

Summary of Woodburning Benefits for Laytonville Ecovillage Mendocino County, CA

Heat and Comfort With our options for energy sources ranging from diminishing or increasingly expensive to environmentally hazardous, our choices are predicated in large part by what is available, local and renewable. While one source has zero emissions, its supply is limited, and while another source is in rich supply, its effects to the atmosphere are harmful. But according to the alternative energy website, journeytoforever.org, "Wood is another renewable energy source with its own problems and limitations, some of which can be managed and minimized, others of which cannot. But when it is used effectively, wood is a fine fuel compared to the fossil fuels like oil, gas and coal, whose consumption leads to global warming."¹

In the mountainous, well-forested area of Laytonville, in Mendocino County, burning wood may well be the best option for now, and perhaps for the future as well. While there is a finite amount of oil on the planet, forests are a renewable source of fuel if they are maintained well and if the fuel byproducts are used in the most efficient ways possible, such as warming a well-insulated building.

Health Effects While it's been proven that there are health risks, especially for children and the elderly, caused by indoor wood smoke, the stoves that are on the market today, which are sealed, significantly reduce those risks. Emissions from wood burning sources in the home are regulated by county air quality departments. For example, according to the air quality management firm Valley Air in the San Joaquin Valley, new installations of wood burning stoves are limited to those that are EPA Certified. These stoves can demonstrate up to 70-80% combustion efficiency. When they are used correctly, their byproducts of particulate matter amount to only 4-6 grams per hour.

"What's in smoke from a wildfire? Smoke is made up particles, gases and water vapor. Water vapor makes up the majority percent of smoke. The remainder is carbon monoxide, carbon dioxide, nitrogen oxide, irritant volatile organic compounds, air toxics and very small particles."² See Sources, below, for more information on the byproducts of wood combustion as well as a number of articles on the correct and efficient way to build a fire.

The Laytonville Ecovillage This is a ten-acre heavily forested site that has not been maintained for several years. There are a few ways to manage this type of forest to prevent fires and to promote healthy growth of the native plants here. Perhaps the best way is the clear all debris and brush, any low hanging branches that could act as "ladders" which could deliver a fire into the canopy, and to run this material through a chipper/shredder. This would create small chunks of material, which are then spread around the forest floor, where they will break down into nutrients that fortify the plants growing there, as well as prevent dust and weeds from coming up. This also is perhaps the most labor intensive way and relies on electric or gas-powered machinery. Another method, used more often in Mendocino County, is to create burn piles of the same dry, highly combustible, ladder-like deadwood and low branches and gathering them into central piles to be burned all at once. While fires are beneficial to forests, and are certainly part of the forest's cycle, it is a waste in a populated area to destroy so much usable fuel. Wood is renewable energy. Coupled with clearing and preventing forest fire, collecting dry, thin, highly combustible wood from the surrounding forest of one's home

both offers a renewable energy source as well as reduces the chances of a fire eating up the home. From www.woodheat.org : “We start from the premise that heating a house with wood, partly or totally, is environmentally appropriate (conditionally) and economically beneficial. That doing it is physically healthful, and that experiencing it is comforting to the body and soothing to the spirit. Big claims for a heating fuel.”³

Is wood burning a “fringe solution?” Some alternative methods of energy production, such as biodiesel, are considered fringe or temporary solutions because they cannot be used by everyone forever. There isn’t the infrastructure in place to collect and transform enough used vegetable oil to run everyone’s transportation needs. It is thus a fringe solution. The same may be said for a small forest such as the Ecovillage in Laytonville, but taking in the factors of highly efficient, insulated passive solar design in the dwellings; correct use of the stoves and proper ecological forest management, wood burning may be the long-term solution for energy needs here. "My assessment is that a healthy, well managed forest can tolerate a moderate loss of biomass each year without any decline in viability."⁴ The same arguments can be made from the standpoint of the environment, for which all factors, both of resource depletion and air quality impact, must be weighed. Journeytoforever.org: "In fact burning wood is no bad thing: the efficient use of wood fuel is much more eco-friendly than more efficient and convenient fuels like kerosene and natural gas (LPG). LPG emits 15 times more CO₂ (carbon dioxide) per kg than wood, and kerosene nearly 10 times as much. CO₂ is the main source of global warming. And as long as wood burning is sustainable and doesn't cause deforestation, its CO₂ emissions are neutral -- the CO₂ released in the fire simply gets recycled back into more trees."⁵

A few EPA-certified wood burning stoves

Brand/Model	Emissions (g/hr)	Efficiency	Heat Output (BTU/hr)	Price
JØTUL 602B ⁶ http://jotulflame.com/	5.2	63%	9,700 – 42,100	\$700.
JØTUL F 118 “Black Bear” http://jotulflame.com/	3.5	63%	12,000-23,500	\$1200.
QuadraFire Cumberland Gap http://www.aladdinhearth.com	3.4	63%	11,200 – 44,300	\$1799.

A note on hot water via thermosiphoning It is possible to increase the efficiency of a wood burning stove even further by installing a heat exchanger either to the flat back surface on the exterior of the stove, or by means of a pre-fab kit (which are somewhat difficult to find) to the inside. The water running through the coils inside or outside the firebox will heat water for domestic use (not radiant floor heating, but showering, for example). The hot water will provide heated or "pre-heated" water in the same way solar thermal water does, thus reducing the reliance on non-renewable energy. The wood stove

combined with a hot water system will double the efficiency. See the informative article at <http://hearth.com/what/woodstovedhw.html> . (Includes links to heat exchange sources.)

Resources and More Information:

- Mendocino County Air Quality Management Board website, containing contact information and updates:
<http://www.co.mendocino.ca.us/aqmd/index.htm>
- A useful, graphic explanation of the steps of combustion:
<http://www.ecoharmony.com/thesis/AppdxD.htm>
- "A good place to learn how to burn wood better:"
<http://www.woodheat.org/>
- The Journey to Forever website is great for many reasons including extensive information on cook stoves and research into wood burning and other fuels. Biomass burning, biodiesel and other appropriate technology resources:
www.journeytoforever.org
- EPA site with technical information on wood stoves:
<http://www.epa.gov/woodstoves/technical.html> .
- Lists of the manufacturers of stoves and stove parts with ratings:
<http://hearth.com/prod.html>
- Ten reasons to use wood heat:
<http://www.woodheat.org/why/10good.htm>
- Good source of general wood combustion information:
<http://www.metaefficient.com/metaefficient/archives/heating/efficient-wood-burning-stoves.html>
- San Joaquin County's Air Quality Firm Valley Air supplies all manner of consumer information. For air breathers in any county:
http://www.valleyair.org/BurnPrograms/wood_burning.htm
- Even BoyScouts are found to build inefficient fires. Learn the art of burning;
http://www.canren.gc.ca/prod_serv/index.asp?CaId=103&PgId=613
and: "wood_burning_handbook.pdf," from the California Air Resources Board, available for download from the Valley Air website:
http://www.valleyair.org/BurnPrograms/wood_burning.htm

¹ http://journeytoforever.org/at_woodfire.html

² This document was prepared by the Air Program, U.S. Forest Service – Northern Region, with assistance from the Office of Air Quality Planning & Standards in the U.S. Environmental Protection Agency. For more information, call 406-329-3493. August 2000

³ <http://www.woodheat.org>

⁴ <http://www.woodheat.org/q&a/qaenvironment.htm>

⁵ <http://www.journeytoforever.org>

⁶ See the CoolTools review of the Classic 602 at
<http://www.kk.org/cooltools/archives/000666.php>