



# **When Push Comes to Shove: Energy Demand for Woody Biomass**

**ENSURING FOREST SUSTAINABILITY IN THE  
DEVELOPMENT OF WOOD BIOENERGY IN THE US**


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# **Biomass Energy Resource Center (BERC)**

BERC is a national not-for-profit organization working to promote responsible use of biomass for energy.

BERC's mission is to achieve a healthier environment, strengthen local economies, and increase energy security across the United States by developing sustainable biomass systems at the community level.



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## **Setting the Stage:**

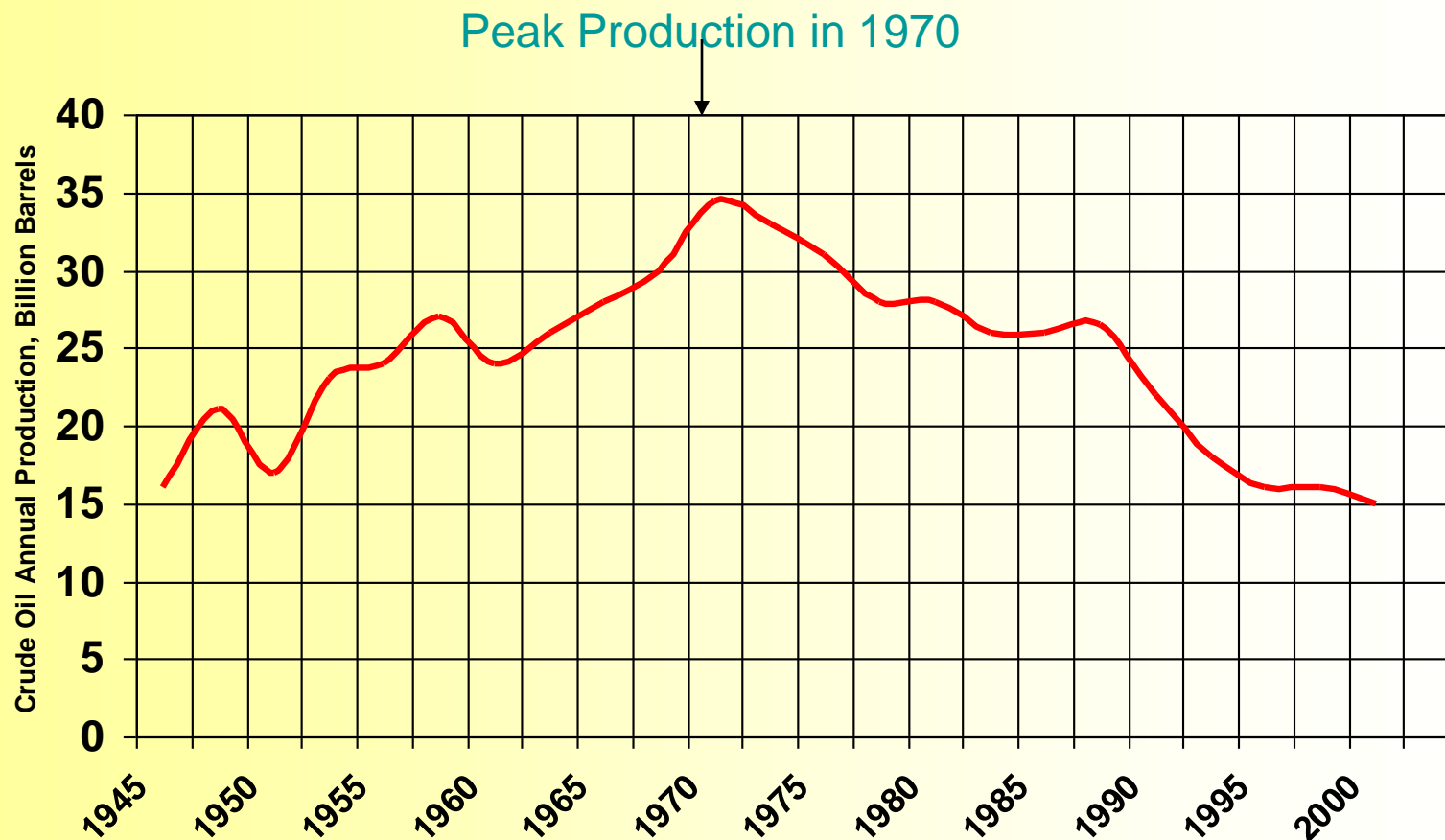
# **US Government Energy Paradigm**

- **US economy will continue to grow**
- **Domestic demand for energy will continue to grow**
- **“The American way of life” will not be compromised**
- **Global demand and competition for oil will grow**
- **US will do what it takes to secure access to foreign oil**
- **Domestic substitutes for foreign oil will be aggressively pursued**

