NET AIR EMISSIONS REDUCTION DUE TO FOREST BIOMASS DIVERSION TO AN EXISTING BIOMASS POWER FACILITY

Pacific West Biomass Conference

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Presentation Overview

- Background
- Challenges and Opportunities
- Biomass Recovery Methodology
- Air Emissions Tracking
- Results
- Observations

Challenges and Opportunities

Challenges

- Century of successful fire suppression activities have allowed forest conditions in the West to deteriorate.
- Wildfire scale and intensity have grown significantly in the last two decades.
- Impacts to watersheds, habitat, and local economies are severe.
- Cost to treat forest fuels are high.
- Very limited markets for biomass material.
- State and federal $ for fuels treatment are of limited scope and duration.

Opportunities

- Alternative markets for biomass material are developing.
- Collection, processing and transport methodologies are more efficient.
- Renewable portfolio standards are in place providing markets for biomass power.
- Short term – federal and state incentives for biomass removal (e.g., BCAP).
- Long term – fungible emission reduction credit offsets or GHG reduction credits.

Angora Fire, Lake Tahoe Basin

No treatment prior to fire

Fuel treatment prior to fire

Conventional Biomass Disposal Method - Open Pile Burning

Alternative Fate – Power Generation

Placer County Air Pollution Control District

- Air quality in Placer County
- Programs:
  - Permitting and inspections of stationary sources
  - Enforcement of Air Pollution Control Regulations
  - Air Monitoring
  - Air Quality Planning – CEQA & Attainment
  - Clean Air Grants and Incentive Programs
  - Air Toxics
  - **Manage Open Burning -- Agricultural/Forestry**

Study Objectives

- Compare net air impacts of biomass combustion - open pile burning and controlled combustion at an existing biomass power generation facility.

- Confirm costs to collect, harvest and transport biomass material from the forest to an existing biomass power generation facility.

Alternative Fate – Recovery and Utilization

Project Location

Air Emissions Sources Tracked - Collection, Processing, Transport & Power Generation

- Diesel engines on grinder and loaders.
- Diesel engines on chip van transports.
- Dust from grinding operation.
- Dust from vehicle travel on dirt roads.
- Biomass-to-energy plant.

Air Emissions Tracking
Collection, Processing & Transport

EQUIPMENT	VENDOR/MODEL/YEAR	ENGINE	FUEL USAGE
Horizontal Grinder	Bandit Beast - 2008	Caterpillar 3680	30 gallons/hour
Excavator Loader	Linkbelt Model 290 - 2003	Isuzu	5 gallons/hour
Excavator Loader	Linkbelt Model 135 - 2003	Isuzu	2.6 gallons/hour
Truck/Chip Van	Kenworth - 1997	Cummins N14	4.5 miles/gallon
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Truck/Chip Van	Kenworth - 2006	Caterpillar C 13	4.5 miles/gallon
Water Truck (dust control)	Ford Model L9000 - 1995	Detroit Series 60	6 miles/gallon
Truck/Low Bed	Kenworth - 2003	Caterpillar C 15	4.5 miles/gallon
Truck – Crew Transport	Ford F 250 - 2003	7.3 liter Powerstroke	14 miles/gallon
Service Truck	Ford F 350 - 2000	7.3 liter Powerstroke	13 miles/gallon

