2 State & Local Context

Utility-scale solar development in Butte County is influenced by factors both inside and outside the county, including incentive programs, regulations, and market conditions at the federal, State, and local levels. This chapter focuses on the programs and regulations at the State and local levels that most strongly influence utility-scale solar development in Butte County.

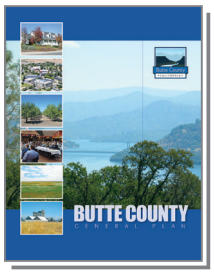
PowerButte

In response to California's renewable energy regulations and incentives, and to local community support, Butte County developed the PowerButte program, which is the face of Butte County's commitment to encourage renewable energy.

The PowerButte website at power.buttecounty.net is an online source of information on innovative programs that are helping to make Butte County a "Place for Clean Energy."

In addition to the Guide and online mapping tool, here are some of the individual initiatives under the PowerButte umbrella.

Butte County General Plan 2030

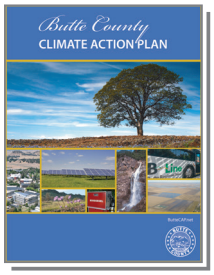


The PowerButte programs implement the goals and policies in the County's General Plan (buttecounty.net/dds/Planning/GeneralPlan.aspx). The General Plan encourages continued renewable energy development (see General Plan Policy CO-P3.2), and directs the County to explore certain actions and policy options, including identifying locations suitable for renewable energy development, exploring the feasibility of a Community Choice Aggregation (CCA) program, and looking at ways to streamline small-scale renewable energy projects. While the General Plan does not provide standards or guidelines for specific aspects of solar development, it expressly allows renewable energy facilities in some types of land, subject to permitting requirements.

Butte County Zoning Ordinance

The County's Zoning Ordinance (buttecounty.net/dds/Planning/Zoning.aspx) provides specific development regulations about different types of buildings and other structures, including renewable energy installations. Section 24-157 regulates alternative energy structures, including utility-scale solar photovoltaic (PV) installations. See Chapter 3, Development and Design Guidelines, and Chapter 4, Permitting Process, for more details on Butte County's existing regulations for utility-scale solar development.

Butte County Climate Action Plan



In 2014, the County adopted a Climate Action Plan (CAP) (buttecap.net), which expanded on and specified how the County will implement those renewable energy policies in the General Plan. The CAP showed that a set of renewable energy-related actions, including installing utility-scale solar facilities (see CAP Action EN11-2), will significantly reduce greenhouse gas (GHG) emissions in Butte County. Several items in the CAP support increased renewable energy development, particularly solar PV, and promote both roof-mounted and larger ground-mounted arrays.

Property Assessed Clean Energy (PACE)

One aspect of PowerButte is PACE programs, which help residential and commercial building owners make energy- and water-related improvements to their properties, including installing solar panels. Under a PACE program, the program administrators pay the upfront cost of the building upgrade, including the cost of materials and labor. The property owners then pay back the cost of the improvements through a temporary increase in their property tax bill. This allows property owners to pay for solar panels or other energy or water savings improvements in installments over a long period of time (up to 20 years), reducing the financial burden for these improvements and making it much easier for property owners to afford them. As of 2017, there are five different PACE programs operating in Butte County for residential buildings and two for commercial properties. While PACE programs would not finance utility-scale solar projects, they do increase overall renewable energy supplies, and can help build awareness and support for larger projects.

Community Choice Aggregation (CCA)

Another program under PowerButte is CCA. In a CCA program, a local government or Joint Powers Authority (JPA) made up of city/county partners purchases electricity on behalf of community members and sells the electricity to local residents and businesses. This allows the local government/JPA to control the electricity source and rates, and gives local governments access to special funds paid for by utility customers to support energy efficiency and renewable energy projects. Unlike a municipal utility, such as those in Gridley and Biggs, a CCA does not own or maintain the electrical infrastructure, nor does it provide billing or customer service. In practice, CCAs allow local governments to offer more renewable energy than private utilities for a comparable cost. There are currently eight CCA programs operating in California, with several more being explored, including in Butte County. Butte County is currently soliciting proposals to evaluate the feasibility of a CCA program. The County will then decide whether to move forward with the preparation of a feasibility study. If a CCA is created in Butte County, local utility-scale solar facilities could sell renewable energy to a Butte County CCA or similar programs throughout the state.

