



ELECTRIC POWER
RESEARCH INSTITUTE

Sustainable Water Resources Roundtable Research

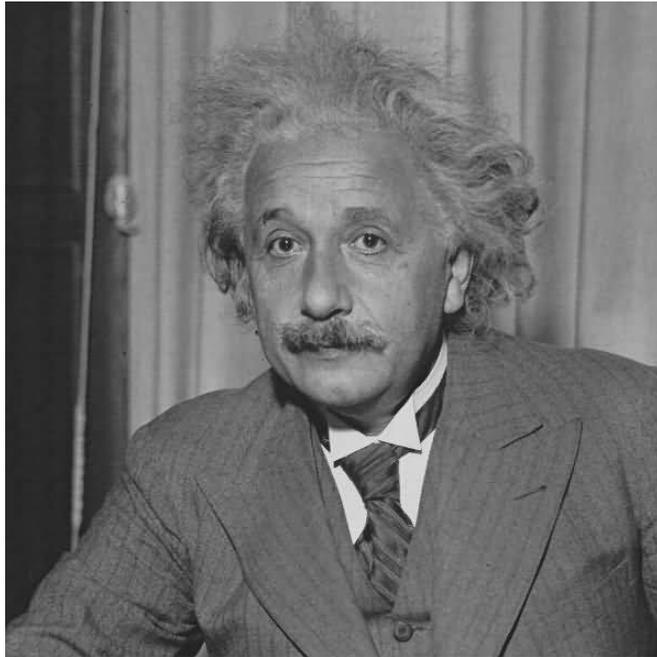
Sustainable Water Resources Roundtable Workshop

January 25, 2007

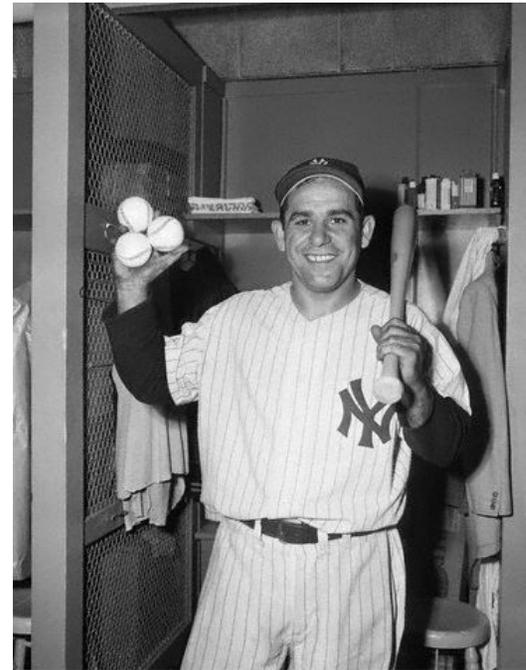
**Robert Goldstein (EPRI) and Paul
Freedman (LimnoTech)**

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The Future



I never think of the future.
It comes soon enough.



The future ain't what it
used to be.

Water is a Shared Resource



John Donne: Meditation XVII

- *All mankind is of one author, and is one volume; when one man dies, one chapter is not torn out of the book, but translated into a better language; and every chapter must be so translated...As therefore the bell that rings to a sermon, calls not upon the preacher only, but upon the congregation to come: so this bell calls us all: but how much more me, who am brought so near the door by this sickness....**No man is an island, entire of itself...**any man's death diminishes me, because I am involved in mankind; and therefore never send to know for whom the bell tolls; it tolls for thee."*

Roundtable Research

- Creates forums to discuss research
 - Needs
 - Programs
 - Plans
- Organizes workshops, conference sessions, and special journal issues
- Contributes publications
- Endorses research efforts
- Macro/micro approaches
- Indicator/criteria research
- Does not fund research



Final Report
September 19, 2005

Great Lakes Region Water Sustainability Research Workshop

April 5 - 6, 2005
University of Michigan, Ann Arbor, MI

Sponsored by:
The Sustainable Water Resources Roundtable
<http://water.usgs.gov/wicp/acwj/swrr>

Hosted by:
University of Michigan ETC
(Environmental Technology Council)

Co-chairs:

Paul Freedman
WEF, SWRR &
Umno-Tech, Inc.

