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INNOVATIVE WATER SUPPLIES FOR THERMOELECTRIC POWER GENERATION

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ABSTRACT: Water is integral to the production of energy. Water systems dominate the cooling and emissions scrubbing in thermoelectric power plants. The thermoelectric power generation market accounts for over 40 per cent of the freshwater withdrawals in the U.S. annually and accounts for 3 per cent of the consumptive use. As water supplies become increasingly limited and regulatory constraints become more stringent, the electric power industry is using a wider range of alternative supplies and improved water use technologies. Among the alternative supplies are recycled municipal wastewater, brackish groundwater, and seawater. Each of these alternative supplies posed particular constraints in terms of water quality and treatment requirements. A summary of more than twenty case studies of innovative water supplies for power production is presented to demonstrate new approaches for obtaining reliable water supplies. Most of the case studies are in the Sun Belt of the United States, but others are from Australia and Asia. The types of fuel used for thermoelectric power production in these case studies include coal, oil, natural gas, and nuclear. The plant sizes range from 50 to 3,000 megawatts. The treatment processes and costs of treatment required for the use of these alternative supplies are also summarized. New technologies to improve water use efficiency or to meet water quality discharge standards are finding increased use within the electric power industry, and the water use implications of these technologies will be addressed. Particular technologies of interest include recovery of moisture in flue gases by multistage cooling and zero liquid discharge for waste streams. Among the notable case studies presented are the Western Corridor Recycled Water Project in Australia, the Turkey Point Nuclear Plant in Florida, the Sandy Creek Power Station in Texas, the Reliant Energy Desert Basin Combined Cycle Plant in Arizona, and the Taylorville Energy Center in Illinois.

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