**Common denominator: Oil!**



# Crude Oil Production in the US – Lower 48

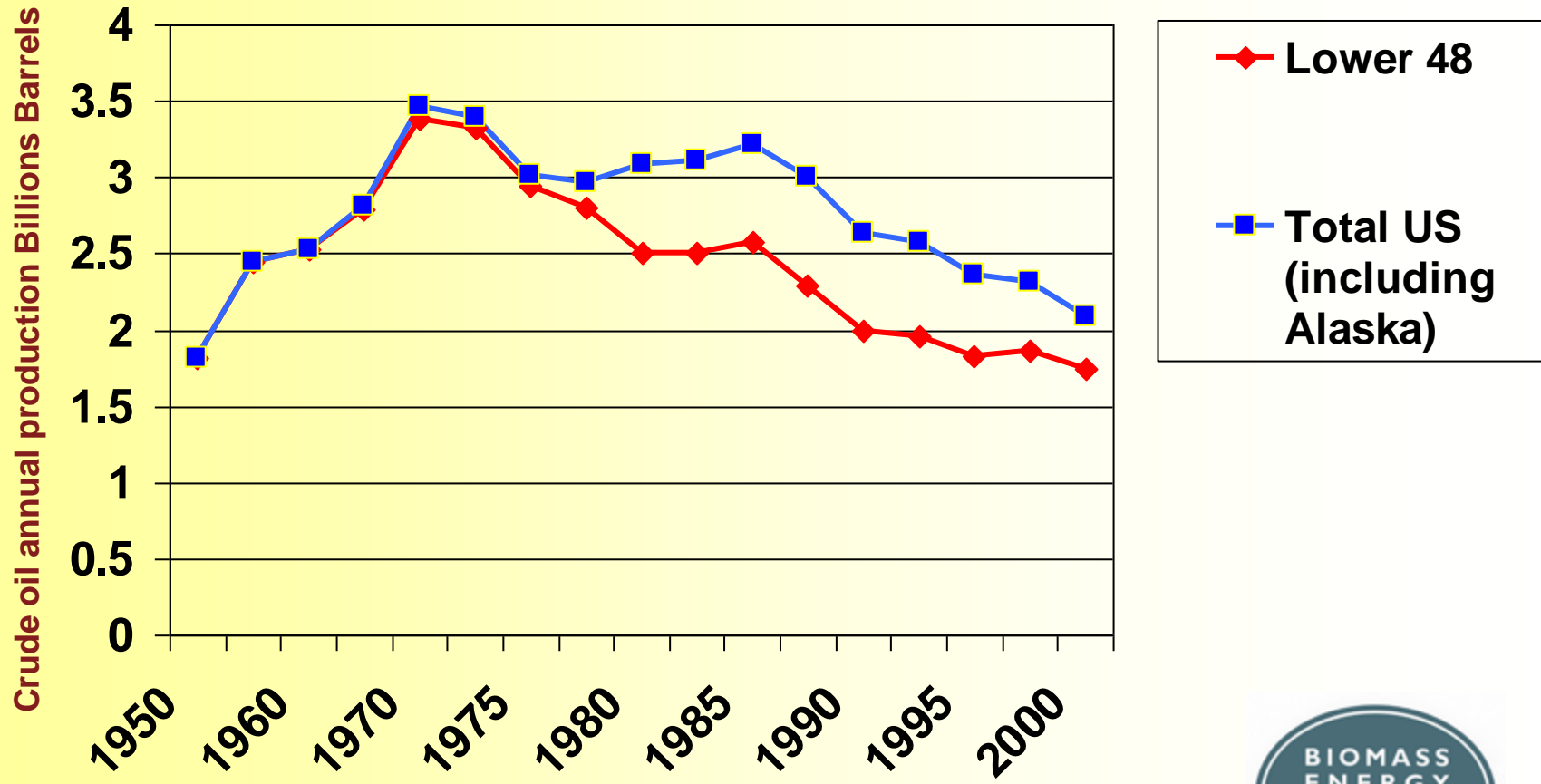


Source: US DOE, Energy Information Administration

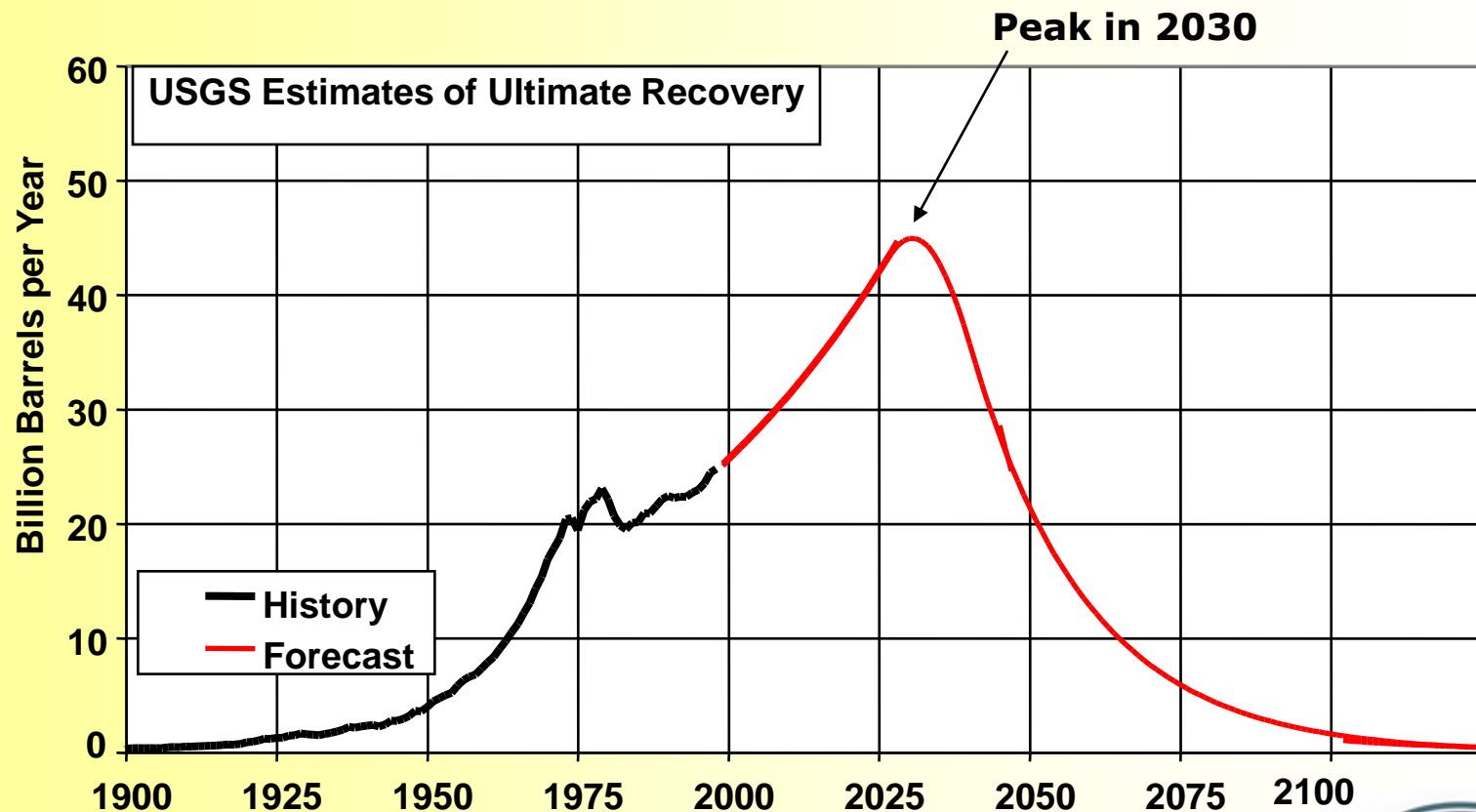




# US Domestic Crude Oil Production




# World Oil Production History & Forecast



**Note:** US volumes were added to the USGS foreign volumes to obtain world totals.

**Source:** US DOE, Energy Information Administration



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## **If the President appointed you Secretary of Energy, what would you do?**

In an oil-constrained future world:

- To solve the future electrical power problem:  
You might develop coal, nuclear energy and biomass power plants.
- To solve the future fuel problem:  
You might look to biofuels!



A vertical strip on the left side of the slide shows a pile of wood chips or mulch in various shades of brown.

## **For the big vision of biomass replacing oil, both ag and forest feedstocks will be needed. In huge volumes.**

- In January 2007 the President called for “Twenty in Ten” – displacing 20% of US gasoline consumption by 2017 – with 5% coming from efficiency and 15% from biofuels.
