

Understanding the Electrical Grid

Unlike water or gas, electricity cannot be stored. It must be generated and then used immediately. Furthermore, electricity follows the “path of least resistance”, so it generally cannot be routed in a specific direction. This means generation and transmission operations in North America must be monitored and controlled in real-time, 24 hours a day, to ensure a consistent and ample flow of electricity. This requires the cooperation and coordination of hundreds of electricity industry participants.

NERC is responsible for aspects of an international electricity system that serves 334 million people, and has some 211,000 miles (340,000 km) of high-voltage transmission line.

The Generation and Transmission components make up the “bulk power system”. If you put dozens or even hundreds of these assets together, you get a “Balancing Area”, in which the balancing authority matches generation with customer demand, and the transmission operator monitors the flows over the transmission system and voltages at substations.

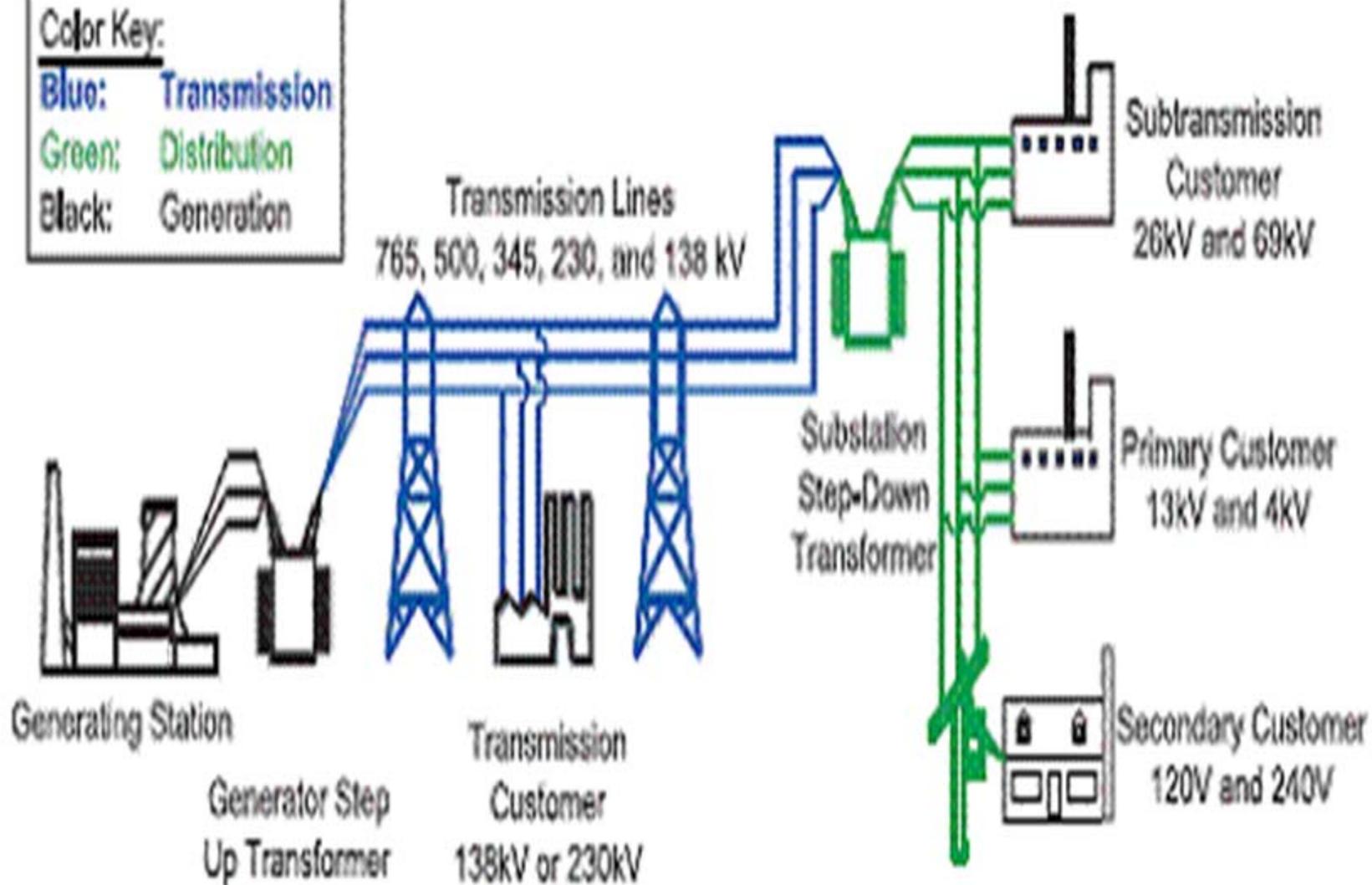
Balancing areas are defined by the electricity meters at their boundaries, which measure the power flowing into and out of the area. These areas are connected to each other by “tie lines.”

