

Water-Energy Nexus

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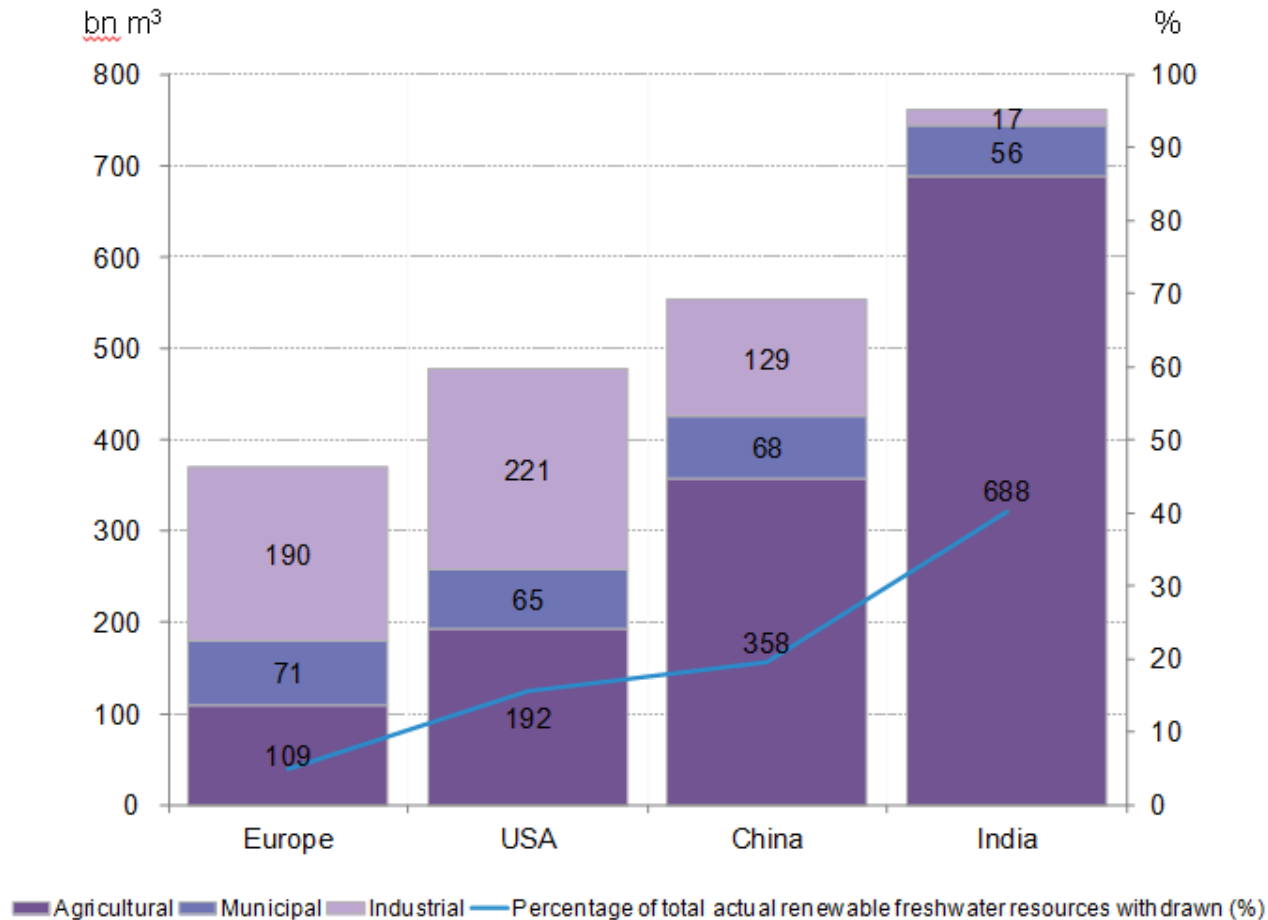
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Topics

