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California"s push toward clean energy has led to an unexpected challenge: an oversupply of solar energy. At times, the state generates more solar power than it can use, resulting in the waste of clean energy. This phenomenon, known as the “duck curve,” describes periods when solar energy production exceeds demand, especially during sunny spring days when electricity use is lower.

The “duck curve” has become a critical issue as California ramps up its solar energy production. Elliot Mainzer, CEO of California"s Independent System Operator (ISO), explains that during certain times of the year, particularly in spring, the demand for electricity is not high enough to match the state"s substantial solar production. This results in excess energy that California cannot use. To manage this, California exports surplus power to other parts of the Western United States. In extreme cases, they even have to curtail or shut down solar production.

Data from the Independent System Operator shows a significant rise in the amount of renewable energy curtailed due to oversupply and congestion. Congestion occurs when there"s more electricity than the transmission lines can handle. In 2024, nearly 2.6 million megawatt-hours of renewable energy will have been wasted, primarily solar energy. This amount could power all the homes in San Francisco for a year.

Mainzer advocates for expanding transmission lines to enhance the flow of electricity across the state. Without adequate transmission lines, new solar projects and other renewable energy sources cannot deliver their electricity to customers, leading to stranded generation. Permitting reform is essential to facilitate the construction of these lines.

Governor Gavin Newsom"s administration is pushing to add more batteries to store excess energy for use during peak demand times. This approach aims to balance the energy supply and reduce wastage. However, state regulators have also taken a controversial step by cutting financial incentives for homeowners to install solar panels.

The reduction in financial incentives, known as net metering, has sparked outrage in the rooftop solar industry. Ed Murray, president of the California Solar and Storage Association and operator of Aztec Solar, reports significant business impacts. The changes have led to a 66% drop in residential solar installations in the first quarter of 2024 compared to the same period in 2022. The association estimates that 17,000 green jobs have been lost since the incentive structure changed.

To make solar installations cost-effective under the new incentives, homeowners now need to install batteries, which can cost an additional $10,000 to $20,000 or more. This requirement has deterred many potential solar customers who cannot afford the added expense.

Governor Newsom defends the state"s policies, highlighting that California had nearly 100 days in 2024 when clean energy exceeded 100% of demand for part of the day. He emphasizes that California"s solar production has increased nearly twentyfold over the past decade, powering millions of homes with clean energy. The state is also rapidly adding more batteries to capture and store excess energy for nighttime use.

Supporters of the incentive changes argue that the shift to solar can raise energy costs for those who do not have solar panels or cannot afford them. Public Utilities Commission member John Reynolds stated that while net metering has successfully brought solar to hundreds of thousands of Californians, it has become too expensive for non-solar customers and needed reform.

However, Murray disputes this argument, noting that many of his clients earn modest incomes and finance their solar installations through loans. He warns that other states are watching California"s changes and may follow suit, potentially hurting the solar industry nationwide.

California"s ambitious goal of achieving 100% clean energy by 2045 faces significant challenges. The state"s experience highlights the complexities of transitioning to renewable energy. According to Murray, the transition to electric vehicles, heat pumps, and electric appliances depends on widespread rooftop solar adoption. He asserts that achieving California"s clean energy goals is impossible without solar energy.

California"s surplus solar energy challenge underscores the need for strategic planning and infrastructure investment to utilize renewable energy fully. As the state continues its historic clean energy transition, addressing these challenges will be crucial to realizing a sustainable and equitable energy future.