

## Hydroelectric Power in Missouri

Some Missouri river systems are suitable for hydroelectric power generation, but none have both the high head and high flow required to produce large amounts of energy. The Osage System (Lake of the Ozarks) and the White System (Table Rock Lake) each have multiple electrical generating stations, and electricity is also generated at Mark Twain Lake and Lake Wappapello. Our hydroelectric power is used to meet peak demand, not base demand. Together, Missouri's hydroelectric plants generated 123,000 mWh in 2004, just over 1% of our total usage.<sup>i</sup>

The Osage Generating Station at Lake of the Ozarks is Missouri's largest, and belongs to AmerenUE. The Ozark Beach station at Lake Tanneycomo is Missouri's oldest and belongs to Empire District. Most of the remaining generating stations belong to the Army Corps of Engineers (ACE) and sell their energy to the Southwest Power Administration (SPA). SPA is the regional distributor for Federally owned hydroelectric energy in Missouri, Arkansas, Louisiana, Kansas, Oklahoma, and Texas. By federal statute it may sell its power only to publicly owned utilities, primarily cities and rural electrical coops.<sup>ii</sup> Historically, hydroelectric power has played a large role in rural electrification.

The Missouri River is not dammed in Missouri. The Mississippi River, however, has six dams abutting Missouri: the Melvin Price Dam at Alton, Dam 25 at Winfield, Dam 24 at Clarksville, Dam 22 at Saverton, Dam 21 at Quincy, and Dam 20 at Canton. None of them currently generate hydroelectric power, although the City of Quincy is studying the feasibility of adding power plants to Dams 20, 21, and 22. Using data regarding the average rate of flow of the Mississippi River and the height of the average lift at the Melvin Price Dam, one can roughly calculate the theoretical amount of hydropower available there to be 889 thousand mWh per year.<sup>iii</sup> If we could capture half of that, it would equate to more than three times as much as Missouri's current total hydroelectric production, and a little less than 5% of Missouri's annual electrical demand. If we could capture half of the energy from each of the six dams abutting Missouri, it would represent a large potential energy resource, equal to perhaps 20-25% of Missouri's electricity demand.

The dams on the Mississippi represent a particularly attractive possibility. A white paper such as this cannot address the building challenges involved, but the dams already exist, thus, the largest cost factor may already be taken care of. The reservoirs also already exist, and they are relatively small compared to the size of the river itself. The negative environmental effects might be limited chiefly to the effects on fish sucked through the turbines. The principle issues would be funding, division of the power between stakeholders, and the problem of privately owned utilities, which have historically opposed such projects, viewing them as competition.<sup>iv</sup>

It is great that we use hydroelectric power to the extent that we do. But we have more than three times more flowing past our doorstep. It requires no building of new dams and flooding of land with new reservoirs. It requires only the building of power plants to harness the power. It should be state policy to exploit this clean power resource and to maximize our use of hydroelectric power in every way possible.

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<sup>i</sup> *Missouri state energy profile*. Energy Information Administration. Retrieved online 12/11/2007 at <http://tonto.eia.doe.gov/state>.

<sup>ii</sup> *Southwest Power Administration Annual Report, 2004-2006*. Southwest Power Administration. Retrieved online 12/13/2007 at <http://www.swpa.gov>.

<sup>iii</sup> The power available in falling water is equal to the distance it falls (the head), times the rate at which the water flows, times the the gravitational constant. (*Micro-hydro power*, Practical Action. Retrieved online at <http://practicalaction.org/practicalanswers/index.php?cPath=21>.) These values can all be found on the Internet. The gravitational constant is approximately 9.8 meters per second squared (*Standard gravity*, Wikipedia). The average flow of the Mississippi at St. Louis is 4,757 cubic meters per second (*Mississippi River*, Wikipedia). The Melvin Price Dam, however, is above the Missouri River confluence, so you must subtract the flow of the Missouri River, which is 2,490 cubic meters per second (*Missouri River*, Wikipedia), yielding a flow at the dam of 2,267 cubic feet per second. The average head is 15 feet (*Melvin Price lock and dam*, U.S. Army Corps of Engineers). Do the multiplication, and it yields 102 megawatts, which translates to 889 thousand megawatt-hours per year.

<sup>iv</sup> *Southwest Power Administration overview video*. Southwest Power Administration. Viewed online 12/14/2007 at <http://www.swpa.gov>.