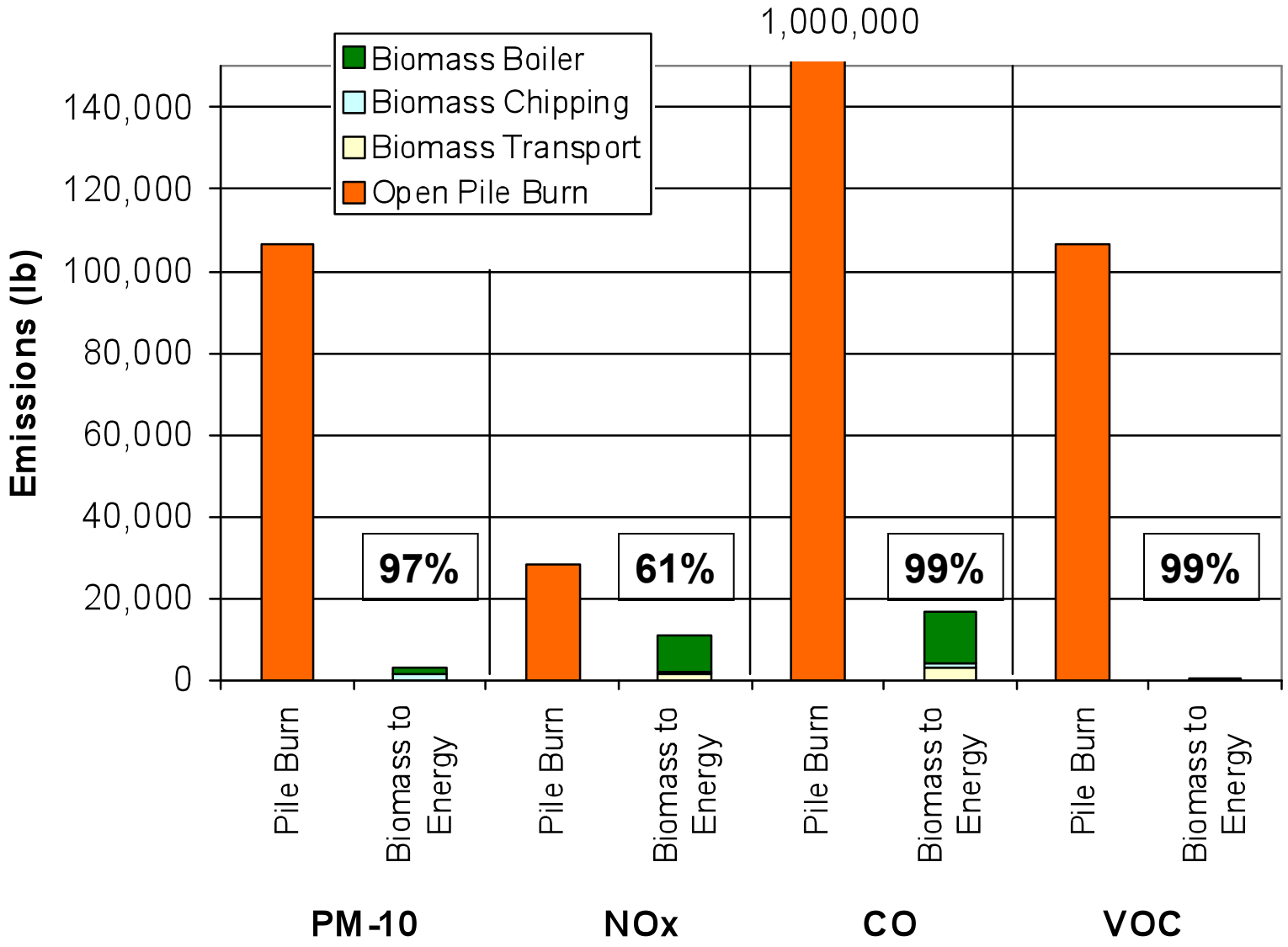
Project Facts & Findings

- Case Study Demonstration Project:
  - Transported 7,089 green tons (4,200 BDT).
  - Biomass fuel characteristics: 9,000 Btu/lb, 40% moisture.
  - 4,652 Mwe generation.
- Economics – approx. $58.50/BDT ($3.25/MMBtu).
  - Working to increase operating efficiency and reduce cost.

