

Wood Products and the Environment – An Overview

1

CREATIVE LEARNING ACADEMY FOR SENIOR SCHOLARS
VT CLASS
4-18-13

PHIL ARAMAN
US FOREST SERVICE & VIRGINIA TECH

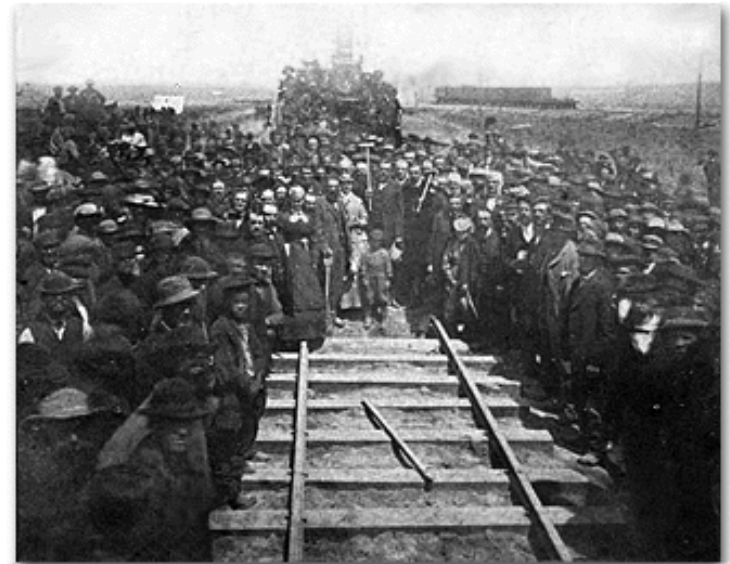
PLUS HELP FROM SOME FRIENDS AT VT LIKE BOB
SMITH, BOB BUSH, DAN HINDMAN, MATT
WINN(FS), AND JUDY ARAMAN(ODU)



Wood products were our first exports



Inland and coastal waterways.



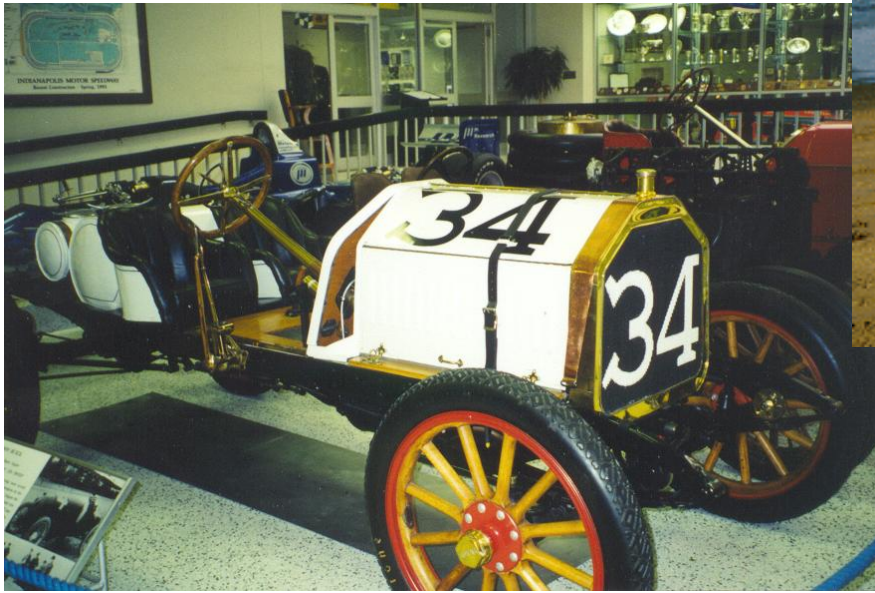
The Last Rail is Laid

Wood ties connected our country!



Communication and electricity

The first cars were over 50% wood.



The first airplanes were wood.



- THE ORIGINAL
WRIGHT BROTHERS
AEROPLANE

FLOWN BY THEM AT
KITTY HAWK, NORTH
CAROLINA
DECEMBER 17, 1903

Wood Based Homes still exceed 90% of new home construction



Many options when using WOOD



WOOD is Important in home Building!

7

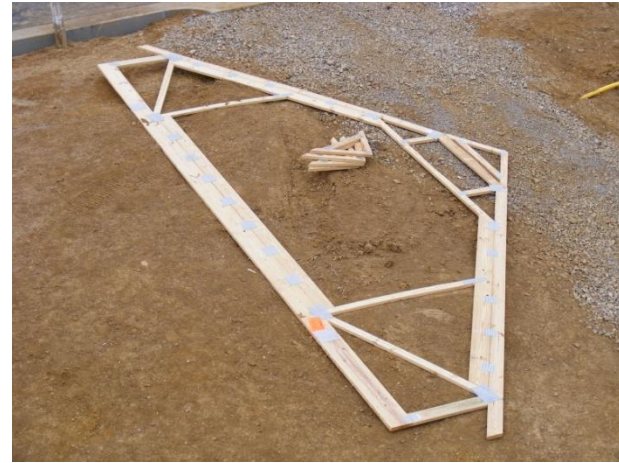


Wood is used in Nonresidential Construction

8



Some local construction with wood at Smith's Landing



Furniture, Cabinets, Windows and Flooring



Some more pictures



Paper, Pallets and Packaging

12



Musical instruments go way back

13



There are more --Find the "Forest Products"



Toothpaste	Football helmet	Crayons	Coating for meds	Chewing Gum
Laundry Detergent	Photo film	Cough syrup	Hair spray	Furniture polish
Aspirin	Fabric	Ice Cream	Spices & Flavorings	Clean air
Dyes	Mayo	Glue	Mushrooms	Holiday decor
Shipping systems	Clean water	Lipstick	Skin Lotion	Paint

And the answer is...

