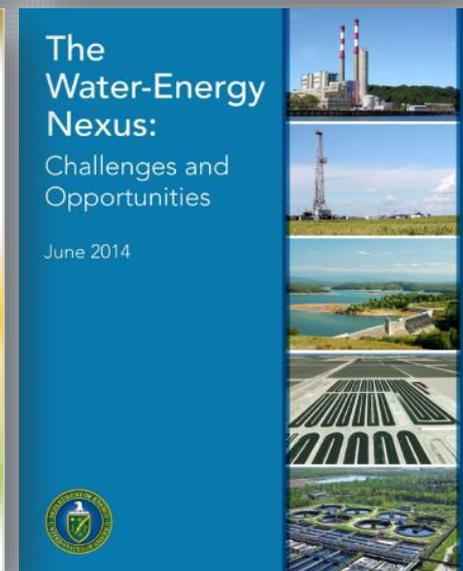
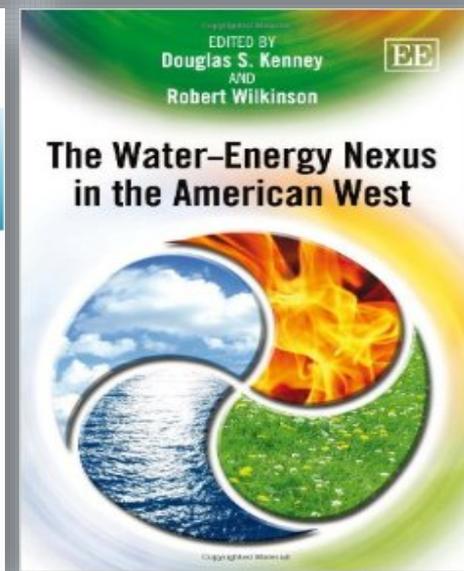
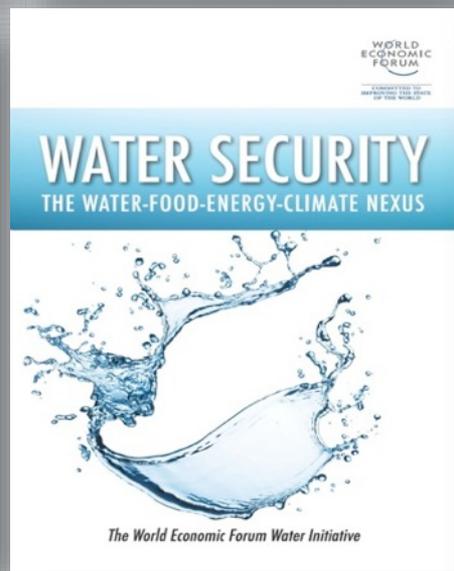
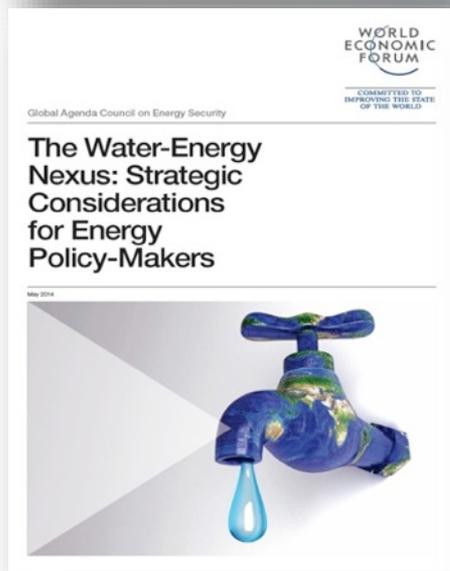
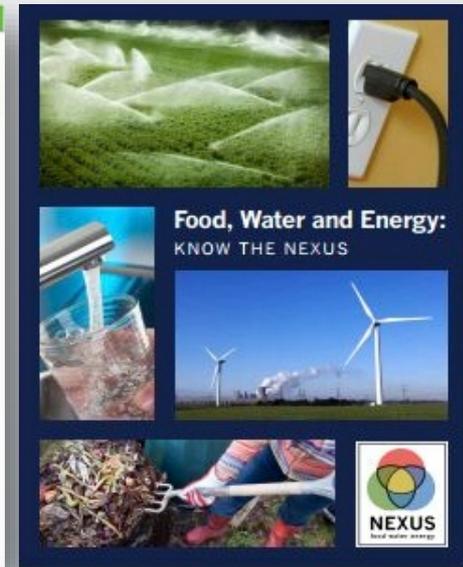
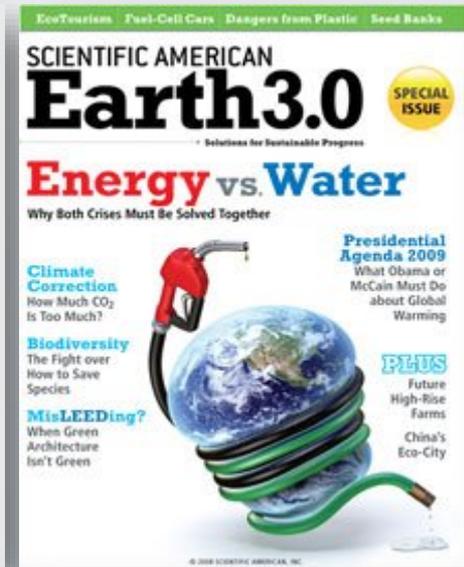
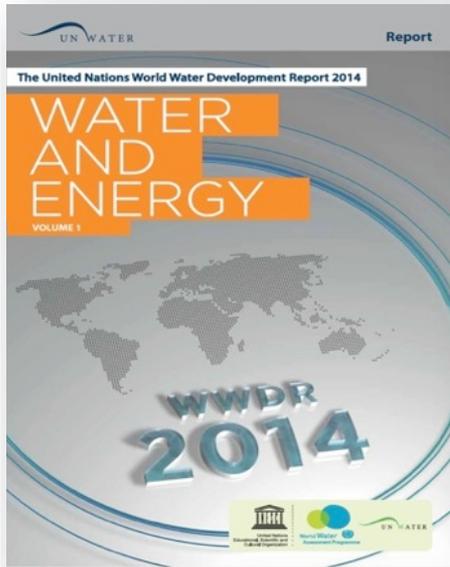