- This will require a greatly increased production of grain ethanol and the development of a whole new cellulosic ethanol industry – using a technology that doesn’t exist today in commercial form.







# What are the biofuels that will drive demand for woody biomass feedstocks?

- **Cellulosic ethanol (substitute for gasoline)**
  - Biochemical processes (enzymes and fermentation)**
  - Thermochemical processes (gasification)**
  - From integrated forest bio-refineries**
- **Pyrolysis oil (substitute for fuel oil and diesel)**
- **Wood pellets (solid biofuel)**
  - Bagged, for residential stoves**
  - Bulk delivery, for light commercial & institutional heating**
  - Industrial-scale, for export and long-distance fuel transport**

**Mostly new industries**





# **What are the direct uses of wood for energy that will drive demand for feedstocks?**

- **Wood-fired power plants**
- **Industrial combined heat and power (CHP) –  
mostly in the pulp-and-paper and forest products industries**
- **Community-scale heating and CHP – schools, colleges,  
hospitals, government buildings, community district energy**
- **Residential heating (wood stoves)**

**Mostly existing technology, could be improved**



# **What can be done with a million tons?**

## **HEAT**

- **About 3,300 schools (there are about 2,500 in the NF region)**
- **400 smaller colleges (there are about 60 in the NF region)**
- **80,000 homes with wood stoves**
- **60,000 homes by replacing fuel oil with pyrolysis oil**

## **POWER**

- **Heat and power 50 large university/college campuses (there are about 20 in the NF region)**
- **Provide power to 350 sawmills as well as heat to dry lumber**

## **SUPPLY**

- **2 new 50 MWe power plants (each could supply power to a city of 50,000)**
- **4 new 20 MWe power plants (each could supply power to a city of 20,000)**
- **7 wood pellet plants**

**PRODUCE 65 million gallons of cellulosic ethanol**

**REPLACE 600,000 barrels of crude oil at the refinery**





## Does efficiency matter?

(efficiency = how much useful energy you get out of the feedstock compared to its energy content going in)

- If the biomass feedstock is a waste, available in huge volumes, and you need to get rid of it to solve an environmental problem, **maybe not**.
- If the feedstock is seen as a valuable, finite (even though renewable) resource, **efficiency definitely matters**.