15

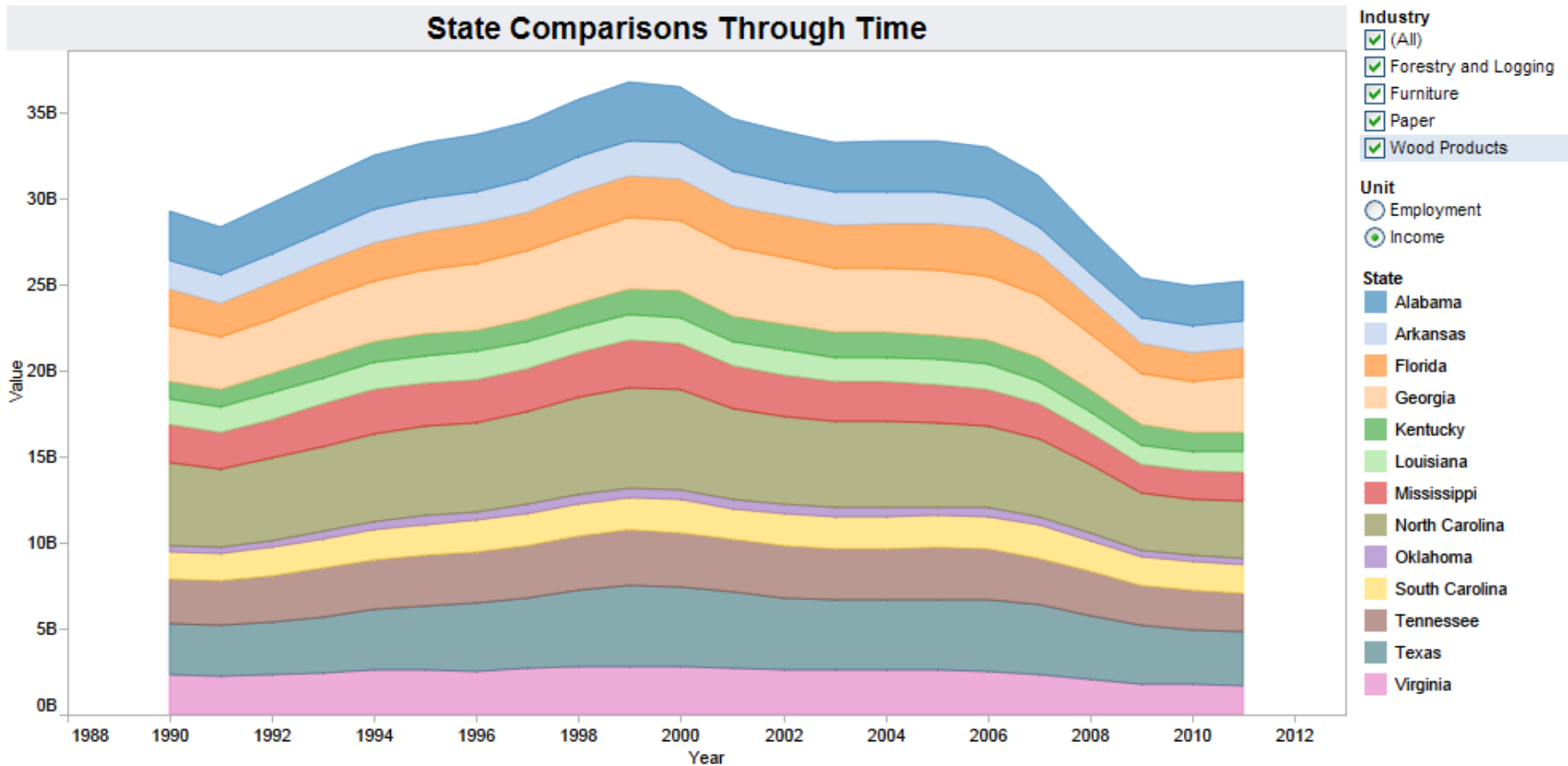
- **All the examples are forest products, either timber or non-timber**
- **Over 5000 products are made either directly from wood or from the by-products of processing wood products**

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Wood Products – the Big Picture in the South

