Renewable Energy
Can Meet Mississippi's Needs

People have been presented only a false choice between conventional fossil fuels and nuclear power. Based on the work of governments, universities and other organizations in the United States, Europe and Japan, it is technically and economically feasible for a diverse mix of existing renewable technologies to completely meet Mississippi's electricity needs over the coming decades. The Gulf Coast states have vast renewable resources, which can be harnessed effectively and reliably. This can be done without producing carbon emissions, radioactive waste, or other significant pollution.

Mississippi continues to be reliant on polluting fossil fuels and nuclear power for its electricity generation. Electricity consumption in Mississippi totaled 46 million megawatt hours (MWh) in 2004. Of this total, 73.2% was produced using fossil fuels and 23.4% from nuclear power.[1] In order to avoid continued pollution, halt climate change, and increase energy independence, Mississippi and the other Gulf Coast states must tap into their renewable energy resources, including solar, wind, advanced hydropower, and geothermal energy.[2] While non-hydro renewables presently provide just 3.4% of electricity in the Mississippi, *it is technically and economically feasible for a diverse mix of existing renewable technologies to completely meet the state's electricity needs in the coming decades.*

Solar

According to a U.S. Department of Energy evaluation of solar energy potential, "Mississippi has a good, useful resource throughout the state."[3] A 2004 Energy Foundation report concluded that in the next two decades with current technology *solar photovoltaic panels (PV) could provide Mississippi with 27 million MWh per year - about 59% of Mississippi's annual electricity consumption*. This is a low estimate, as it uses a modest value for Mississippi's hours of sunshine and only includes the available residential and commercial roof space. Using the available space from parking lots, awnings, windows, highway medians, and industrial buildings would further increase the amount of potential electricity generated from solar in Mississippi. The overwhelming majority of solar panels can and would be built into existing buildings and infrastructure, and will not take up any additional land.

Wind

Mississippi also has useful wind resources, particularly offshore. A Stanford study on U.S. wind resources in 2003 found that the Gulf of Mexico has a potential bounty of coastal and offshore wind energy – much more so than previously believed.[4] Offshore wind typically has higher speeds and more regular patterns than wind over the land. To date, however, no complete mapping has been done of Mississippi's wind resources[5]. The few studies that have been done are dated and limited in scope.[6] Specifically, they are based on very few measurements taken with outdated techniques like measuring wind speed at 50 meters. Most wind turbines range from 60 to 80 meters where winds are stronger.[7]

According to the 2003 Stanford study, Mississippi has at least two significant offshore areas with class 4 and 5 winds respectively.[8] These classes of wind are typically rated by the Department of Energy as "good" and "excellent" for commercial production. *Two large wind installations in these areas each of 120 turbines would produce 1.4 million MWh annually – equal to the contribution from all of Mississippi's non-hydro renewables in 2004.[9] In other words, developing just these two wind sites would double renewable generation in the state. This is before any systematic mapping has been done. Given the wind sites in the Gulf Coast region near Louisiana, Texas, and Florida, it would not be unreasonable to expect Mississippi to have additional wind resources.[10]*

According to the Stanford study, Louisiana has several areas offshore with class 6 and 7 winds, and could be a large source of offshore wind power in the U.S.[11] Recently companies like Wind Energy Systems Technologies LLC (WEST) have proposed the installation of offshore wind turbines on abandoned oil and natural gas platforms in the state. The Florida panhandle also has offshore wind areas of mostly class 4 strength,[12] and Texas has an even larger coast with class 4, 5, 6, and 7 winds capable of commercial electricity production. In 2005, the Texas General Land Office announced the development of one of the first offshore wind projects in the U.S. just off of Galveston Island.

While the siting of wind turbines has been controversial in some communities, turbines are clean and safe, and have far fewer impacts than other forms of electricity generation. Improved turbine design has virtually eliminated turbine noise, while establishing siting considerations and limiting the number of turbines in one area has reduced concerns about visual effects. Bird and bat migration is being addressed through monitoring, warning signals, and site selection that takes their migratory patterns into account.[13] Much of Mississippi's wind is also offshore, meaning turbines would be five to fifty miles from shore – barely visible as specks on the horizon.

What about Variability and Intermittency?

One major concern often raised regarding solar and wind generated electricity is variability and intermittency. Although it is true that "the sun doesn't always shine and the wind doesn't always blow" - it is possible to harness these sources of energy in a way that substantially reduces these problems. Mississippi has a diverse renewable resource base, and the solar resources across the state could be balanced with the wind resources along the coast, advanced hydroelectric generation, and some types of sustainable biomass. Demand reductions through geothermal heat pumps and other forms of efficiency could also help these technologies meet the state's needs. Advanced hydro is already capable of producing baseload power, and offshore wind has similar potential. Peak solar energy production is particularly beneficial in Mississippi because it coincides with high energy demand for air conditioning during the summer.

