

Overview

NREL Stakeholder Technology Forum Exploring the Energy/Water Nexus: A Stakeholder Dialogue for Identification of Critical Issues

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National Renewable Energy Laboratory

- Only national laboratory ***dedicated*** to renewable energy and energy efficiency R&D
- Research spans fundamental ***science*** to ***technology*** solutions
- ***Collaboration*** with industry and university partners is a hallmark
- Research programs ***linked*** to market opportunities



Major NREL Thrusts

Wind

- Photovoltaics
- Solar Thermal

Biomass

- Biorefineries
- Biosciences

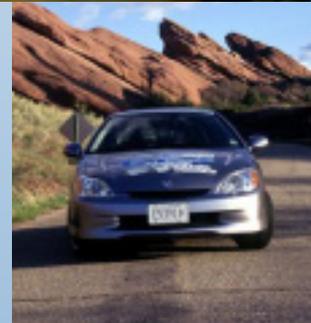
Geothermal

Hydrogen

- Production
- Storage
- Delivery and End Use
- Systems Integration

Distributed Energy

- Distribution and Interconnection
- Thermal Systems
- Superconductivity



Vehicle Technologies

- FreedomCAR
- 21st Century Truck

Building Technologies

- Building Efficiency
- Zero Energy Buildings

Federal Energy Management

Basic Energy Science

- New Materials
- Chemical and Biological Sciences

Analytical Studies

International

Energy and Water are Inextricably Linked Functionally / Geographically

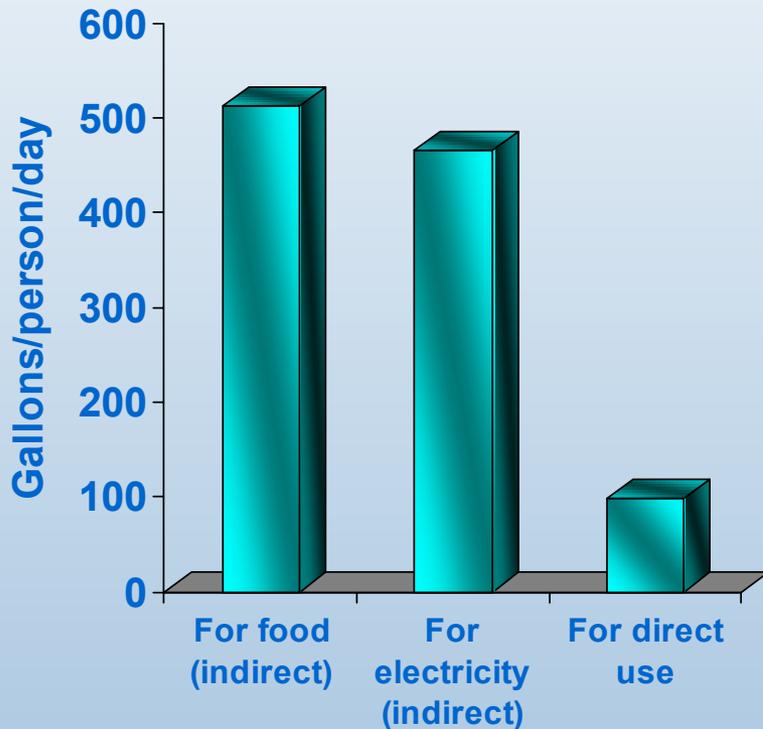
Energy production and generation require water



Water pumping, treatment, and distribution require energy

Energy Requires Water

Water used to produce household electricity exceeds direct household water use



GALLONS PER PERSON PER DAY

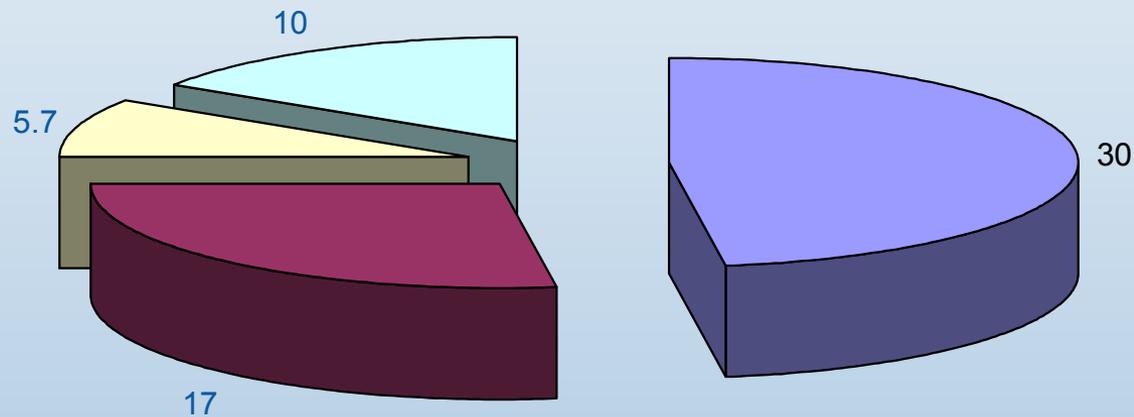
- 510 for food production
 - includes irrigation and livestock
- 465 to produce household electricity
 - Range: 30 to 600 depending on technology
- 100 direct household use
 - includes bathing, laundry, lawn watering, etc.

Source: derived from Gleick, P. (2002), *World's Water 2002-2003*.

Water Requires Energy

Annual Electricity Consumption, BkWh

\$4.7B per annum



- Water Supply
- Pumping for Wastewater Treatment
- Aeration in Wastewater Treatment
- Irrigation

EPA/IFC, 2004



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Nanoalumina
Fiber



Workshop Purpose

- Key nexus of energy and water needs
- Critical need for research and solutions
- Build new relationships

Planning Committee

Robert Ward, Director, Colorado Water Resources Research Institute

Bill Karsell, U.S. Bureau of Reclamation

Bill Horak, U.S. Geological Survey

Bob Fullerton, Western Area Power Administration

Art Diem, U.S. Environmental Protection Agency

Doug Arent, National Renewable Energy Laboratory

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