Color Key:

Blue: Transmission

Green: Distribution

Black: Generation



Federal Energy Regulatory Commission (FERC)

FERC is an independent agency that regulates the interstate transmission of electricity, natural gas, and oil. FERC also reviews proposals to build liquefied natural gas (LNG) terminals and interstate natural gas pipelines as well as licensing hydropower projects.

The Energy Policy Act of 2005 gave FERC additional responsibilities as outlined in FERC's Top Priorities and updated Strategic Plan. As part of that responsibility, FERC:

- Regulates the transmission and sale of natural gas for resale in interstate commerce;
- Regulates the transmission of oil by pipeline in interstate commerce;
- Regulates the transmission and wholesale sales of electricity in interstate commerce;
- Licenses and inspects private, municipal, and state hydroelectric projects;
- Approves the siting and abandonment of interstate natural gas pipelines and storage facilities, and ensures the safe operation and reliability of proposed and operating LNG terminals;
- Ensures the reliability of high voltage interstate transmission system;
- Monitors and investigates energy markets;
- Uses civil penalties and other means against energy organizations and individuals who violate FERC rules in the energy markets;
Oversees environmental matters related to natural gas and hydroelectricity projects and major electricity policy initiatives;
- Administers accounting and financial reporting regulations and conduct of regulated companies.

National Electricity Reliability Council ***(NERC)***

- National Electrical Reliability Council (NERC) is a self-regulatory organization, subject to oversight by the U.S. Federal Energy Regulatory Commission and governmental authorities in Canada.
- NERC ensures the reliability of the bulk power system in North America
- Develops and enforces reliability standards;
 - Assesses reliability annually via 10-year and seasonal forecasts
 - Monitors the bulk power system
 - Evaluate users, owners, and operators for preparedness
 - Educate, train, and certify industry personnel