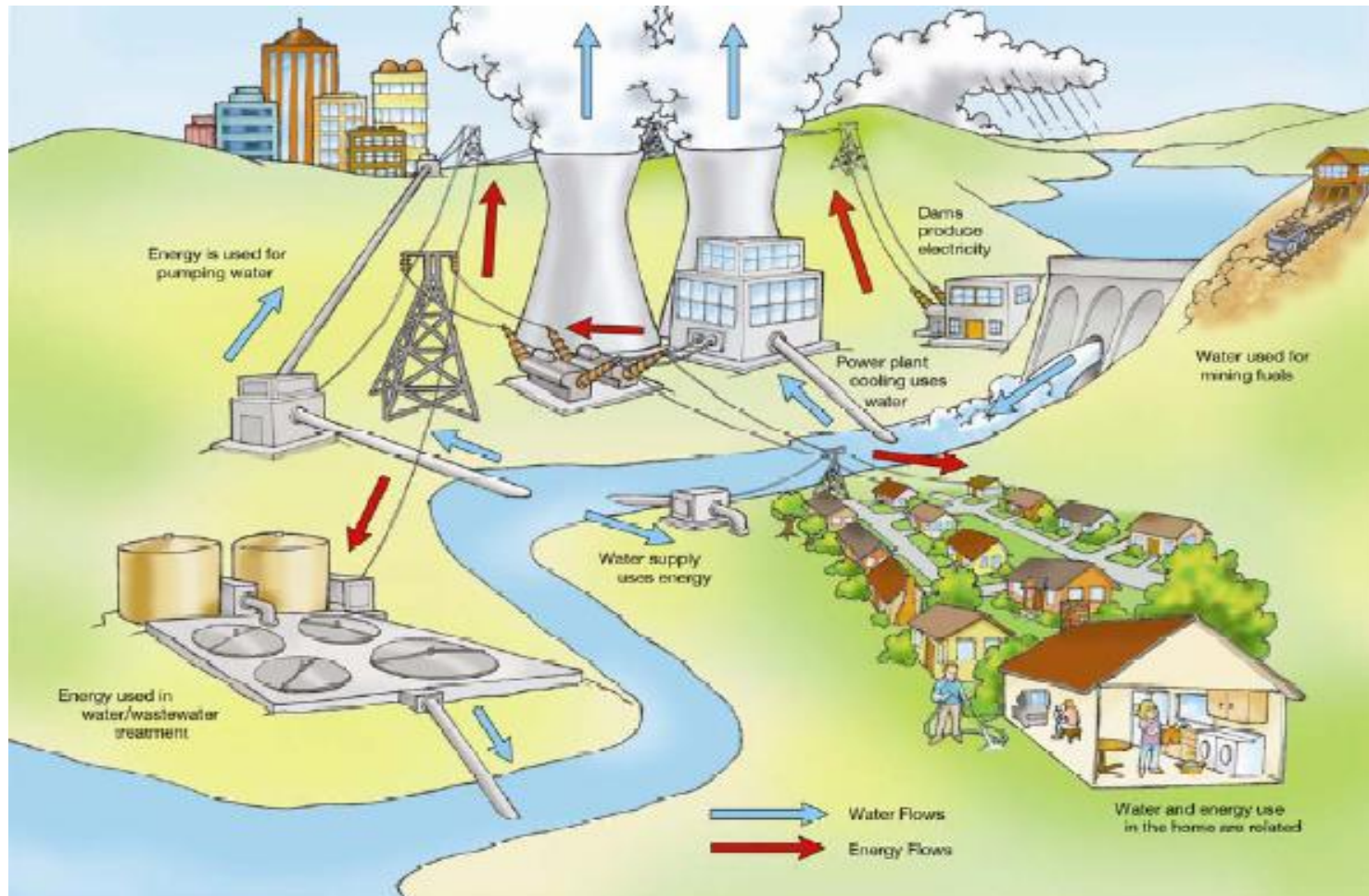
1. Multiple Avenues of Overlap
2. Electricity Water Requirements
3. Energy Requirements of Water
4. Potential Solutions