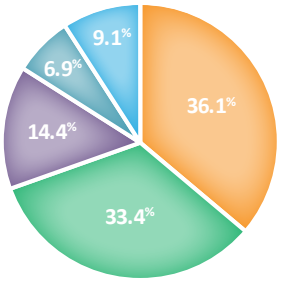
Renewable Energy in California

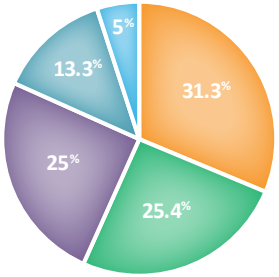
Generation and Capacity

California generates a significant amount of its electricity from renewable energy. In 2015, approximately 20 to 25 percent of electricity generated and used in California was from renewable sources, among the highest in the US. Renewable energy in California fits in five general types: biomass, geothermal, small-scale hydroelectric, solar, and wind. Renewable energy facilities either have a dedicated purpose of supplying electricity to the grid or are intended to supply electricity to a dedicated home, business, or other facility rather than the wider grid.

When measured by the amount of energy generated, solar energy is the largest source of California's renewable energy, making up over 31 percent of renewable energy in 2015. When measured by the capacity for renewable energy generation in the state, solar energy is again the largest at over 36 percent of the state's capacity.

California's Renewable Energy Capacity and Generation Sources





Capacity is the maximum amount of power that could theoretically be produced in any given instant. It is measured in watts (W) and related metrics (e.g., kilowatts, megawatts).

Generation is the total amount of energy generated over a period of time (e.g., a year). It is measured in watt-hours (Wh) and related metrics (e.g., kilowatt-hours, megawatt-hours).

Solar | Geothermal | Wind | Bioenergy | Small-scale Hydroelectric

Types of Solar Generation Facilities

Currently, the solar industry uses three main types of ground-mounted solar generation facilities:

Source: groSolar

Fixed Tilt

Solar photovoltaic (PV) panels arranged in a single plane typically facing south to southwest at a tilt of 20 to 40 degrees. This arrangement allows for a higher density of solar panels.

Source: A2Z Energy

Solar Trackers

Solar PV panels affixed to a movable structure that tracks the movement of the sun. Solar trackers are generally either one-axis or two-axis systems. Two-axis systems generate more electricity per unit capacity.

Source: Lost Anvil / Creative Commons

Concentrated Solar Thermal

Solar technology that uses heliostats (mirrors that reflect sun) to focus sunlight toward a vessel, such as a tower or tube, containing a working fluid that is used to generate steam to power a turbine connected to a generator. This type of technology is sited in desert environments and is currently not allowed in Butte County by the Zoning Ordinance.

What is the "Grid"?

The electric grid is the network of systems for generating, transmitting, and distributing electricity. A micro grid could be as simple as a home using electricity from solar panels on its roof along with a battery system. A regional grid, on the other hand, is a complex network of interconnected electrical systems, including power plants, transmission lines, substations, distribution lines, transformers, and other components connected to end users (businesses and homes). The connections between all of these things can cross county, state, and even national borders.

Source: Sacramento Municipal Utility District, NREL

State Regulation

Renewable energy in California is primarily regulated by two key State agencies: the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC).

The CEC is California's energy policy and planning agency responsible for promoting efficiency and conservation, supporting cutting-edge research, and developing the State's renewable energy resources. The CEC also regulates public utilities, verifies that renewable energy facilities are in fact generating energy from renewable sources, and promotes increased energy efficiency, energy conservation, and renewable energy generation through a variety of research and incentive programs.

The CPUC regulates California's private utility companies, including the Pacific Gas and Electric Company (PG&E), and is responsible for guiding energy-related policy and programs designed to benefit the consumer, environment, and economy. It approves power purchase agreements and energy procurement plans for these companies, and ensures that they are complying with renewable energy requirements. The CPUC also regulates changes to energy rates, private utility transmission lines, and CCA programs (see page 8). The CPUC has implemented a number of initiatives to support the development of renewable energy technologies, including Electric Rule 21, a rule governing interconnection, operating, and metering requirements for generating facilities.

Various other State agencies also play a role in California's renewable energy framework. The California Independent Systems Operator (CAISO) is responsible for permitting a power plant's connections to the parts of the electricity grid owned by private utilities, and several agencies are responsible for regulating potential environmental impacts from energy facilities and infrastructure.

Renewables Portfolio Standard

The Renewables Portfolio Standard (RPS) is a State law that requires all electricity suppliers in the state, including private utilities, public utilities, and CCA programs, to provide at least 33 percent of their electricity from eligible renewable sources by the end of 2020, and at least 50 percent of electricity from those sources by the end of 2030. The CPUC is responsible for ensuring that private utility companies and CCAs meet their RPS obligations, while the CEC plays a similar role for public utilities.

The State is currently ahead of schedule for complying with RPS standards; as of October 2016, the CEC estimates that approximately 27 percent of the electricity supplied in California was from eligible renewable sources for the 2016 calendar year.

