PRODUCING ENERGY FROM WOODY BIOMASS

CONS

1. Woody Biomass Utilization

- **Markets for woody biomass very limited at present time**
  Despite the passage of a Renewable Fuel Standard (RFS) requiring biofuel production to reach 36 billion gallons by 2022, only ONE advanced biofuels facility (Range Fuels – Soperton, GA) is under construction. Limited capital, state-of-the-art technology and strict rules for woody biomass under the RFS are to blame. Only trees planted before 2008 on non-federal land qualify under the RFS, which disqualifies as much as 90 percent of our nation's private forests.
  Source: National Alliance of Forest Owners (NAFO)

- **Harvesting and transportation rates can be prohibitively costly**
  Woody biomass is expensive to transport, so markets for biomass must be close to harvesting sites (ideally 25-50 miles) not to exceed 100 miles.
  Source: Property and Environment Research Center (PERC) Report, 2009

- **Wood products have positive carbon footprint, not wood energy**
  The amount of carbon now stored in U.S. wood products is estimated at 35 billion metric tons, mostly in houses. Each year, an additional 60 million metric tons of carbon are stored in U.S. wood products. If burned, wood releases carbon into the atmosphere.
  Source: Carbon Storage in Wood and Wood Products, Dovetail Partners, Inc.

2. Cellulosic Ethanol Production

- **Commercial production has been "about 5 years away" for years**
  Although the commercial production of ethanol from corn is well established, there are no commercial cellulosic ethanol plants in operation. Range Fuels is constructing the first U.S. biorefinery near Soperton, GA, due in part to an $80 million bond guaranteed through the USDA's Biorefinery Assistance Program.
  Source: Sustainablebusiness.com

- **Ethanol has a lower energy content than gasoline**
  The E85 blend (85 percent ethanol and 15 percent gasoline) that can power flex fuel vehicles, decreases fuel efficiency by 28 percent compared to conventional gasoline, making E85 more expensive per mile.
  Source: PERC Reports, September 2008

- **Ethanol cannot be shipped via existing pipelines**
  Since ethanol contains water, it cannot be shipped by existing pipelines. Ethanol needs to be shipped by truck or rail, both more costly for transporting fuel long distances.
  Source: The Wilderness Society, 2007

- **Ethanol production has been subsidized since the 1970's**
  A recent estimate of ethanol subsidies are between $1.05 and $1.38 per gallon, or about $6 billion each year.
  Source: Earth Track, 2006

- **Cellulose is difficult and costly to break down into alcohol**
  Cellulosic ethanol production will cost about $3.35 per gallon compared to $2.35 per gallon for corn-based ethanol.
  Source: The Milken Institute Review, 2007

3. Electricity from Biomass

- **Biopower is subsidized**
  Tax credits to biopower producers were about $1.5 billion per year in 2004, and expected to rise as demand for renewable energy increases.
  Source: Earth Track, 2004

- **Biopower generation can be more expensive than other sources**
  Biomass is expected to cost 8 to 12 cents per kilowatt hour (KWh) whereas electricity produced by coal and natural gas consistently costs 7 to 10 cents per KWh.
  Source: PERC Report, 2009

- **Biopower plants are limited in size due to expense of transporting raw materials**
  Electrical power plants that use coal and natural gas can be much larger in size, taking advantage of economies of scale, due to the relatively high cost of transporting raw materials (wood) to biopower facilities by comparison.
  Source: PERC Report 2009

4. Wood for Heat

- **Fireplaces and inefficient wood stoves release high level of emissions**
  Burning wood for heat releases 12 to 17 pounds of particulates and 74 to 140 pounds of carbon monoxide per ton. Using efficient wood-powered boilers, only 1.25 pounds of particulates and 1.67 pounds of carbon monoxide are released per ton of wood burned.
  Source: USDA Forest Service, 2007

- **Compared to other fuels, heating with wood can be messy**
  Burning firewood is a messy, time-consuming chore that most home owners avoid. It is much easier to simply turn on an electric or gas-powered heating unit where the local utility does all the work, than to continuously feed a wood stove or fireplace.
  Source: Energy Information Administration, 2009

- **Infrastructure for delivery of wood heating fuels less developed**
  Electricity produced at coal or nuclear power plants and heating units supplied by natural gas have minimum impact on home owners. Propane is purchased once or twice a year, and delivered directly to the home owner. However, home owners that use wood for heat must be more involved in the purchase, delivery and consumption of wood.
  Source: PERC Report, 2009

5. Traditional and New Users

- **Incentives for new users are not often available to current users who depend on bioenergy to operate their forest products facilities**
  The proposed changes to the Biomass Crop Assistance Program (BCAP) will reward those that increase their production of bioenergy, rather than compensate those that have been producing bioenergy for years. Currently, over 400 forest product mills

nationwide rely on biomass for their heat and power, making biomass the second leading producer of renewable electricity behind hydropower.
Source: Energy Information Administration, 2009

- **Government mandates and incentives for biomass will likely drive up or displace some current users**
  The BCAP and other incentives have already had a negative impact on existing users competing for the same wood for producing pallets, OSB & particleboard, paper and charcoal products. Although most incentive programs like BCAP are designed to aid biomass consumers and suppliers to better utilize the undesirable small trees and tree tops left behind after harvesting, in many cases these low-grade markets compete for the same woody biomass with bioenergy firms having a price advantage due to incentive programs.
  Source: "The Best Use of Wood," 2009

