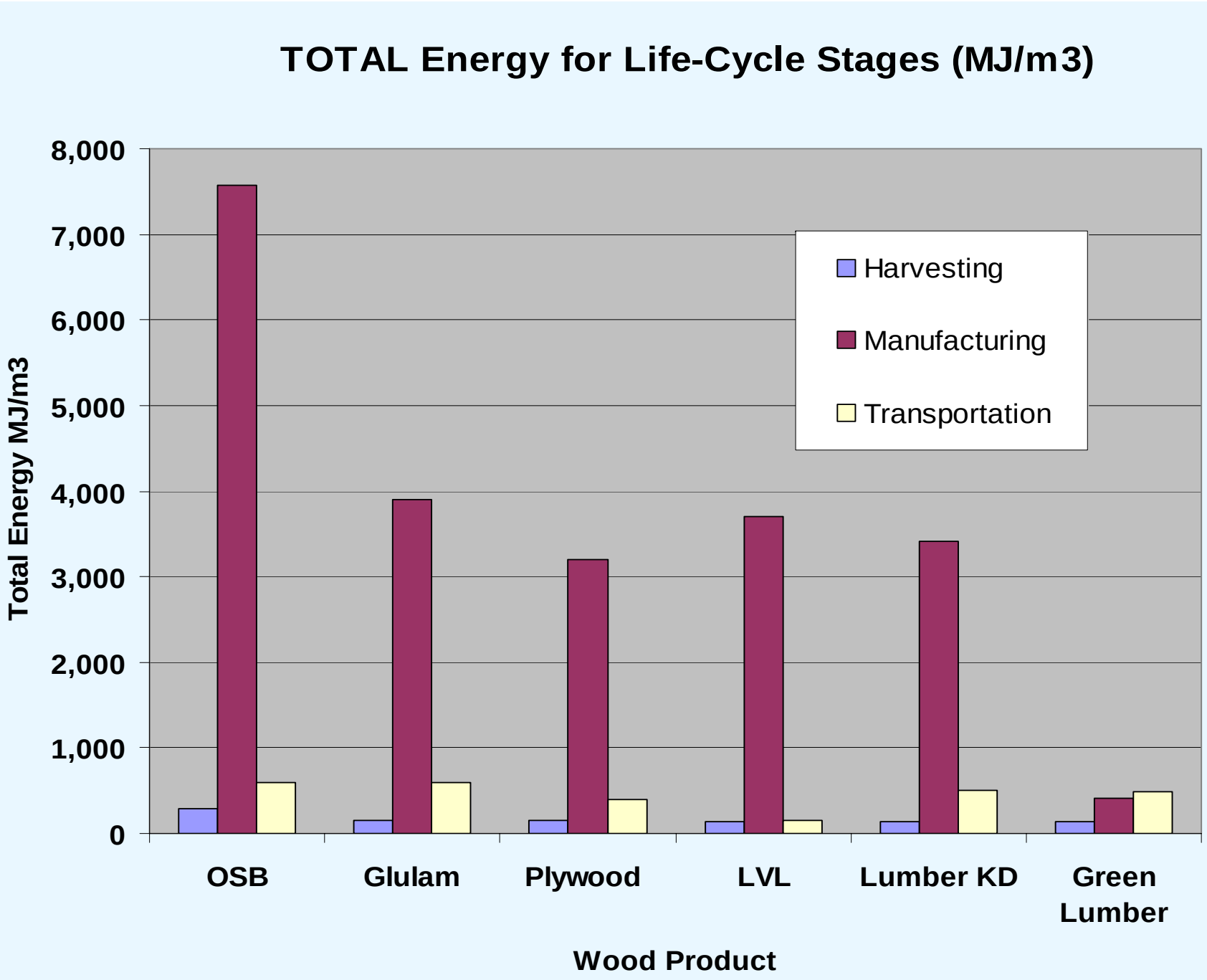
- ***High fire risk to low: $25-50 (worst case?)***
- ***Muni waste close to boiler: $10***
- ***Mill waste next to boiler: $0 to (+ or -)***
- ***Treatment net of avoided social costs: -$140 High risk stands***
- ***Treatment net of avoided social costs: -$60 Mod. risk stands***
- **Ave. avoided social costs: -$90**
- **With social costs you could furnish any facility**

Why not consider long lived products?

Does wood used for structural materials save more energy -- or carbon emissions?

Emissions is the real objective!

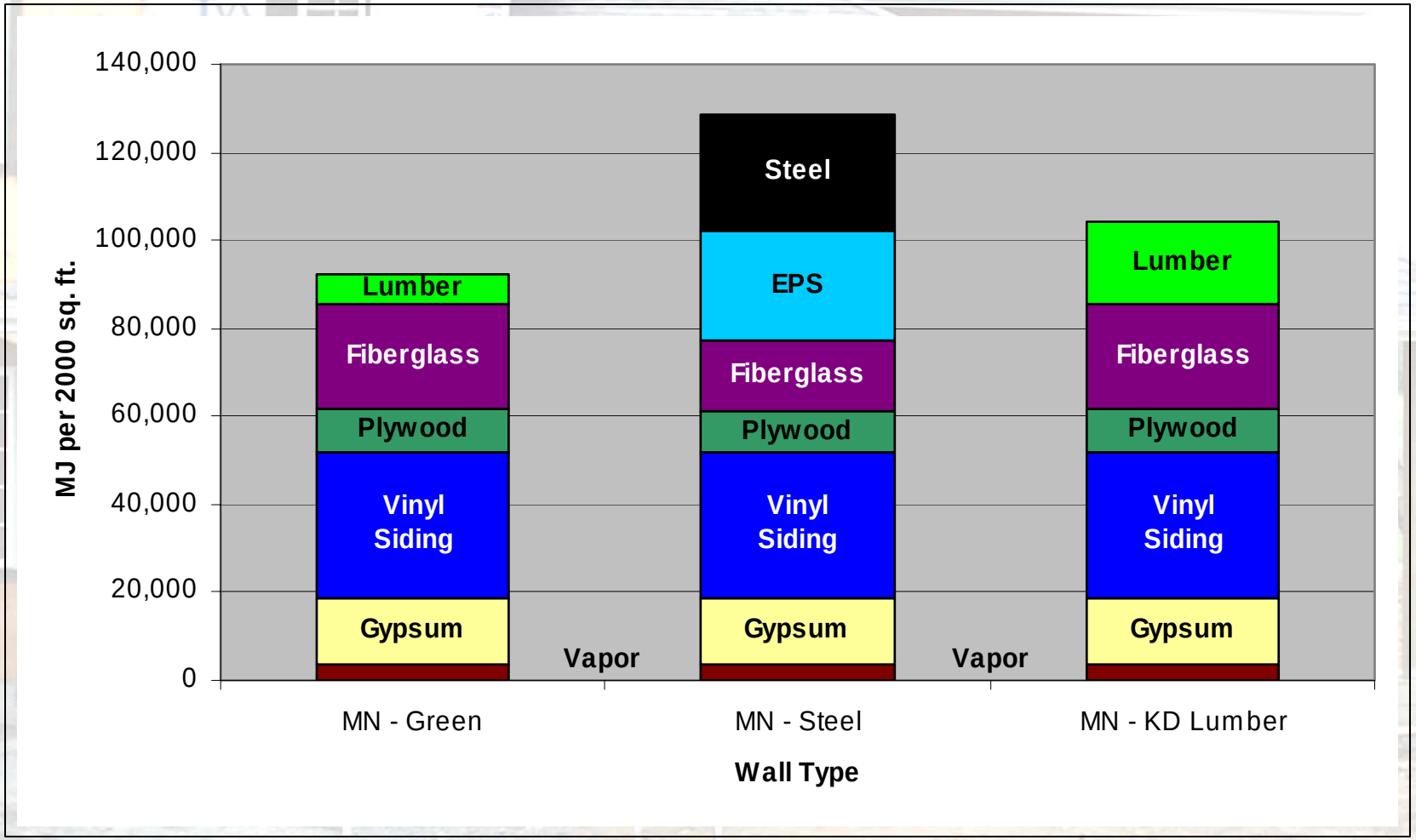
Look at the CORRIM research findings:


TOTAL Energy for Life-Cycle Stages (MJ/m3)
Total Energy MJ/m3
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Harvesting
Manufacturing
Transportation
OSB
Glulam
Plywood
LVL
Lumber KD
Green Lumber
Wood Product