17

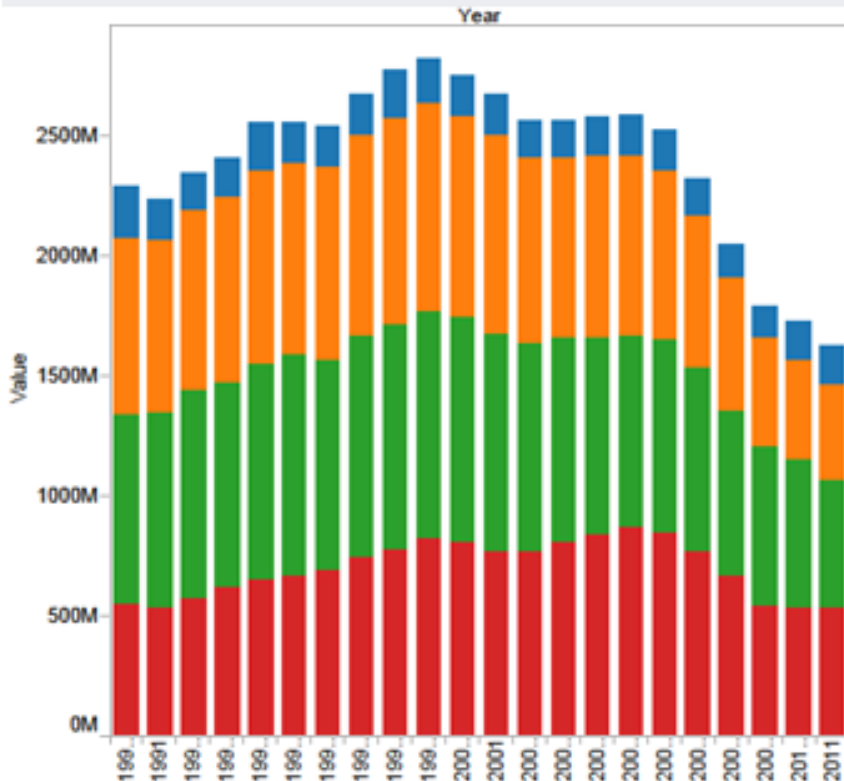
State Comparisons Through Time



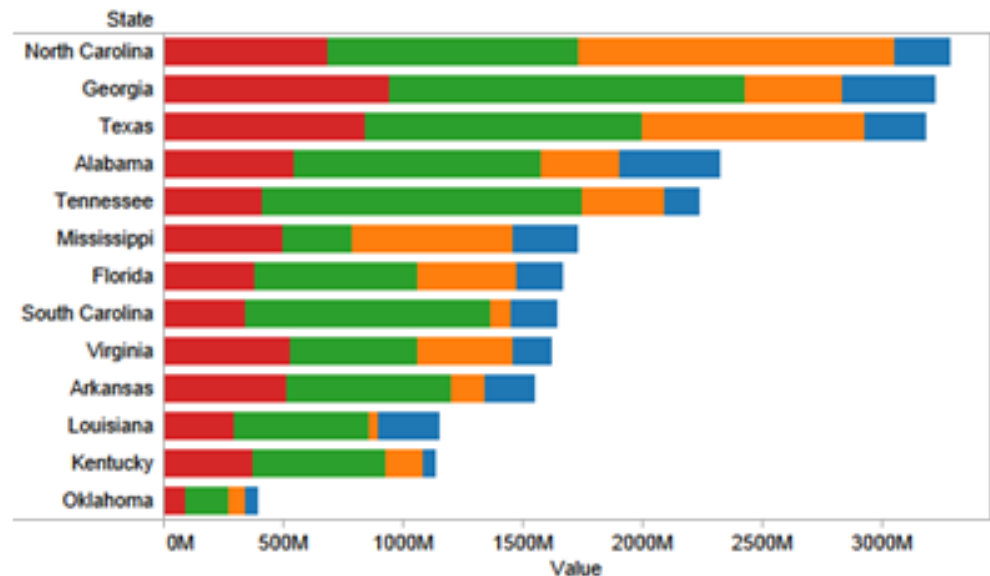
Virginia Trends and other Southern States

Wood Related Industries Comparisons

Full Timeseries - Select Area Below



Yearly Snapshot



- State
- ☐ (All)
 - ☐ Alabama
 - ☐ Arkansas
 - ☐ Florida
 - ☐ Georgia
 - ☐ Kentucky
 - ☐ Louisiana
 - ☐ Mississippi
 - ☐ North Carolina
 - ☐ Oklahoma
 - ☐ South Carolina
 - ☐ Tennessee
 - ☐ Texas
 - ☐ Virginia
- Unit
- ☐ Employment
 - ☒ Income
- Industry
- ☒ (All)
 - ☒ Forestry and Logging
 - ☒ Furniture
 - ☒ Paper
 - ☒ Wood Products