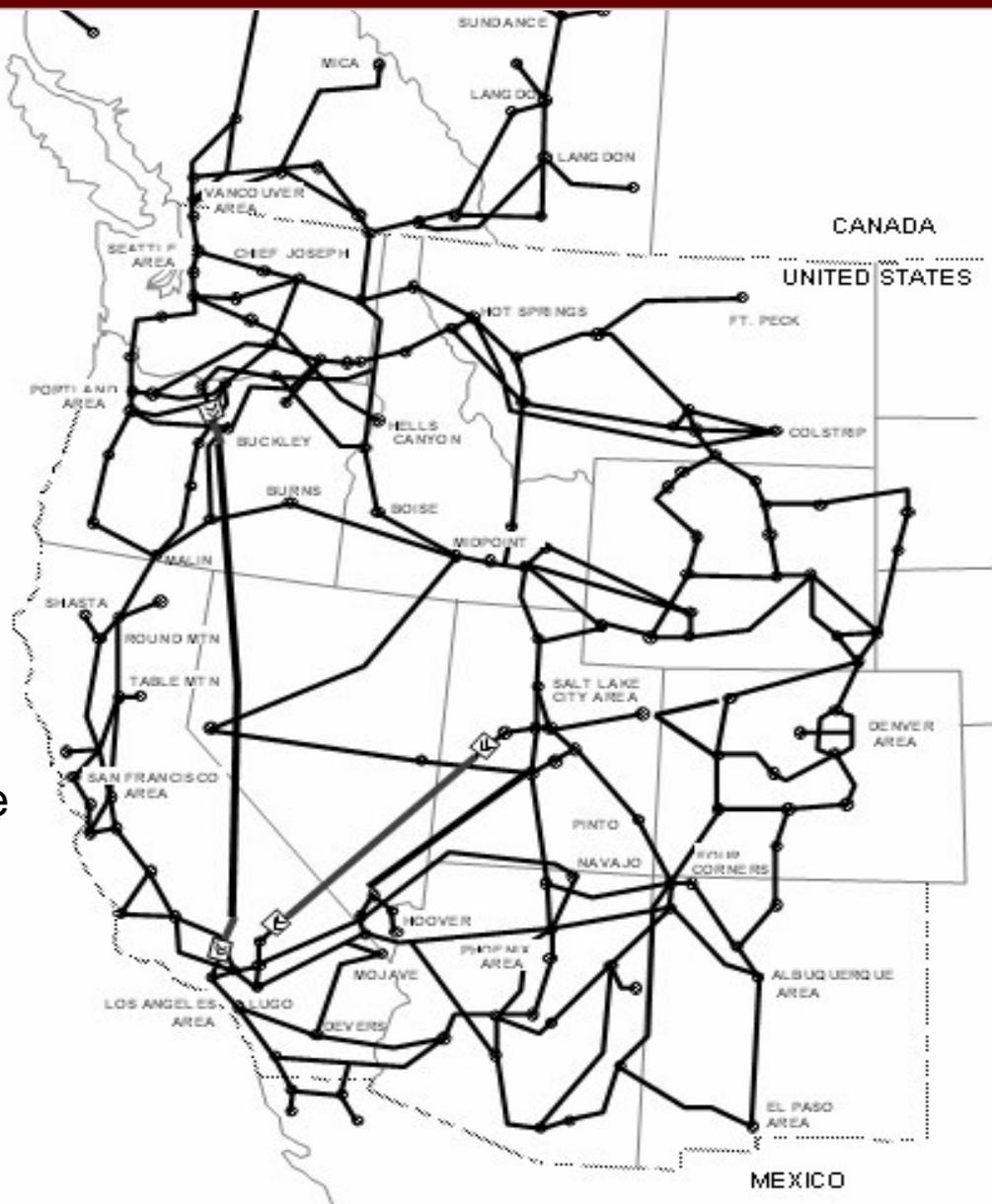


Western Interconnection Regional Advisory Body

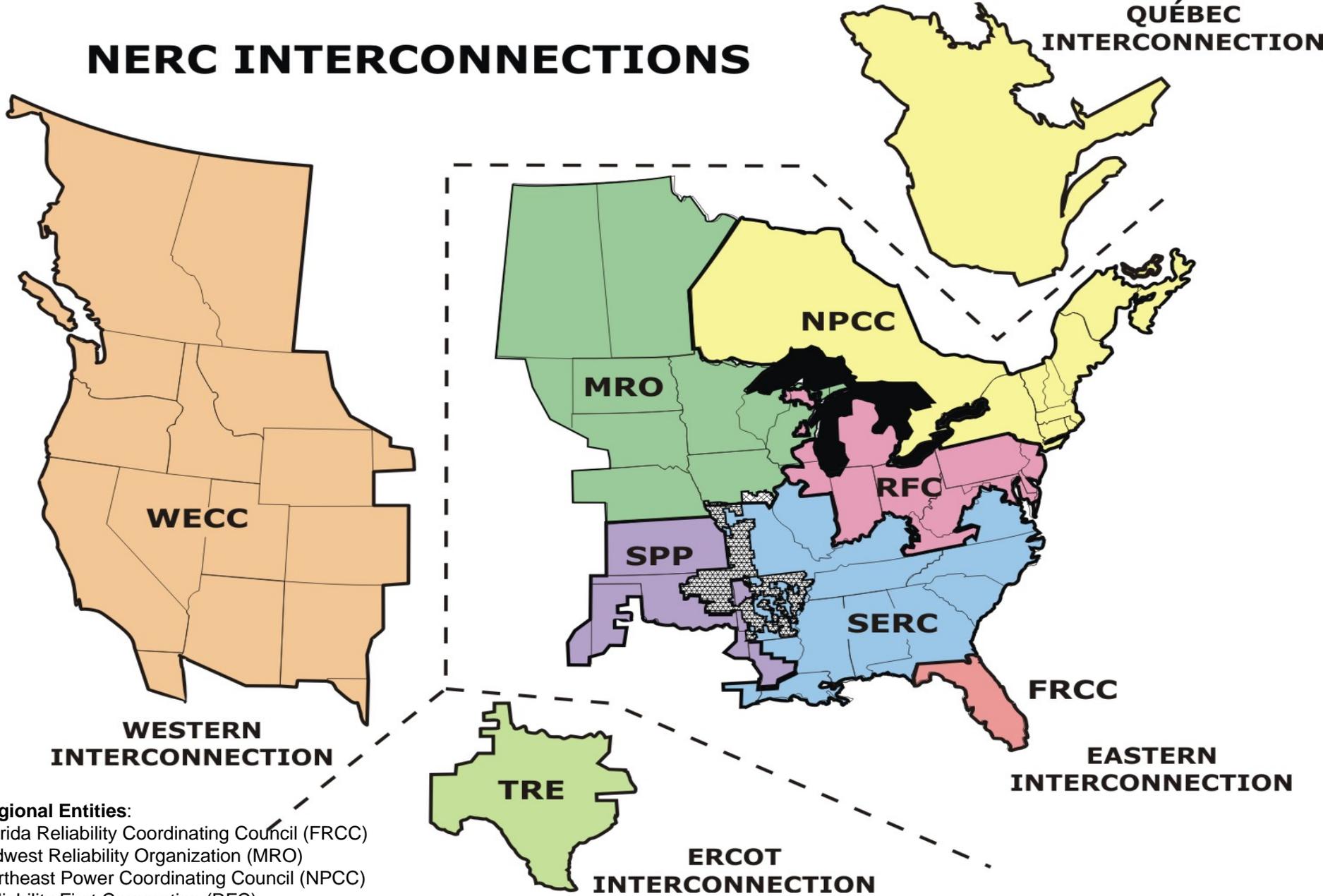
- **The Western Interconnection Regional Advisory Body (WIRAB) was created by Western Governors under Section 215 of the Federal Power Act.**
- **The WIRAB advises the WECC, the Electricity Reliability Organization (ERO) and FERC on whether proposed reliability standards and the governance and budgets of the ERO and WECC are in the public interest.**
- **FERC may request that WIRAB provide advice on other topics.**

Western Interconnection

The Western Interconnection Regional Advisory Body (WIRAB) was created by the Western Governors under Section 215 of the Federal Power Act. The WIRAB is to advise WECC, the ERO and FERC on whether proposed reliability standards and the governance and budgets of the ERO and WECC are in the public interest. FERC may request that WIRAB provide advice on other topics.