Energy-Water Nexus

CAES Workshop July 27, 2016



The Problem







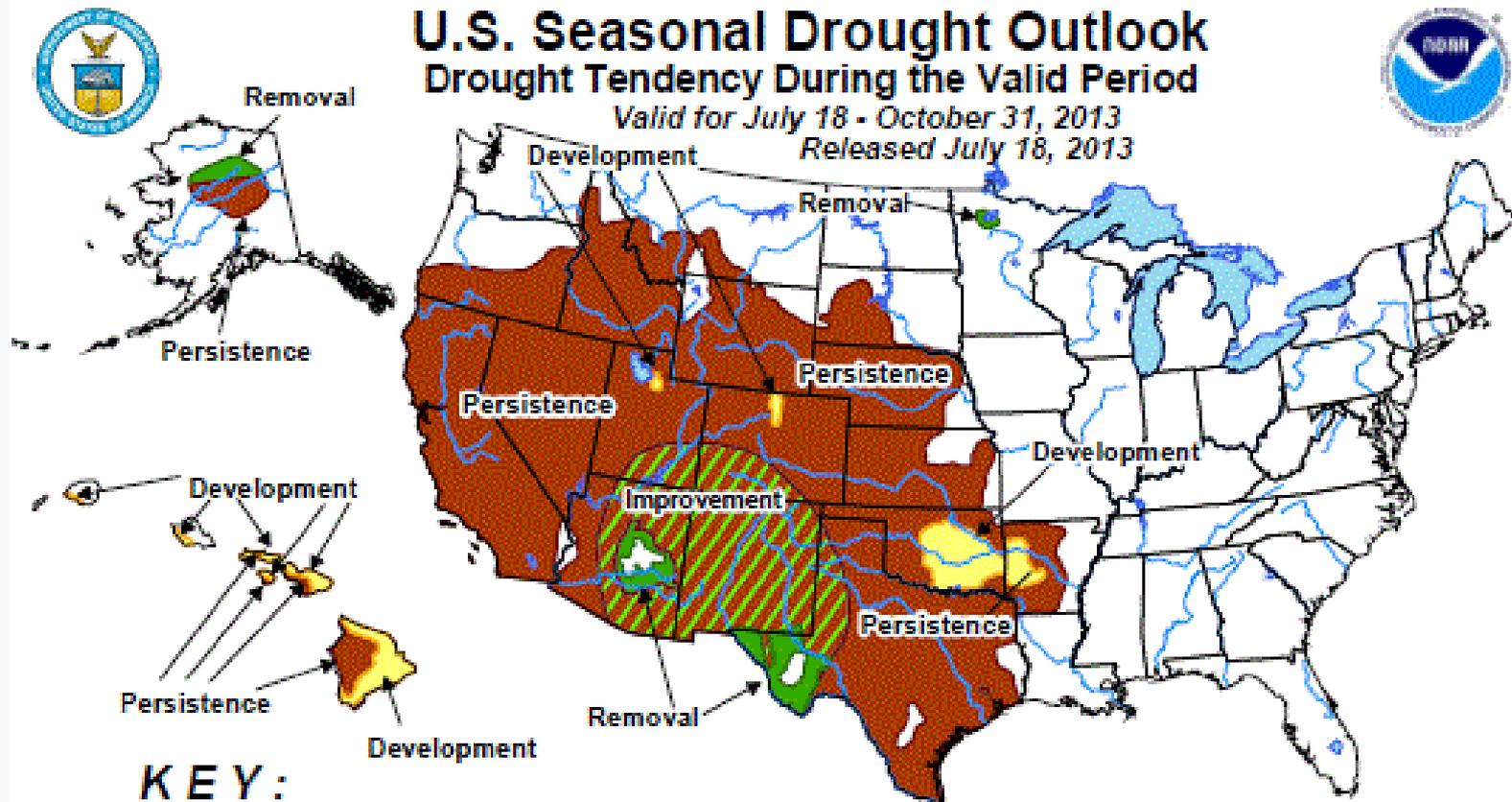








Droughts Never Seem to End



KEY:

-  Drought persists or intensifies
-  Drought remains but improves
-  Drought removal likely
-  Drought development likely

No Drought
Posted/Predicted

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Short-term events – such as individual storms – cannot be accurately forecast more than a few days in advance. Use caution for applications – such as crops – that can be affected by such events. "Ongoing" drought areas are approximated from the Drought Monitor (D1 to D4 intensity). For weekly drought updates, see the latest U.S. Drought Monitor.