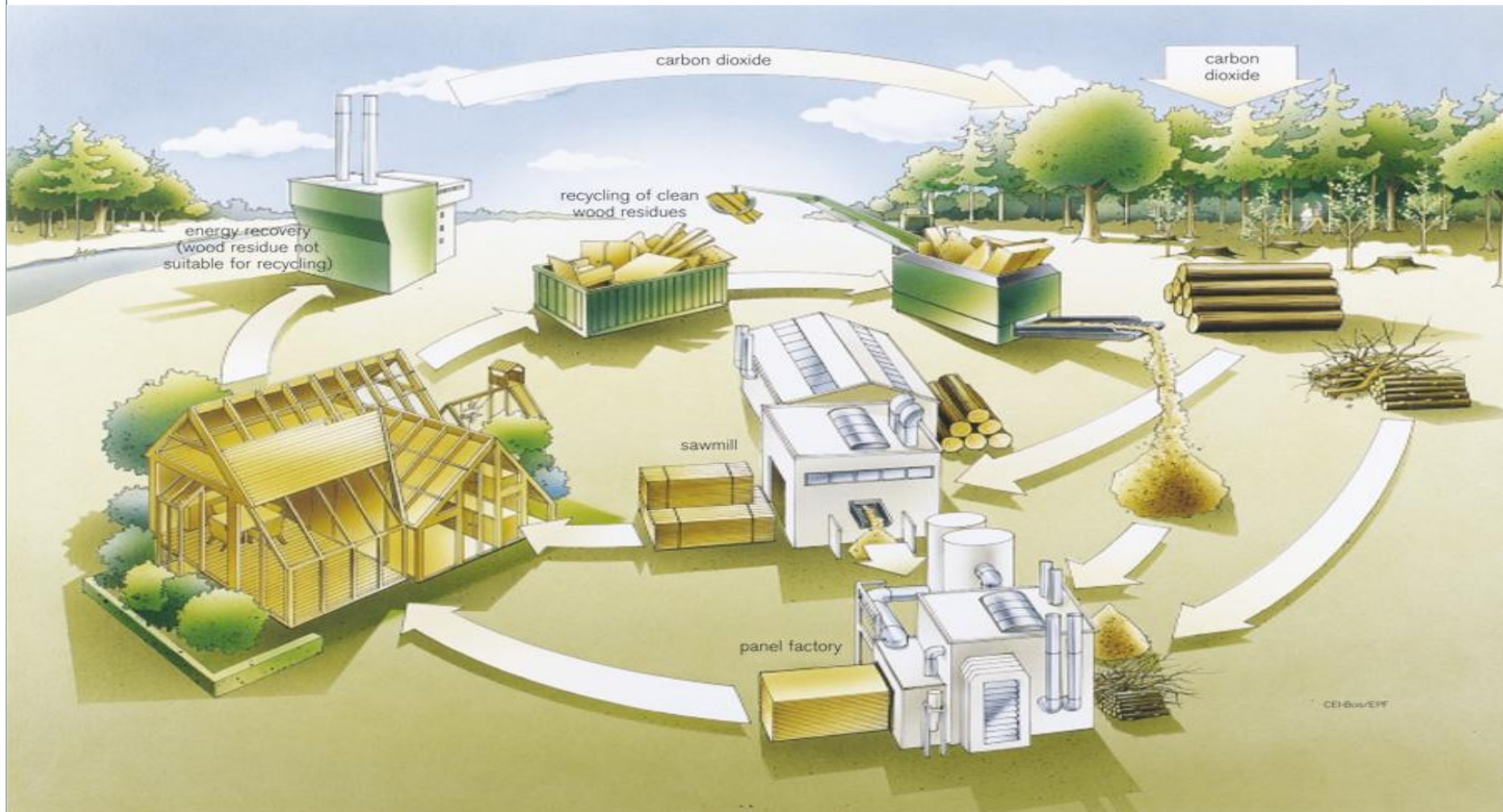
- Industry
- ☒ Forestry and Logging
 - ☒ Furniture
 - ☒ Paper
 - ☒ Wood Products

