

Water and Energy

Water and Energy – Threats and Opportunities creates awareness of the important coupling between water and energy. It shows how energy is used throughout water cycle operations and demonstrates how water is used and misused in all kinds of energy production and generation.

Population increase, climate change and increasing competition between food and fuel production create enormous pressures on both water and energy availability. Since there is no replacement for water, water security looks more crucial than energy security. This is true not only in developing countries but also in the most advanced countries. The western parts of the USA suffer from water scarcity that provides a real security threat.

The book does not aim to show “how to design” or to solve some of the very intricate conflicts between water and energy. Instead it systematically lists ideas, possibilities and a number of results. There are a few more technical chapters that act as entry points to more detailed technical literature.

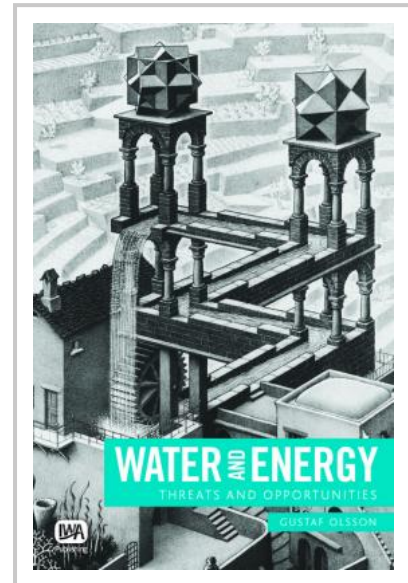
Part One describes the water-energy nexus, conflicts and couplings between water, energy and food security.

Part Two captures how climate change, population increase and growing food demand impact water availability worldwide.

Part Three describes how energy production and conversion depend on water. Environmental consequences of oil and coal exploration and refining are huge around the world. Oil leak accidents have hit America, Africa, Europe and Asia. The competition between hydropower generation, flood control and water storage is illustrated. The importance of water for cooling thermal power plants is described, as tragically demonstrated at the Fukushima nuclear plants in 2011. Climate change further emphasizes the strong coupling between water availability and the operation of power plants.

Part Four analyses how water production and treatment depend on energy. A lot can be done to improve equipment, develop processes and apply advanced monitoring to save energy for water operations. Significant energy can be saved by better pumping, reduction of leakages, controlled aeration in biological wastewater treatment, efficient biogas production, and improved desalination processes.

The book is suitable for a wide and varied readership, from engineer to politician, from student to water/energy professional.



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