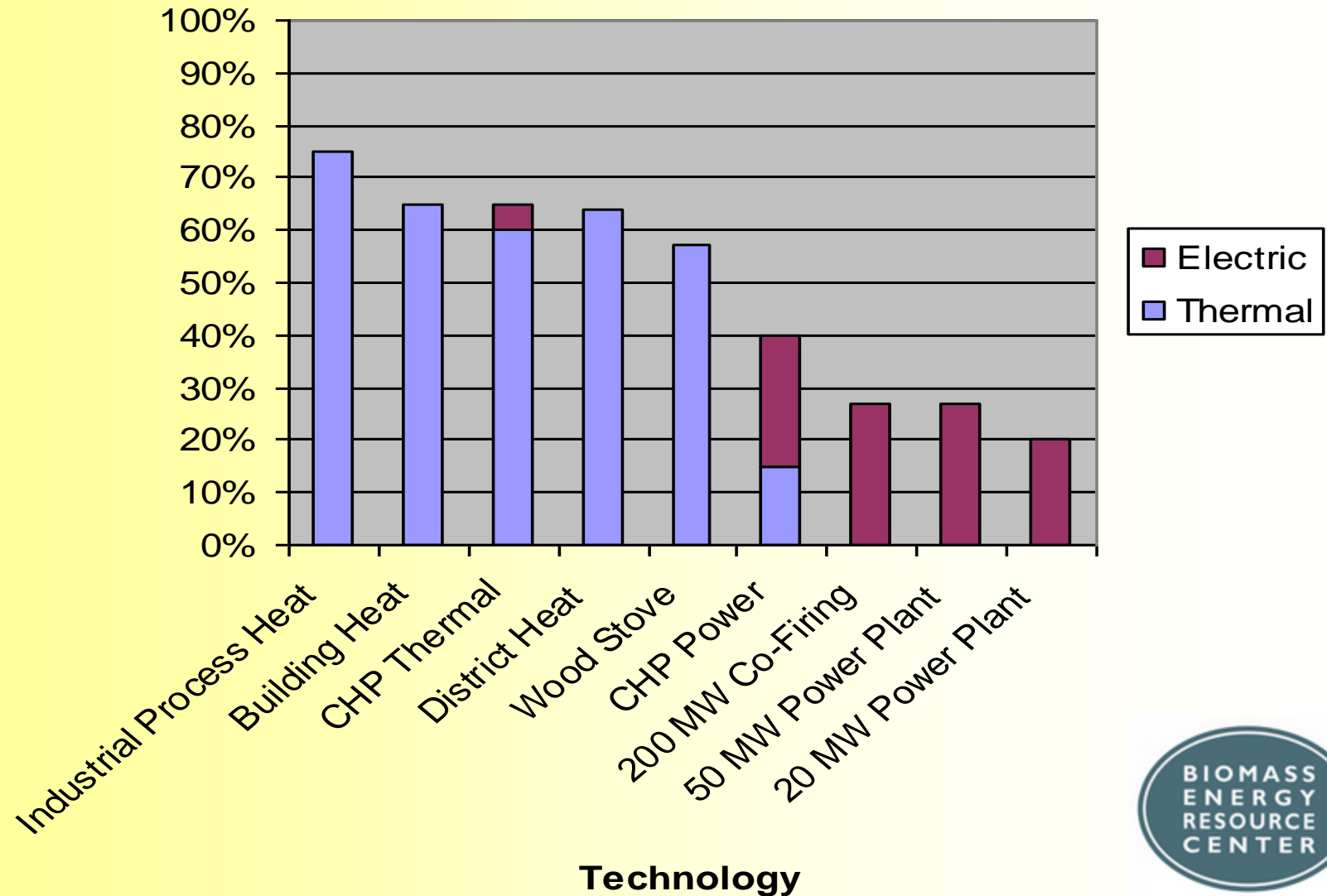






# Conversion Efficiency

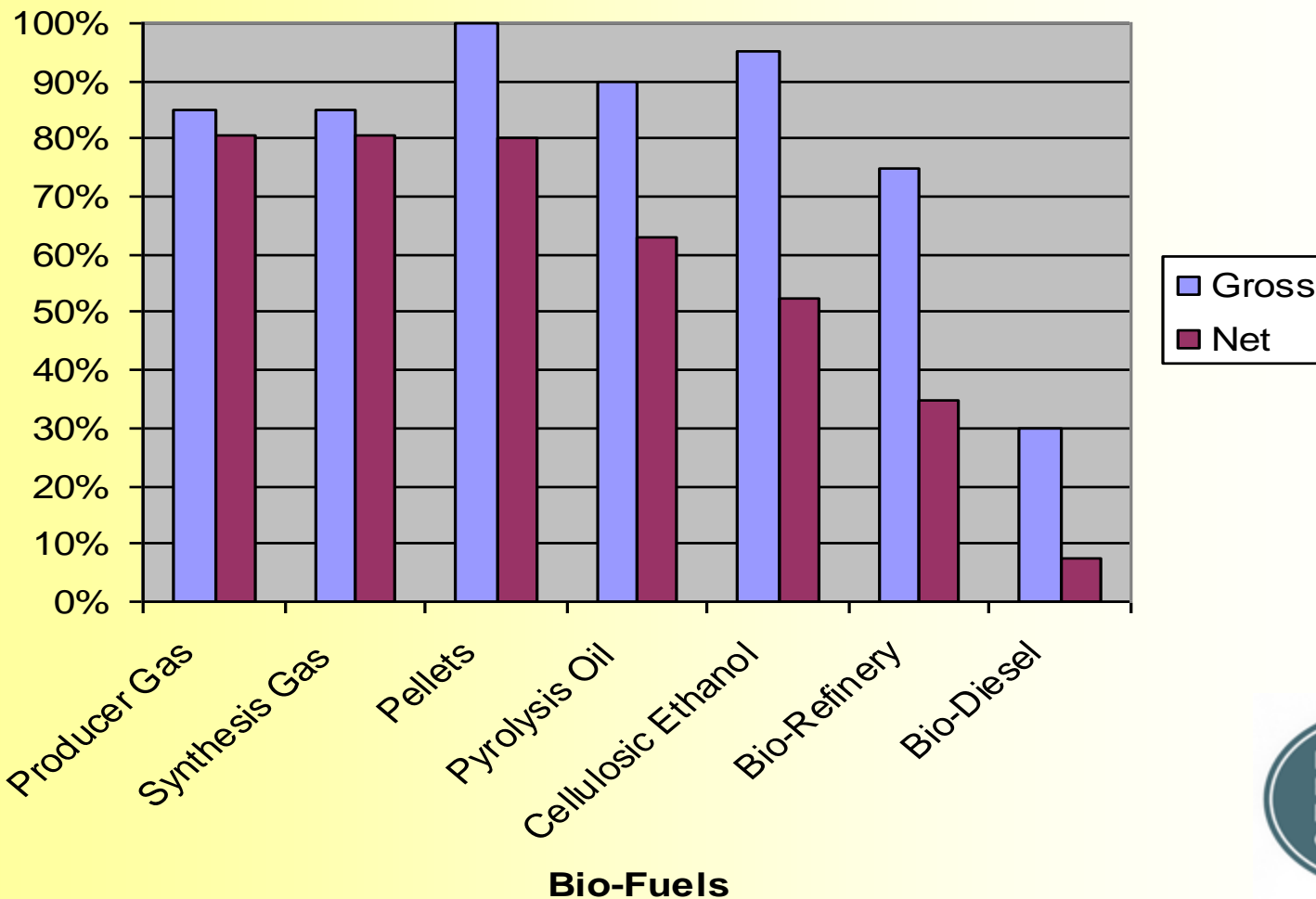
## Wood Residues to Energy (available technology)






# Conversion Efficiency

## Wood Residues to Bio-Fuels



A vertical strip on the left side of the slide showing a pile of wood chips or mulch.

# **Drivers of future demand for woody feedstocks**

- **Peak oil (future limited availability, high price)**
- **Climate change (biomass is net carbon neutral)**
- **State & federal power policies/incentives (RECs, RPS, PTC)**
- **Federal energy policy and priorities**
- **User demand**
- **Off-shore markets**
- **Business profitability**



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## Conclusion

There is a virtual certainty that woody biomass feedstocks, mostly from the forest, will come under unprecedented large, competing demands in the coming years. Market forces may accelerate and threaten the sustainability safeguards necessary to protect the forest resource.



# Contact Information

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