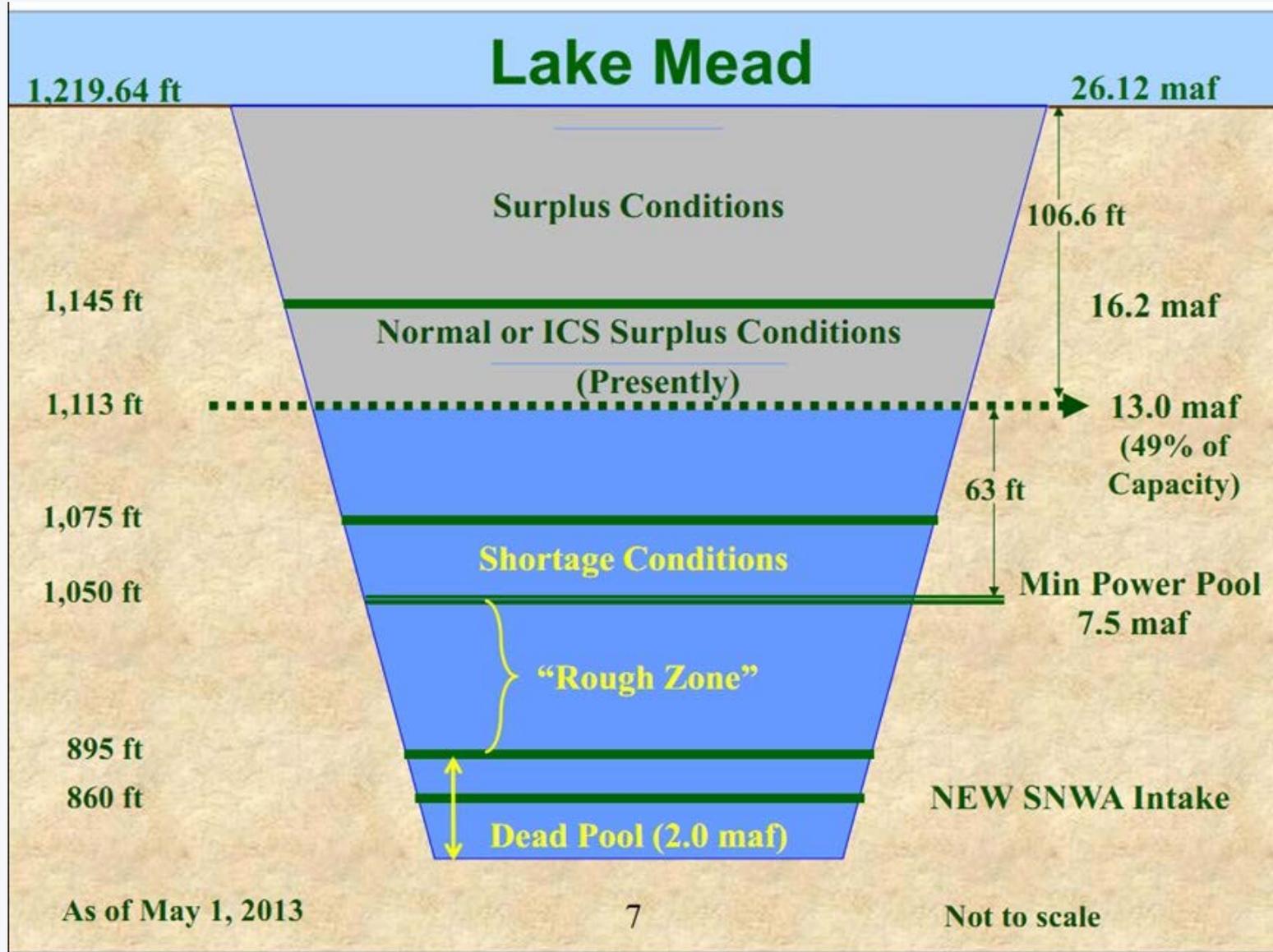
NOTE: The Green and Brown hatched areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period although drought will remain. The Green areas imply drought removal by the end of the period (D0 or none)

Few areas are immune

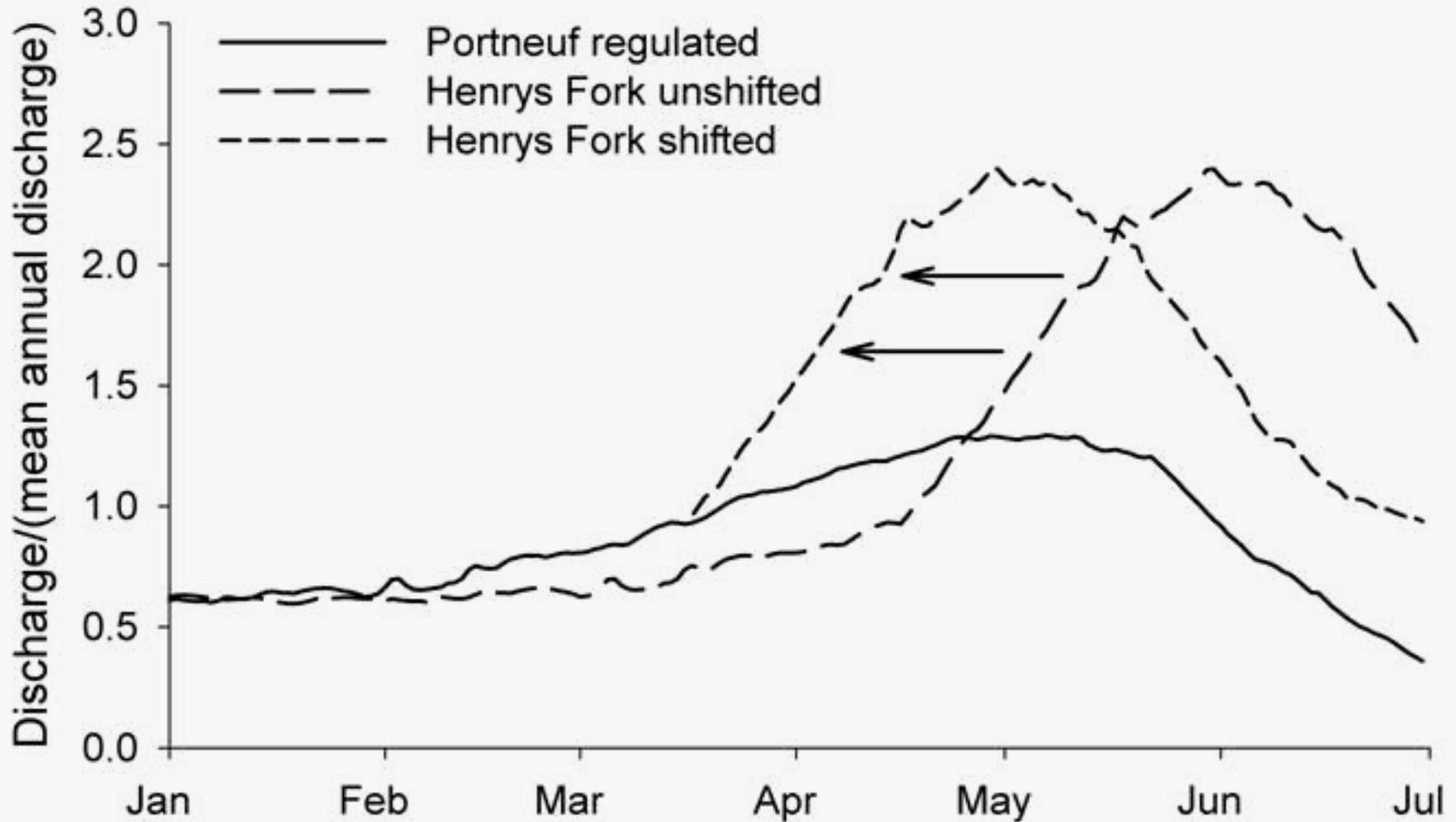
Nearly every state west of the Rockies has been facing a water shortage of one kind or another in recent years.

