

# 'Tree-Power' Could be Future Energy Source

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A wood-fueled electricity generating plant may be in your future. In fact, the future is 'now' in some Scandinavian countries, said Dr. Darwin Foster, Texas Cooperative Extension forestry program leader. "In Sweden, they're already bundling up what we're leaving in the forest after a timber harvest and using it as bio-fuel," Foster said. "Bio-fuel" is all-inclusive term that includes any renewable resource used to generate energy. As with ethanol distilled from small grains byproducts and methane from animal-waste, wood refuse is another renewable energy source.

The key word is "renewable," Foster said. "As compared to fossil fuels which take hundreds of millennia to create and are not renewable," he said.

Using forest bio-mass – limbs, bark, tree tops – as a bio-fuel is not unheard of in the United States. Forest product manufacturing concerns already burn wood residue in steam boilers. The steam is used to drive electrical generators and supply part of the energy needed to run the plant.

Other mills use "black liquor" – the lignin-rich residue of the pulp and paper industry – for heat, steam and electric power generation.

But currently, in both examples, the residue used is created at the plant during the manufacturing process, not recycled from the harvest site as many European countries do, Foster said.

"In one of our meetings, a forest product manufacturer indicated that about 12 percent of the volume delivered to their plant wound up as residue," he said. "It's mostly bark, but there's some fines (sawdust) too. But it's just a drop in the bucket as far as their energy needs go."

But the use of forest bio-fuel is not limited to energy production of forest industry plants. With prices of natural gas, crude oil and other non-renewable sources rising, scientists are looking at using bio-fuels for residential consumption, Foster said.

At least one company in Texas, Green Mountain Energy in Austin, has turned this from science fiction into science fact. Green Mountain uses wood residue to generate a part of the electricity it produces and sells to Austin area clients.

"The potential is huge," Foster said.

In the United States and many other countries, tree tops are left at the harvested sites. Though the tonnage is huge, these tops are considered "unmerchantable" and are left where they fall to bio-degrade or are burned or chipped to speed up the process. The tops are left in the field because they are considered too bulky and too small in diameter to be worth the cost of hauling to a processing plant.

But the Scandinavians have shown harvesting this potentially huge energy source is economically feasible – at least in Europe. But can it be so in the United States?

Science and preliminary economic studies say forest residue can be an economically viable energy source. What's required is for everyone involved in the forestry industry – foresters, plant operators, forest landowners, energy producers and educators – to rethink how they do things, Foster said.

Armed with a \$500,000 grant from the U.S. Department of Agriculture, Foster and his colleagues in Extension Forestry and the Texas A&M University department of forest science plan to develop education modules on forest bio-fuel production, harvest and utilization. Foster expects the modules will be comprised of not only printed material, such as brochures and handbooks, but also Web pages and multi-media CD-ROMs and DVDs.

Specifically, the training modules will address:

- An overview of how forest residue is already used in Southern forests;
- How to manage forests, old and new, for enhanced bio-fuel production;
- How to harvest and process forest residue for bio-fuel and other products;
- How to utilize biomass for bio-energy, bio-fuels and bio-based products;
- The socio-economic impacts and community development issues; and
- How to develop environmentally sustainable biomass production systems for bio-energy and bio-based products.

The last subject – environmental sustainability – may be expanded to educate the public, Foster said. Some people might not understand the environmental benefits of burning forest residue to produce fuel.

But the economic benefits are two-fold, he said. First it is a truly renewable resource. Trees are efficient at turning sunlight, moisture and a few basic nutrients into bio-mass. Using forest residue as bio-fuel also

will utilize a resource that is being left to rot in the field.

But another important issue is carbon sequestration. Trees "breathe" in carbon dioxide, one of the major greenhouse gases. The trees "breathe out" oxygen and sequester the carbon as part of the biomass.

"Carbon is the 'C' in CO<sub>2</sub>," Foster said.

True, burning the residue emits carbon dioxide, but as most of the harvested forest mass would be used for lumber, furniture and paper, there would still be a net sequestration of carbon.

Another common concern, Foster said, was that harvesting forest residues could cause nutrient deficiencies and retard future re-forestation efforts.

But studies have shown, residues can be harvested without loss of regrowth productivity as long as a few simple precautions are taken, he said. These precautions include not taking 100 percent of the residues, avoiding harvesting on sensitive sites, and not removing residues after every harvest. In some areas, returning most of the nutrients as ash to the harvest site might be possible, he said.

"The whole point of this program is to work to reduce our dependence on non-renewable fossil fuels," Foster said.

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