Water Use Varies Widely Across Regions

Electric generation is typically 80% of industrial use



Water and Electricity

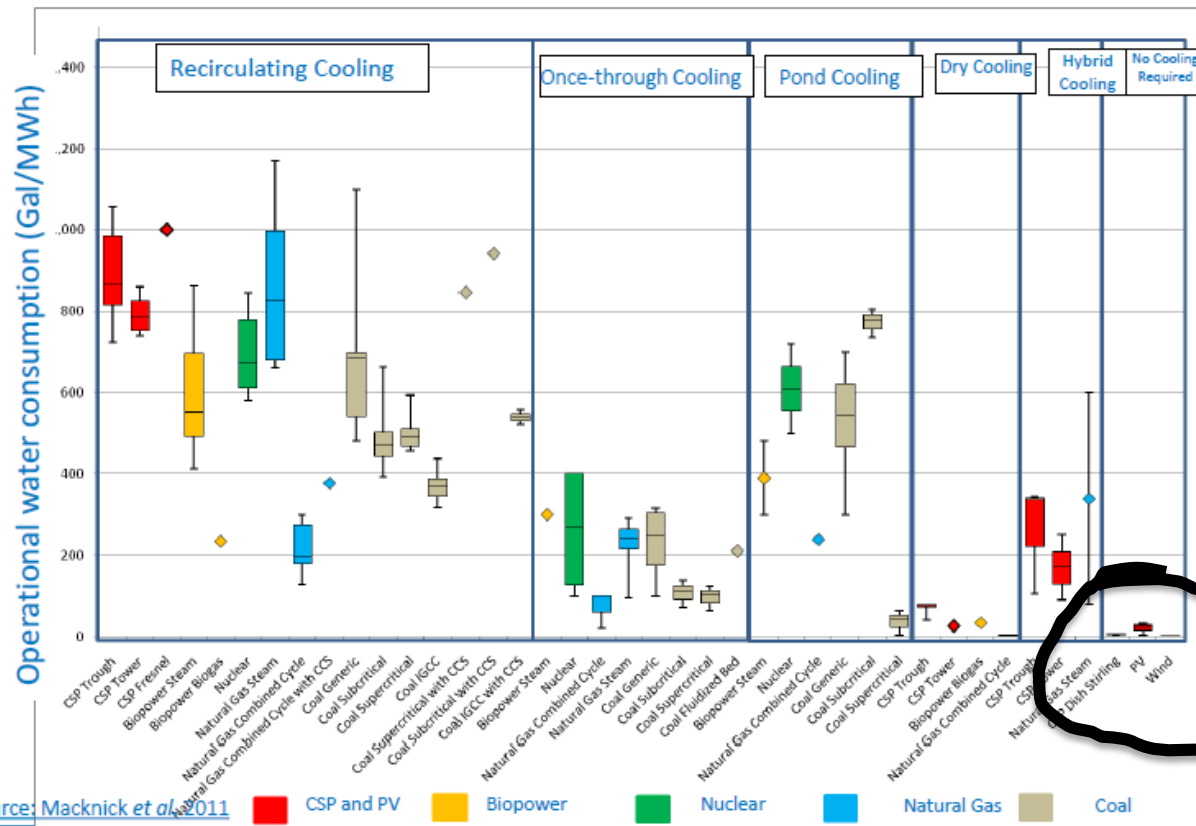


Source: U.S. Department of Energy, Sujoy Roy