Robert Goldstein
Electric Power Research
Institute & SWRR

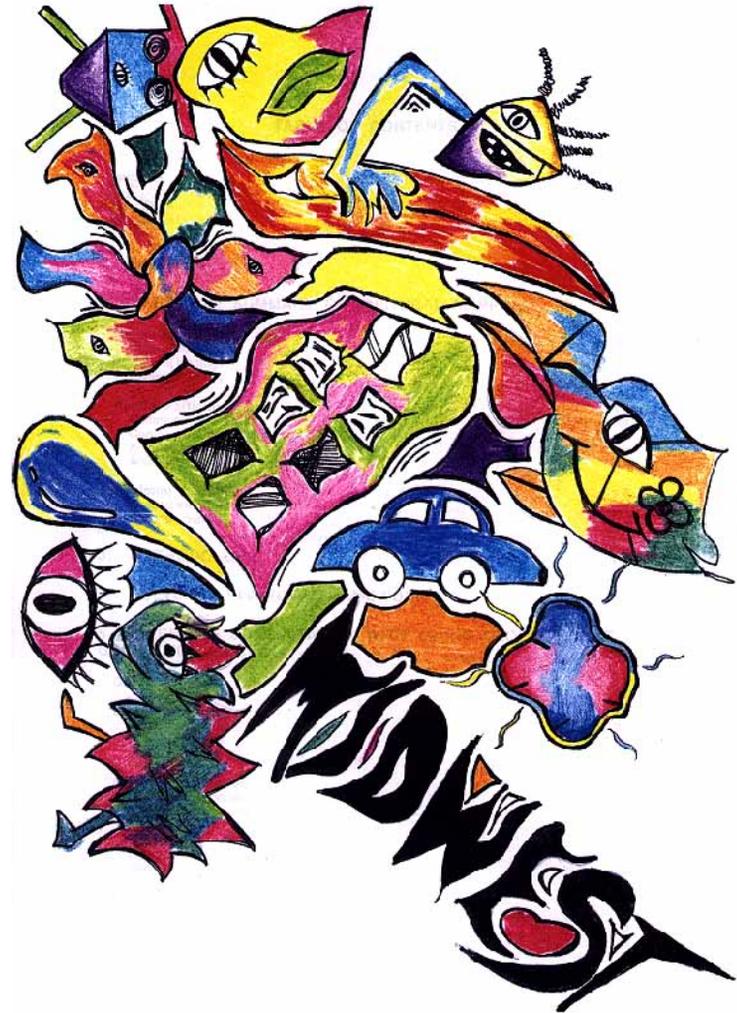
Peter Adriaens
Department of Civil and
Environmental Engineering,
The University of Michigan



SWRR Manager and Facilitator:
David Berry

Represented Sectors

- Power generation
- Agriculture and forestry
- Urban issues
- Manufacturing/industry
- Ecological protection
- Ethics, law and policy



