Framing Energy, Water, and Climate
Critical Links

USDoE Quadrennial Energy Review Task Force Meeting
San Francisco, June 19, 2014

Dr. Peter H. Gleick
www.pacinst.org

Bio/background for Dr. Gleick

- Dr. Peter Gleick co-founded and leads the Pacific Institute in Oakland, one of the most innovative, independent non-governmental organizations in the fields of water and economic and environmental justice and sustainability.
- Dr. Gleick received the prestigious MacArthur "genius" Fellowship in 2003 and was named "a visionary on the environment" by the BBC. He was elected a member of the U.S. National Academy of Sciences in 2006. *Wired Magazine* featured Dr. Gleick as "one of 15 people the next President should listen to."
- He received his B.S. from Yale University and an M.S. and Ph.D. from the University of California, Berkeley. Dr. Gleick serves on the boards of numerous journals and organizations, and is the author of many scientific papers and ten books, including the influential series *The World's Water* and *Bottled and Sold: The Story Behind Our Obsession with Bottled Water*, as well as the 2012 release *A Twenty-First Century U.S. Water Policy*.

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Overview

- Water and energy
- Water, energy, and climate
- Integration of the “nexus” into policy
- Water and security: some thoughts

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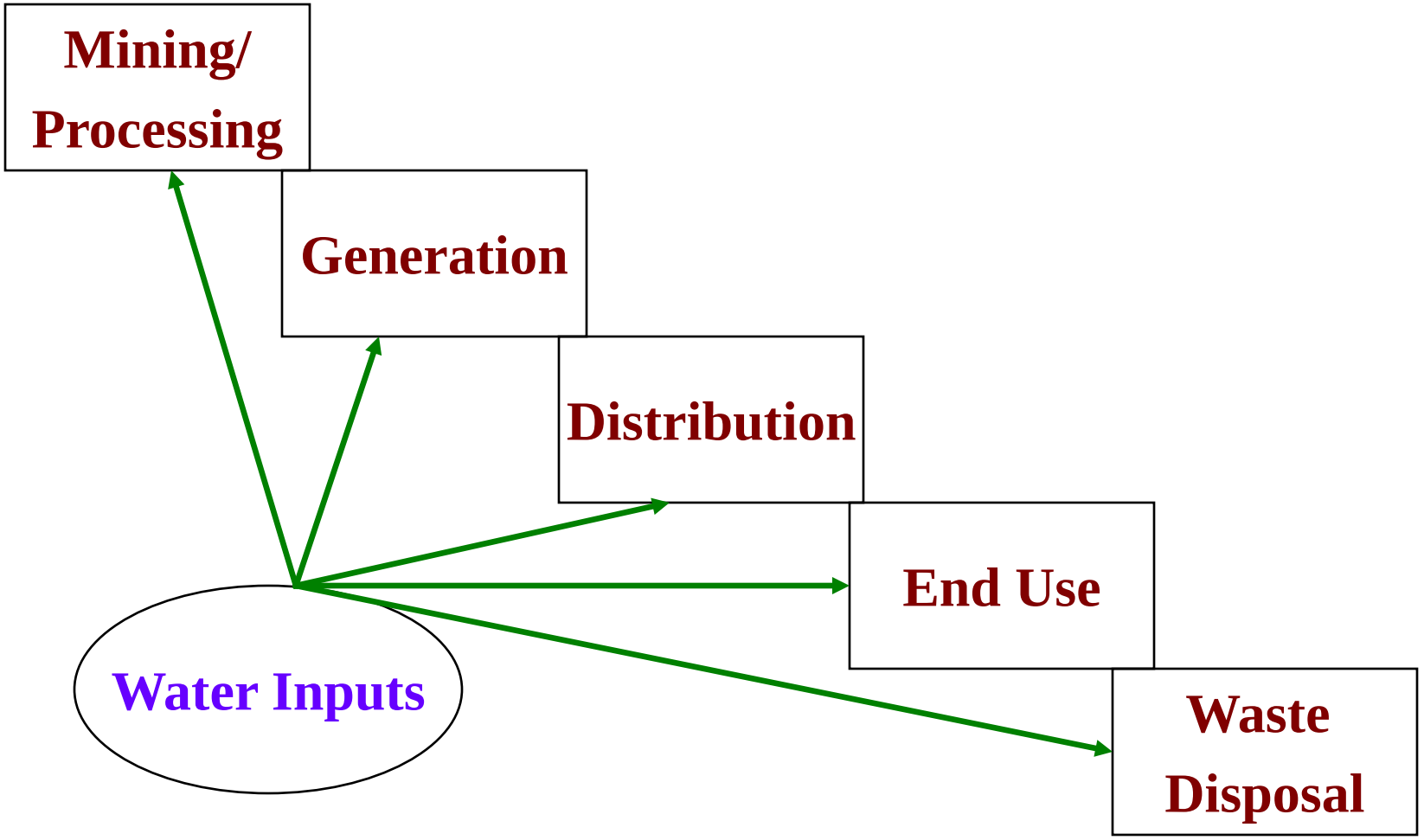
Conclusions

- Water use and energy use are closely linked.
- Limits to each are beginning to affect the other; Yet energy and water issues are rarely integrated in policy.
- Considering them together offers substantial economic and environmental benefits.
- The reality of climate change affects policies in both areas.
- There are growing risks of conflicts over water.