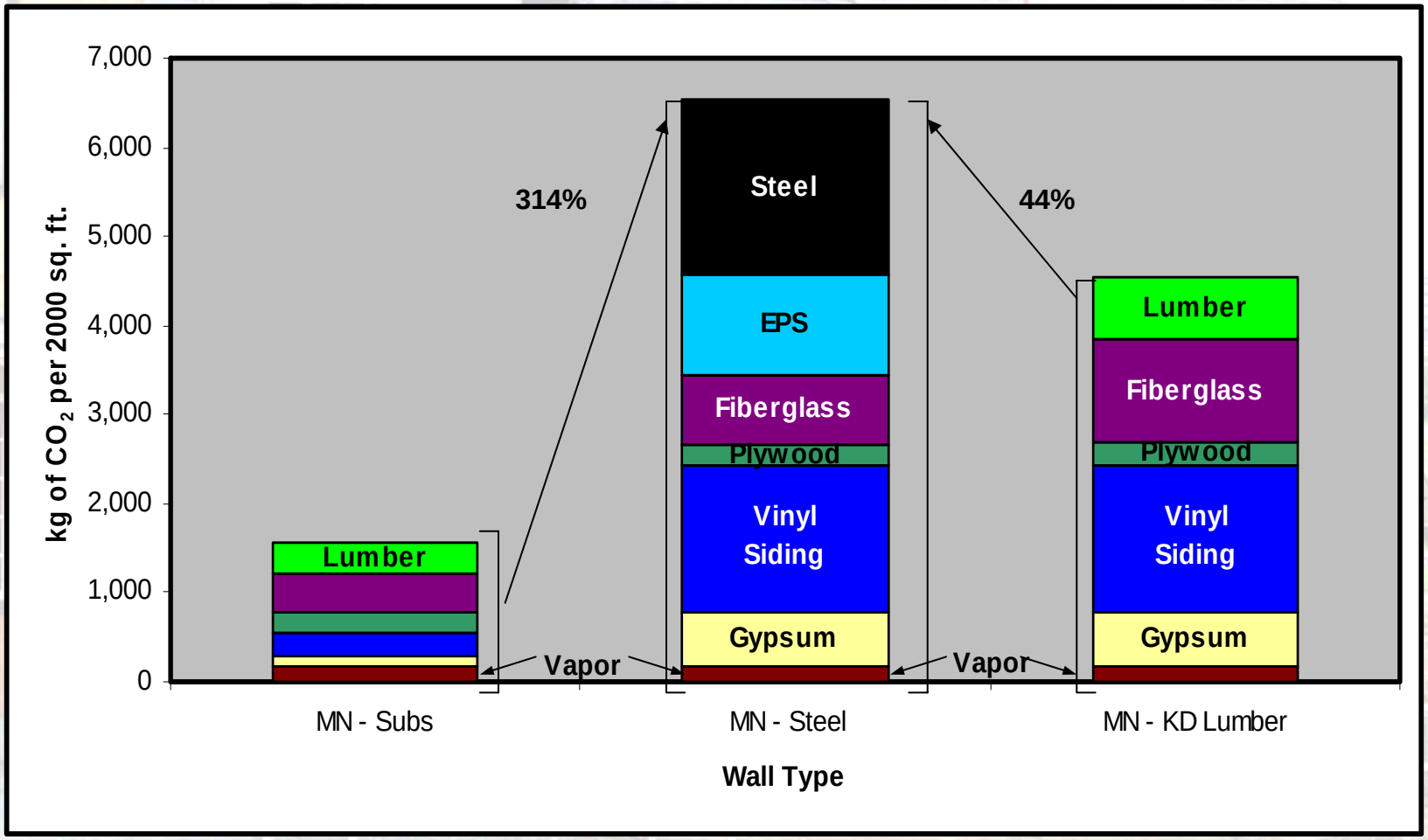
Process Fuels from Biomass

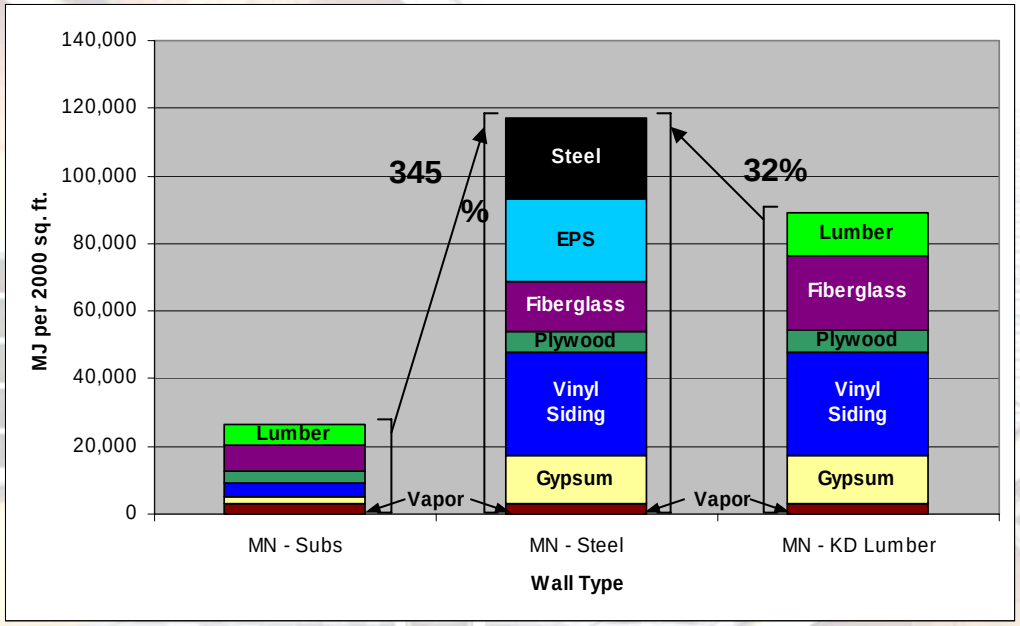
Wood Product	PNW	SE
OSB	N/S	74%
Glulam	58%	56%
Plywood	61%	62%
LVL	53%	50%
Lumber	58%	100%
Average	58%	69%

Total energy for cold climate exterior walls (Minneapolis)



