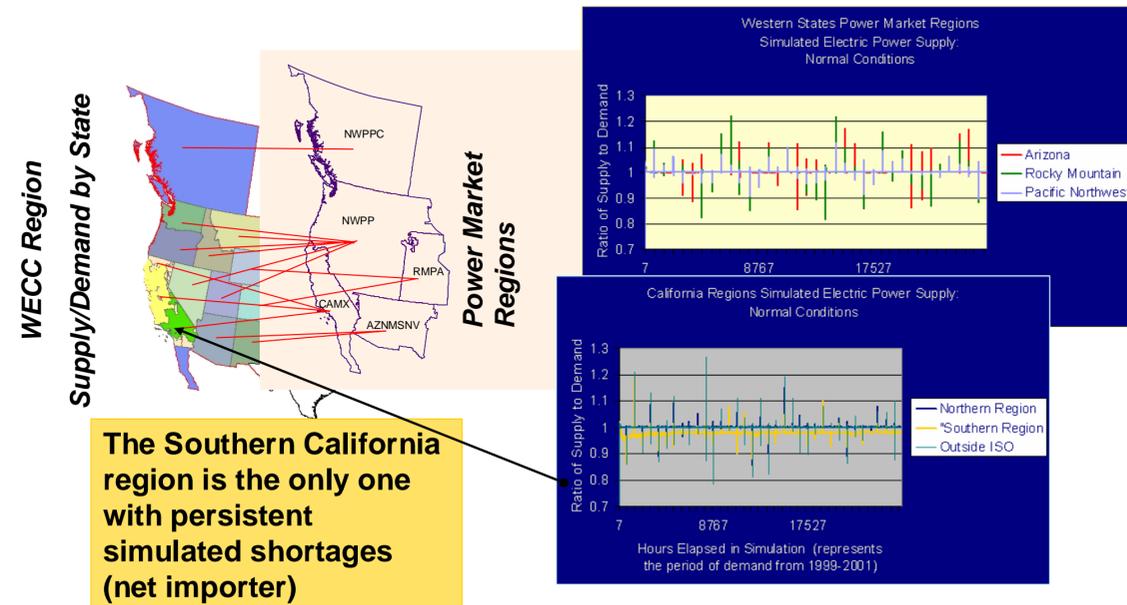




## Regional Infrastructure Interdependency Analysis

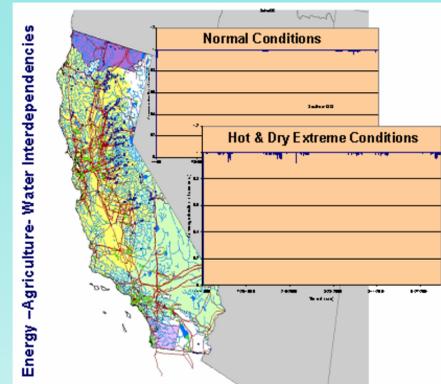


**Modeling and analysis to quantify and evaluate the effects of infrastructures and their interdependencies on supply and demand under different conditions (e.g., time of day, time of year, unusual event, new regulations, incentives, market structures).**

- Quantifying consequences for evaluating risks
- Limiting factors under different, ambient conditions, hypothetical events and policies
- Effects of alternatives, pathways, redundancies, and inventories
- Potential magnitude, location and timing of disruptions that propagate to other infrastructures and regions
- Positive and negative feedbacks created by interdependencies and their net effect on supply/demand balance

## California Interdependencies

**How will electric power conditions impact water supplies?**



**Environmental Conditions Influence:**

- Demand for water and power
- Availability of water
- Transmission and generation capacities

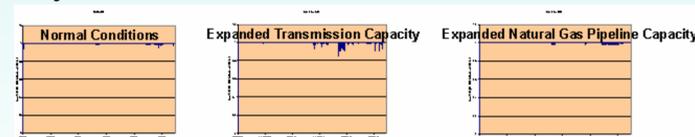
**Hydroelectric Generation Influences:**

- Discharge from reservoirs

**Electric Power Influences:**

- Agricultural water use/source
- Water utility performance

**Simulated electric power shortages are shown for “normal” (historical) and extended drought conditions. Under normal conditions, the only issues with propagation to water supplies occur if storage is low and pumping is required to re-fill storage tanks. The bigger issue is the potential impact of reservoir depletion on electric power supplies, competitive uses of scarce water resources and impacts of extended power outages on water availability and use.**



**Changes that create greater reliance on hydroelectric generation (e.g., increasing transmission capacity N-S) reduce the incentive to store natural gas and may increase power shortages when environmental conditions cause sudden increases in demand for electric power.**

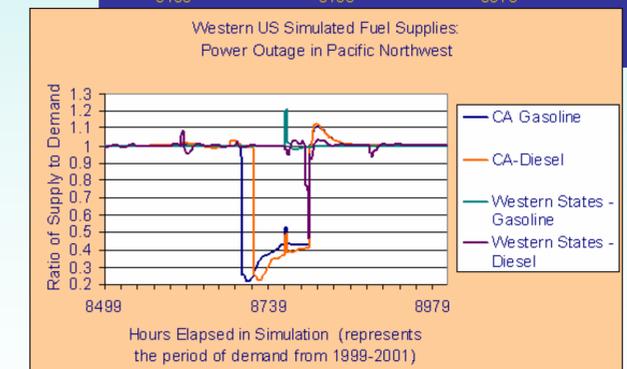
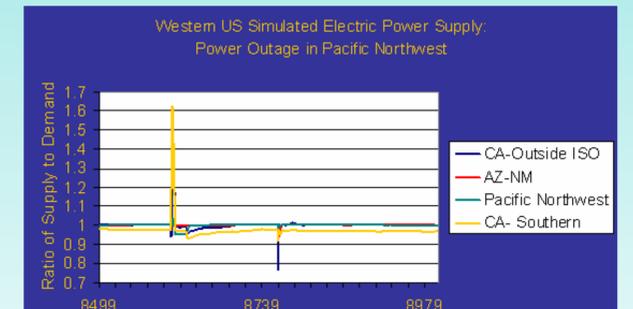
*“Both the CEC and ISO can use the modeling efforts by Sandia to improve policy and implementation strategies to protect California infrastructure... What is learned here can be used in other states and regions of the U.S.”*

Larry Baird – California Energy Commission, Policy Analyst

## Pacific Northwest

**How will the electric power conditions in California impact the region?**

*A simulated power outage in the Pacific Northwest that causes a brief collapse of the western grid (which shows up as a sudden decrease in demand) and a week long decrease in local generation capacity, indicates how the outage has a more lasting impact on California power conditions than on the Pacific Northwest, due to the need for imports into the southern California region.*



*The greatest relative impact on supplies is for Southern California fuel supplies due to the impacts of power outages on the refineries in the region. Special fuel requirements limit the imports of fuels to compensate.*