NERC INTERCONNECTIONS



- Regional Entities:**
- Florida Reliability Coordinating Council (FRCC)
 - Midwest Reliability Organization (MRO)
 - Northeast Power Coordinating Council (NPCC)
 - Reliability First Corporation (RFC)
 - SERC Reliability Corporation (SERC)
 - Southwest Power Pool, RE (SPP)
 - Texas Regional Entity (TRE)
 - Western Electricity Coordinating Council (WECC)

Western Electricity Coordinating Council (WECC)

- The WECC region encompasses a vast area of nearly 1.8 million square miles. It is the largest and most diverse of the eight regional councils of the North American Electric Reliability Council (NERC).
- WECC's service territory extends from Canada to Mexico. It includes the provinces of Alberta and British Columbia, the northern portion of Baja California, Mexico, and all or portions of the 14 western states in between.
- Transmission lines span long distances connecting the Pacific Northwest with its abundant hydroelectric resources to the arid Southwest with its large coal-fired and nuclear resources.
- WECC and the seven other regional reliability councils were formed due to national concern regarding the reliability of the interconnected bulk power systems, the ability to operate these systems without widespread failures in electric service, and the need to foster the preservation of reliability through a formal organization.

Western Renewable Energy Zones



A joint initiative of the Western Governors' Association and U.S. Department of Energy

Western Governors Association

Western Renewable Energy Zones (WREZs)

- The Western Governors' Association and U.S. Department of Energy launched the Western Renewable Energy Zones Project in May 2008.
- The central goal of the WREZ project is to utilize those areas in the West with vast renewable resources to expedite the development and delivery of clean and renewable energy.
- Participating in the project are 11 states, two Canadian provinces, and areas in Mexico that are part of the Western Interconnection: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming; Canada-Alberta, British Columbia; Mexico-Baja California.

Western Governors Association

WREZ

- **Technical Committee.** The Technical Committee was appointed by the Steering Committee to represent them and stakeholder interests and to integrate and review the efforts of the three Working Groups.
- **Working Groups**
- Environment and Lands Working Group (E&L) is working to categorize the development potential of REZs based on environmental, land use and wildlife criteria. They will coordinate their efforts with the Western Governors' newly formed Wildlife Habitat Council.
- Zone Identification and Technical Analysis Working Group (ZITA) is identifying areas throughout the Western Interconnection with high concentrations of one or more renewable energy resources and incorporating land, natural resource, and wildlife data from the E&L Work Group to gauge the developability of the potential REZs.
- Generation and Transmission Modeling Working Group (GTM) will develop a flexible and user-friendly model to evaluate the delivered price of power coming from REZs to load centers and will engage transmission planners to study the transmission needed to move that power.

California Energy Commission ***(CEC)***

- **The California Energy Commission is the state's primary energy policy and planning agency. [Created by the Legislature in 1974 and located in Sacramento].**
- **The Commission has five major responsibilities:**
 - 1-Forecasting future energy needs and keeping historical energy data.**
 - 2-Licensing thermal power plants 50 megawatts or larger.**
 - 3-Promoting energy efficiency through appliance and building standards.**
 - 4-Developing energy technologies and supporting renewable energy.**
 - 5-Planning for and directing state response to energy emergency.**
- **The Commission's role includes overseeing funding programs that support public interest energy research; advance energy science and technology through research, development and demonstration; and provide market support to existing, new and emerging renewable technologies [per the Electric Industry Deregulation Law in 1998 (Assembly Bill 1890)].**

CA Independent System Operators (CISO)

- The California ISO is a not-for-profit public-benefit corporation charged with operating the majority of California's high-voltage wholesale power grid.
- ISO is the impartial link between power plants and the utilities that serve more than 30 million consumers balancing the demand for electricity with an equal supply of megawatts.
- The ISO provides equal access to the grid for all qualified users and strategically plans for the transmission needs of this vital infrastructure.

California Public Utility Commission (CPUC)

- CPUC regulates privately owned electric, natural gas, telecommunications, water, railroad, rail transit, and passenger transportation companies, in addition to authorizing video franchises.
- The California Public Utilities Commission serves the public interest by protecting consumers and ensuring the provision of safe, reliable utility service and infrastructure at reasonable rates.
- CPUC has five Governor-appointed Commissioners, as well as our staff, ensuring that consumers have safe, reliable utility service at reasonable rates, protecting against fraud, and promoting the health of California's economy.