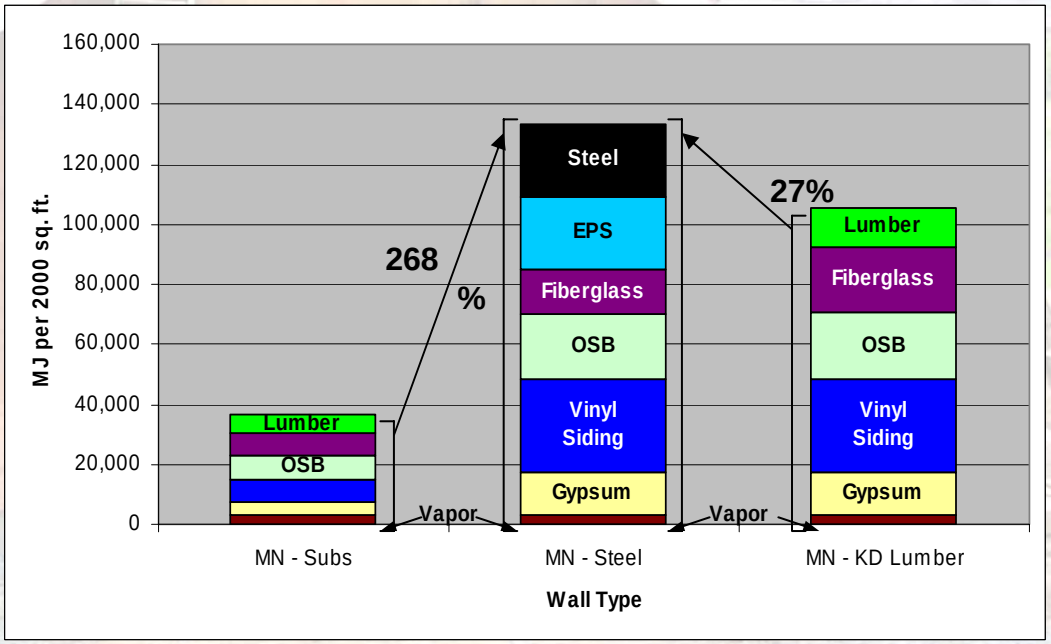
Minneapolis Walls: GWP per component



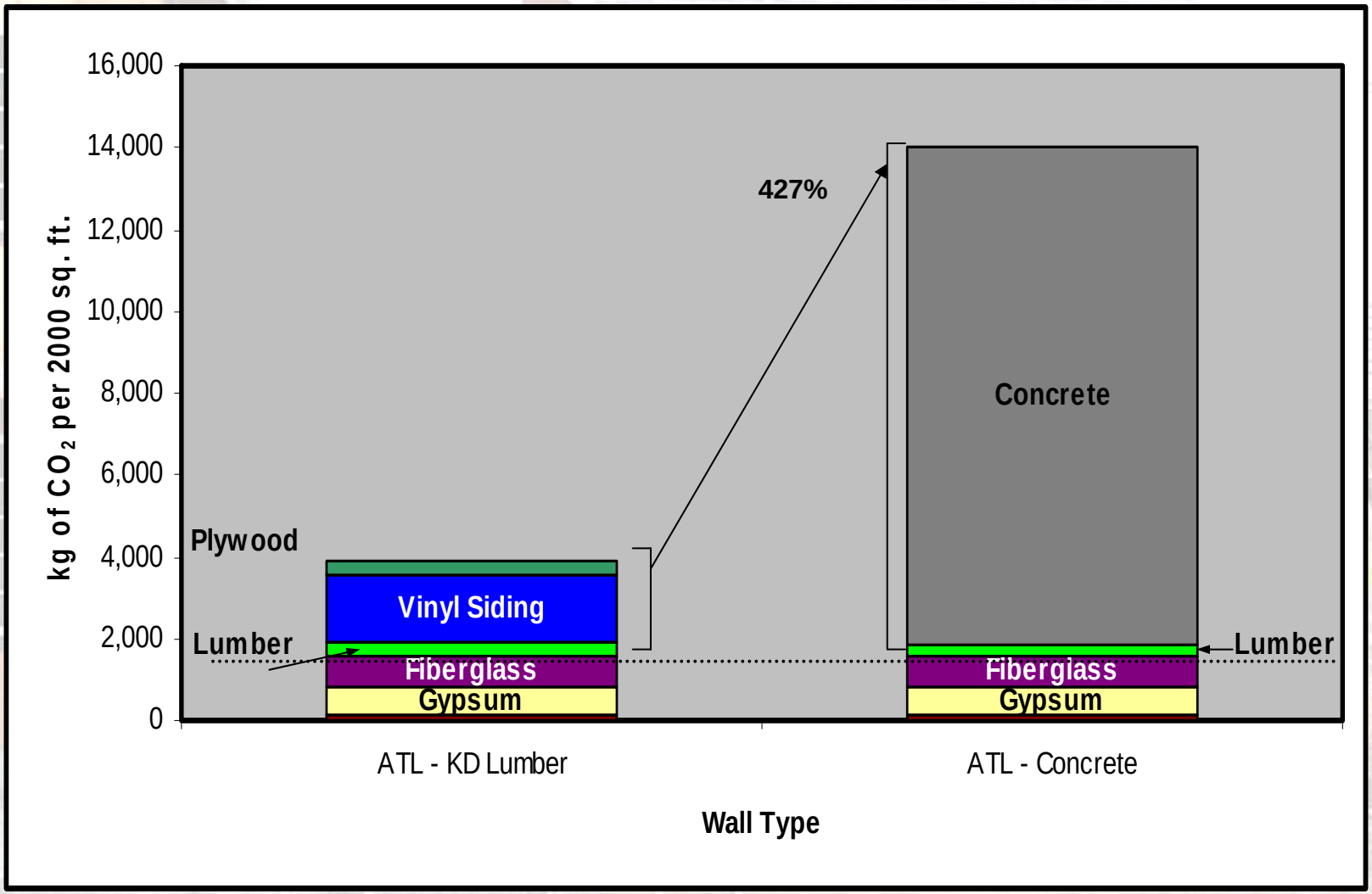


Plywood versus OSB

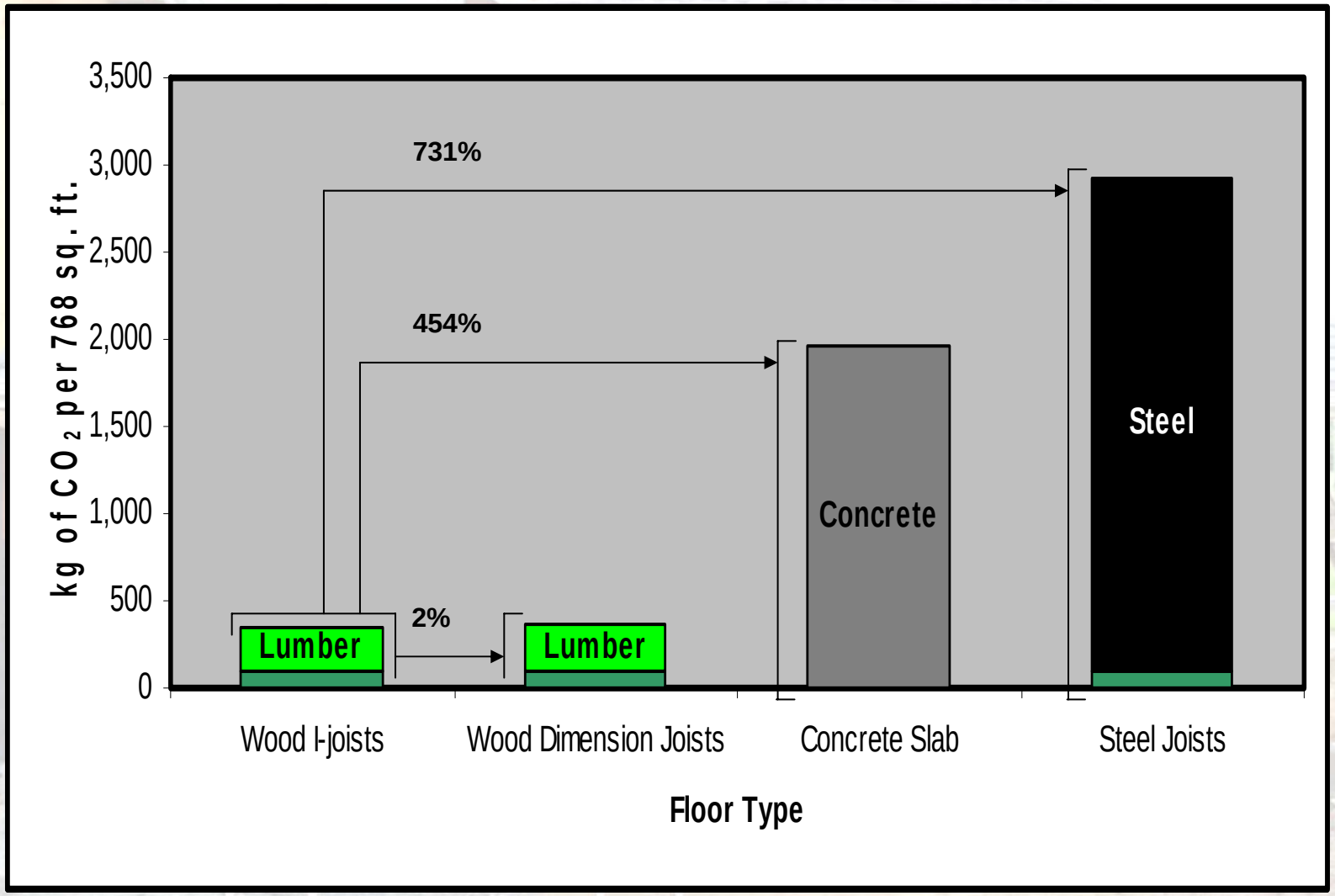
- OSB sheathed KD-wood wall uses about 18% more fossil energy than the comparable plywood sheathed KD-wood wall (based on 2000 square foot wall)