Year

2011

Wood Products and the environment- Trees and Wood are part of the Eco-Cycle

19

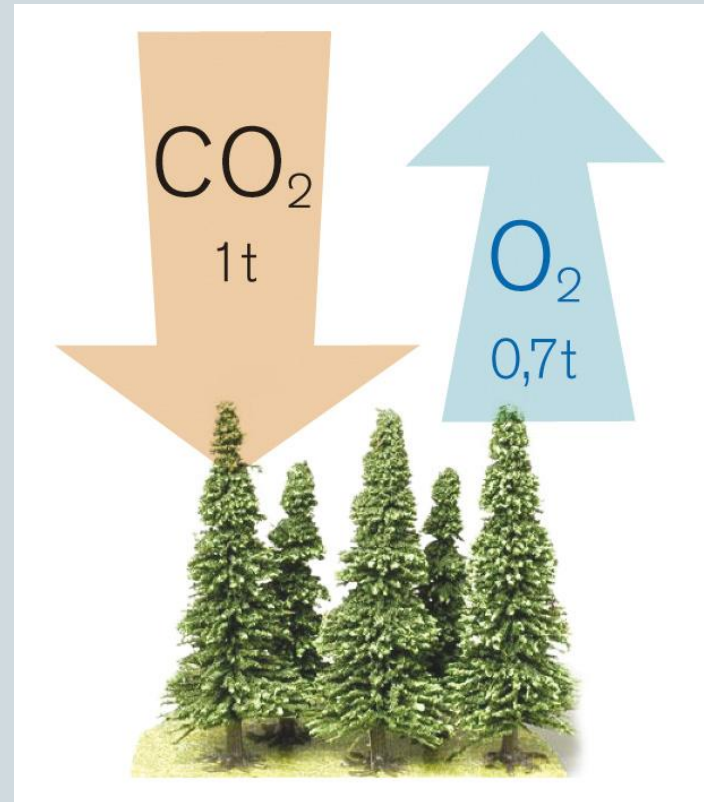


TREES need Carbon Dioxide

20

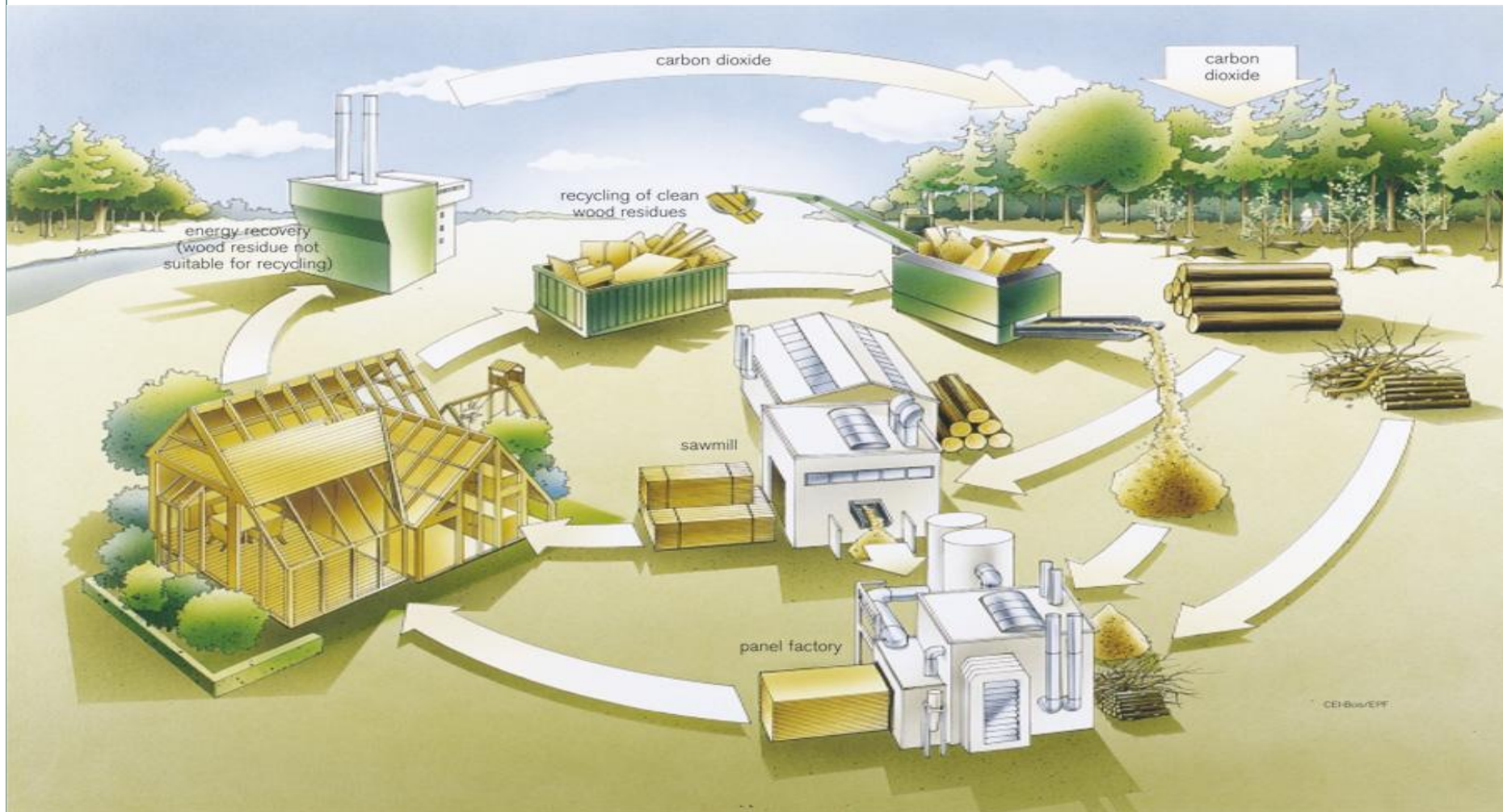
- Older trees are not as productive
- For every m³ growth, a tree absorbs 1 tonne CO₂ creating .7 tonne O₂

Surprise !!!!



Wood Products and the environment- Trees and Wood are part of the Eco-Cycle

21



Renewable trees have helped and continue to help build and supply this country with products

22



Over the past 60 years (1950 thru 2010)

23

- **Renewable trees**

- 847 billion cubic feet of wood was harvested (a football field 10,000 miles high)
- 90 millions home built
- But we have 50% more wood volume in our forests
- Trees and wood are renewable!

- **Nonrenewable Oil**

- 163 billion barrels of petroleum were extracted in the US
- This consumption also released over 75 billion tons of Carbon dioxide to the atmosphere

Another plus is that **wood** can be reused and recycled when it finishes the original use

24



Used pallets can be recovered – They should be reused or recycled and not landfilled

25



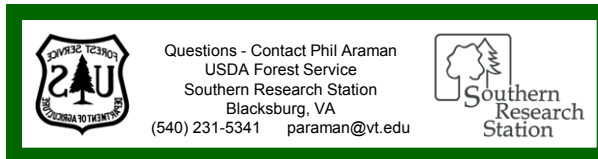
What we like to see ...Urban Wood Pallet Recovery, Reuse, and Recycling

(SAVES TREES SAVES LANDFILL SPACE AND PROVIDES NEEDED WOOD PRODUCTS)

