

2024 California Envirothon **“Renewable Energy for a Sustainable Future”** **Current Issue Scenario**

Background

Overview of National and State Enacted Legislation on Renewable Energy

An equitable and clean energy economy deploying new energy technologies are vital to combating the climate crisis. The U.S. Department of Energy (DOE) is leading America on a path to net-zero carbon emissions by 2050 through scientific and innovative solutions. New technologies are being developed and installed for wind, solar, biomass, hydroelectricity, geothermal, battery storage, electric vehicles, carbon capture, and a resilient grid infrastructure.

This is both a challenge and opportunity to invest in American companies at the cutting edge of clean energy technology and manufacturing. The DOE has regulatory authority to innovate in advanced building technologies, energy efficient appliances, and more.

DOE offers funding and financing through grants, loans, and financing programs for renewable energy projects. They offer technical assistance to states, tribes, and local government to build and invest in a clean energy future. These strategic investments in energy efficiency and groundbreaking technologies reflect a collaboration with a wide range of communities, business stakeholders, state/tribal/local government agencies and local organizations.

The 2021 Bipartisan Infrastructure Law (BIL) and the 2022 Inflation Reduction Act (IRA) are both leading to historic levels of private sector investments to expand clean energy, infrastructure jobs, and economic growth.

The BIL was passed by Congress and signed on November 15, 2021 by President Biden. It invests \$550 billion in funding over fiscal years 2022-2026 for transportation projects including electric vehicles, buses and ferries. It also makes the largest investment in clean energy infrastructure in history. The funding provided under BIL will modernize the power grid, weatherize and upgrade homes, schools, businesses, and communities to make them cleaner and more affordable. It will fund new programs to support the development, demonstration, and deployment of cutting-edge clean energy technologies. These investments create jobs, grow the economy, build resilience to climate change, and rebuild aging infrastructure.

President Biden signed the IRA on August 16, 2022, marking the most significant action Congress has taken on clean energy and climate change. Among many goals, it drives the global clean energy economy forward by investing in domestic energy production and reducing carbon emissions by roughly 40% through 2025.

Among the many federal departments and agencies the IRA invests in, is the Natural Resources Conservation Service and its Farm Bill conservation programs such as Regional Conservation Partnership Program and the Environmental Quality Incentives Program among others.

(<https://www.nrcs.usda.gov/about/priorities/inflation-reduction-act>)

These additional funds help farmers and ranchers implement expanded conservation practices to reduce greenhouse gas emissions and increase carbon storage in soil and trees. The funding is in addition to other available program funds, and participation is voluntary, incentive-based, and targeted to support

climate-smart mitigation activities.

California

California is leading the nation toward a 100% clean energy future to address climate change. The California legislature passed SB 350, the Clean Energy and Pollution Reduction Act of 2015, and was signed by Governor Gavin Newsom in September of that year. <https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350>.

It established clean energy, clean air, and greenhouse gas (GHG) reduction goals, including reducing GHG to 40 percent below 1990 levels by 2050. The bill also calls for energy efficiency in buildings to increase by 50 percent and for 50 percent of the state utilities' power to come from renewable energy by 2030. The legislation is more aggressive than the 2020 renewable portfolio standard (RPS) by now requiring the state's RPS to reach 40 percent by 2024 (up from 20 percent in 2000), 45 percent by 2027, and 50 percent by 2030. <https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350>
<https://www.environmentenergyleader.com/2015/09/sb-350-passes-california/>

The California Energy Commission (CEC) is working with other state agencies, including the California Public Utilities Commission, the California Air Resources Board, and the California Independent System Operator (ISO). The CEC is also coordinating with affected utilities and electrical corporations to achieve RPS targets and meet GHG emission reduction targets.

In May 2023, Governor Newsom announced the “Building the Electricity Grid of the Future: California's Clean Energy Transition Plan,” showing how California will reach its goal of 100% clean electricity by 2045, while keeping costs affordable and maximizing the energy supply through this transition. The roadmap outlines how California will leverage hundreds of new solar, wind, battery storage, and other clean energy projects to achieve the 100% clean electricity goal. <https://www.gov.ca.gov/2023/05/25/governor-newsom-updates-the-roadmap-to-californias-clean-energy-future/>

Opposition to Renewable Energy Projects

At least 15% of counties in the U.S. have effectively halted new utility-scale wind, solar, or both. These limits come through outright bans, moratoriums, construction impediments and other conditions that make green energy difficult to build.