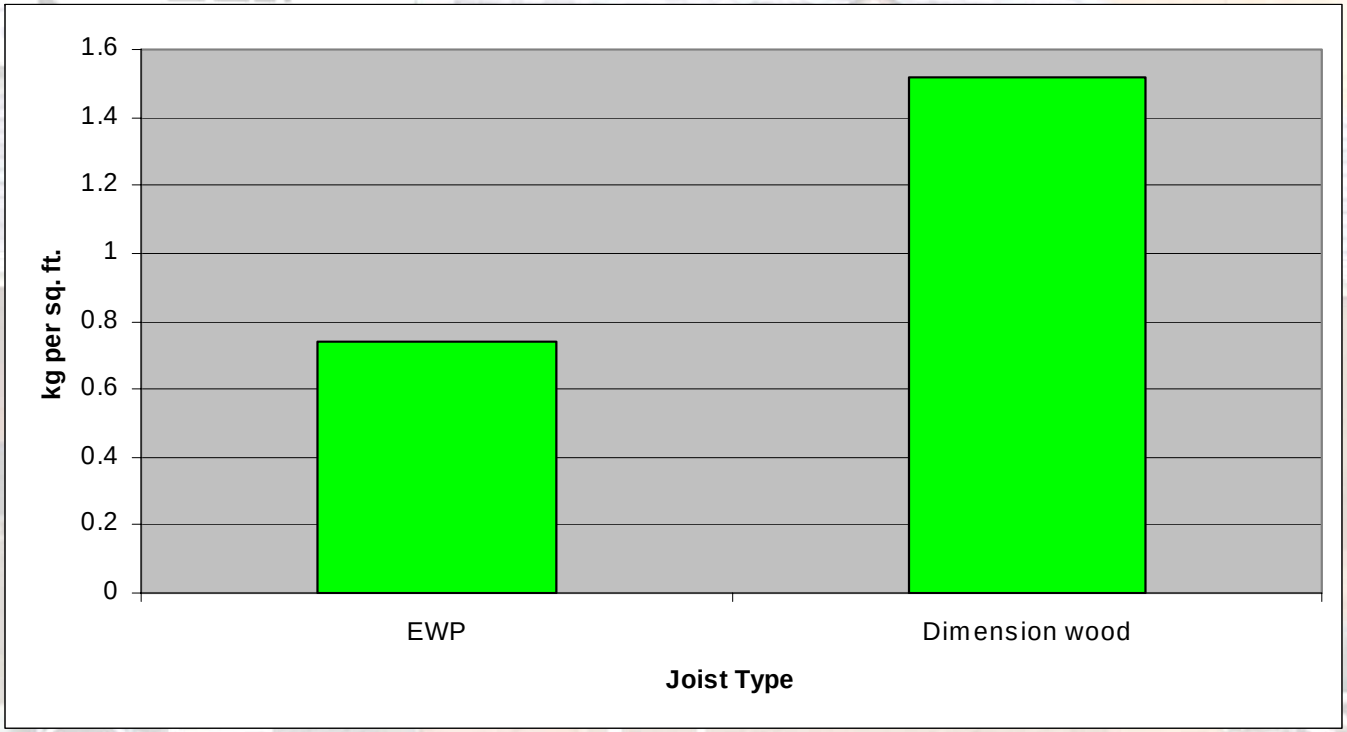
Atlanta Walls: GWP per component



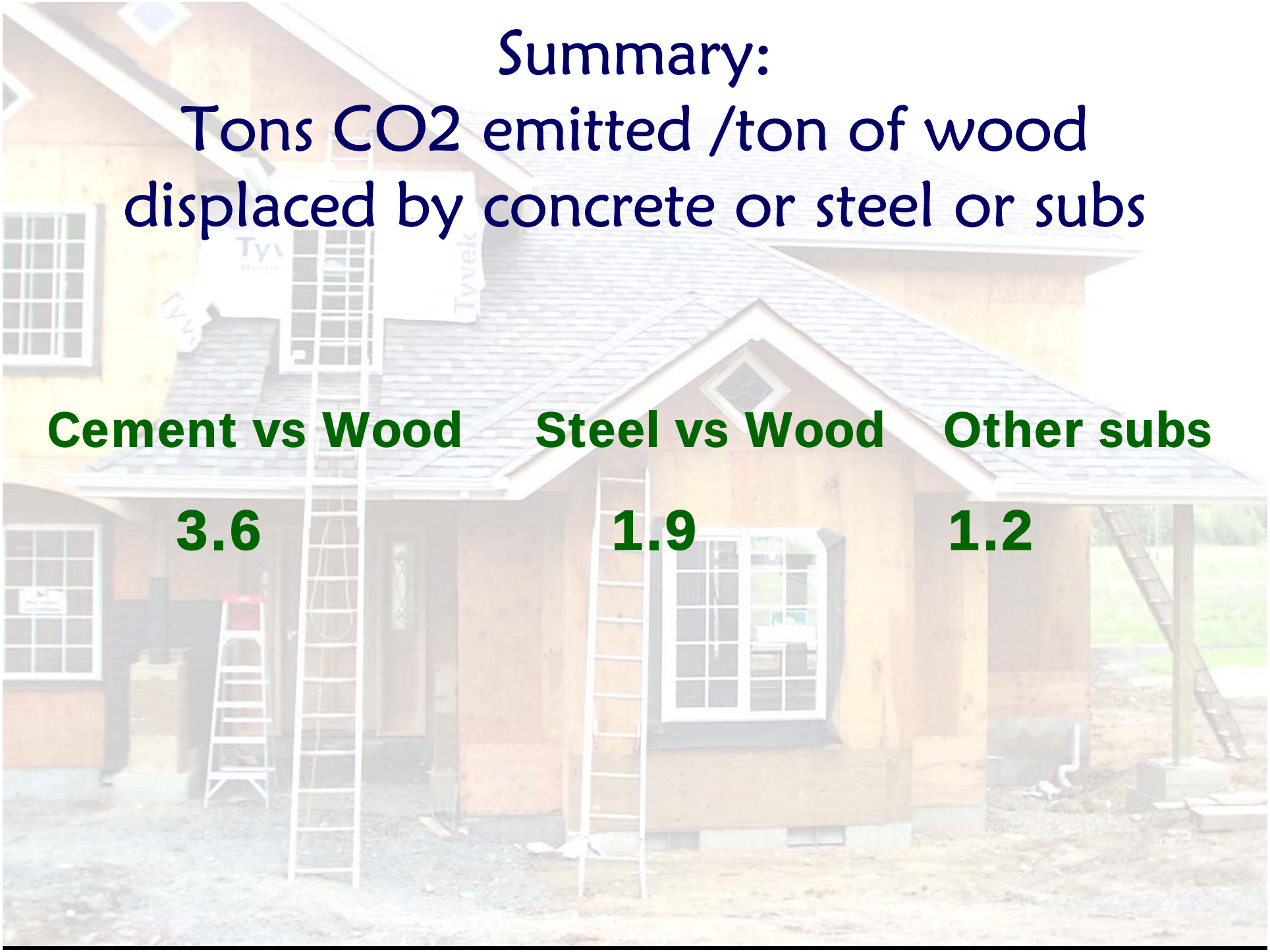
Floors: GWP per component



Resource use for wood floors



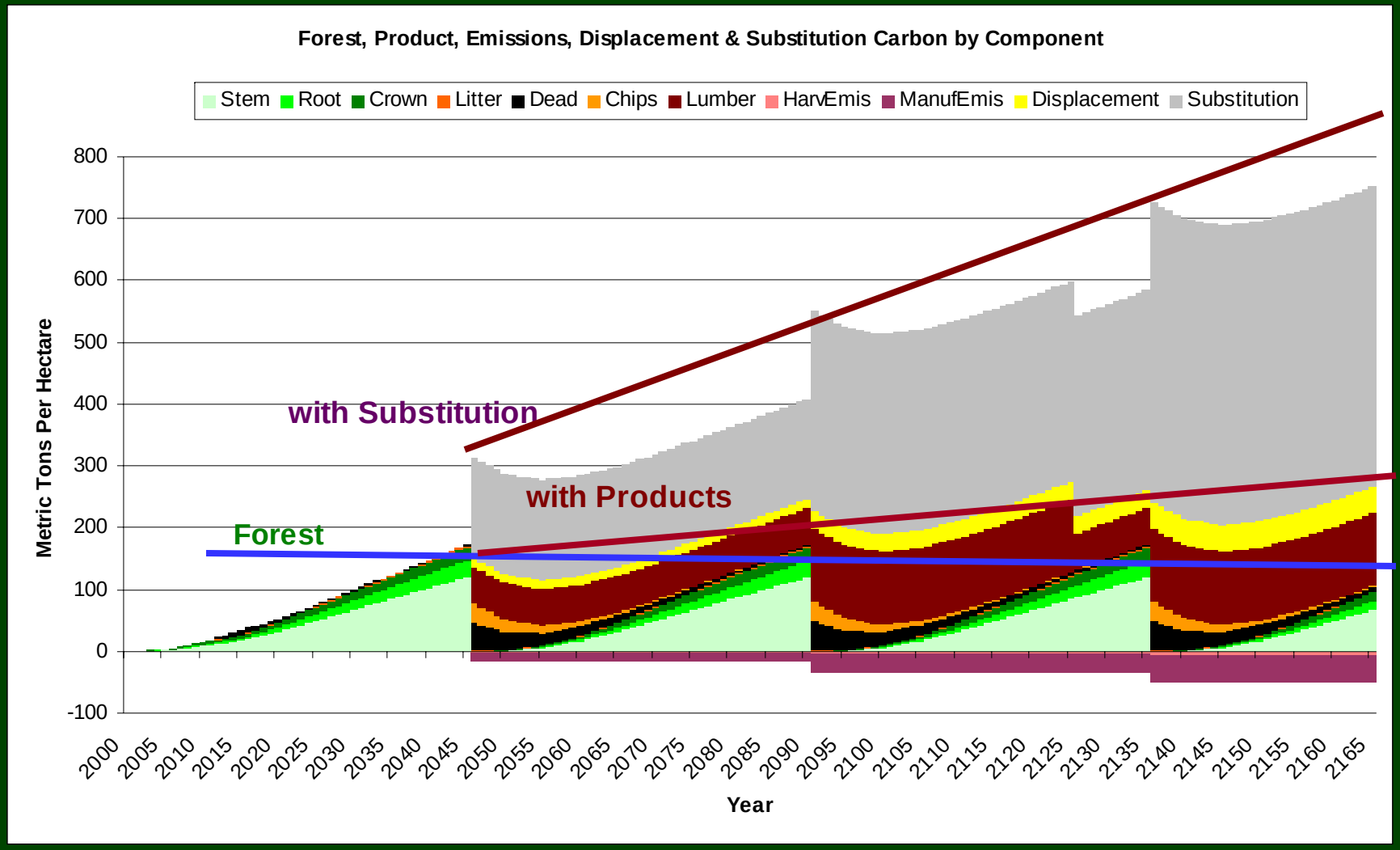
Dimension lumber joists use 105% more fiber mass than the I-joist that benefits from stiffness and the reduced waste that results from cut to length procurement.