Energy systems require water



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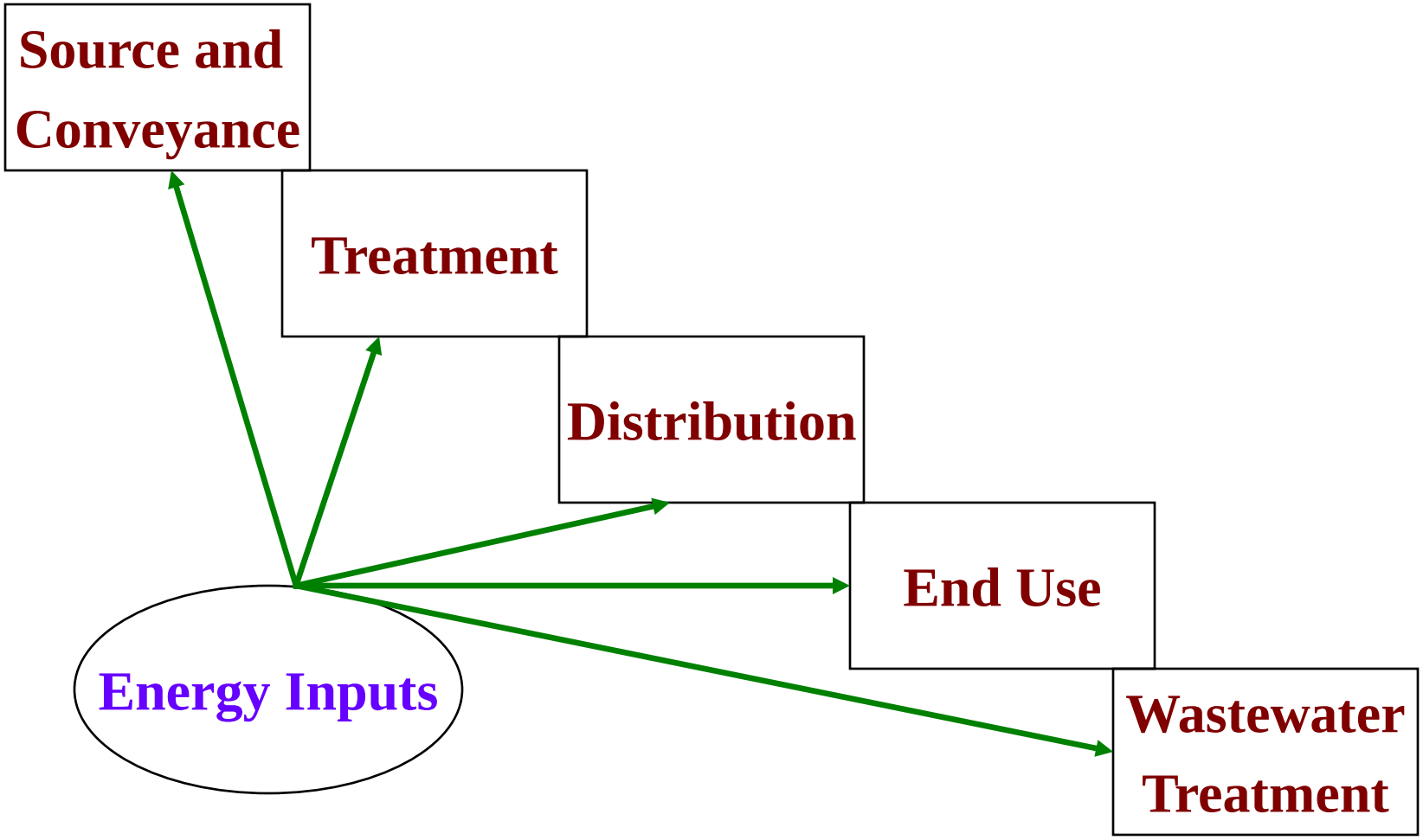
Water systems require energy



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Water constraints for energy

- **Drought Could Force Nuke-Plant Shutdowns**
  – *The Associated Press,* January 2008
- **Sinking Water and Rising Tensions**
  – *EnergyBiz Insider,* December 2007
- **Stricter Standards Apply to Coal Plant, Judge Rules; Cooling Towers for Oak Creek**
  – *Milwaukee Journal Sentinel,* November 2007
- **Journal-Constitution Opposes Coal-Based Plant, Citing Water Shortage**
  – *The Atlanta Journal-Constitution,* October 2007
- **Maryland County denies cooling water to proposed power plant**
  – *E-Water News Weekly,* October 2007
- **Water woes loom as thirsty generators face climate change.** *Greenwire,* September 2007