The Future of Renewable Energy in California

Future renewable energy development is dependent on a number of factors, including economic conditions, regulatory environments, and political changes. Anticipated increases in electricity use as a result of population growth, phasing out the State's coal and nuclear power plants, and California's aggressive RPS standards are expected to result in continued increases in California's renewable energy generation.

As of late 2016, California had 21,300 MW of renewable energy capacity installed and operational, not including self-generation. Renewable energy capacity and generation is projected to continue to grow in the near future with new renewable energy potential (mostly solar) coming online, permitted projects, and power purchase agreements. Short-term forecasts through 2020 indicate that most growth in renewable energy generation will occur in solar, with a somewhat smaller amount of growth from wind.

How is Electricity Measured?

The difference between power and energy is important to understanding electricity. A very simple way to understand power and energy is that power is the rate at which energy is used. You can think of power as being like someone's hourly wage, while energy is like the total amount of money they make in a day, month, or year.

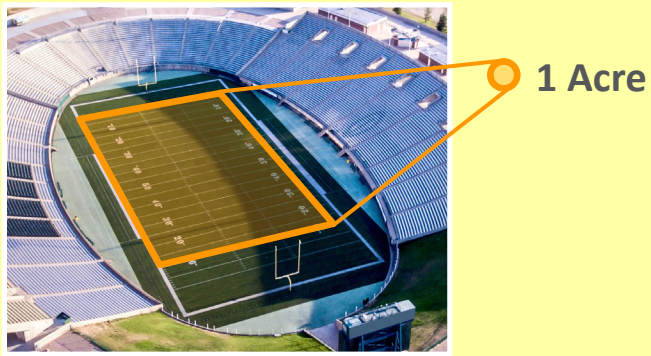
Kilowatts (kW) and megawatts (MW) are measures of power and kilowatt hours (kWh) and megawatt hours (Mwh) are measures of energy. Kilowatt hours are how we typically measure the amount of electrical energy used by a home or business.

Power *Kilowatts* × **Time** *Hours* = **Energy** *Kilowatt Hours*

How Much Electricity are we Talking About?

1 MW is enough power for 250 to 500 homes. 1 MW is equal to 1,000 kW.

Generating 1 MW of solar energy takes 4 to 8 acres of solar panels, or roughly equal to 3 to 6 football fields.



Source: Sierra Nevada Brewing Company

Source: Department of Development Services

Source: Butte College

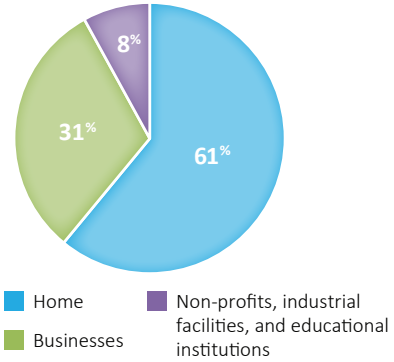
Large solar projects throughout Butte County (top left: Sierra Nevada Brewery, top right: Butte County Government Center, bottom: Butte College)

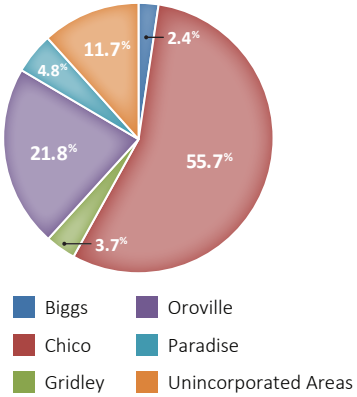
Renewable Energy Projects in Butte County

As of late 2016, Butte County has 18 renewable energy facilities with a total capacity of 80 MW that supply energy to the electrical grid. Much of this capacity comes from nine small-scale hydroelectric facilities, along with eight small utility-scale solar arrays and a bioenergy facility. Of California's 58 counties, Butte County ranks 28th in renewable energy capacity.

Butte County also has a substantial amount of self-generation renewable energy capacity with approximately 76 MW of self-generation solar potential installed as of March 2017.

Distribution of Self-Generation Solar Potential





Three of the largest solar installations in Butte County are at Butte College, the Sierra Nevada Brewery, and the Butte County Government Center. Butte College's solar array generates enough electricity annually to power approximately 930 California homes, and is large enough to entirely meet the campus' electricity needs and produce a surplus energy that can be sold back to PG&E. The Sierra Nevada Brewery's solar array supplies approximately 20 percent of the facility's electricity needs. The Government Center solar energy system is capable of meeting the electricity needs of three County government buildings. In addition, the City of Chico's Water Pollution Control Plant Solar Facility provides up to 40 percent of the plant's energy.