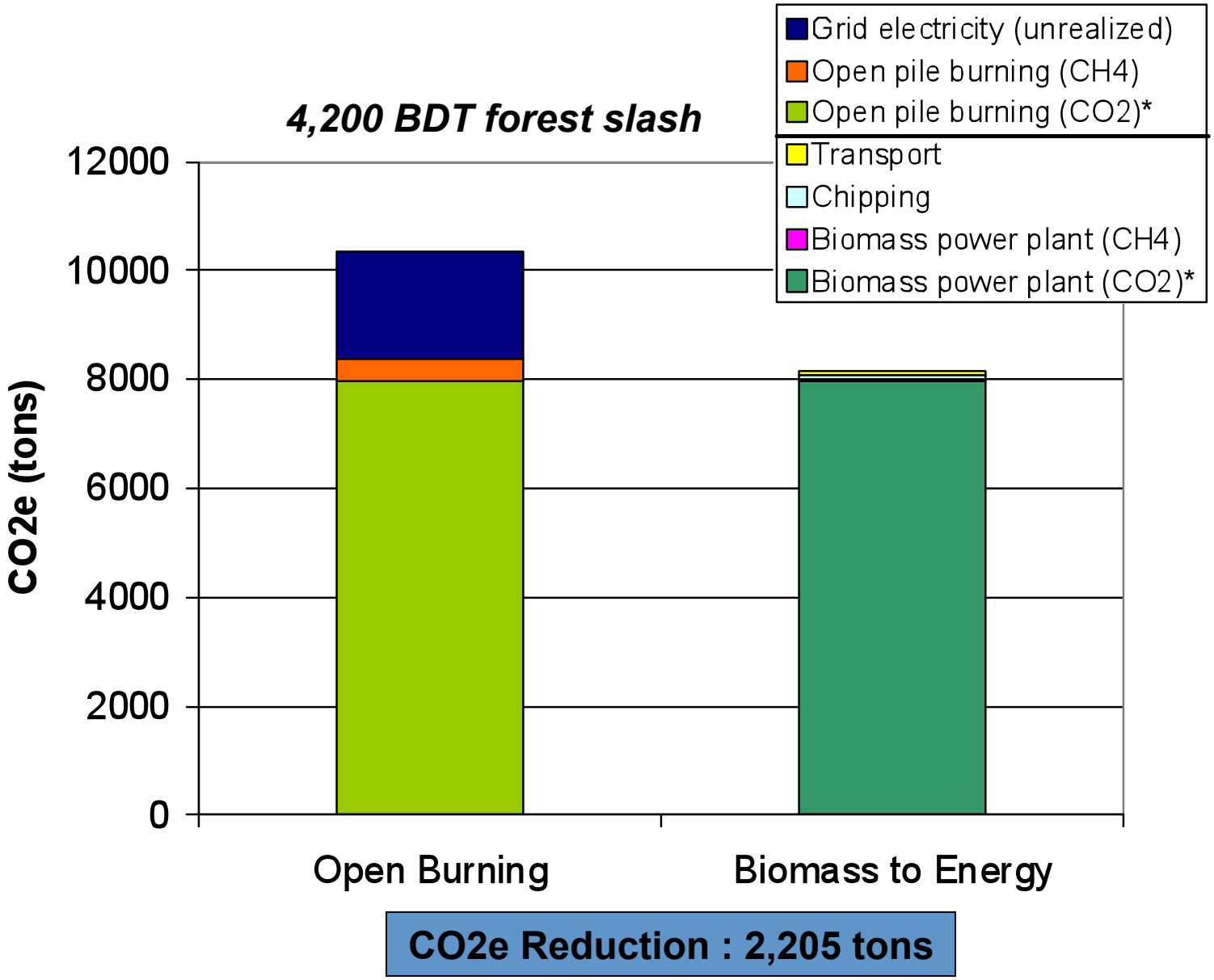
Air Pollutant Emissions Comparison

	PM10	NOx	CO	NMOC
Baseline, Business as Usual				
Open Pile Burn (lb)	106,335	28,356	1,063,350	106,335
Biomass to Energy				
SPI – Lincoln Boiler (lb)	1,338	8,921	12,744	299
Transport (lb)	32	1,335	3,140	39
Chipping (lb)	1,632	829	874	26
TOTAL (lb)	3,002	11,084	16,759	365
Reduction (tons)	51.7	8.6	523.3	53.0
% Reduction	97.2	60.9	98.4	99.7

Criteria Air Pollution Emission Reductions
Open Pile Burn vs. Biomass Fuel to Energy