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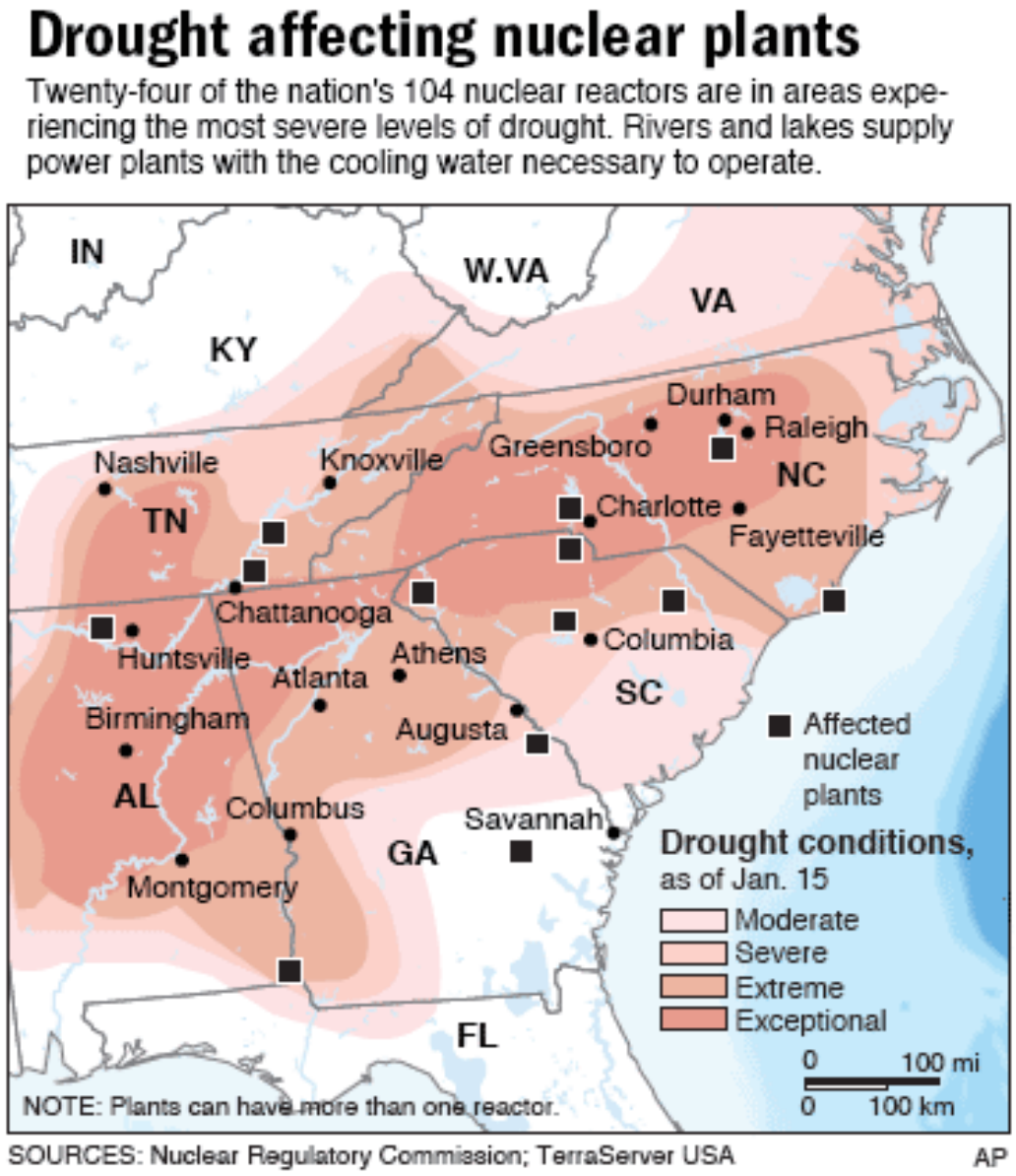
Water constraints for energy