Consensus Needs



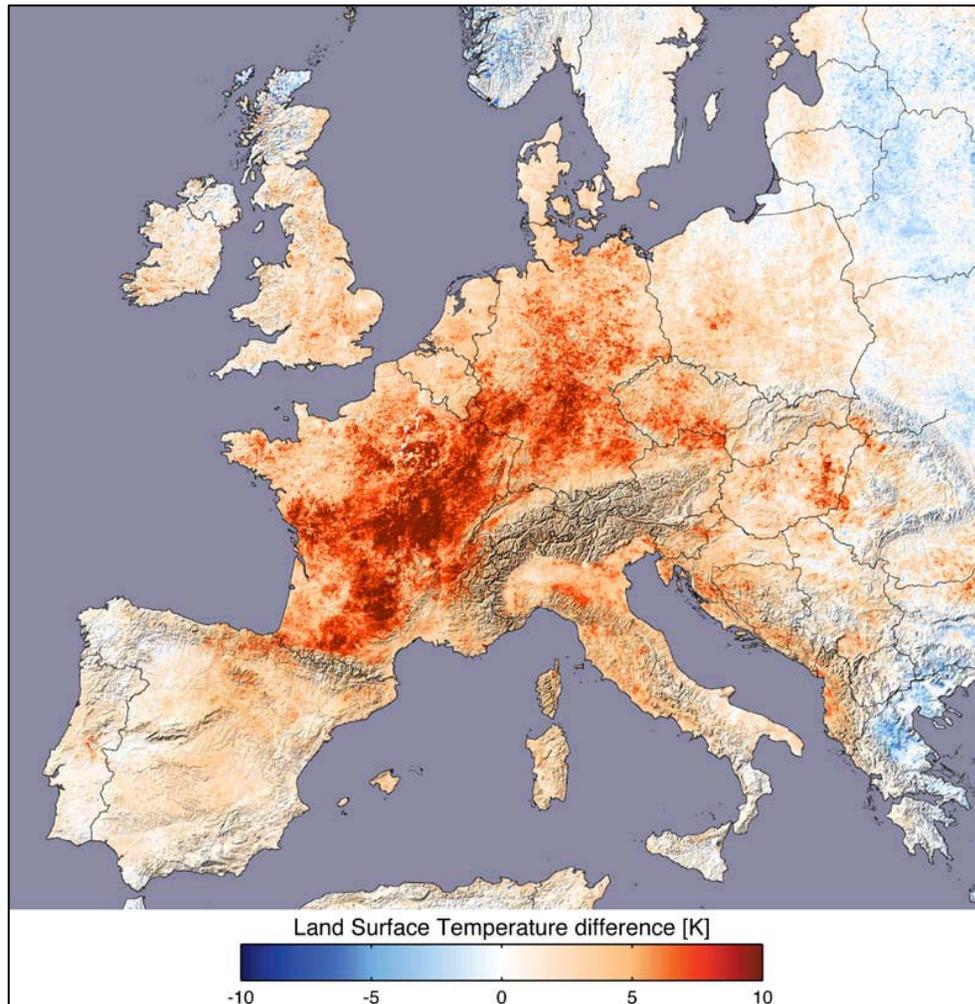
- Improved understanding of critical water resource process and their impact on sustainability
- Decision support models/tools
- Better inventory of critical data
- New monitoring technologies
- Quantify “value” of water
- New policy and law to manage water on regional basis
- Conserve relevant specialists
- Collaboration

First Western Forum on Energy & Water Sustainability

- Bren School of Environmental Science & Management
- University of California, Santa Barbara
- March 22-23, 2007
- http://www2.bren.ucsb.edu/~keller/energy-water/first_forum.htm



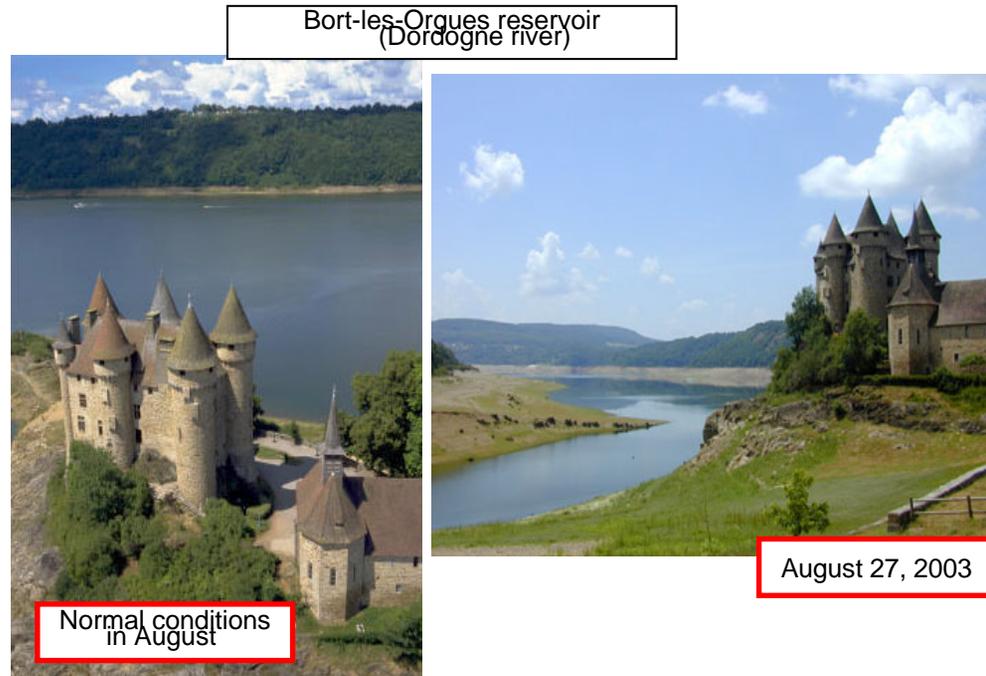
2003 Heat Wave/Drought in France and Europe: exceptional intensity, duration, spatial extent



