Wood: Fuel of the Future?

Despite concerns over Third World deforestation, a new study suggests that wood could be a significant energy source

Given the near-catastrophic state of deforestation in many of the developing nations, and the sheer immensity of the energy demand in the industrialized states, it is a bit disconcerting to hear someone tout old-fashioned wood as a potentially important source of energy. But that is exactly what senior researcher Nigel Smith of the Worldwatch Institute in Washington, D.C., does in a Worldwatch report released on 31 January ("Wood: An ancient fuel with a new future"). The report outlines a number of trends that lead him to believe that the worldwide use of wood will increase at least 50 percent by the end of the century.

Wood's potential contribution to the energy budget of the United States is even greater than that, adds Smith. In 1980, the United States used roughly 1.5 quads (quadrillion British thermal units) of wood energy, mostly in the wood products industry. This compares to an estimated total U.S. energy consumption of some 80 quads in 1980. He quotes a study by the Office of Technology Assessment which suggests that wood could supply about 10 quads by the turn of the century without disrupting the flow of raw material to the wood products industry; depending on the effect of energy conservation measures on the growth of demand, says Smith, this could represent some 10 percent of the total.

Smith, who came to Worldwatch after 4 years at the Brazilian Institute for Amazonian Research in Manaus, notes that proper management of wood resources is especially critical in the poorer nations; approximately half the families in the world still cook their food and heat their homes with wood. In most of the Third World, in fact, the ever-rising cost of kerosene and other fossil fuels leaves them with little other choice.

But proper management is in terribly short supply at the moment. The desperate need for firewood has led to massive deforestation in many parts of Asia and in sub-Saharan Africa during the last decade. Yet Smith thinks that the process can still be reversed. Development agencies such as the World Bank have greatly stepped up the funding of forestry projects in recent years. More important, Smith finds that some of the developing nations are beginning to look at their forests not as impediments to progress, but as an energy resource. A number of recent reforestation programs have gone quite well; during the last decade in South Korea, for example, villagers established 643,000 hectares of trees, about half as much area as the country has in rice.

In the United States and other industrialized nations, events since the 1973 oil embargo have made a return to wood look attractive for reasons other than aesthetics. Prior to 1973 fewer than 200,000 wood stoves were sold in the United States, Smith says; in 1980 that figure climbed to well over 1 million. "Seven percent of the homes in the country are now entirely or partly heated with wood stoves or furnaces, and the proportion is steadily increasing," he says.

A similar pattern of conversion to wood is apparent in industry, Smith writes. In the middle 1960's, sales of wood-fired industrial boilers were a negligible percentage of the U.S. total; by the middle 1970's, they had climbed to 5 percent. The U.S. pulp and paper industry now provides half its own energy from waste products. The Swedish paper industry obtains 60 percent.

Industrial use of wood is receiving a boost from the availability of wood in more convenient forms. Machines have been developed that shred trees into matchbox-sized chips, for example. Burlington, Vermont, plans to build a 50-megawatt wood-chip furnace that will generate electricity for 20,000 city residents. Wood waste is also being bound together into small pellets that can be used directly in coal furnaces. Pellets are denser and drier than wood chips, so they are more economical to transport.

An increased reliance on wood is not without its environmental hazards, however. Aside from deforestation in the Third World, there is the problem of air pollution. Woodsmoke haze is already quite thick over certain New England villages in winter. Vail, Colorado, has limited new houses to one wood stove apiece. In London, wood fires are banned.

"None of these environmental problems is insurmountable," says Smith. "Small precipitators installed in chimneys can reduce harmful effluents and more efficient stoves designed for short-lived, intense fires would emit fewer noxious compounds."

One important advantage of growing trees for energy is that woodlots need not compete directly with land needed for growing food, says Smith. Land that is marginal for agriculture—erosion-prone hillsides, for example—may be perfectly suitable for trees. In the United States, for another example, the Tennessee Valley Authority may soon establish trees for firewood production on some of the barren land under its power lines. The spread of woodlots is also unlikely to provoke the kind of public ire drawn by other energy developments, Smith points out; for once, the production of energy would actually enhance the scenery.

Smith's paper has elicited little comment as yet. But one reviewer, John Spears, forestry adviser to the World Bank, describes it as "on balance, sensible." Certainly, the trends Smith outlines are intriguing. It must be said, however, that he is sometimes cavalier with the data when he makes a rhetorical point. Most serious is his unsupported statement in the paper's last paragraph that "the contribution of wood to the [U.S.] energy budget recently passed that of nuclear power." Since U.S. nuclear plants are currently producing about 2.7 quads, versus wood's 1.5 quads, the comment as it stands seems questionable.

Smith explained to *Science*, however, that wood is mostly burned on the spot to produce heat, whereas nuclear energy is delivered to the consumer as electricity. The energy wastage with wood is thus less than 50 percent, while thermodynamic and transmission losses lower nuclear's contribution by two-thirds.

Such an analysis certainly brings wood and nuclear within shouting distance of each other, although it's certain that reasonable people will want to argue over the numbers—and ask Smith for a more complete explanation of where such an arresting statement comes from.

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