Free as Running Water: Hydro-electricity

The U.S. consumed 2.84 quads of hydroelectricity in 2000[265], some imported from Canada. Thanks to global warming caused droughts, and competing uses, available hydroelectricity may not stay at that level. Also, hydroelectricity is extremely damaging ecologically, disrupting critical habitats and often endangered species. However, a lot of existing dams are used only for flood control and water supply; some of them could add turbines without affecting these existing uses or causing additional damage. Also, small hydro plants use canals and ditches rather than dams, and thus may do less environmental damage. This potential is almost untouched. We don't know what hydroelectric production in the U.S. will be at the end of this century. Given that the need for flood control and water supply won't go away, and the potential to add turbines to existing dams, plus small hydro potential we can guess that it won't be substantially less than we have now. Given the limiting climate and ecological factors needed we can guess it won't be substantially more. So a good tentative guess is that we can keep production about the same at a reasonable economic and ecological cost. But, we need to understand that there is a huge question mark; that is an extremely foggy number.

Most regions with hydroelectric power produce significantly less than needed just for their own consumption - even after the efficiency improvements recommended[266]. But the regions that produce the most hydroelectricity, the Pacific Contiguous and Rocky Mountain census areas, produce much more than their requirements after efficiency measures[266]. Hydroelectricity is among the most important renewable energy resources – because dams make it storable and dispatchable. Within limits we can store hydroelectricity and dispatch when we choose. (The limits are, of course, that dams are also important for flood control, and irrigation. We can’t let them get too full, nor waste water we need for other purposes.)

According to the California Energy Commission, the levelized production costs of hydroelectricity are about 6.04 cents per kWh.

End Notes

[265] Stacey C. Davis and Susan W. Diegel, *TRANSPORTATION ENERGY DATA BOOK: - Edition 22*, ORNL-6967 (Edition 22 of ORNL-5198). Sep 2002. *Center for Transportation Analysis Science and Technology Division of the Oak Ridge National Laboratory for the U.S. DOE*, 23/Sep/2005 <http://www-cta.ornl.gov/cta/Publications/pdf/ORNL-6967.pdf>. p563. Energy and Utilities - Table No. 877. Energy Supply and Disposition by Type of Fuel: 1960 to 2000
[In quadrillion British thermal units (Btu). For Btu conversion factors, see source]

[266]Hydroelectricity:
United States Department of Energy, Energy Information Administration, *Table E2. Existing Capacity at U.S. Electric Utilities by Census Division, State, and Prime Mover, 2000.* 24/Sep 2002, United States Department of Energy, Energy Information Administration, 22/Aug/2004 <http://www.eia.doe.gov/cneaf/electricity/ipp/html1/ippv1te2p1.html>.

Estimates for power consumption by State:
United States Department of Energy, Energy Information Administration, *State Energy Data 2000: Consumption Estimates for Power Consumption by State.* 2003, United States Department of Energy, Energy Information Administration, 22/Aug/2004 <http://www.eia.doe.gov/emeu/states/sep_use/total/csv/use_all_btu.csv>.