A nationwide analysis by USA TODAY shows local governments are banning green energy faster than they're building it (reported February 4, 2024, link follows: <https://www.usatoday.com/story/news/investigations/2024/02/04/us-counties-ban-renewable-energy-plants/71841063007/>).

On June 30, 2022, Governor Newsom signed Assembly Bill 205 into law, in part to help the state reach its goal of generating all its power from carbon-free sources by 2045. The new law, among other things, allows developers of wind and solar projects to apply to the CEC for streamlined reviews and authorization. That process has historically been handled by cities and counties. Under AB205, local concerns will have to be weighed against the bigger and broader threat of climate change.

AB205 has encountered resistance, challenges, and anger among local government officials and community interests who perceive the new law as heavy handed and overriding their authority to approve such projects. For example, State officials are using this authority for the first time, to gain

approval powers over a plan to build 48 giant wind turbines in Shasta County. They have encountered opposition from the from the local community representatives, including the Pit River Tribe, and county officials ((<https://www.sfchronicle.com/california/article/shasta-wind-climate-politics-18499963.php> The San Francisco Chronicle, December 12, 2023, “Battle over wind in conservative county”).

Energy Justice and Equity

For far too long, there have been barriers to opportunities for low income customers to access renewable energy; lack of contracting opportunities for local small businesses in disadvantaged communities; and a shortfall of other investments such as energy efficiency, rooftop solar panels, tankless water heaters, and home weatherizing. Communities of color and low income neighborhoods have borne the brunt of pollution to the air, water, and soil they rely on to live and raise their families. This also results in public health problems especially childhood asthma and other health affects to the elderly. The conversion to clean energy must lift up these communities that have been left behind and make sure those who have suffered the most are the first to benefit.

<https://study-online.sussex.ac.uk/news-and-events/what-is-energy-justice/>

Advocates for energy justice promote policy measures aimed at reducing energy costs and burdens on low income customers, avoiding disproportionate impacts, and ensuring the equitable distribution of the benefits of energy generation, transmission and transition, and access to reliable and clean energy. Energy justice seeks to ensure equitable access to distributed energy resources and requires addressing affordability, technological barriers, and regulatory challenges.

Case Study: Demonstrating Principals of Energy Justice

Hurricane Maria hit Puerto Rico in 2017 and knocked out the power grid dependent on fossil fuel energy. Remote rural areas, with a combined population of 90,000, endured more than nine months without electricity and experienced power outages almost daily. Hurricane Fiona arrived precisely five years after Maria, hitting the unreliable power grid which still had not fully recovered from the impacts of Maria.

Microgrids are rural energy solutions and are powerful tools for these remote communities to have control over their energy supplies. In addition, it increases their resilience with the ability to keep power even when disaster strikes. Microgrids in Puerto Rico have kept rural communities connected.

The first rural electric cooperative on the island, Cooperative Hidroelectrica de la Montana, is developing the Microrred de la Montana, to support rural communities in case of power outages. The microgrids' success has led to partnerships and funding with federal agencies such as the U.S. Department of Energy and the U.S. Department of Agriculture to support and empower rural villages as well as promoting equity and diversity in clean energy innovation.

While there were solar panels on the island before 1017, more than 45,000 panels have been installed in the years since. Puerto Rican households have placed more than 200 megawatts of rooftop solar panels in the five years after Maria. These residential solar systems provide almost all of the solar energy going into the community microgrid, as there are few large-scale solar projects. Most of these distributed solar arrays are paired with batter storage, allowing families and businesses to store energy when it is sunny and use it during power outages.

Native American Tribes and Renewable Energy

In the United States, Tribal nations that are specifically recognized by the Federal Government have sovereign power, meaning that state and local governments have no authority over them or their lands, even though they are located within a state or county. One of the roles of the federal government, since the time of this Nation's founding, has been to protect Tribal nations from state or local regulation. These tribes are referred to as “federally recognized” and have a special government-to-government relationship with the United States. This recognition includes the responsibilities, powers, limitations, and obligations attached to that designation. They are also eligible for funding and services from the Bureau of Indian Affairs and other federal agencies. At present, there are 574 federally recognized American Indian and Alaska Native tribes and villages.