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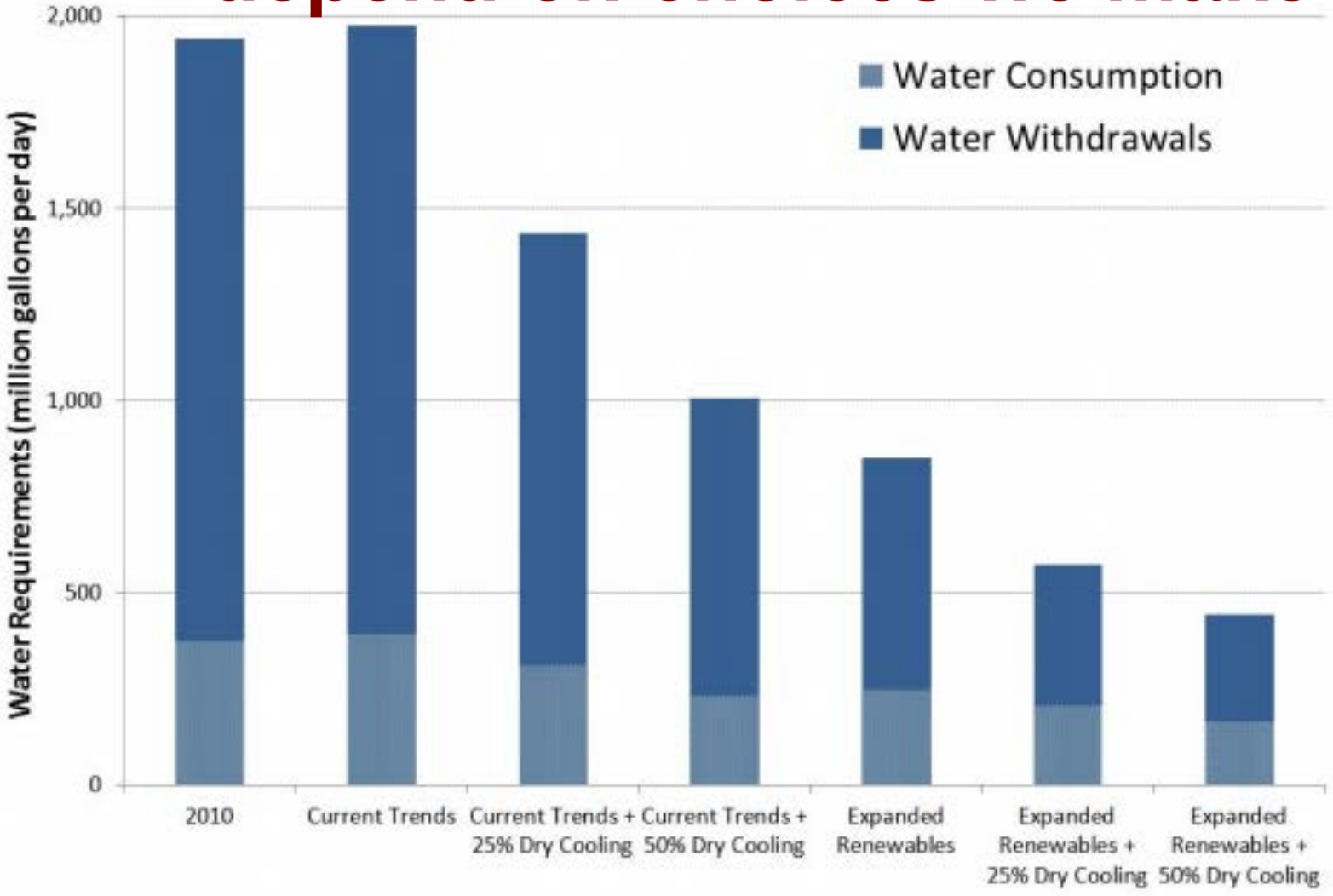
Water demands for energy systems depend on choices we make



Cooley et al. 2011. "Future water needs for electricity in the Intermountain West." Pacific Institute, Oakland, California.