Summary:
Tons CO_2 emitted /ton of wood displaced by concrete or steel or subs

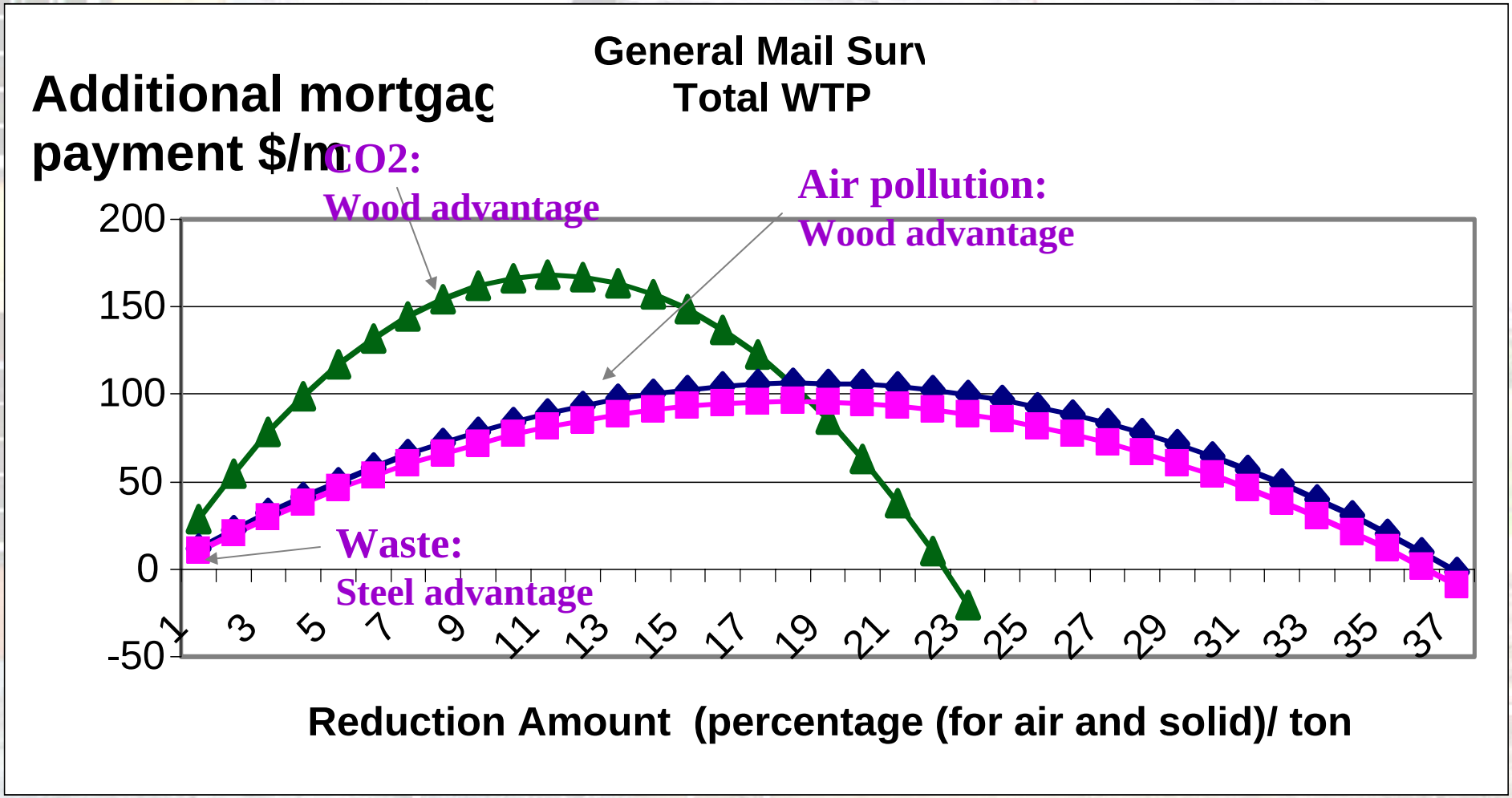
Cement vs Wood	Steel vs Wood	Other subs
3.6	1.9	1.2

Forest, Product and Substitution Pools



WTP for reduced emissions in a home purchase:

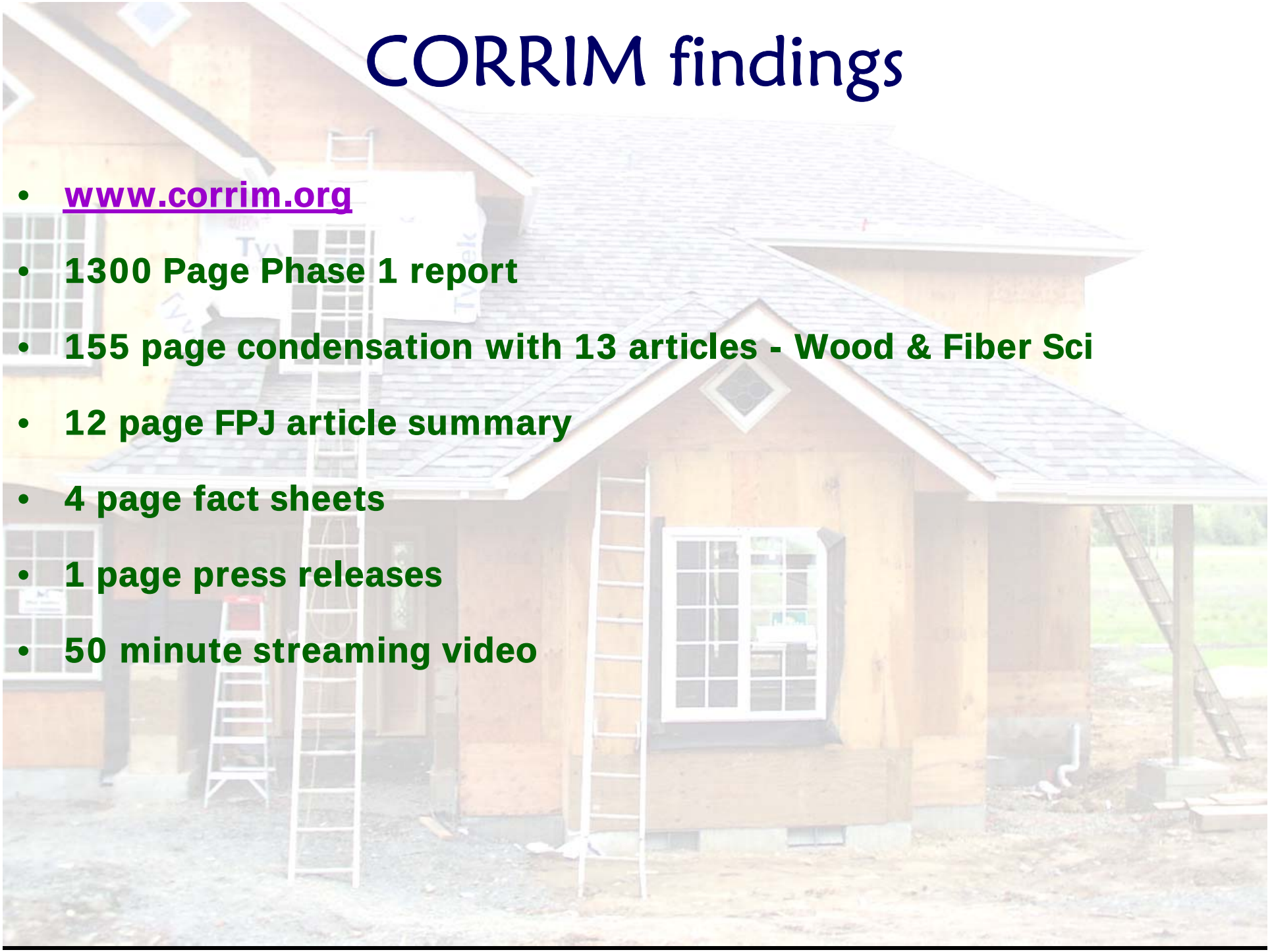
Comparing wood vs. steel frame



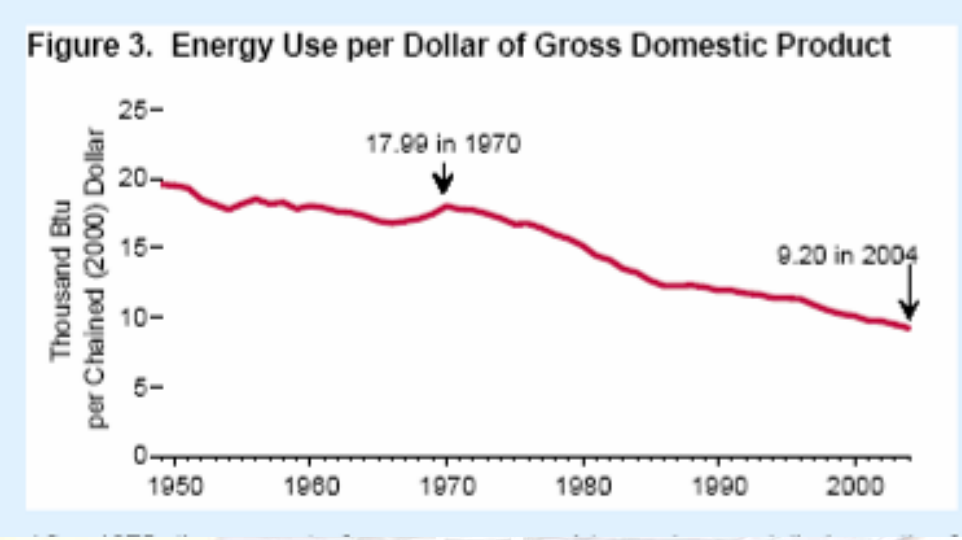
Conclusions

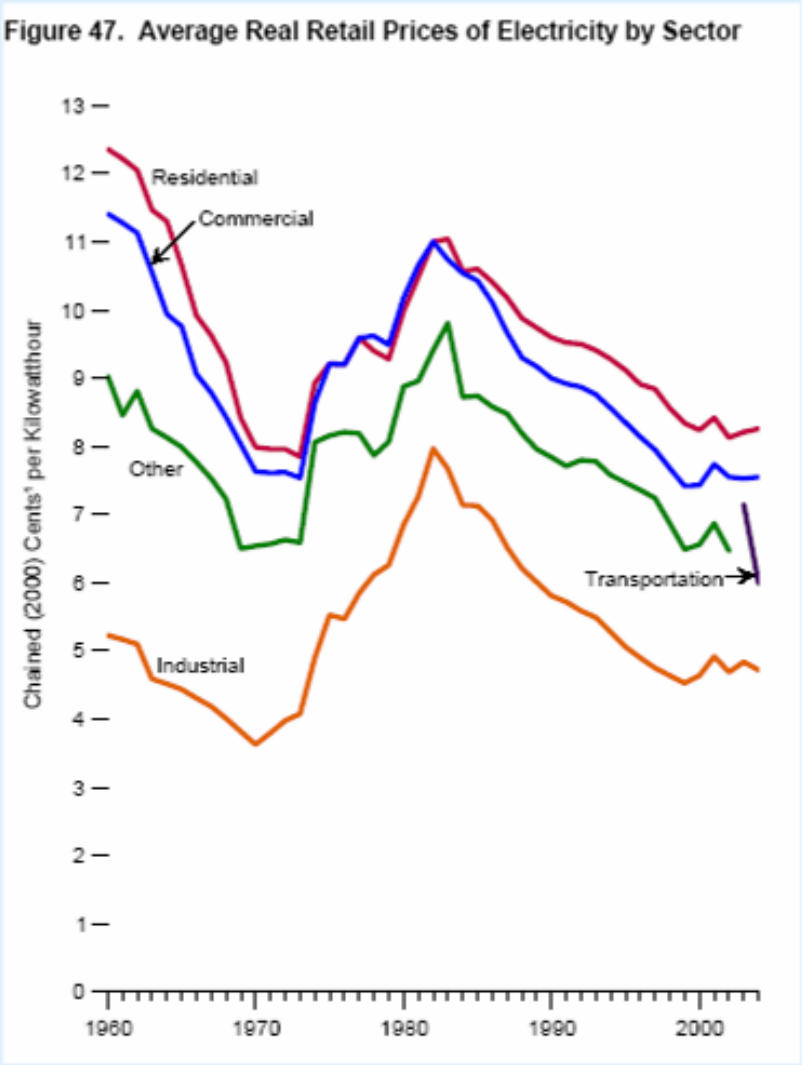
- **Wood used in long term structural products provides the greatest reduction in fossil fuel use & emissions.**
  - **And can still be used as biofuel at end of life**
- **If avoided costs are used to incentivize biomass flow, long lived products would save more energy than bio-energy conversion.**
  - **Incentivizing only bioenergy can be counterproductive**
- **Biomass used in existing mills can be quite efficient with no delivery efficiency loss.**
- **Substituting wood fiber for other materials has less leverage and may fall below biomass to energy conversions off site even though lowering the the emissions from construction substantially.**
- **The environmental benefits of wood products is less well understood than that of energy -- non-mkt values (like avoided costs) are not in the market**
- **NEPA no-action alternatives create huge costs vs the usual no cost or low cost assumption**
- **Ignoring the environmental benefits of wood products also creates environmental costs**

CORRIM findings



- www.corrim.org
- 1300 Page Phase 1 report
- 155 page condensation with 13 articles - Wood & Fiber Sci
- 12 page FPJ article summary
- 4 page fact sheets
- 1 page press releases
- 50 minute streaming video





Energy is abundant and cheap. But consumer prices do not reflect unseen real costs of pollution, climate change, health care, and others.