While tribes that are not federally recognized, meaning not having sovereign powers or a trust relationship with the government, many still possess tribal structures and maintain tribal traditions.

Those non-federally recognized tribes are at a disadvantage as they do not have a government-to-government relationship with the U.S. This handicaps tribal conservation efforts and access to federal resources, including funding for renewable energy projects.

The State of California recognizes the right of Native American tribes to self-govern and to exercise inherent sovereign powers over their members and territory. Every state agency and department is encouraged to communicate and consult with California Native American tribes. The State continues to work with tribes on a government-to-government basis to address issues concerning tribal self-government and tribal trust resources. (<https://tribalaffairs.ca.gov/state-government/>)

The Energy Policy Act of 2005 authorized DOE to establish the Office of Indian Energy. The mission of the Office of Indian Energy Policy and Programs is to maximize the development and deployment of energy solutions for the benefit of American Indians and Alaska Natives.

The Office works across government agencies, and with Indian tribes and organizations, to promote Indian energy policies and initiatives in support of the federal government's trust responsibility, tribal self-determination policy, and the government-to-government relationships.

The Office delivers programs that:

- Promote tribal energy development, efficiency, and use
- Reduce or stabilize tribal energy costs
- Strengthen tribal energy infrastructure
- Electrify Indian land, housing, and businesses

The impact of federal investments in tribal energy projects are tangible given 2010-2022 data:

- More than 210 funded tribal energy projects
- Over \$120 million in DOE investments
- Nearly \$215 million in total project value
- Nearly 46 megawatts of new generation installed on tribal lands
- Collectively, nearly \$315 million saved in communities over the life of the systems
- Nearly 8,800 tribal buildings affected

Many of the projects are solar related such as solar-plus-storage and solar microgrid projects to provide energy during grid shutdowns and to provide energy to key facilities such as tribal community colleges.

(<https://www.energy.gov/indianenergy/mission>)

(<https://www.energy.gov/indianenergy/tribal-energy-projects-database>)

The CEC approved a resolution recognizing and committing the agency to support California tribal energy sovereignty and independence (March 2, 2023). The resolution is between Native American tribal leaders and commissioners from the CEC and the California Public Utilities Commission. The CEC will work with California tribes to develop a Tribal Energy Sovereignty Policy to implement the resolution. The policy also formalizes CEC's approach to tribal energy sovereignty, land, and consultation.

California tribal governments are undertaking efforts to advance a more sustainable future and expand energy independence and resiliency, include:

- Carbon sequestration in the Humboldt region
- Carbon offset projects
- Renewable energy microgrids (especially where wildfires can threaten the electrical grid)

State agency tribal liaisons encourage representatives to continue engaging tribes directly to address the needs of their communities.

There remain concerns regarding proposed renewable energy projects adversely impacting tribal lands and culture. Proposed federally funded projects must include tribal consultation to determine what impacts there may be to sacred sites and ancestral lands, culture, religion, natural resources, and livelihood.

Life Cycle of Key Components to Solar and Wind Renewable Energy Projects

Solar panels often last well beyond their 25-year lifespan. Beginning in 2018, there were 53GW of solar capacity deployed. The total weight of all panels deployed equates to 44.5 million tons.

Wind turbines are trending to longer blades on bigger turbines and taller towers to increase electricity production. Wind turbines and their turbine blades (approximately the length of a football field) last an average of about 25 years. They require little maintenance over the lifespan of the investment compared to other forms of energy generation.

The solar and wind industries pride themselves on sustainability, clean renewable energy which help local economies, and reduce greenhouse gas emissions. For these industries, there must be a focus on recycling at the end of the renewable energy project's lifespan so landfills do not overflow with old solar panels or turbine blades.

Solar panel recycling has not been a huge issue because a vast majority of installation has occurred in the past ten years. But it is clear that the market need for recyclers will only increase over time. A 2016 study (<https://irena.org/publications/2016/Jun/End-of-life-management-Solar-Photovoltaic-Panels>) by the International Renewable Energy Agency (IRENA) estimates the recyclable materials in old solar modules will be worth \$15 billion in recoverable assets by 2050.