The Urban Resources



Shouldn't Do



Repair



Pallet Disassembly



Mulch



Animal Bedding

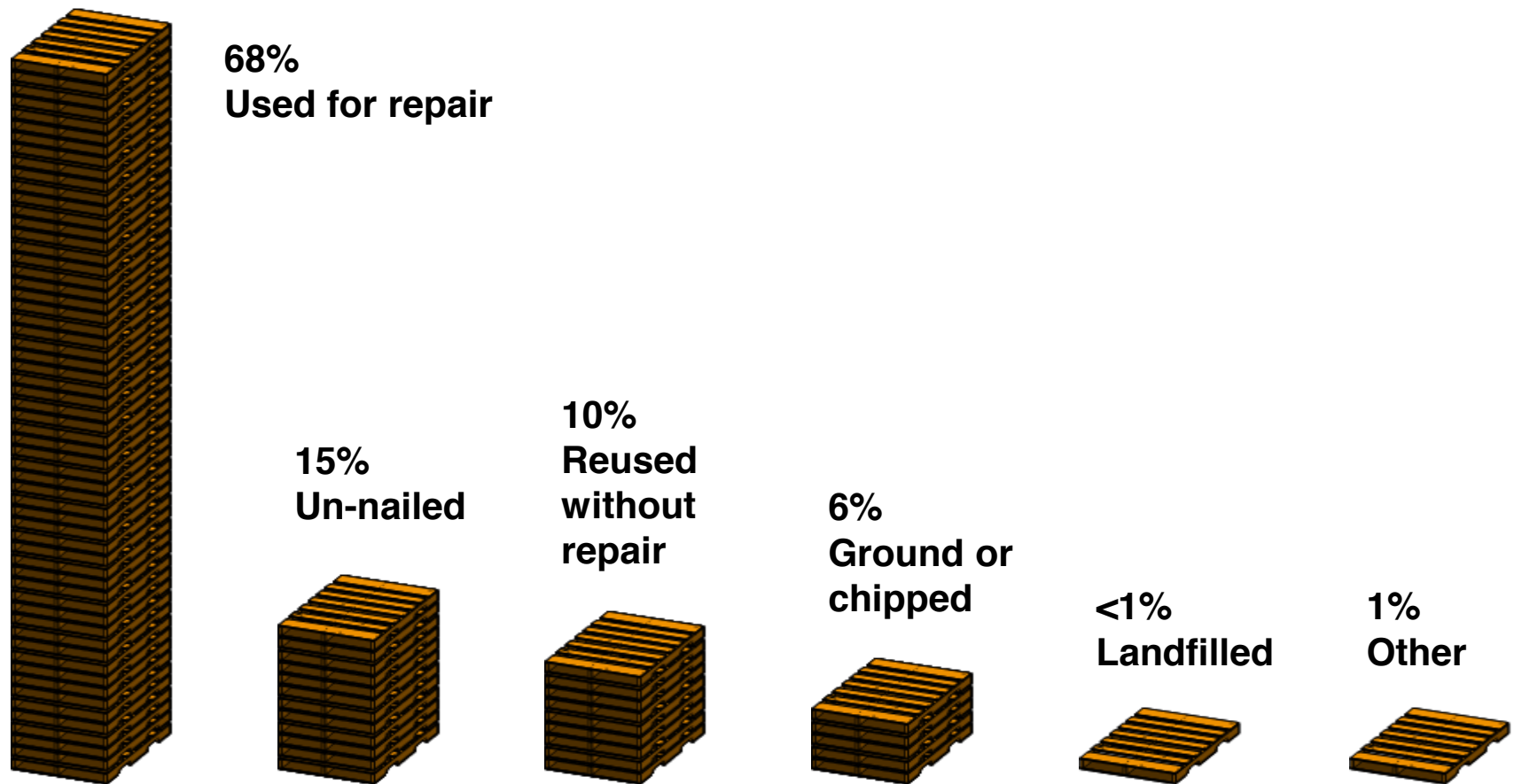


Flooring/
Paneling

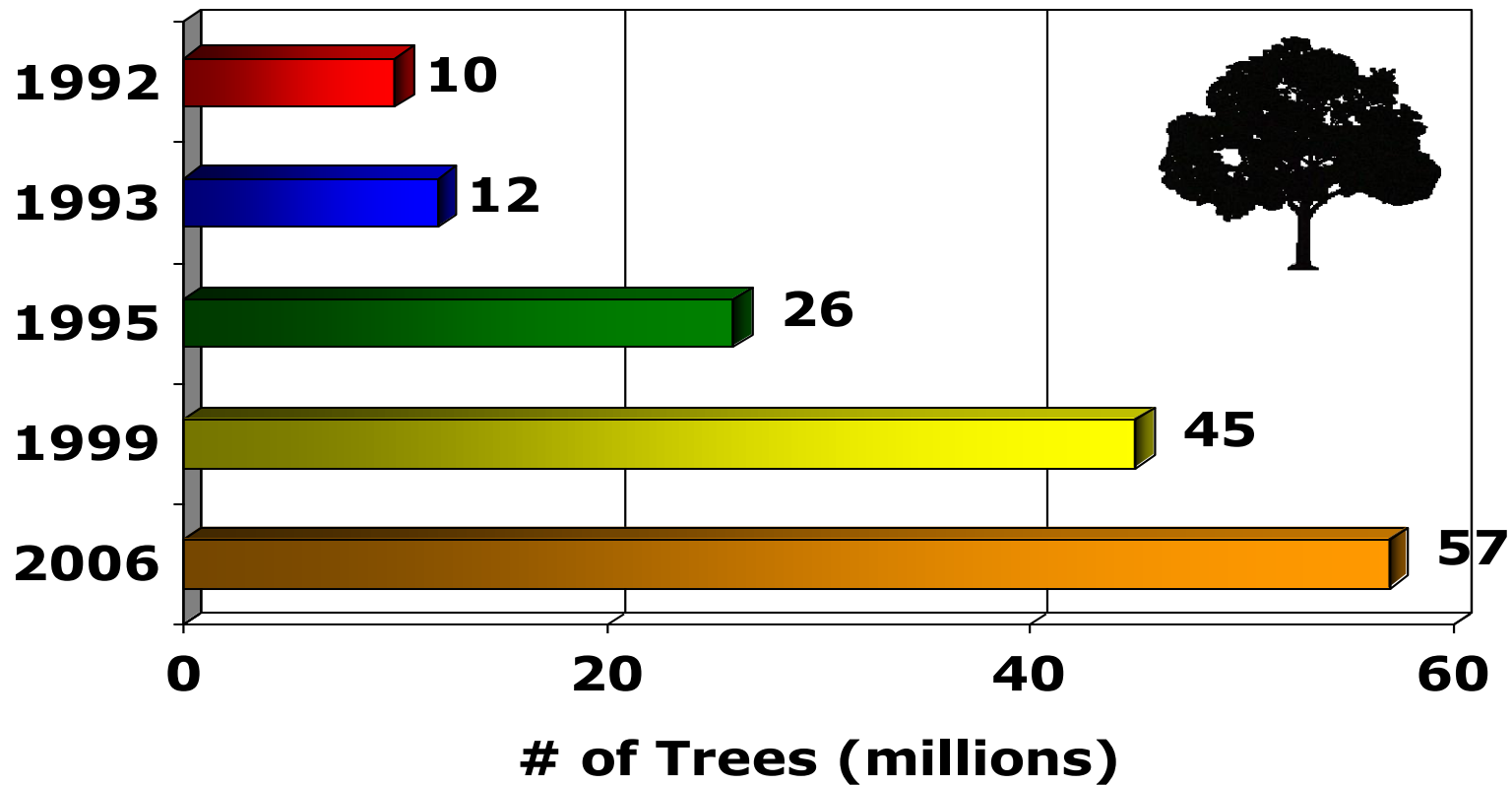


Fuel

What is happening -- Most recovered pallets are reused



And it is good for the environment ... Equivalent numbers of trees saved from being harvested for pallets because of reuse



* Based on trees 12" in diameter (DBH) with 2.5 16 foot long logs.
(Estimated to contain 100 board feet of lumber)

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28

More can be done to achieve ZERO PALLET WASTE

29

- There could be up to 2 billion pallets in service
- 441 million new pallets / year
- 460 million pallets recovered / year
 - 357 million of those returned as pallets
 - The remaining 103 million were recycled to other products
- **Millions still sent to landfills every year**
 - About 1/4th recycled at landfills
- **More Recovery, repair and recycling is needed**

Used pallets collected in a trailer

30



Pallets going to repair and incoming trailers from pallet users

31



Separation area at large recycler

32



Recovered/Repaired Pallets

A large stack of wooden pallets, some showing signs of wear and repair. The pallets are arranged in several tall, vertical columns. The wood is weathered and discolored, with some areas showing blue and red paint or markings. The structure of the pallets is made of horizontal slats and vertical stringers. The overall appearance is one of a well-used, recycled material.

Some pallets and other wood go to chipping operations



Tub Grinder and Colored Mulch

35



Uses for Recycled Ground Wood Chips

36

Landscape Mulch

- **Screen Size:** 1" – 1 1/2"
- **Buyer:** Can be sold retail or wholesale to park districts, golf courses, corps., playgrounds, homes.
- **Comments:** Can be sold retail/wholesale + bagged or bulk. Retail needs outlets. Colored mulch markets have grown significantly in recent years.



Source: *Cresswood Recycling Systems*

Uses for Recycled Ground Wood Chips

37

Animal Bedding

- **Screen Size:** 3/8" – 5/8"
- **Buyer:** Sawdust/wood chip brokers in Yellow Pages, land grant college animal science depts., stables, kennels, poultry/meat producers.