- California's drought has brought a great deal of attention to water issues
- The Colorado River Basin
 - 16th year of low water flows
 - 15% of the nations food supply
 - Critical water supply 7 states

Lowest water level since Hoover Dam was completed in 1936 - with a surface level of 1,074.68 feet above sea level.

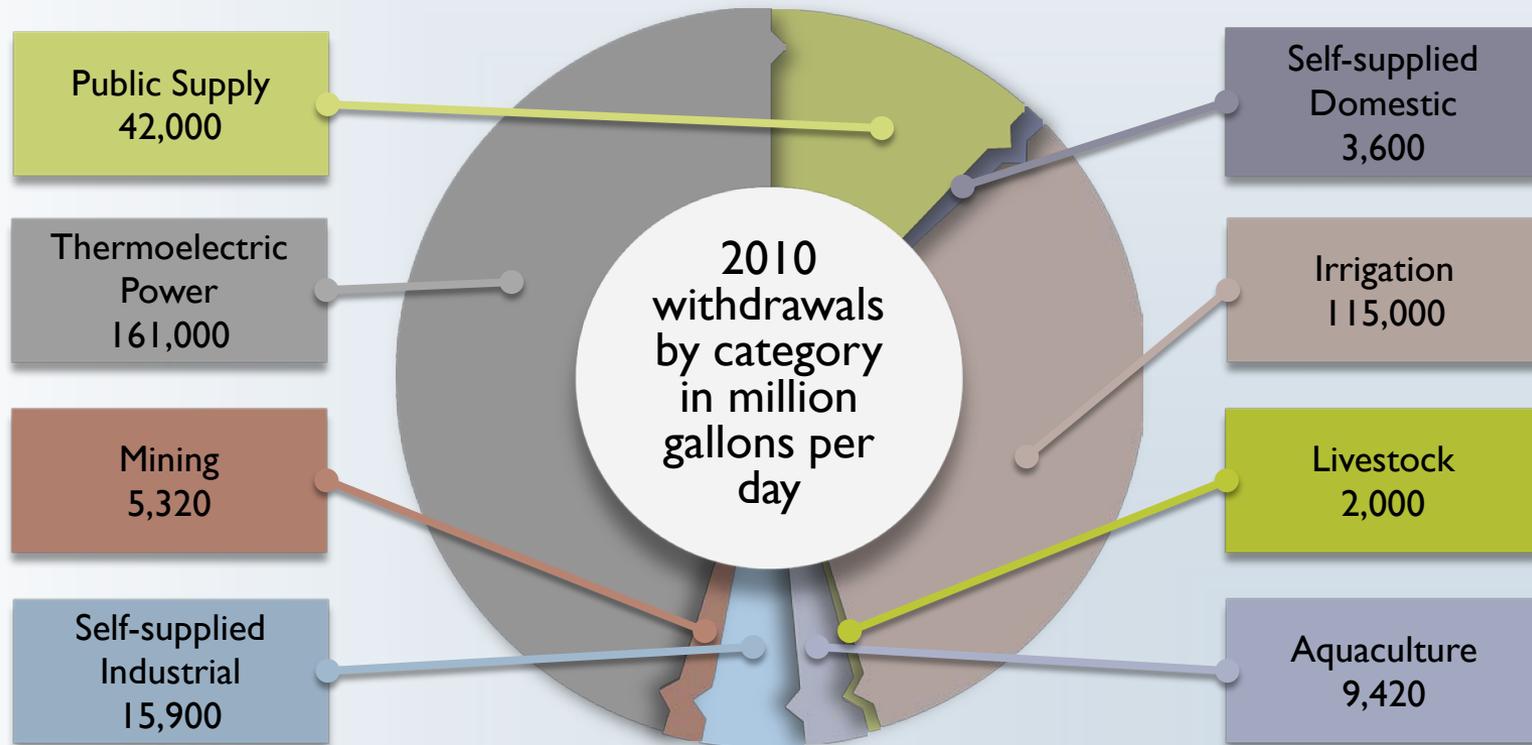


Spring Hydrographs are Changing



Metrics

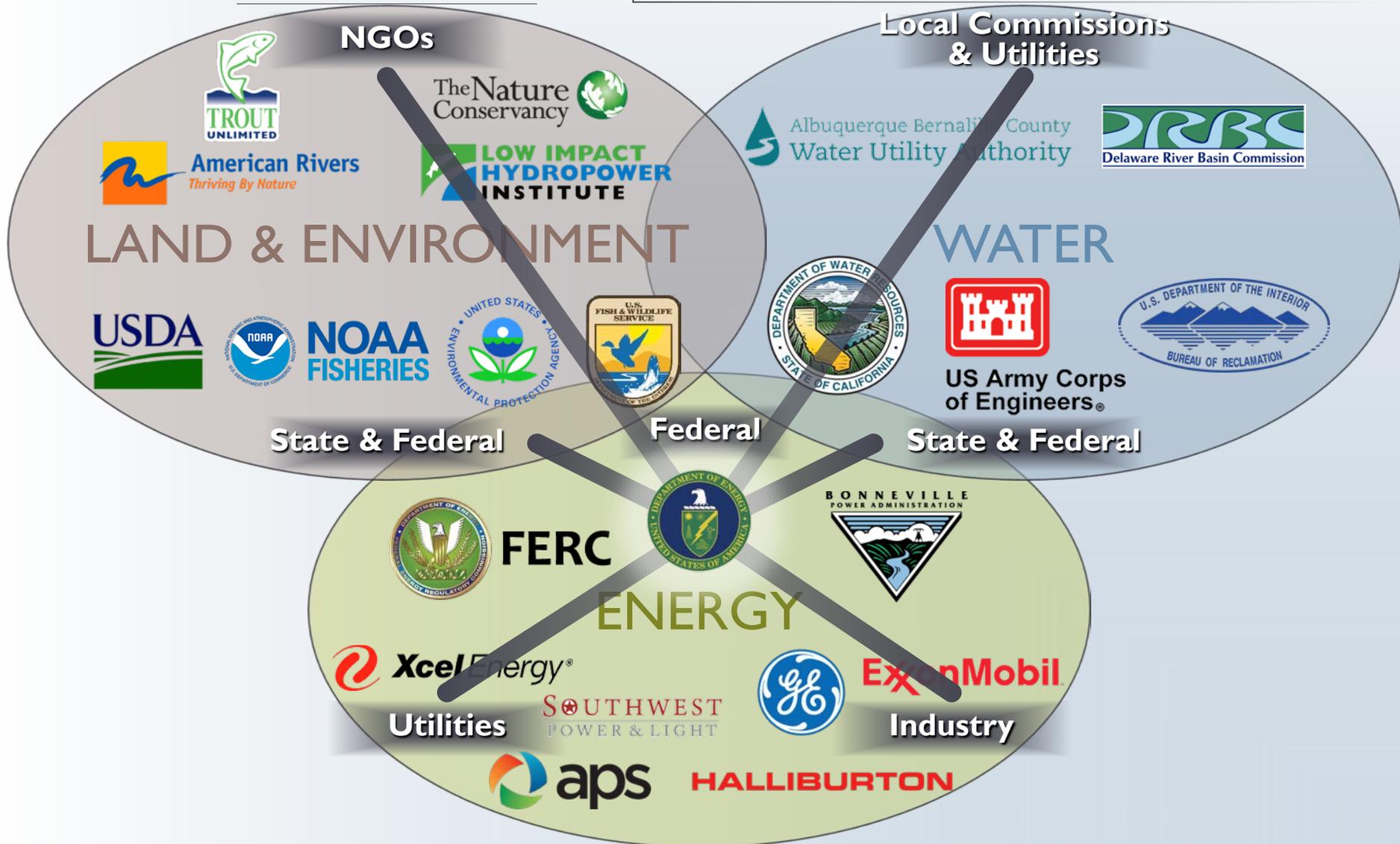
The Energy Sector withdraws more freshwater than any other sector in the US



45 % of all water withdrawals are for power

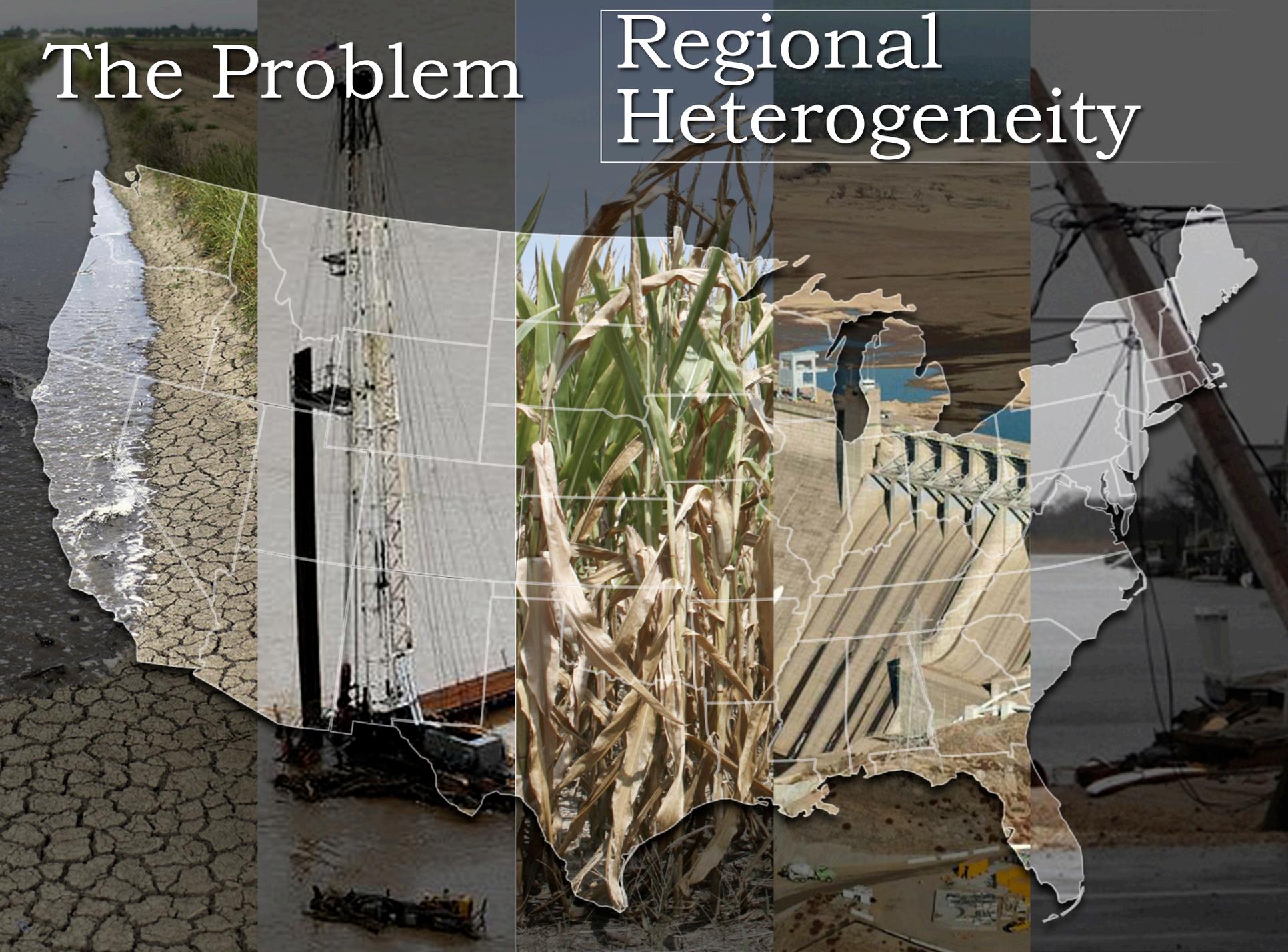
Why DOE?