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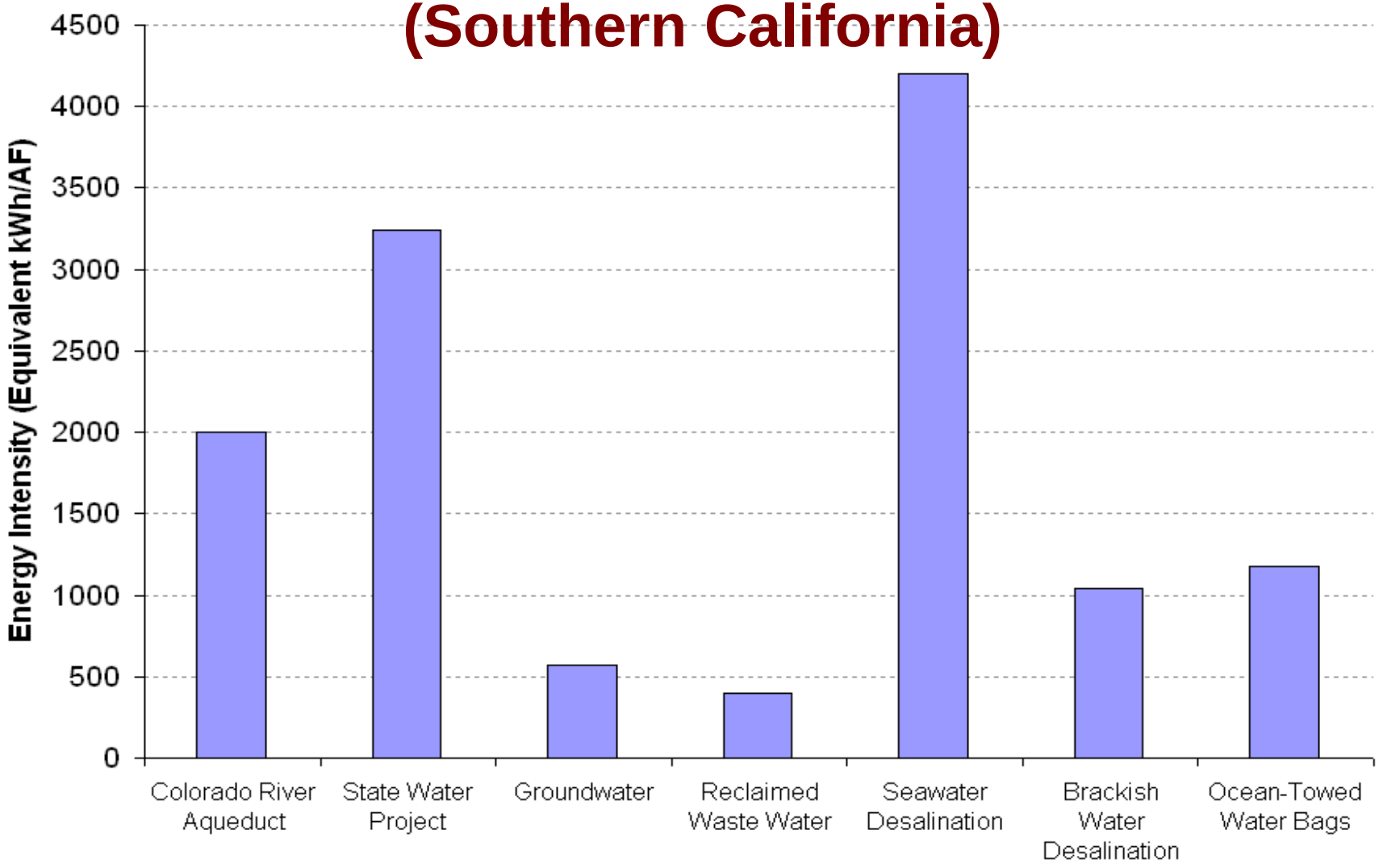
Water-supply energy intensities
(Southern California)



Source: Pacific Institute, "Energy Down the Drain," 2004

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Energy for water: The California State Water Project (SWP)

- The SWP is the single largest user of energy in California.
- It requires an average of 5 billion $kWhr_e$ /yr to operate.
- Pumping 1 acre-foot of water through the system to Los Angeles requires 3,000 $kWhr_e$.

[1 acre-foot is 326,000 gallons or 1233 cubic meters]

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Some key energy-water connections

- Running a hot-water faucet for five minutes uses the same energy as lighting a 60W incandescent light bulb for 14 hours.
- California is beginning to regulate greenhouse gas emissions, including from water utilities.
- Some of the cheapest energy efficiency savings can come though water-efficiency programs instead. (CEC)

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The climate link

- All of these water-energy links also have a climate change link, through the emission of greenhouse gases.
- Some climate change – perhaps significant climate change – is already unavoidable.
- We must move to avoid those consequences we cannot manage; and learn to manage those impacts we cannot avoid.

Policy implications

- Water and energy are tightly linked, but these links are poorly understood and rarely used in policy.
  - Decision makers and corporations should better integrate energy issues into water policy *AND* water issues into energy policy.
- Failure to link these issues will *inevitably* lead to disruptions in the supply of both water and power.