Energy Information Administration/Annual Energy Outlook 2004

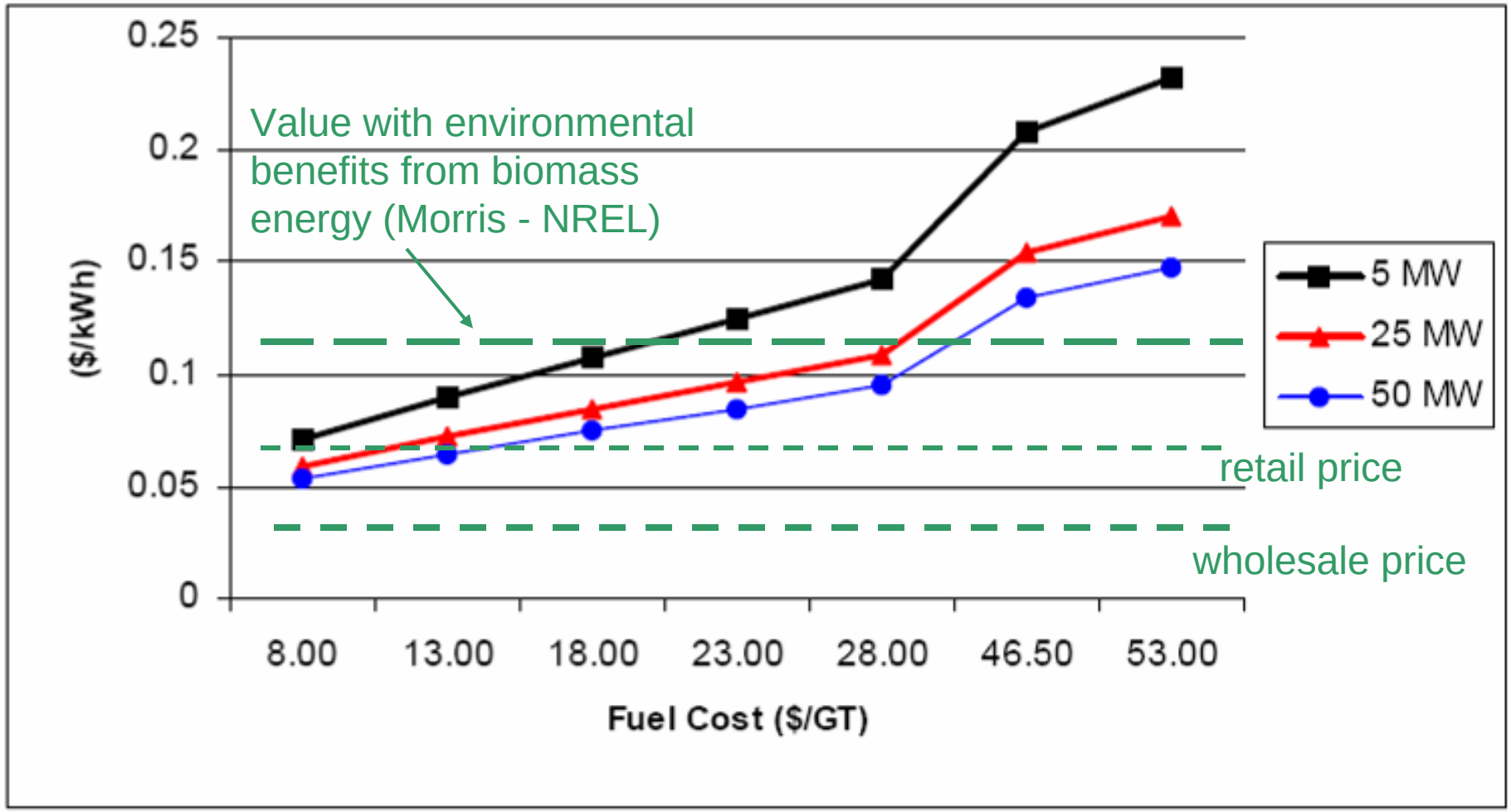
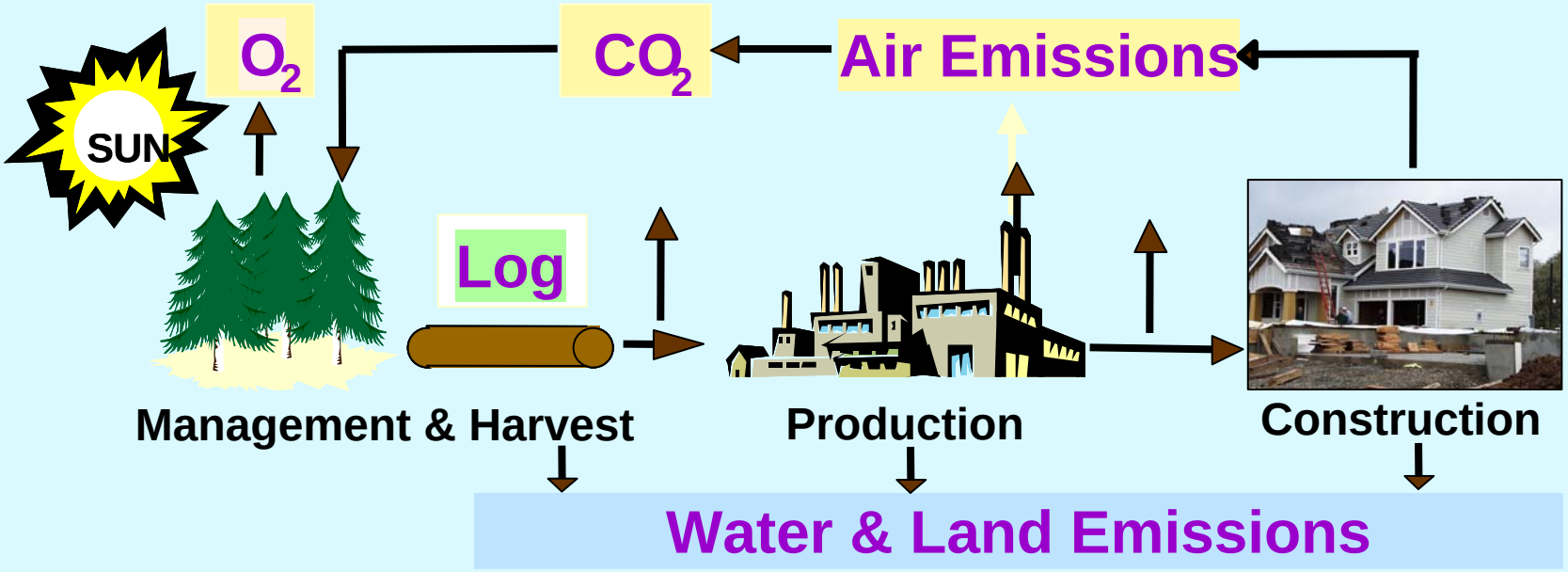
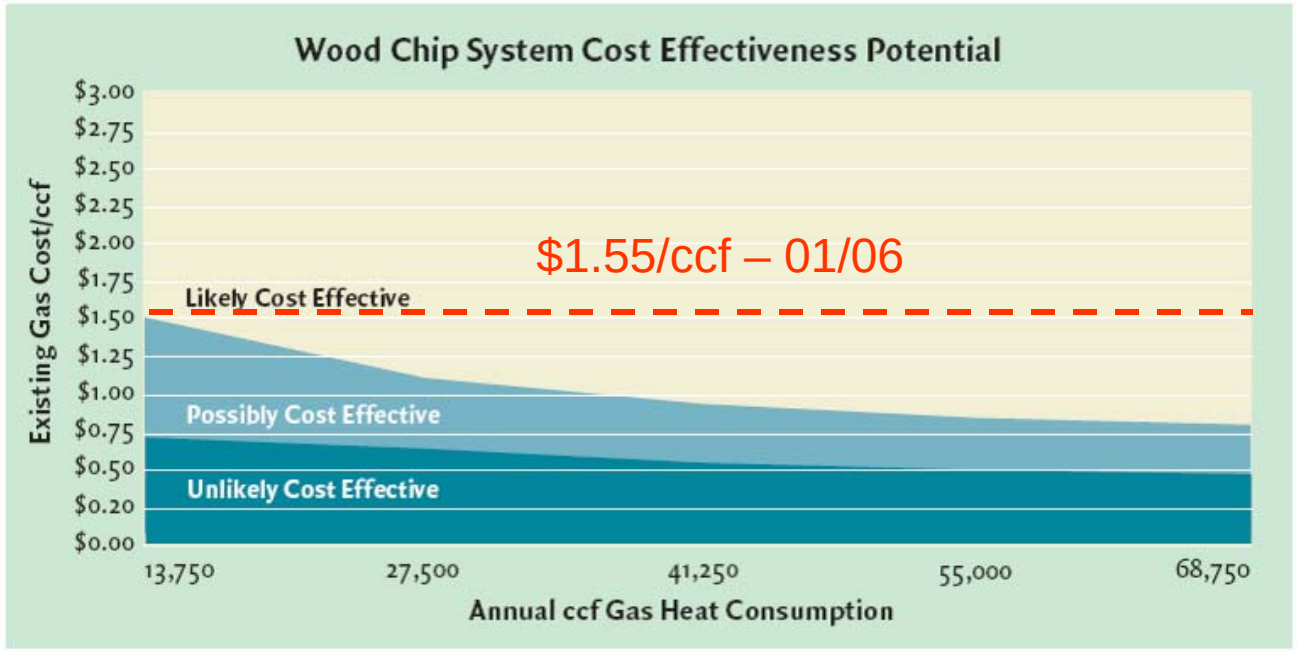


