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Innovations for Thermoelectric Cooling Technologies: Potential Benefits to the Energy-Water Nexus

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INNOVATIONS FOR THERMOELECTRIC COOLING TECHNOLOGIES: POTENTIAL BENEFITS TO THE ENERGY-WATER NEXUS

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This paper is being submitted as part of a panel proposed by Michael Sale on the topic of Science and Technology Innovations for the Energy-Water Nexus.

Thermoelectric power generation currently accounts for 40% of all fresh water withdrawals in the U.S. - the same as is withdrawn for irrigation – and for approximately the same amount of fresh water consumed as the industrial/mining sector. Future consumption may significantly increase due to regulatory-induced shifts to closed cycle cooling. Most of this water is used to manage waste heat. Water availability currently limits the siting of facilities and the generation of electricity throughout the U.S. Meanwhile, demand for electricity is projected to increase by 53 percent from 2003 to 2030.

The conflicts that result at this nexus of energy and water create opportunities for R&D and technology innovation in the use and management of heat during thermoelectric generation. This paper will examine the opportunities to reduce cooling water demand, utilize waste heat, access alternative water supplies, regenerate process and cooling water and implement alternative environmental technologies during thermoelectric power generation

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