DOE brings unique capabilities and is uniquely positioned to coordinate, leverage, and build on existing efforts at the energy-water nexus



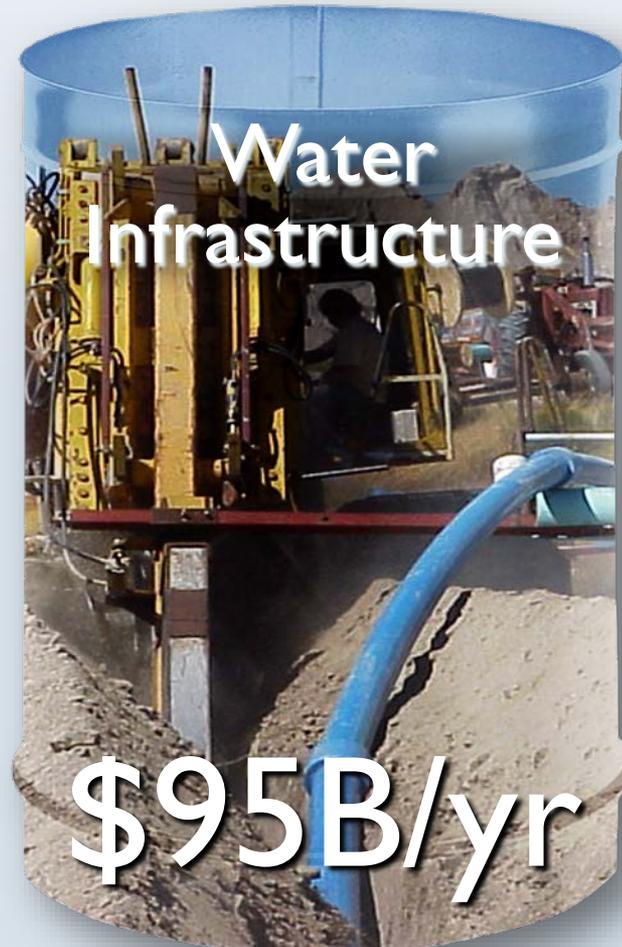
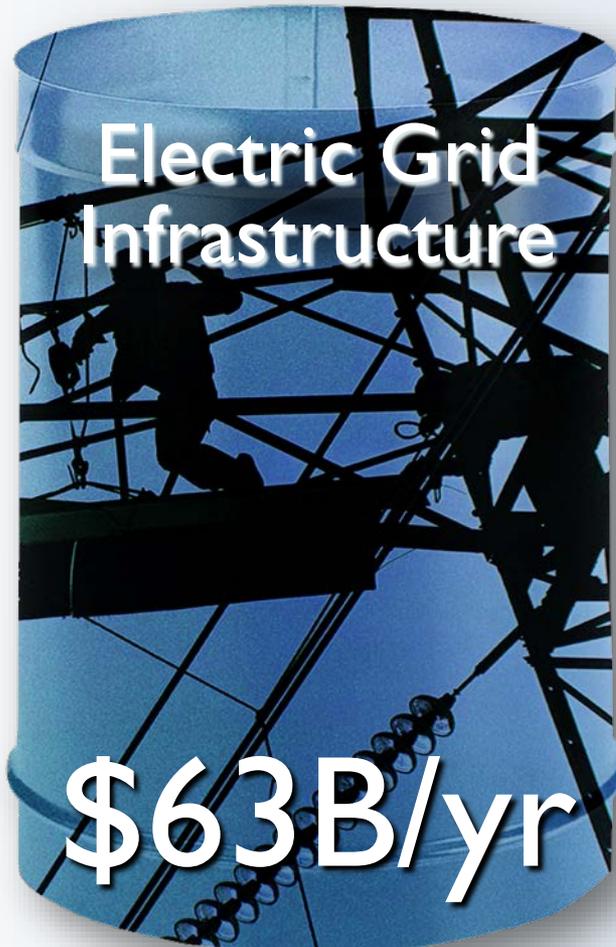
The Problem