- **Comments:** Larger chips can be blended w/ sawdust for good absorbency. Small chips reduce grinder output. To add value, secondary grinders reduce size and increase consistency (require air).



Uses for Recycled Ground Wood Chips

38

Boiler Fuel

- **Screen Size:** 3/4" – 2"
- **Buyer:** Large wood fired boilers for heat kilns and cogeneration, paper mills.
- **Comments:** Chip size determined by boilers, material handling specifications. BTUs green - 3500, dry - 7000, particle board - 14,000



Uses for Recycled Ground Wood Chips

39

Composting

- **Screen Size:** 3/4" – 1"
- **Buyer:** There are 250-300 bio-solid composting centers in U.S. plus sewerage districts and nurseries.
- **Comments:** Provides carbon and bulking agent for organic material like food scraps, yard waste and sewerage. Note: Large food processors frequently have own composting center.



Source: *Cresswood Recycling Systems*

Uses for Recycled Ground Wood Chips

40

Wood Pellet Feed

- **Screen Size:** 1/8"
- **Buyer:** Wood pellet fuel manufacturers.
- **Comments:** Pellets typically have ash content less than .5%. Ground pallets and barked chips are not acceptable due to residue. Any species acceptable, though process needs volume in constant proportions.



Source: *Cresswood Recycling Systems*

Natural and Colored Mulch

41



“Green” flooring can be made from used pallet parts

42



Zero Wood Construction Waste is Possible in Homebuilding

43



Why because wood construction waste materials should be kept out of landfills



- At 500,000 homes per year around 2,500,000,000 pounds of new wood waste is generated
- At 2,000,000 homes per year around 10,000,000,000 pounds of new wood waste is generated



We are working at Mount Tabor Meadows

Blacksburg, VA's First "Green Development"

45



- A housing development in Blacksburg, Virginia with Phase 1 currently under way.
- 49 lots with twelve different house plans to choose from.
- Homes will be certified **EarthCraft House** with a focus on environmental standards.

To determine much wood construction waste is generated in home building ...



From a little over a 2000 sq. ft. house

Total wood waste – 5,059 lbs.

- OSB waste – 1,419 lbs.
- Treated wood waste – 417 lbs.
- Spruce structural lumber waste – 3,134 lbs.
- LVL – 64 lbs.
- Paralam – 25 lbs.

The Waste ...