A recent analysis by the International Energy Agency (IEA) - an intergovernmental body of twenty-six countries committed to advancing security of energy supply, economic growth, and environmental sustainability- *concluded that intermittency is not a technical barrier to renewable energy*. To deal with variability and intermittency, IEA recommends distributed generation, links across geographic areas, a diverse mix of technologies harnessing different resources, and the continued development of storage technologies. In the near term, single stage gas turbines could also be used to meet shortfalls in peak demand.

Significant advances along these lines have already been made. Presently, one of the best options for storage is hydroelectric pumped water. Hydroelectric pumped storage moves water from lower to higher reservoirs when extra electricity is being produced, and releases it when that energy is needed. These systems are well-established, low in cost, up to 80% efficient, and have an enormous capacity for storage. Mississippi currently operates no hydroelectric facilities, but has the potential to do so. Unfortunately, large conventional dams cause serious environmental damage. The Department of Energy estimates that advanced systems which minimize environmental impact can be applied at more than 80% of existing hydropower projects and all new projects.[14] A DOE resource assessment report found 19 existing impoundments in Mississippi suitable for 62.2 MW of pumped storage and 6 additional undeveloped sites with a potential storage capacity of 29.4 MW. Also, because energy is stored in times of excess generation, pumped storage systems do not compete with hydro generation.[15]

Geothermal

Geothermal heat pumps are systems that use the relatively constant temperature of the earth to heat and cool buildings, reducing the energy typically used for these purposes. These pumps can reduce a building's energy use by 30 to 60%.There are two principle types of geothermal heat pump systems – a vertical loop design and horizontal loop design. The vertical loop system is only a few feet wide, but extends deeper into the ground (350 ft average depth). The horizontal system only extends 12 to 18 ft. underground, but stretches much longer horizontally. The type and size of the system required depends on the amount of space available, as well as local geology and soil type.

The Department of Energy states that Mississippi has "resources that can be tapped for direct heat or for geothermal heat pumps."[16] Geothermal pumps save approximately a maximum of 1 kW per ton of capacity.[17] An average geothermal heat pump for a home has a capacity of about 3 tons,[18] and can be used to reduce the use of electricity for cooling and natural gas for heating. At Fort Polk Army Base in West Central Louisiana, where geothermal heat pumps were installed in 4,003 U.S. Army apartment housing units in 1996, electrical consumption was reduced by 26 million kWh, or 6,445kWh per apartment.[19] Geothermal pumps in commercial, industrial, and public buildings could result in even greater savings.

Other Forms of Efficiency

Efficiency is an important way to reduce electricity use and facilitate the transition to renewable technologies. Efficiency also pays for itself many times over, as electric bill savings more than cover the efficiency improvements. Examples include energy-efficient appliances, properly weatherizing buildings, and insulating hot water tanks and pipes. In 1993, the U.S. federal government's Office of Technology Assessment (OTA) estimated that the U.S. could reduce its electricity use 20-45% by adopting currently available efficiency technologies. Since the early 1990's when this analysis was performed, other efficiency measures - such as LED lights - have become commercially available, and thus the energy reductions possible through efficiency today are likely to be even greater. Electricity demand reduction through efficiency would further help Mississippi meet its electricity needs.

What about Cost?

Despite the perception that renewable technologies continue to be too expensive to consider, wind power at good sites in the U.S. is already significantly cheaper than power would be from new nuclear power plants.[20] Solar is still more expensive, but higher efficiency thin film panels and expanding manufacturing are expected to cause a significant drop in these prices.[21]

Moreover, conventional technologies such as coal and nuclear power have costs that are unaccounted for in our present economic models, such as carbon emissions, air pollution, land and water degradation from mining, the safety and security risks posed by commercial reactors, risks from nuclear weapons proliferation, and the dangerous legacy of radioactive waste. These costs should be accounted for in the price of these technologies before any price comparisons are made.

Also, over the last fifty years, federal support for nuclear power and fossil fuels has far surpassed support for renewable technologies, resulting in unequal technology development and commercialization. According to a report by the Renewable Energy Policy Project (REPP), from 1947 through 1999, direct federal government subsidies totaled $115.07 billion for nuclear power and $5.49 billion for wind and solar.[22] To make up for these problems, states around the U.S. now offer financial incentives for investing in renewable technologies.

For the documents referenced in this fact sheet, please see http://www.citizen.org/cmep/energy_enviro_nuclear/renewables/articles.cfm?ID=15584

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Public Citizen's Energy Program
Phone: (202) 588-1000
cmep@citizen.org
www.energyactivist.org