

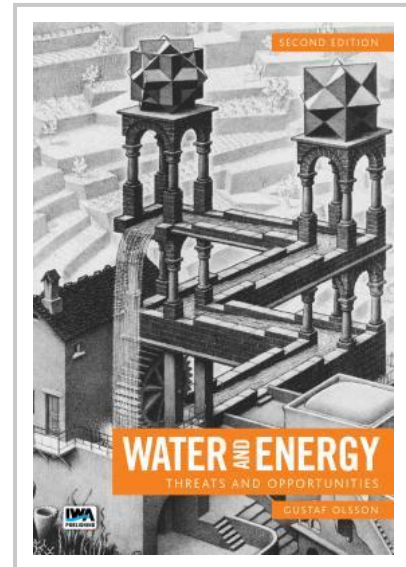
Water and Energy: Threats and Opportunities - Second Edition - Student Edition

Student Edition of *Water and Energy: Threats and Opportunities – Second Edition*^[1]

Rapid and important developments in the area of energy-water nexus in recent years have been significant. This timely new edition continues to highlight the inextricable link between water and energy, providing an up-to-date overview with detailed summaries of the technical literature.

This edition has been updated throughout and major changes are:

- new chapters on global warming and fossil fuels, including shale gas and fracking
- consequences of the Deepwater Horizon accident in the Mexican Gulf and the Niger Delta oil spills
- developments in hydropower
- continued competition between food, water and energy



This book creates awareness of the important couplings between water and energy. It shows how energy is used in various water cycle operations and demonstrates how water is used and misused in all kinds of energy production. 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. For example, the western parts of the USA suffer from water scarcity that provides a real security threat.

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

Part Two captures how climate change, population increase and growing food demand will impact water availability around the world.

Part Three describes how energy production and conversion depend on water availability. The environmental consequences of oil and coal exploration and refining are huge, in North America and worldwide. Furthermore, oil leak accidents have hit America, Africa, Europe and Asia. Consequences of hydropower and the competition between hydropower generation, flood control and water storage are discussed. The importance of water for cooling thermal power plants is described, as tragically demonstrated at the Fukushima nuclear plants in 2011. Climate change emphasizes the strong coupling between water availability and 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 amounts of energy can be saved by better pumping, reduction of leakages, controlled aeration in biological wastewater treatment, efficient biogas production, and improved desalination processes.

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