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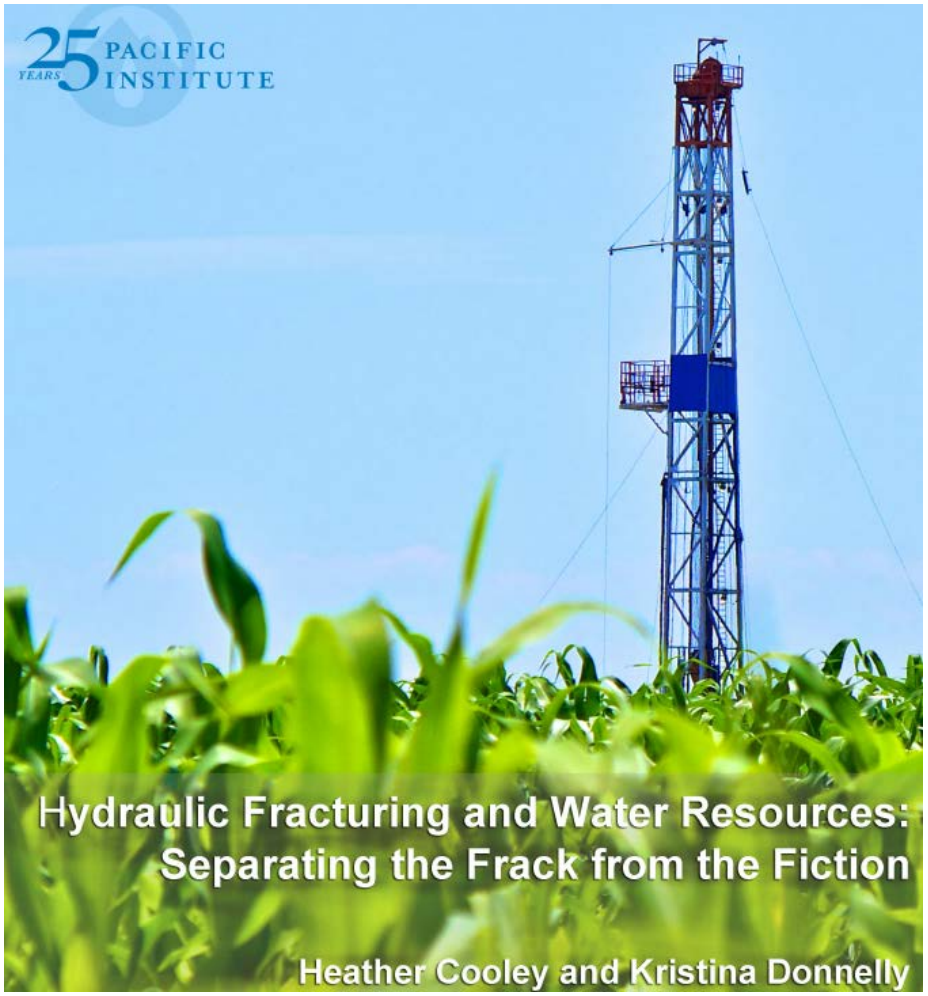

The science/hydrology of fracking is uncertain; data are scarce or proprietary. But the debate is about far more than science…

Sources: Pacific Institute 2012; Celsias; upthejones.com

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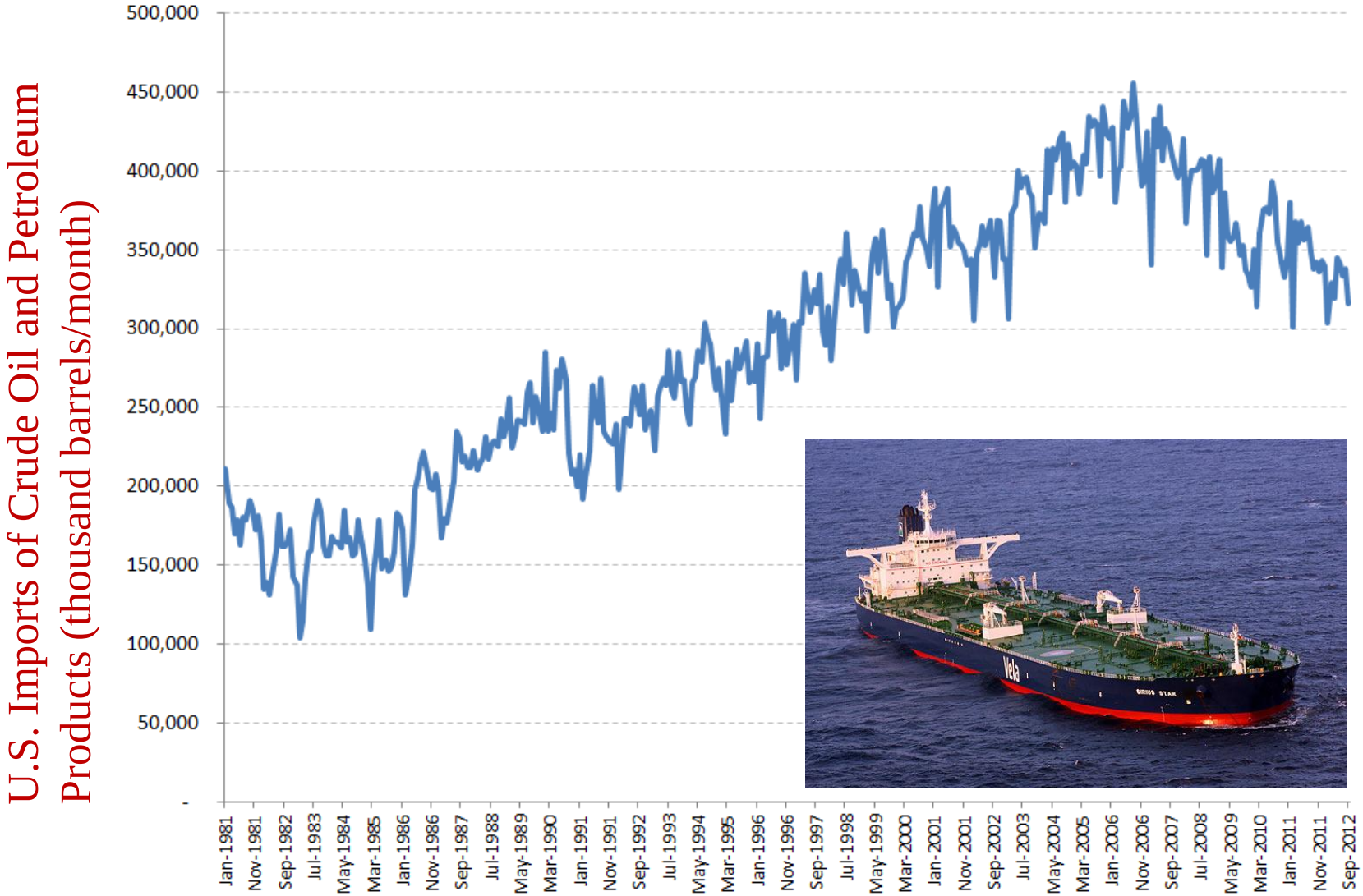
Fracking and international security