Variable Energy Renewables and Energy Efficiency Use Least Amount of Water

Water impacts for electricity generation technologies range widely

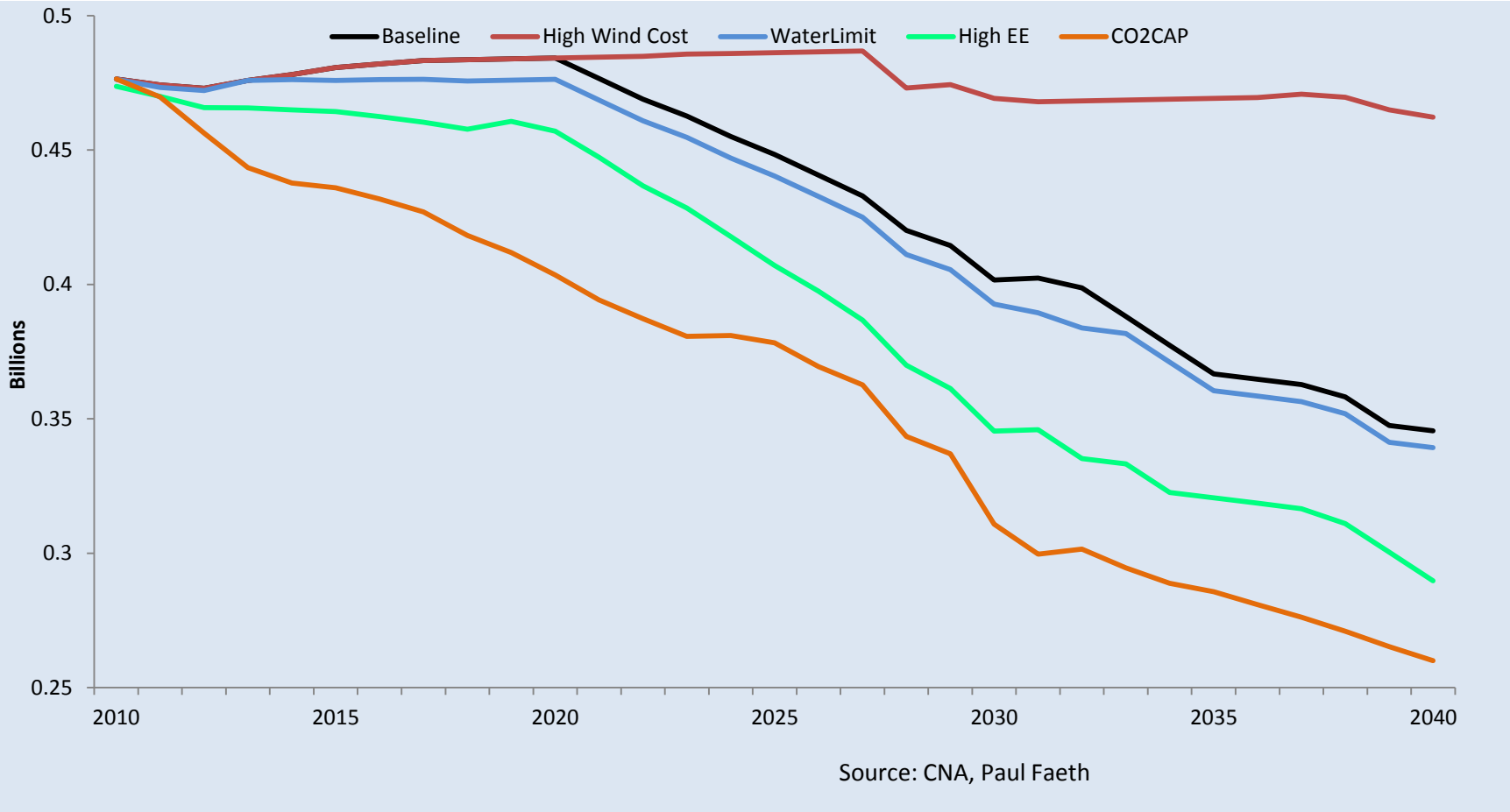
Operational water consumption factors for electricity generating technologies



