Cooling degree days

Average temperatures have increased in California over the past century. As a result, the energy needed to cool buildings during warm weather — measured by "cooling degree days" — has increased.

The need to cool indoor living spaces depends on the outdoor temperature. As California air temperatures warm, the energy needed to cool buildings is rising.

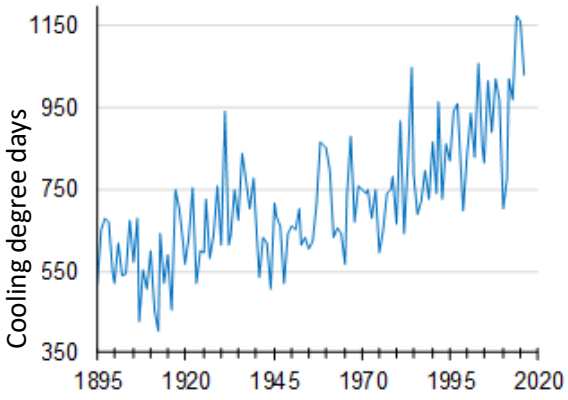
Measurement of "cooling degree days" offers a way to track the demand for energy to cool homes and buildings. Cooling degree days are not actual days. Instead, they measure, by how much, the daily average temperature is higher than 65 degrees Fahrenheit (°F), a reference temperature. For example, a day with an average temperature of 75°F corresponds to 10 cooling degree days. If every day in a week had an average temperature of 75°F, the total number of cooling degree days for that week would be 70 (10 cooling degree days per day × 7 days in a week).

What does the indicator show?

The graph below shows the total number of cooling degree days each year statewide. Between 1895 and 2016, the total number of cooling degree days per year increased in California. The past few years have seen unusually warm temperatures, as reflected in the relatively high cooling degree days observed.

Trends across the state vary by climate division, as shown in the map below. Coastal California shows a trend toward greater increases in cooling degree days since 1895 compared to the rest of the state.

Statewide annual cooling degree days*



Percent change in cooling degree days, by climate division, 1895 -2016

Source: NOAA 2017

** Each value shown in the graph is the sum of degree days for that year*

Temperatures during the cold months have likewise been warming over the past century. As a result, the energy needed to heat buildings during cold weather – measured by "heating degree days" – has decreased. Heating degree days reflect how much the daily average temperature is lower than 65°F.

Why is this indicator important?

Cooling degree days track how temperature can affect energy demand. As the climate continues to warm, the demand for energy to cool the air in places where people live and work increases. Utility planning and construction decisions are guided by trends in degree days, as well as by the availability of energy-efficient cooling technologies, consumer behavior, and population shifts.

The increasing demand for cooling may disproportionately impact certain California populations. Households with lower incomes are less likely to own air conditioners, making them more vulnerable to the health effects of summer heat extremes. For lower-income households that own air conditioners, the cost of energy associated with cooling represents a greater proportion of their household income than it does for higher-income households.

Studies suggest that climate change may hamper the ability to meet the increased demand in electricity for cooling. Warming temperatures, sea level rise, and wildfires can impact the operation or the efficiency of power plants, transmission networks, and natural gas facilities. Climate change can also affect rainfall, wind and biomass, which fuel renewable energy. Thus, investments in new energy generation and distribution infrastructure, and new ways to manage peak demand and system reliability may be required to meet a growing demand for air conditioning.

Photo: California Energy Commission

For more information about this and other climate change indicators, visit:
https://oehha.ca.gov/climate-change/report/2018-report-indicators-climate-change-california