USEIA. 2012. http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MTTIMUS1&f=M

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“Peak Water,” security, and conflict

- Definitions of “security” vary, and are expanding.
- There is a long history of conflicts over fresh water.
- Such conflicts take many forms (as a goal, weapon, target, development disputes, terrorism).
- The risks of water-related disputes are growing, including over “peak water” constraints of all kinds.
- These water-related factors will have both direct and indirect impacts on security and conflict.

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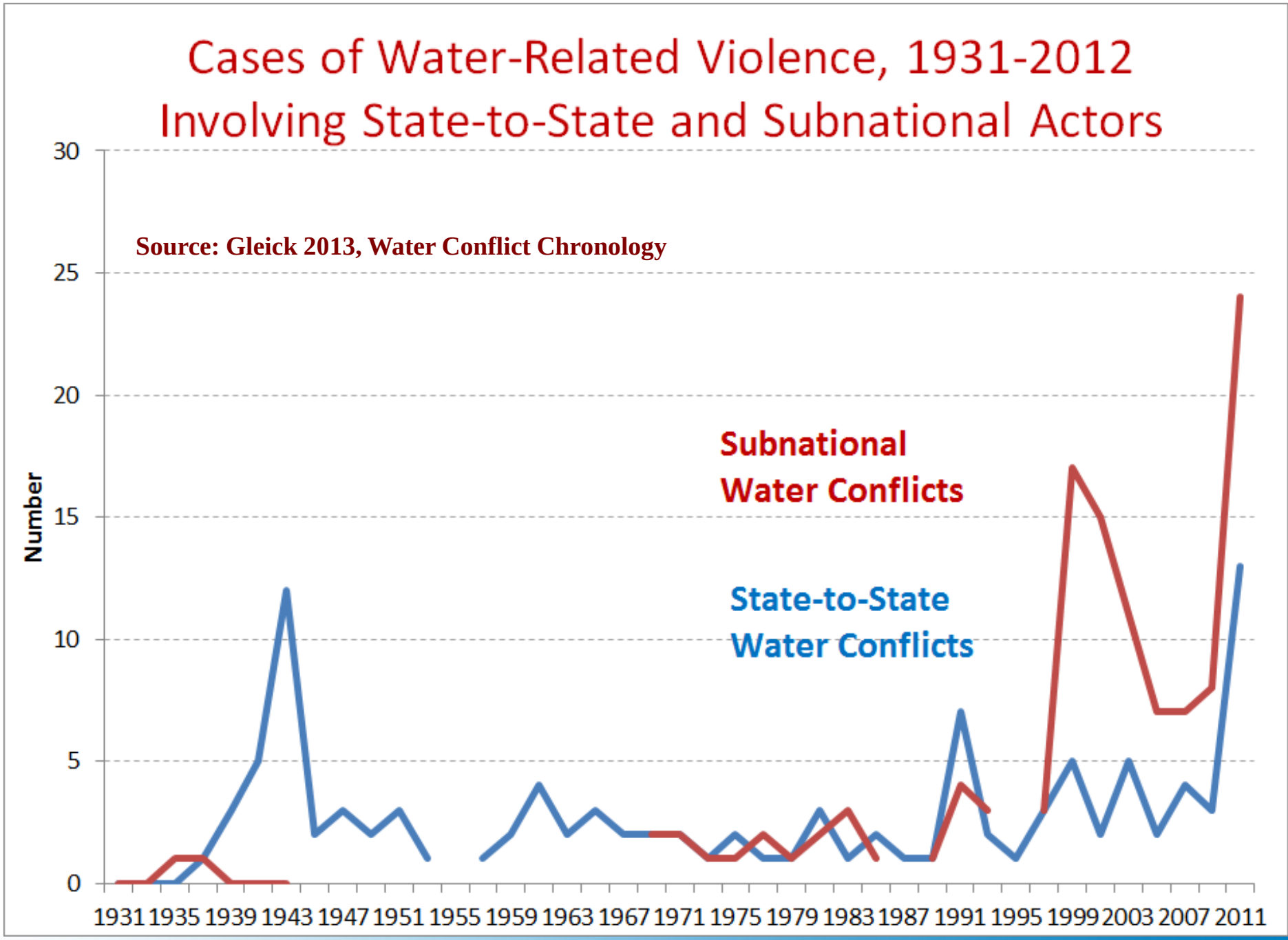
Cases of Water-Related Violence, 1931-2012 Involving State-to-State and Subnational Actors



New concerns at the intersection of Water/Energy/Climate/Security?

