The Potential Role of Woody Biomass
In the Economic Revitalization of Southeast Alaska

Given our current energy and economic challenges, the home-grown forest resources of southeast Alaska have the potential to play an important role in the economic revitalization of the region.

Why Wood?

It is in our self-interest that we act to diversify our energy portfolio. On a macro-scale, i.e., "looking down from 35,000-feet", there are a number of reasons why diversifying our energy portfolio is desirable, not all of which you have to subscribe to in order to come to the conclusion that it is the right thing to do. Those reasons can include reducing carbon emissions, concerns over 'peak oil', financial drain and trade imbalance, and national security, to name a few -- any *one* of which may be sufficient justification to act. While there are a number of potential alternative energy solutions on the horizon (wind, solar, wave, tidal, geothermal, hydrogen, etc.), none, with the possible exception of wind, holds as much potential for short term implementation as does wood.

From a lower elevational perspective, woody biomass can serve as an economic engine in several ways:

1. Local utilization of low-grade wood can improve the financial well-being of struggling wood products manufacturers by providing a local market for processing residues, "utility wood", and second-growth thinning materials, i.e., re-creating an integrated industry. Job retention and creation are inevitable.

2. With the recent development of a new technology, wood combustion gases can be used to operate a gas turbine-driven combined heat and power (CHP) generation facility, avoiding the need for highly skilled steam boiler operators, and at scales that are appropriate for many communities in southeast Alaska, i.e., 0.5 to 10 MW. (For more details please see www.zilkha.com).

   A. Communities struggling with high power costs would experience significant rate reductions and cost savings while creating jobs

   B. Thermal exhaust can be used in heating applications and manufacturing processes (see Item 3)

3. Wood, in various forms, is a viable heating fuel. However, it must be dry and it must be burned efficiently to derive maximum heat value and mitigate emissions. No one is promoting smelly, smoky, dirty, polluting wood burners. However, there are

appliances, for both residential and commercial/institutional applications, that can operate at efficiencies equal to or exceeding those of the oil stoves, boilers and furnaces currently in use, and satisfy clean air standards, given dry fuel.

A. Densified fuel production (pellets, briquettes, cubes, etc.) require clean, dry feedstocks. Feedstock for premium-grade pellets must be nearly pure wood (little/no bark), and must be dried to 10-12 percent moisture content. "Industrial" pellets and briquettes can accept more bark, and perhaps a small percentage of recycled paper (an additional opportunity in itself).

1) Residential pellet stoves, pellet fireplace inserts, pellet furnaces and pellet boilers generally require premium-grade (i.e., low ash) fuel.

2) Industrial pellets can be burned in commercial/industrial boilers designed to handle other bulk fuels such as wood chips, hog fuel, cubed municipal paper wastes and certain forms of coal

3) Briquettes can be burned in existing fireplaces, woodstoves and institutional cordwood boilers (such as Garn boilers)

4) Densified fuels are value-added products, and are both renewable and carbon-neutral

5) There are a variety of potential markets for densified fuels:

a. Local/southeast Alaska (residential, commercial, institutional)
b. Lower 48 and Canada
c. Exports to Asia via new container facility at Prince Rupert
d. Exports to Europe via Prince Rupert and Canadian National Railway to East Coast ports

<u>The Potential of Combined Heat and Power (CHP); aka co-generation, co-gen</u>

Until the advent of the new gas turbine technology by Zilkha Energy, CHP was limited to conventional steam turbine technology, and CHP development in Alaska is hampered by the lack of highly skilled, certified/licensed high-pressure steam boiler technicians and engineers. Conventional high-pressure steam systems also suffer from poor turn-down ratios and a requirement for a significant minimum base loading, perhaps more than can be absorbed by the local market, and which cannot be sold to non-local consumers for lack of an electrical intertie. Presumably, the Zilkha technology changes this picture significantly.