- **Most traditional forest products have higher "value-added" economic benefits than using wood to produce energy**
  For example, when you use "pulpwood" size material to produce paper, the total direct added value to manufacture the paper from wood is 7 to 10. The indirect value is the money the workers spend in the local community, creating additional jobs, which multiplies the impact another two to three times. Therefore, the added value of making paper from wood is about 14 to 33 times the cost of wood. In contrast, the same wood could be used as fuel in a boiler-steam turbine unit to make biopower with a total valued-added multiplier value of 3.2 times the cost of wood. Clearly, using biomass to make forest products instead of bioenergy has more economic benefit to local communities.
  Source: "The Best Use of Wood," 2009

PROS

1. Woody Biomass Utilization

- **Energy is produced domestically rather than from imported fuels**
  Political support for bioenergy is strong for many reasons including the desire to have less reliance on foreign sources of energy to improve national security.
  Source: PERC Report, 2009

- **Woody biomass is a renewable alternative to fossil fuels**
  Trees are a renewable resource that are plentiful and can be processed into cellulosic ethanol---an alternative to importing oil for transportation fuels.
  Source: PERC Report, 2009

- **Wood to energy production reduces emissions compared to wildfires**
  Wildfires release 17 pounds of particulates and 140 pounds of carbon monoxide per ton of wood burned. Thinning forests reduce wildfire risk and using the biomass in a wood-fired boiler can reduce emissions to only 1.25 pounds of particulates and 1.67 pounds of carbon monoxide per ton of wood.
  Source: USDA Forest Service, 2007

- **Reduced fire hazard mitigation and fire suppression costs**
  The USDA Forest Service spent $6.7 billion on fire suppression and $1.7 billion on fuels reduction between 2000-2006. Only 10 million of the estimated 151 million acres of federal forests in need of fuels reduction were treated during that period.
  Source: USDA Forest Service

- **Carbon neutral whereas fossil fuels are carbon negative**
  Studies show that burning woody biomass is carbon neutral because the carbon released is equal to the carbon stored during the life of the tree. Critics of burning wood for energy point out that the carbon stored is released immediately, whereas it takes a tree's lifetime to accumulate the carbon.
  Source: PERC Report, 2009

2. Cellulosic Ethanol Production

- **Raw materials are abundant, i.e., trees, plants, algae**
  Cellulose is the most abundant organic (carbon-containing) compound on earth, found in any plant-based material. However, collecting, storing and processing cellulose from trees and plants is expensive and still needs more research to find commercially viable options.
  Source: PERC Report, 2009

- **Intensive agricultural methods are unnecessary for tree production**
  Although intensively-grown tree plantations exist, they are not necessary for the production of woody biomass. Using corn for ethanol production, requires much greater fossil fuel inputs due to the intensive agricultural methods used to produce enough raw material for ethanol production.
  Source: PERC Report, 2009

- **Woody biomass does not interfere with food production**
  Another drawback of current ethanol production using corn and biodiesel production using soybeans is that each of these products are used in producing food, directly or indirectly as feed for livestock. Not true for woody biomass.
  Source: PERC Report, 2009

3. Electricity from Biomass

- **Biopower production is based on mature technology**
  Wood-fired boilers have been used for decades producing steam that operates turbines to produce electricity. In fact, 70 percent of the energy used by Weyerhaeuser's pulp and paper mills in 2007 was fueled by woody biomass. In addition, nearly 20 electric utilities use wood to generate electricity for sale on the power grid.
  Source: PERC Report, 2009

- **Emissions from biopower are lower than for fossil fuels**
  Only wind and nuclear have lower greenhouse gas emissions during electrical production than woody biomass, using life-cycle analysis.
  Source: International Atomic Energy Agency, 2000

- **Biomass is a reliable source of electricity compared to wind and solar**
  Because biomass uses combustion to produce electricity, it can be used to generate electricity at any time, unlike wind and most solar technologies.
  Source: PERC Report, 2009

4. Wood for Heat

- **Newer wood-fired boilers are more efficient than gas furnaces**
  Efficiency of appliances that turn fuel into heat is 79% for propane, 80% for natural gas, and 83% for wood pellets used in wood-fired boilers.
  Source: USDA Forest Products Laboratory, 2004

- **Very low emissions with wood-fired boilers**
  New wood-fired boilers are 20 times cleaner than wood stoves and leave very little debris following combustion.
  Source: USDA Forest Products Laboratory, 2007

- **Heating with wood is less expensive than other energy sources**
  Only natural gas is cheaper than heating with wood, with electricity providing the most expensive heating cost.
  Source: PERC Report, 2009

5. Traditional and New Users

- **Use of logging slash residues for bioenergy can produce additional revenue opportunities for current industry**
  Using logging slash that is now left behind after harvesting, would allow loggers to increase revenues through better utilization.
  Source: "The Best Use of Wood," 2009

- **Using mechanized harvesting and processing equipment gathering logging residues improves safety and efficiency**
  Being able to harvest more loads of load per acre may allow some loggers to invest in mechanized harvesting and processing equipment, that is safer and more efficient to operate---and the only way to process some of the wood left behind on conventional logging operations.
  Source: USDA Forest Service, 2009

- **Forest management of current stands may be improved**
  Besides better utilization, biomass harvesting may include removal of undesirable small trees that will allow for the best formed and the best species of trees to be left behind, to grow more rapidly and improve the quality (and price) of future harvests.
  Source: USDA Forest Service

The following two documents provided the references listed above:

The Best Use of Wood, **Paper360°**, January/February 2009 issue, pages 26-29.

Tapping Our Forests for Green Energy, **PERC** (Property and Environmental Research Center), 2009, 66 pages, http://www.perc.org/articles/article1209.php