Regional Heterogeneity



The Opportunity

Massive uncoordinated and under-informed investments and decisions



Sustainable and Resilient Energy in an Uncertain Water Future



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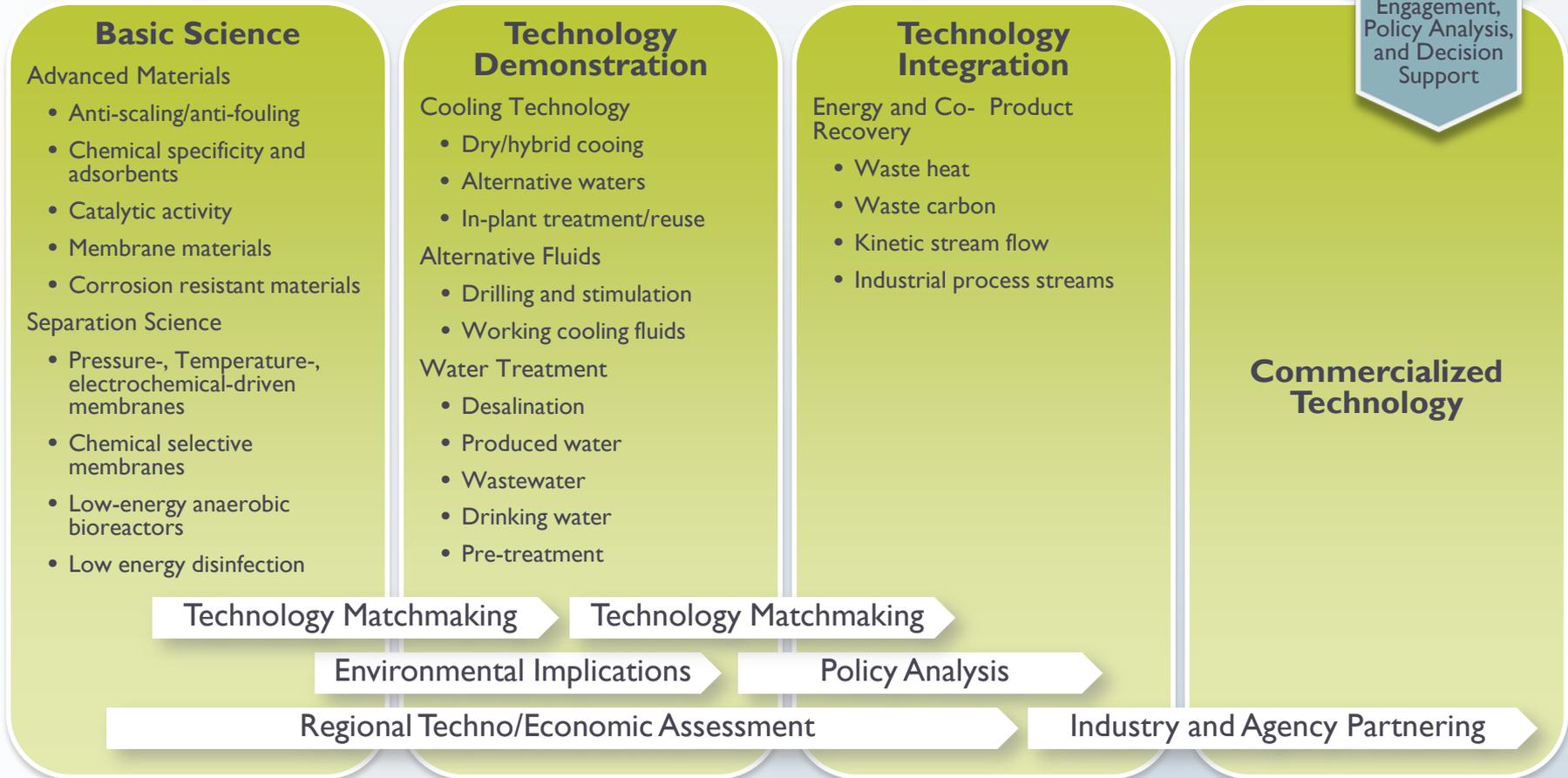
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Advanced Technology