2003 Mid-summer Temperature
Deviation from Average
(°C)

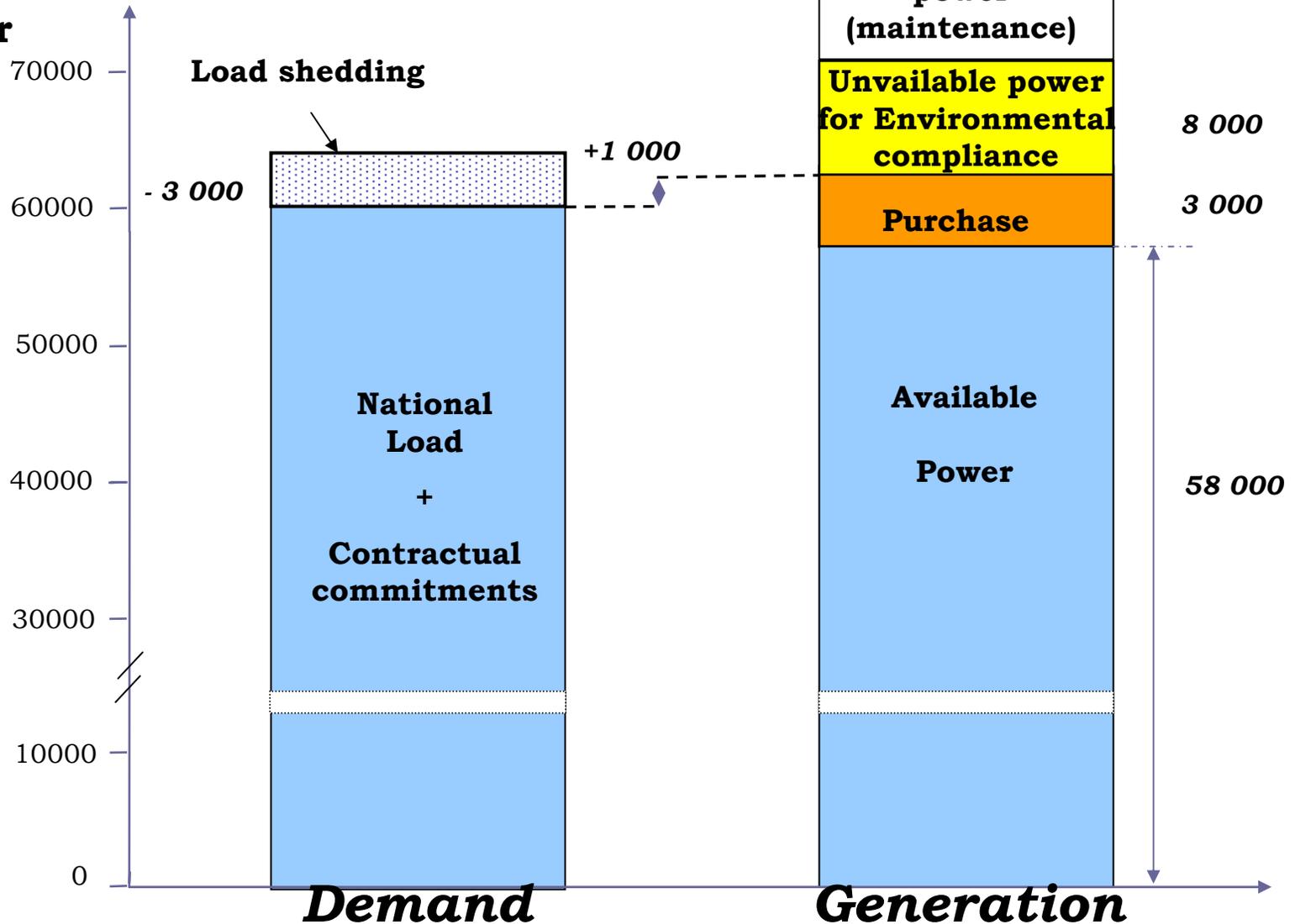
2003 Heat Wave/Drought Impact on French Generation System