- Water and economic development: poverty, water allocations, and rights.
- Subnational, state-to-state, ethnic, local disputes are all increasingly common.
- Water-related acts of terrorism.
- Direct and indirect impacts of climate change.

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Summary and recommendations

- There are strong and growing links between water, energy, climate, and security.
- We rarely consider integrated policies to address these links.
- The failure to address them will lead to inappropriate actions and unnecessary risks.
- Smart policies can be efficient and effective.

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Summary and recommendations

- Energy choices must now consider water availability.
- Water-efficiency efforts offer substantial water (and energy) savings at lower cost, and faster, than new “supply.”
- Water and energy strategies can both lead to fast, cost-effective greenhouse-gas emissions reductions.

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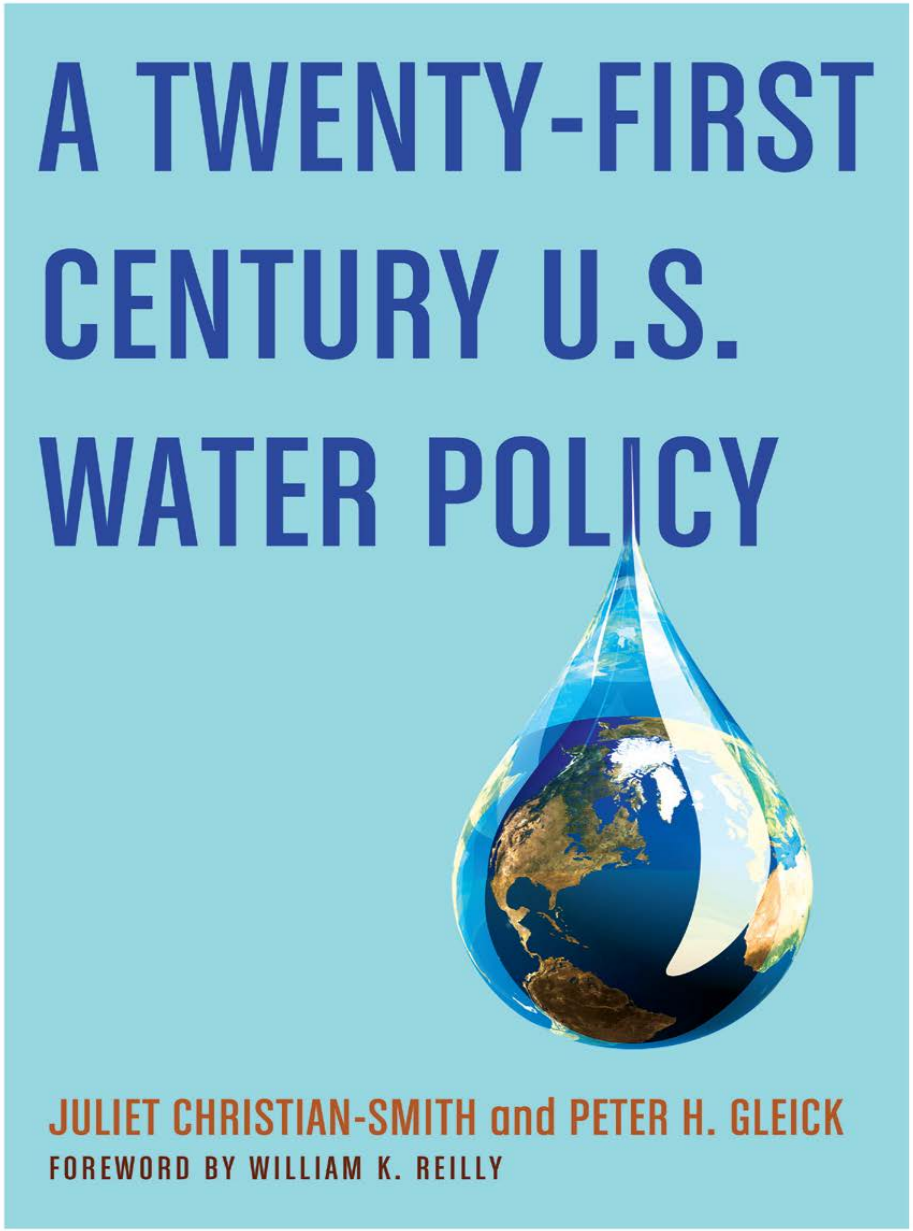

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