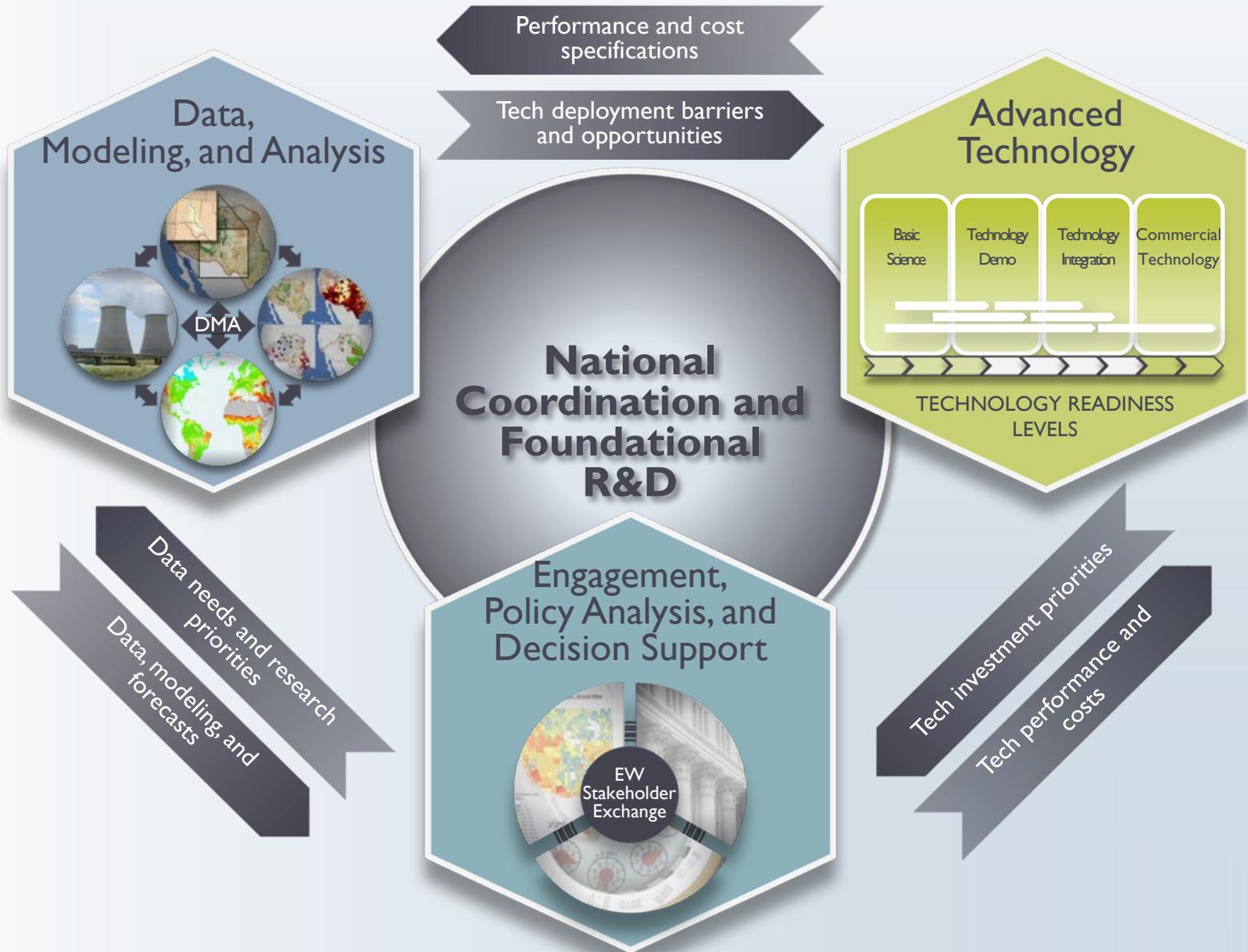
BASIC

DEMONSTRATION

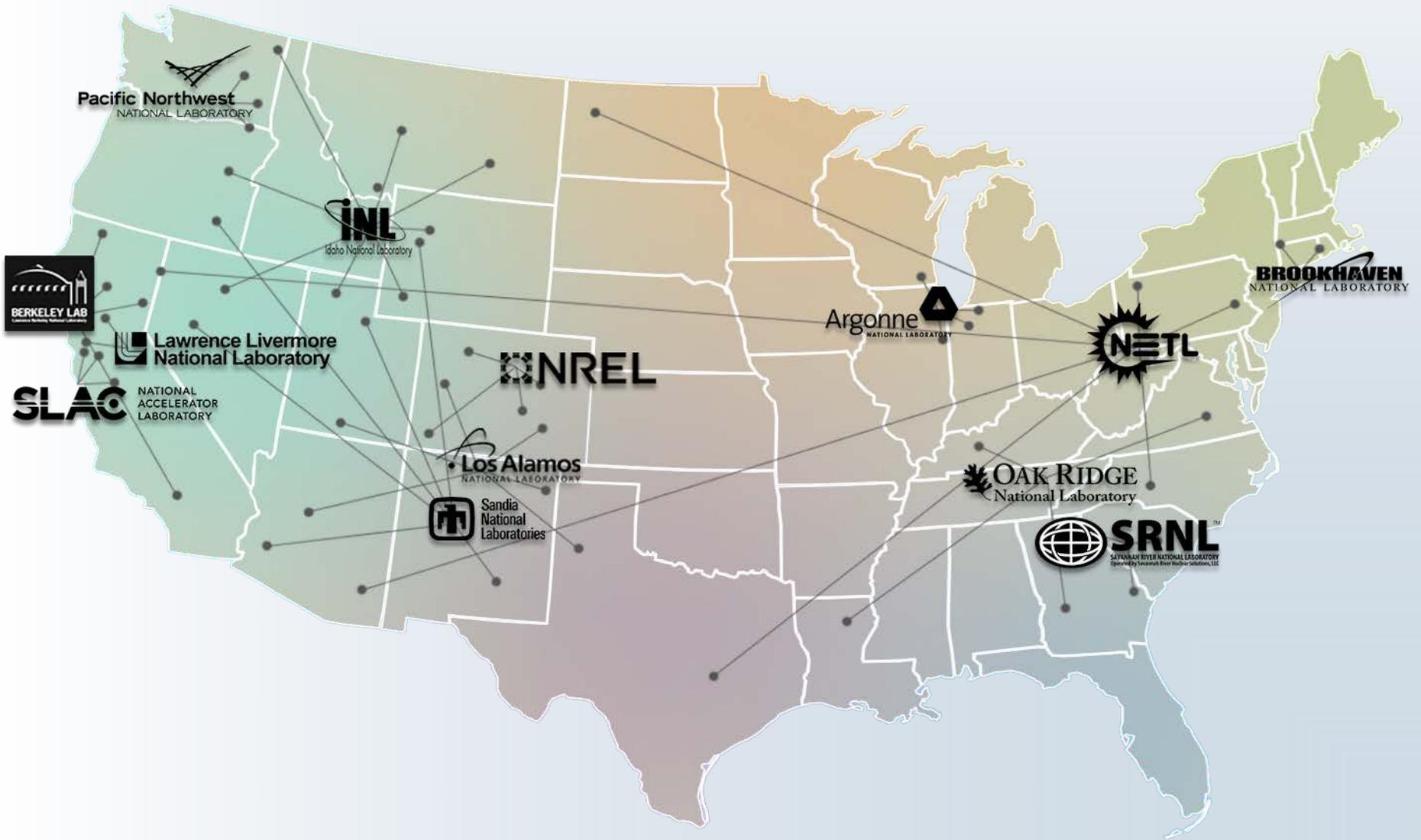
COMMERCIALIZATION

TECHNOLOGY READINESS LEVELS

How the Pieces Fit Together



The program will leverage and extend existing activities and capabilities from across the DOE labs (and beyond)



The Time is NOW

- ▶ Water uncertainty is threatening our nation's energy security
- ▶ We are investing over **\$100 BILLION** in infrastructure each year, with little consideration of energy-water interdependencies

Sustainable and Resilient Energy in an Uncertain Water Future



G O A L S