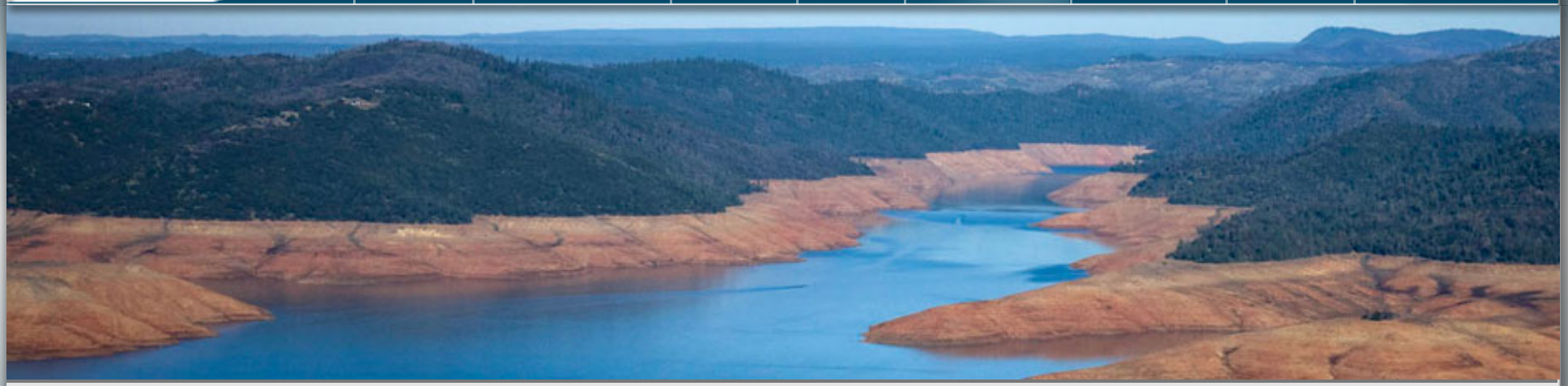

Drought Impacts California's Energy; Governor Brown's Response Plan (Executive Order B-29-15)

Conservation - the wise, sparing use of water - remains California's most reliable drought management tool.

Five days after Governor Edmund G. Brown Jr. signed the $1 billion emergency drought package calling for funding relief and critical water infrastructure projects, he directed the first ever statewide mandatory water reductions in Executive Order B-29-15. These actions will save water, increase enforcement to prevent wasteful water use, streamline the state's drought response and invest in new technologies that will make California more drought resilient.

The California Energy Commission will carry out part of the plan as will several other state entities including the Department of Water Resources, State Water Resources Control Board, the Governor's Office of Emergency Services, Department of Fish and Wildlife, and Department of Forestry and Fire Protection (Cal

More Information

- FAQs: Drought Impact on Hydropower
- Facts on California's Use of Hydroelectricity
- Hydropower Working Group Briefing Document
- Hydroelectric Facilities Map

Related Links

- Main California Drought Page
- California Department of Water Resources
- Save Our Water
- Latest Snowpack Conditions

Fire).

The Energy Commission will focus on four responsibilities:

- Jointly with the Department of Water Resources and the State Water Resources Control Board, the Energy Commission shall implement a time-limited statewide appliance rebate program to provide monetary incentives for the replacement of inefficient household devices.
- The Energy Commission, jointly with the Department of Water Resources and the State Water Resources Control Board, shall implement a Water Energy Technology (WET) program to deploy innovative water management technologies for business, residents, industries, and agriculture. This program will achieve water and energy savings and greenhouse gas reductions by accelerating use of cutting-edge technologies such as renewable energy-powered desalination, integrated onsite reuse systems, water-use monitoring software, irrigation system timing and precision technology, and on-farm precision technology.
- The Energy Commission shall adopt emergency regulations establishing standards that improve the efficiency of water appliances, including toilets, urinals, and faucets available for sale and installation in new and existing buildings.
- The Energy Commission shall expedite the processing of all applications or petitions for amendments to power plant certifications for the purpose of securing alternate water supply necessary for continued power plant operation.

Governor Brown has stepped up actions and increased conservation measures since January 2014 as the drought has worsened. On January 17, 2014, the Governor declared a Drought State of Emergency. On April 25, 2014, the Governor issued a Proclamation of a Continued State of Emergency to strengthen the state's ability to manage California's water supply effectively in drought conditions. The orders and provisions of those Proclamations, plus those of Executive Orders B-26-14 and B-28-14, remain in full force and effect as modified by the April 25 Executive Order.

According to the Department of Water Resources, California is now in its fourth year of drought:

- 2012 was a period of continued drier-than-normal conditions.
- 2013 was the driest year in recorded history for many parts of California.
- 2014 was the third driest in the 119 years of official California water monitoring records.
- As of March 2015 the dry trend continues.