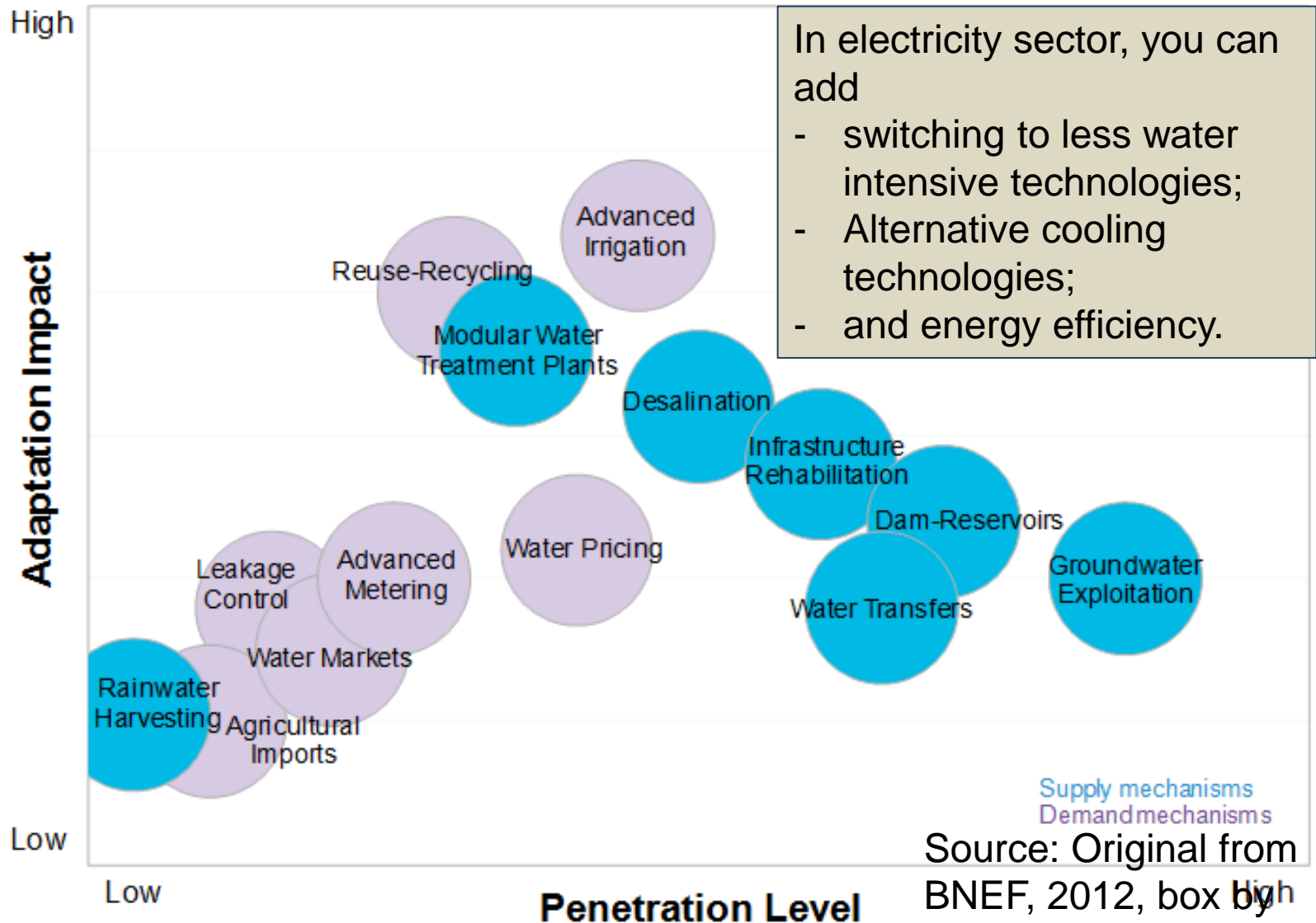
Source: Macknick et al. 2011

Water and Energy Modeling Runs

(Electricity water cooling in BCM over time - Texas)



The Many Strategies Available for Improving Access and Efficient Use of Scarce Water



Sample of End Use Energy and Water Efficiency Investments in Household

Low flow shower heads

Efficiency washers

Faucet Aerators

Efficient Toilets

About 13% of electricity in the US and 19% of it in California is associated with moving and processing water.

Potential Solutions to Spur More Efficient Cooling

- Price water
- Carbon restrictions
- Water and energy efficiency programs and strategies;
- Invest in renewables
- Revisit plans for thermal generation

A photograph of a winter scene. In the foreground, a wooden fence runs across the frame. To the left, a red barn with a snow-covered roof is visible. The background is filled with snow-covered evergreen and deciduous trees under a grey, overcast sky. The word "Questions?" is written in white text in the center of the image.

Questions?

References

BNEF, Leadership Forum Results Book 2012; www.bnef.com

Faeth, Paul; Forthcoming Water and Electricity Report, CNA

Energy Efficiency (water showerhead)

Energy and Capital Savings

- Energy used to heat the water in the water heater
- Capital and Energy used to process the waste water before returning to streams
- Capital and Energy used to pump the water to the home
- Capital and Energy used in water treatment facilities to create potable water
- Capital and Energy used to pump the water or desalinate the water (3.5 kWh per cubic meter)
- Parasitic energy required for cooling thermal generation to produce the power for (1) through (5).

Water

- Water used directly for end user needs
- Water lost in transport
- Water consumed in the water treatment process
- Water used for cooling thermal generation that provides the generation listed above.