Some people will claim that the power produced from a wood fired CHP plant cannot compete with hydro power on a cost per kWh basis, and to some extent that may be true, until you consider the potential value of the exhaust heat. And in places where hydro does

not exist and diesel generators are the power source, it appears that you may be able to waste all the exhaust heat (i.e., not utilize any of it) and still produce power at rates equal to or less than the diesel-generated rates (depending on the cost of wood).

What matters to a CHP plant operator are the *total revenues* derived from the sale of both power (kilowatt-hours) and heat (Btus). As long as the combined revenues meet the CHP operator's requirements, the individual revenues from the power and heat taken separately matter little. For example, if the electricity value in Ketchikan is $0.08 to $0.10/kWh, then the sale of heat at $12 to $15 per million Btu may provide a sufficiently positive income stream (NOTE: The cost of oil-produced heat is currently around $35 per million Btu.) In a community reliant on diesel generated power, such as Hoonah or Kake, electric rates are around $0.50 per kWh. If there was no market for or utilization of the exhaust heat, Zilkha power could be sold for $0.25 to $0.35 per kWh (depending on wood costs).

Power generation (in some situations) and combined heat and power (in other situations) can be a local economic engine. (NOTE: a 1.5 megawatt Zilkha plant would require approximately 2,600 green tons (or the equivalent of about 350 mbf given 7.5 tons per mbf) of feedstock per year. Wood must be harvested, transported and processed, and the plant must be operated and maintained.

The exhaust heat generated by a Zilkha CHP plant would amount to about 20 million Btu/hr. If the average building requires 20 Btu per square foot per hour, this amount of heat could heat one million square feet. It would also be enough heat to evaporate some 8.5 tons of water per hour; providing the ability to dry nearly 20 tons per hour of green wood feedstock to an acceptable moisture content for further processing into densified fuels.

<u>The Potential for Densified Fuels</u>

According to the 2000 census, there are approximately 28,000 households in southeast Alaska (Yakutat to Metlakatla). Assuming each household uses 400 gallons of fuel oil per year, the annual consumption is 11,200,000 gallons at an annual cost of $42,000,000 (at the current average price of $3.75 per gallon) -- nearly all of which leaves southeast Alaska as soon as the bill is paid (notwithstanding the relatively small amount that goes to local distributors and their employees). And this estimate does not begin to include all the commercial, industrial and institutional consumption, which could very well push the total to 20,000,000 gallons and $75,000,000 per year.

Assuming that 1 ton of wood pellets contains roughly the same heating value as 100 gallons of fuel oil, southeast Alaskans would need 112,000 tons of pellets to replace 11,200,000 gallons of home heating oil. At a cost of $250 per ton (the retail price of imported pellets at Home Depot in Juneau, December 2007), our annual fuel bill would be $28,000,000 as opposed to $42,000,000; an annual savings of $14,000,000. And where would $28,000,000 go? If the pellets were made in southeast Alaska, most of that $28M would go directly into

the local, southeast Alaska economy. The other $14M would be available for "discretionary spending".

Yes, we *can* produce pellets here in Southeast, and 112,000 tons is well-within the range of possibility, whether there is one large production facility or two (or more) smaller production facilities. A large pellet plant operates around the clock, and would employ about 30 people. In addition, there would have to be a significant increase in the number of loggers, truckers, etc. [The feedstock required to manufacture 112,000 tons of pellets would be roughly equivalent to 30 million board feet of timber, or roughly about the same amount that is currently going into conventional timber processing and sawmilling, not including the low-grade material (i.e., utility wood) that is left in the woods or sold out of state. However, just the residues (chips, bark, sawdust) from current milling operations could supply about half of the required feedstock.]

Yes, wood supply is critical and the Tongass National Forest would have to "step up" and become a major player again. But the National Forest is not the only player, and between the Alaska DNR, Mental Health Trust, University of Alaska, and the Native Corporations, there is more than enough wood to make this work.

Daniel Parrent
Juneau Economic Development Council's
Wood Products Development Service
Sitka, AK