Silicon solar modules can be recycled as they are primarily composed of glass, plastic, and aluminum. These three materials are recycled in mass quantities (/article/thin-film-vs-crystalline-silicon-pv-modules). (<https://www.epa.gov/hw/solar-panel-recycling>)

Wind turbine blades require landfill disposal or recycling when turbines are decommissioned at the end-of-use stage, or when wind farms are upgraded (i.e. repowering).

About 85% of turbine component materials, such as steel, copper wire, electronics, and gearing, can be recycled or reused. But the blades are different as they are made of fiberglass (a composite material) to be lightweight for efficiency yet still durable enough to withstand storms. The mixed nature of the blade materials makes separating the plastics from the glass fibers to recycle into a workable fiberglass material difficult. In addition, the strength needed for the blades means they are also physically challenging to break apart.

Because there are so few options for recycling blades currently, the vast majority of those that reach the end-of-use are either being stored in various places or taken to landfills. This is clearly not an ideal situation. The necessity arises for more creative recycling solutions for used blades.

There are efforts underway to develop alternatives by large utilities to recycle spent turbine blades rather than landfill disposal. There are new technologies being supported through grant funding by the U.S. Department of Energy and will be used to break down and reuse fiberglass from used blades.
(<https://blog.ucsusa.org/james-gignac/wind-turbine-blades-recycling/>)
(<https://www.nationalgrid.com/stories/energy-explained/can-wind-turbine-blades-be-recycled>)
(<https://www.energy.gov/eere/wind/articles/carbon-rivers-makes-wind-turbine-blade-recycling-and-upcycling-reality-support>)

Renewable Energy and Natural Resources

Please review the following Study Resources Guide prepared by the New York Envirothon and posted on the National Conservation Foundation Envirothon's website: envirothon.org or at caenvirothon.com under the Study Materials tab:

Renewable Energy for a Sustainable Future
Current Environmental Issue Study Resources- Part A

Key Topic #3: Renewable Energy and Natural Resources 110 (starting page)

Introduction to the Scenario

As described in the Background section, California is making large investments in renewable energy over the coming years. These projects will necessarily vary from county to county.

Your team must select a county or a tribal reservation/lands in California for which you will propose a renewable energy project. This county may, but is not required, to be the county in which you reside or elsewhere. While preparing your presentation consider the following factors and how they relate to your chosen county or tribal land (note that this list may not be exhaustive):

- Existing energy infrastructure
- Natural resources (in particular, soil, aquatics, wildlife, and forestry)
- Certain climatic, geologic, and topographic conditions
- Tribal considerations
- Demographics and socioeconomics
- Cultural resources
- Diverse viewpoints of citizens and relevant government agencies
- Funding mechanisms

Scenario

Your team consists of five natural resource professionals with expertise and understanding in the field of renewable energy. The CEC is exploring opportunities for renewable energy projects statewide including in your county. They have contracted with your team to develop a renewable energy development plan to identify projects conducive to the county's climate, landscape features, natural resources, and communities.

You will present the plan at a public meeting convened by the CEC and the county board of supervisors or tribal council. The 20-minute presentation shall focus on one type of renewable energy source and explain how it helps the CEC and the county or tribal government reach its climate change and clean energy goals.

The policy brief should be clear, science-based, and concise to inform the decision makers. It should include the team's analysis and rationale of its renewable energy choice over other renewable energy options and give both pros and cons.

The plan should include a proposed budget, the project's construction timelines, and identify those agencies with regulatory oversight requiring close coordination and cooperation.

In addition, the plan will identify funding possibilities, prospective partners to collaborate and coordinate (e.g., technical assistance), and highlight impacts and benefits to the communities, local economy, and natural resources. It should also summarize outreach efforts conducted to gain public input in an inclusive and focused approach. The plan should specifically consider how the renewable energy project advances environmental justice, community development, and equity.

The policy brief will provide a detailed examination of the project's impacts on natural resources (e.g., wildlife) from construction and operation of the project. It will recommend avoidance and minimization measures to mitigate negative effects.

The brief should articulate opportunities to recycle end-of-life components of the project.

Discuss consultation and coordination with local tribal government in the early planning stages of the project and how their concerns will be addressed.

Propose opportunities for collaboration with local tribes and the community and what benefits they will derive from the project. Include findings on the cultural and social impacts/benefits of the project to environmental and social justice groups, Indigenous communities, underrepresented and underserved communities.