47



Waste OSB, LVL, SPF, and treated lumber material from home building

48



From the waste we make Products

49



Recycled Construction Waste OSB Sold at Habitat for Humanity Restore

50



We grind the other materials



- Tub grinder
- Small horizontal grinder
- Larger horizontal grinder



Grinding – SPF and OSB (OSB material is not accepted in some states)



- General mulch for landscaping
- Mulch berms – erosion control
- Temporary walkways and roads for crews
- Soil enhancer for lawns



Some more mulch examples



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Wood for Energy is next and can be as simple as firewood from Kroger

54



Wood Pellets for Energy

55

- Uniform
- Easy to handle
- Easy to transport
- Burn efficiently
- Large market



Module 5: Utilization of Biomass

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Sources of Woody Biomass for Energy – Logging Residue

56

- Unconsolidated
- Comminuted
- Bundled



Module 5: Utilization of Biomass

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Wood Processing Residue for Energy

57

- Black Liquor
- Sawdust
- Bark



Module 5: Utilization of Biomass

Other Sources of Woody Biomass for Energy

58

- Energy plantations
- Construction waste



Module 5: Utilization of Biomass

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Urban Waste for energy -- OSB, LVL and treated lumber material left over after house construction

59



More Urban Waste -- spruce(SPF) material left over after house construction

60



Don't forget -- Used home deck wood

61



And -- Demolished homes and construction waste

62

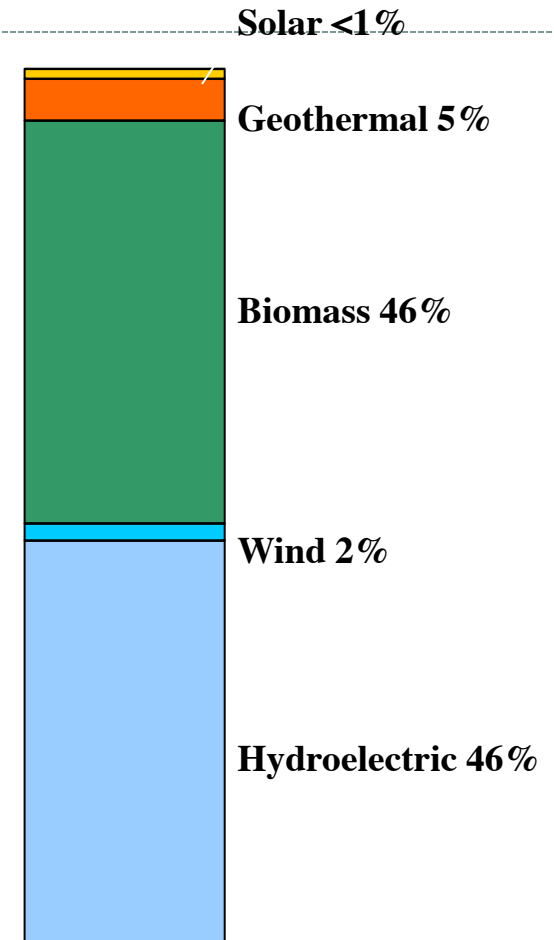
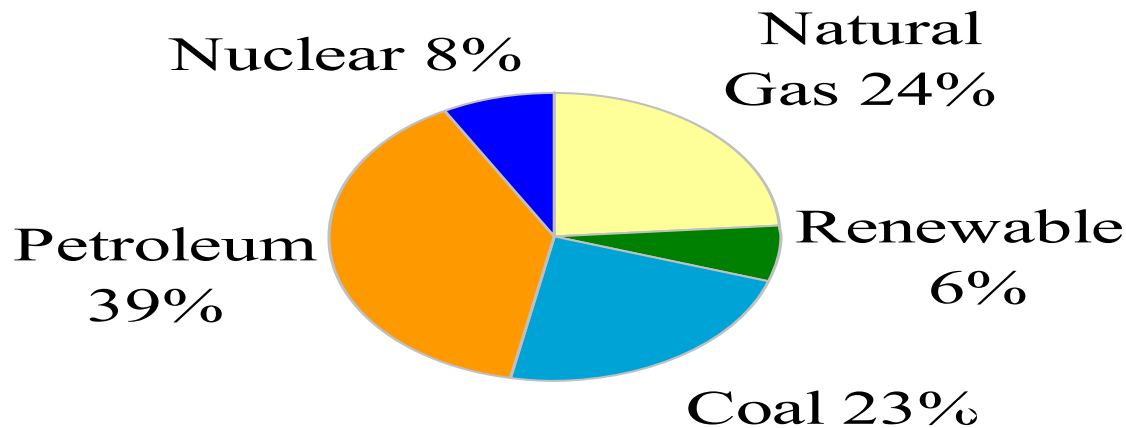


US Energy Supply

(data for 2003)



Source: AEO 2004 tables (released in December 2003) based on US energy consumption. Overall breakdown Table A1 (Total Energy Supply and Disposition), and Renewable breakdown Table A18 (Renewable Energy, Consumption by Section and Source). Slide courtesy Mile Pacheco, NREL, US-DOE.



Module 5: Utilization of Biomass

WOOD

64

- Wood is an extraordinary material
- Naturally renewable, it grows in ever-increasing abundance in North America
- It is beautiful, light, and strong to build with
- It is warm and welcoming to live with
- Plus ... I did mention it is renewable

Properly used – wood can last a long time – 14th century structure in Lucerne, Switzerland

65



This cabin could be made from dead hemlock trees -- Any Questions?

66