Greenhouse Gas Emission Reductions
Open Pile Burn vs. Biomass Waste to Energy



CO2e Reduction : 2,205 tons

Costs to Collect, Process & Transport

EQUIPMENT	$/OPERATING HOUR	AVERAGE OPERATING HOURS/DAY	COST $/BDT
Grinder – Bandit Beast	$400	4	$17.19
Excavator – Linkbelt 135	$125	3.7	$4.97
Excavator – Linkbelt 290	$150	3.7	$5.96
Chip Truck - Kenworth	$85	9	$27.13
Water Truck – Ford L9000	$60	3	$1.93
Service Truck – Ford F 350	$25	2	$0.54
Crew Truck – Ford F 250	$20	2	$0.43
Low Bed – Kenworth	$100	.27	$0.29
TOTAL			**$58.43**

CO_2 Cost Effectiveness

Biomass:
Biomass costs = $58.50 per BDT for collection, processing and transport
Biomass power plant rate $45 - $65 per ton

Carbon: (60 mile radius travel)
4,200 tons biomass = 2,200 tons of CO2 reductions
2,200 / 4,200 = .523 tons of CO2 per ton of biomass

Carbon equation =
½ a ton of CO2 per ton of biomass

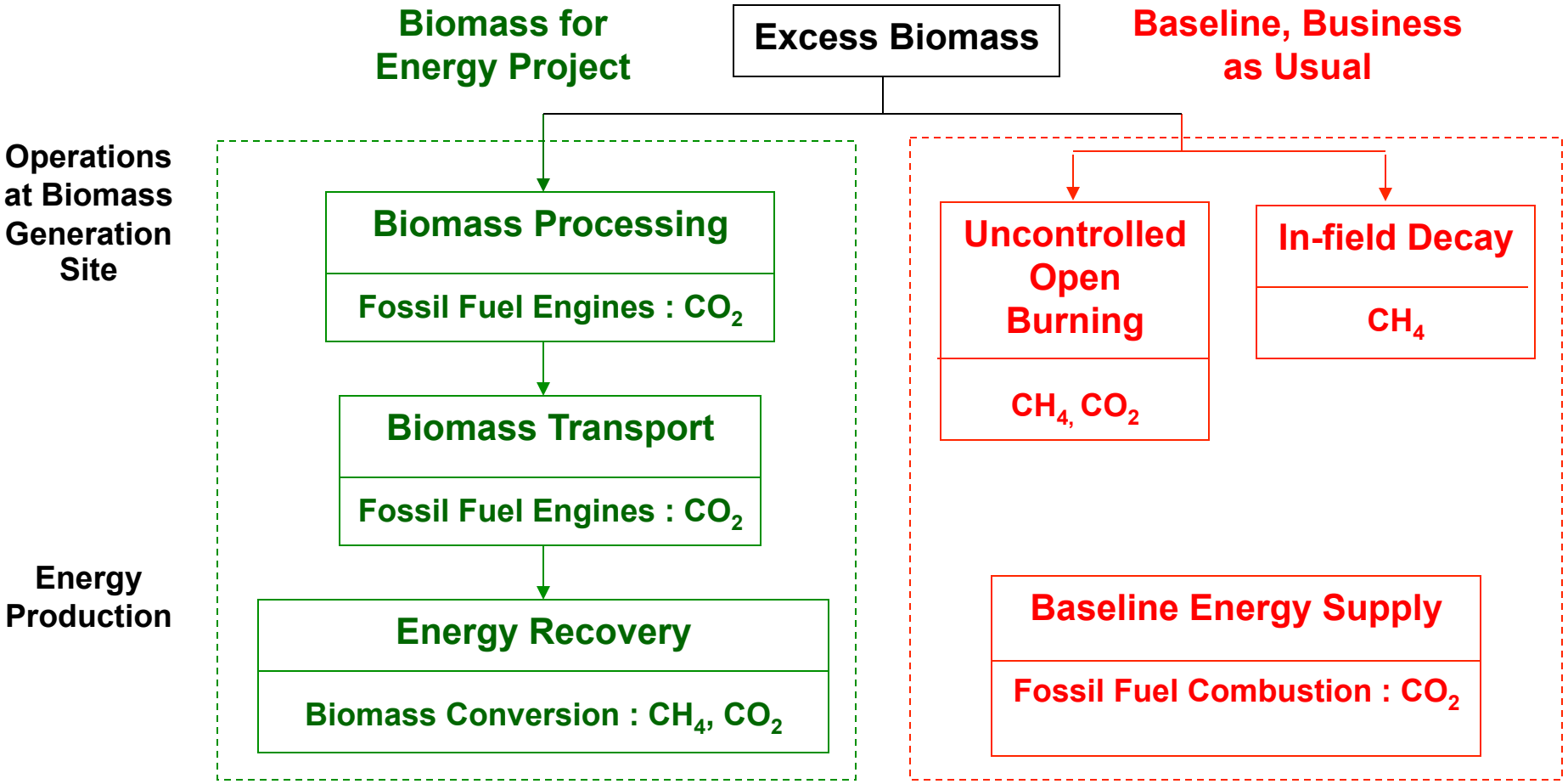
Premise: Sustainable biomass operations

- For biomass to be sustained 2 items need to be accomplished
  1) Operational costs need to be improved
  2) An economic driver needs to be injected

- utilize the carbon credit (½ a ton of CO2 per ton of biomass) as the driver

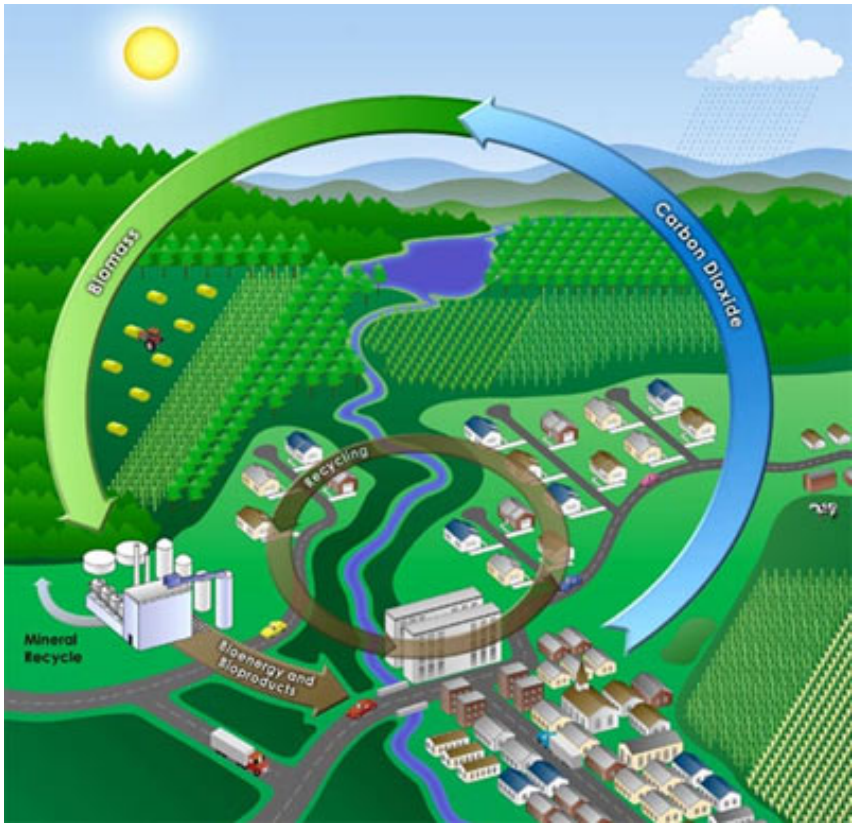
- Carbon credit sale of $10 per ton equals $5 per ton of biomass = Sustainability

BIOMASS WASTE FOR ENERGY: GHG OFFSET PROTOCOL



Carbon “Neutral”

- Biomass absorbs carbon dioxide during growth of wood and green materials, and emits it during conversion
- It recycles the carbon and does not add to the greenhouse effect
- It displaces fossil fuel



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