(CA) Renewable Energy Transmission Initiative (RETI)

California has adopted energy policies that require substantial increases in the generation of electricity from renewable resources. Extensive improvements, however, are needed to California's electric transmission infrastructure to get the electricity generated by new renewable power facilities to consumers.

The Renewable Energy Transmission Initiative (RETI) is a statewide initiative to help identify the transmission projects needed to accommodate these renewable energy goals, support future energy policy, and facilitate transmission corridor designation and transmission and generation siting and permitting.

RETI will be an open and transparent collaborative process in which all interested parties are encouraged to participate.

RETI will assess all competitive renewable energy zones in California and possibly also in neighboring states that can provide significant electricity to California consumers by the year 2020.

RETI also will identify those zones that can be developed in the most cost effective and environmentally benign manner and will prepare detailed transmission plans for those zones identified for development.

Memorandum of Understanding for Renewable Energy Projects

- The Executive Order will advance California's transition into a clean energy economy and directs state agencies to create comprehensive plans to prioritize regional renewable projects based on an area's renewable resource potential and the level of protection for plant and animal habitat. To implement and track the progress of the Executive Order, the California Energy Commission and the Department of Fish and Game (DFG) signed a **Memorandum of Understanding** formalizing a Renewable Energy Action Team (REAT).
- To streamline the application process for renewable energy development, the Energy Commission and DFG will create a "one-stop" permitting process with the goal of reducing the application time for specific projects in half. This will be achieved through the creation of a special joint streamlining unit that will concurrently review permit applications filed at the state level.
- To jump start Natural Communities Conservation Plans (NCCPs) under the Executive Order, the REAT will initiate the Desert Renewable Energy Conservation Plan in the priority Mojave and Colorado Desert regions and identify other preferred areas that will benefit from a streamlined permitting and environmental review process. This will help reduce the time and uncertainty normally associated with building new renewable projects.
- In addition to the Executive Order, the Energy Commission, DFG, U.S. Fish and Wildlife Service, and the U.S. Bureau of Land Management signed another **Memorandum of Understanding** to establish a coordinated approach with our federal partners in the expedited permitting process. This coordinated approach will significantly reduce the time and expense for developing renewable energy on federally-owned California land, including the priority Mojave and Colorado Desert regions.
- **Memoranda of Understanding**
 - [California Energy Commission and the Department of Fish and Game MOU, November 2008. \(PDF file, 102 kb\)](#)
 - [Energy Commission, DFG, U.S. Fish and Wildlife Service, and the U.S. Bureau of Land Management MOU, November 2008. \(PDF file, 284 kb\)](#)
 - [BLM and Energy Commission MOU, August 2007. \(PDF file, 140 kb\)](#)
- Many State-Federal MOUs On Renewable Energy Projects are being proposed in California's desert area on federal Bureau of Land Management (BLM) land. BLM has received right-of-way requests encompassing more than 300,000 acres for the development of approximately 34 large solar thermal power plants totaling approximately 24,000 megawatts. Many of these projects have not yet reached the stage of an Application for Certification (AFC) with the California Energy Commission.
- Solar thermal projects (above 50 MW) will require approvals from both the BLM and the Energy Commission prior to construction. Therefore, to provide joint National Environmental Protection Act (NEPA) and California Environmental Quality Act (CEQA) review and a more efficient process, the BLM and Energy Commission had entered into a **Memorandum of Understanding (MOU)**. That MOU had attached of (as of July 2007) and the time line for the joint review process.

On November 17, 2008, Governor Arnold Schwarzenegger signed [Executive Order # S-14-08](#) that raises California's renewable energy goals to 33 percent by 2020 and clears red tape for licensing renewable projects.