Water and Energy Resources are Inextricably Entwined

The times when the highest intense energy water supply options are needed occur during multiyear droughts when surface water supplies are low and groundwater levels drop, requiring even more energy to pump each gallon of water. To compound the problem, reduced surface water supplies and snowpack in higher elevations are likely to reduce the availability of valuable hydroelectric supplies. Energy is needed to pump, treat, transport, heat, cool and recycle water. On the flip side, the force of falling water turns the turbines that generate hydroelectric electricity, and most thermal power plants depend on water for cooling. In California, an elaborate system of man-made storage, treatment and conveyance structures exist to augment natural hydrologic features. This system not only helps produce needed electricity supplies, but

requires large amounts of energy to deliver quality water where Californians need and want it.

Drought Impacts on Hydroelectricity

The most widely recognized aspect of the water-energy relationship is hydroelectricity production. A vast system of reservoirs and dams, pumped storage, and run-of-river facilities serves California. These facilities are operated by investor-owned utilities (IOU), publicly-owned utilities (POU), state and federal agencies, irrigation districts, and other entities. The water facilities serve multiple purposes, including power generation, water supply, recreation and flood control.

When the state is experiencing less rainfall, less snowpack in the mountains, and earlier snowmelt, then less water is available to generate hydroelectricity. Also, reduced snowpack that is melting earlier could lower the amount of water that generates hydropower during the summer months, when electricity demand and prices are highest. There is a natural variation in year-over-year hydroelectricity production. It supplies between 14 to 19 percent of the state's electricity, down from nearly 60 percent in the 1950s. Most of that reduction is from the diversification of California's energy sources. When hydroelectricity does decline because of drought, natural gas is the fuel used most often to provide replacement electricity. However, the use of renewable energy has increased. In 2014 alone, about 2,500 megawatts (MW) of renewable energy capacity became operational, increasing the state's total to about 21,000 MW. The Energy Commission estimates that in 2014, nearly 25 percent of all electricity retail sales were provided by renewable sources.

Three snowpack areas have been most affected by the drought: Northern Sierra/Trinity, the Central Sierra Nevada and the Southern Sierra. The Sierra Nevada snowpack typically melts in the spring and summer. It collects in reservoirs and provides about one-third of the water Californians use each year. Even with recent storms, reservoir storage is significantly below average. As of March 2015, Shasta Lake was at 78 percent of the historical average. Similarly, Lake Oroville storage was at 49 percent, and Folsom Lake was at 58 percent.

California imports an estimated 3 to 4 percent of its total hydroelectricity from the Pacific Northwest and the Hoover Dam in the Southwest.

With less water available to generate hydroelectricity, natural gas and renewable energy supplies may be used to make up the difference. In 2014, the amount of natural gas-fired generation increased by 3 percent from 2013, but renewables added in 2013 and 2014, especially solar, helped make up about 55 percent of diminished hydrogeneration. Some utilities rely more on hydroelectricity than others. Although the drought is mostly affecting northern utilities, some utilities have resources spread through more than one snowpack or watershed, which could reduce shortfalls in one area if greater production is realized in another. With that said some smaller publicly owned utilities (irrigation districts) rely heavily on hydroelectricity and are more detrimentally impacted during drought times.

Given that hydropower is one of the least expensive sources of energy and has zero emissions, other types of energy used to make up the difference may have different costs and emissions. Natural gas is more expensive than hydropower and produces greenhouse gas emissions and other air pollutants, although

natural gas units are becoming increasingly efficient. While renewable energy does not produce greenhouse gas emissions and costs continue to decline, there are capital costs associated with new renewable energy capacity (which is not the case for existing hydrogeneration). But the effects of the drought and additional power replacement costs is difficult to predict because each power provider must determine its costs, and how much of the cost will be absorbed, covered by contingency funding, or required from ratepayers.

Monitoring the Situation

Governor Brown convened an interagency Drought Task Force to provide a coordinated assessment of the state's dry conditions and provide recommendations on current and future state actions. The Energy Commission is part of the Drought Task Force that monitors and assesses drought impacts on hydropower generation, and by extension, California's electricity supply.

The Energy Commission is also part of the interagency Electricity Working Group, comprised of staff from the State Water Resources Control Board, Department of Water Resources, California Public Utilities Commission, and the California Independent System Operator. The group is an extension of the Drought Task Force and is led by the Governor's Office.

The Electricity Working Group develops necessary actions to protect California's energy supply and service reliability that could be affected by the drought. It is tasked with:

1. Developing tools to illustrate the effect of the drought so that decision makers can better evaluate hydropower generation and electricity reliability.
2. Monitoring hydropower generation impacts.
3. Monitoring natural gas plants using water for cooling purposes.
4. Reviewing and activating emergency contingency plans for electricity shortages, if needed.

Did You Know?

Transportation and treatment of water, treatment and disposal of wastewater, and the energy used to heat and consume water account for nearly 20 percent of the electricity used in California and 30 percent of non-power plant-related natural gas consumed in California.

Members of the News Media:
Please contact the Media and Public Communications office at 916-654-4989.