Figure ES-7. Impact of biomass fuel cost on cost of energy

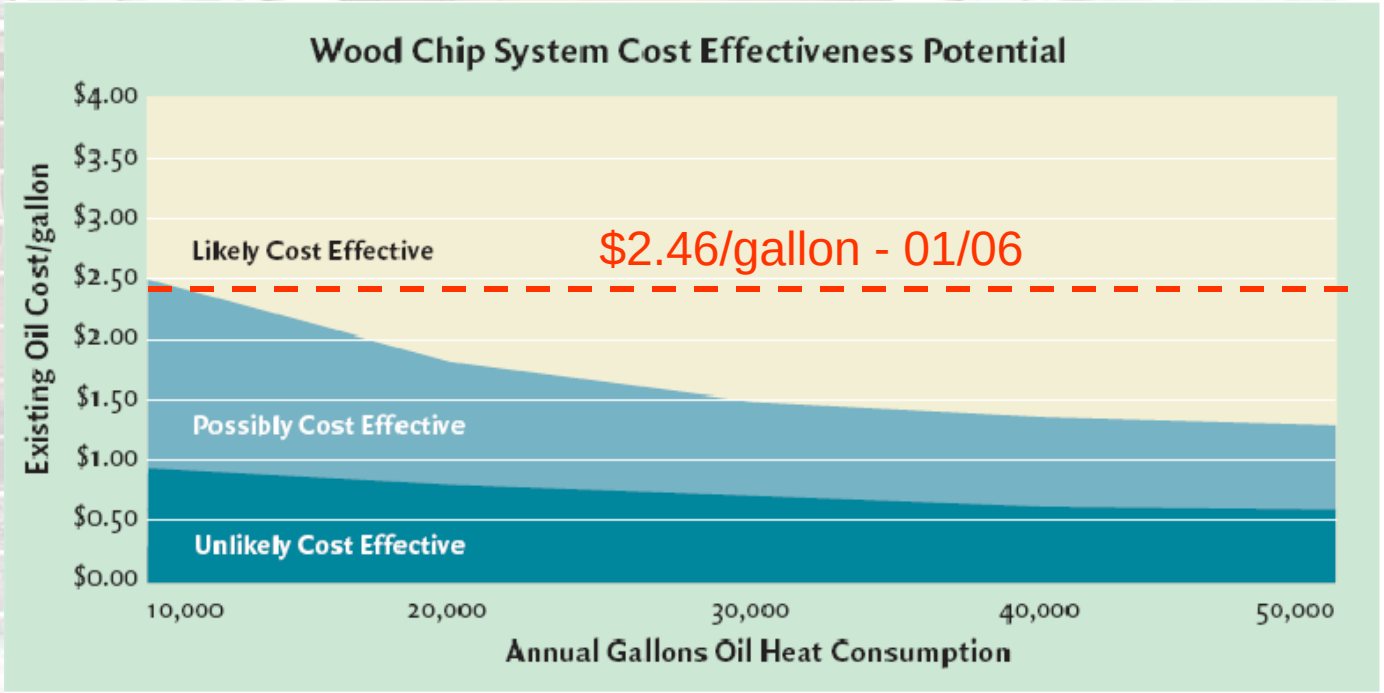
McNeil Technologies, Inc. 2003. Biomass Resource Assessment and Utilization Options for Three Counties in Eastern Oregon

Life Cycle Inventories & Assessment of Wood Products & Buildings





Wood cost assumption
$25-30/green ton



Source: Wood-Chip Heating Systems

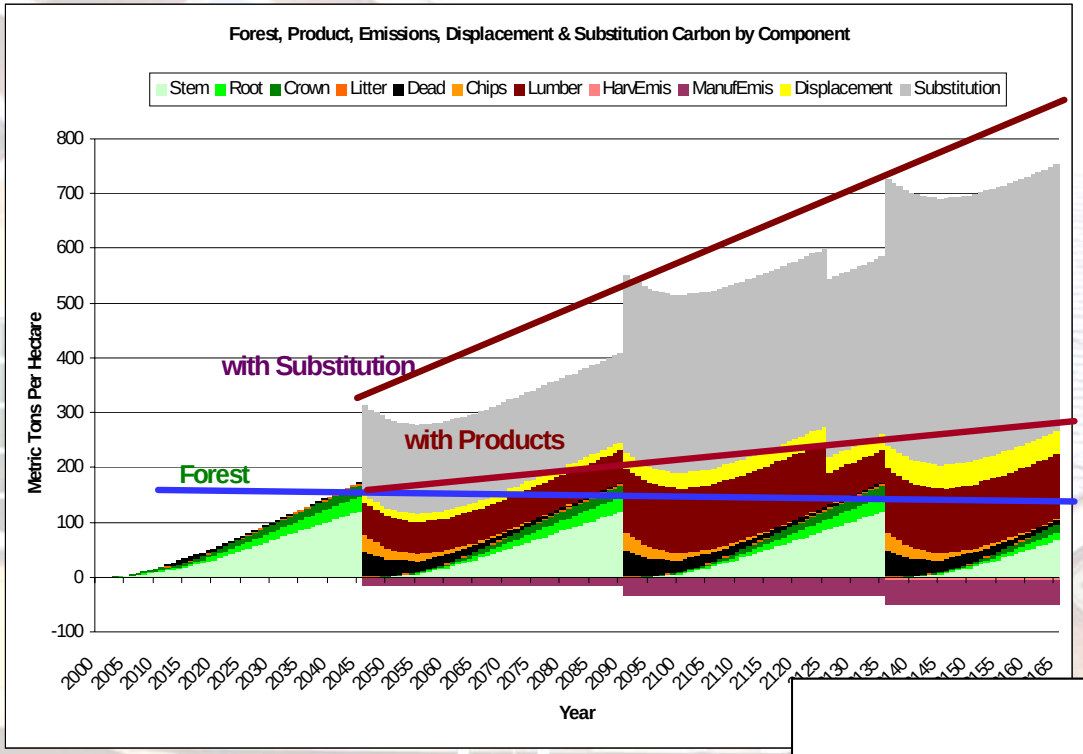


Figure 1. Carbon pools in a Pacific Northwest Forest, in products & energy displacement, and fossil intensive substitutes with 45 year rotation simulations

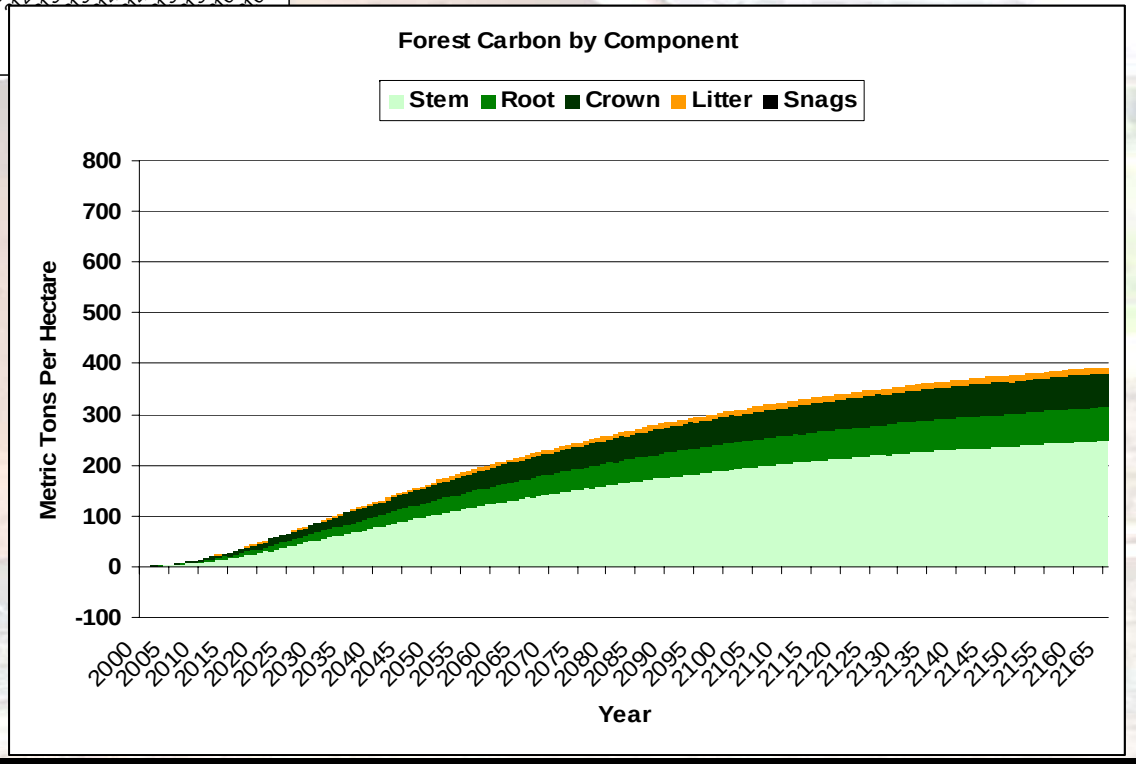


Figure 2. Carbon pools in a Pacific Northwest Forest, for stem, roots, crown, litter, and dead wood with no harvest.

CORRIM