- **Nuclear generation** (~ 85 % of mix)
 - **Lost 7 to 15% of capacity for 5 weeks**
- **Hydro generation** (~ 10% of mix)
 - **Lost 20% of capacity**
- **Consequences :**
 - **Peak-load increases 4%**
 - **Purchases** of large amounts of power **on wholesale market**
 - **Large-scale load shedding** and shut off exportation (Italy)
 - **Spot market prices increase** up to 50% on most critical days

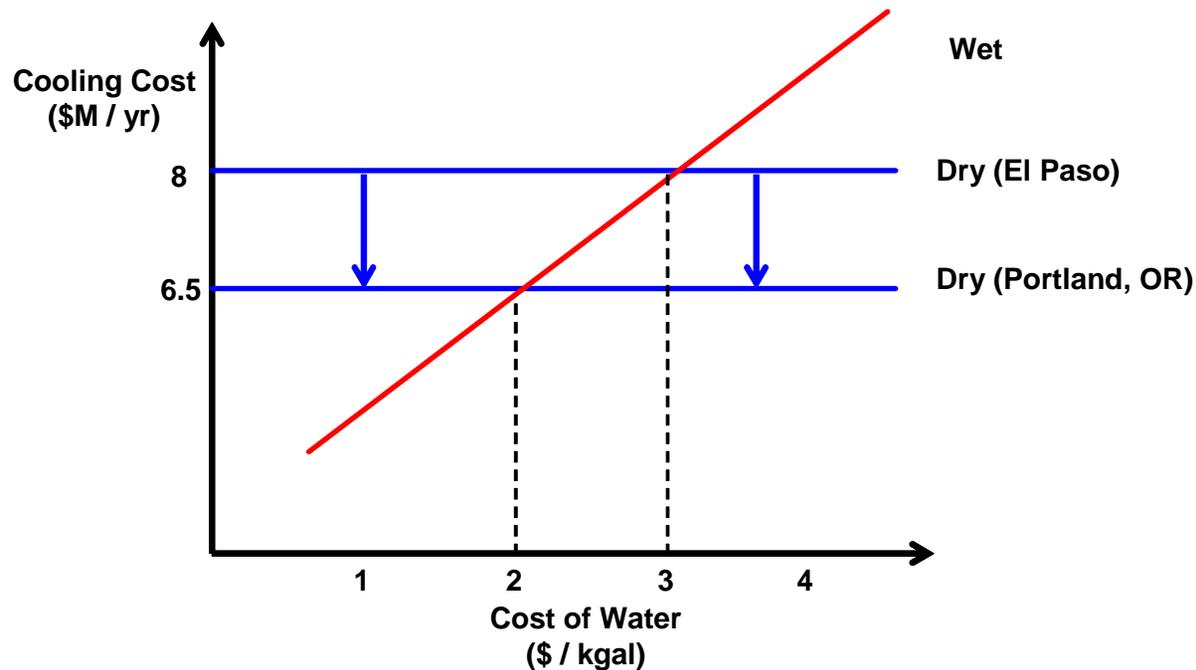


Late July 2006 : French generation/demand

**Power
MWe**

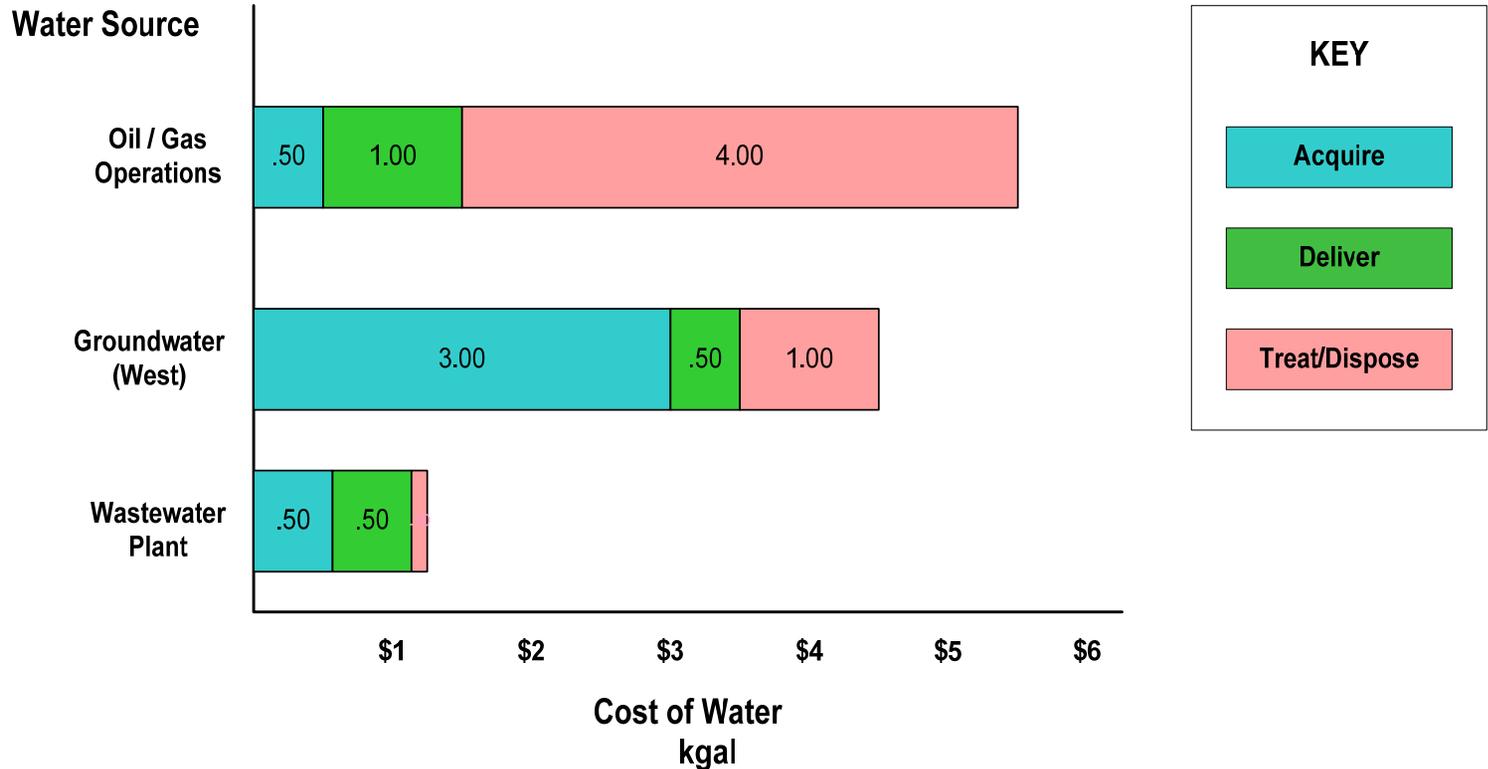


Overcoming Hot Weather Penalty



- Potential benefits:
 - Reduce plant cooling cost by up to \$1.5M/year
 - Increase net profit margin by roughly 1 percentage point
 - Make dry cooling more cost-competitive

Cost of Water – Treatment



- For degraded waters, treatment & disposal can be the largest component of cost.

Urban Wastewater – A Growing Source

- US population growing by about 3,000,000/yr (US Census Bureau)
- Will generate about 60,000 gpm new sewage flows annually (@ 30 gal/day/capita)
- Could cool up to 6,000 MW of new power plants, at 10 gpm/MW.
- This is close to the annual increase in US generating capacity of 7,000 MW (ASCE)



Discussion

- In what research activities and topics would you like to see SWRR engage?
- To what relative degree should research address technology, science, economics and sociology?
- How do we encourage cross sector research?
- Whom do you see as funders of water resource sustainability research?
- How would you justify support to potential funders?
- Can society proactively address water resource sustainability?
- How good are we at predicting future societal developments?
- Would you like to volunteer?

