Dear Legislator:

The Independent Energy Producers (IEP) has been actively representing California’s power industry before the State Legislature and regulatory commissions since 1982 — to encourage open and fair competition and healthy market opportunities in the independent energy industry.

Our members are investing billions of dollars to build and modernize power plants in California — using clean and renewable energy technologies like co-generation, wind, solar, geothermal and biomass — to ensure our state’s electricity system remains sustainable, and meets legislative mandates for addressing global climate issues.

We have prepared the enclosed “The Power of California” as a resource for you and your staff on the very complex issues surrounding power generation in California — from how electricity is distributed, transmitted and generated, to how our members are reducing greenhouse emissions while increasing efficiency and output. All at no risk to ratepayers.

IEP and its members are committed not only to a brighter energy future, but a stronger California economy where our independent energy businesses can continue to create jobs, generate tax revenues and provide clean, reliable and affordable electricity — now and for the future.

Jan Smutny-Jones
Executive Director
Independent Energy Producers Association
# The Power of California

*Table of Contents*

<table>
<thead>
<tr>
<th>Section I</th>
<th>Executive Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section II</td>
<td>The Global Climate Challenge</td>
</tr>
<tr>
<td>Section II</td>
<td>Key Legislation 1999-2006</td>
</tr>
<tr>
<td>Section IV</td>
<td>IEP Background</td>
</tr>
<tr>
<td>Section V</td>
<td>Maps</td>
</tr>
<tr>
<td>Section VI</td>
<td>Glossary</td>
</tr>
</tbody>
</table>
Executive Summary

The Power of California

Introduction

California is home to one of the most sophisticated electricity systems in the world — a vast, complex system of wires, transmission lines and more than 500 power plants delivering nearly 60,000 megawatts of power during peak demand. Without this power, California and California’s thriving economy would go dark.

California’s electricity system is divided into three parts: distribution, transmission and generation. Together, they combine to create, transport and distribute the electricity we depend on.

Distribution

Everyday, millions of California residents and businesses rely on electricity for lights, air conditioning, computer access and so much more. Electricity is distributed to homes and businesses by utility companies which can be investor-owned utilities (IOUs) like PG&E, Southern California Edison and San Diego Gas & Electric, or municipal utilities like SMUD and the Los Angeles Department of Water and Power.

These utility companies own the wires that deliver electricity to consumers and are responsible for billing, maintaining the wires and responding to local power outages.

The IOUs are regulated by the California Public Utilities Commission (CPUC), while the municipal utilities are regulated by locally elected governing boards. Both CPUC and these local boards set the rates customers pay for electricity. These rates are designed to provide the utilities with a reasonable profit or “return on investment,” and are based on the cost the utilities pay to generate or purchase the electricity, along with the cost of various energy-related programs these companies are required to provide.

In some cases, large electricity users like retailers, manufacturers and the University of California buy their electricity from “energy service providers” instead of the utility companies. This process is known as “direct access.”

Direct access allows large electricity customers to purchase electricity directly from any electricity supplier in the competitive wholesale power market instead of from their utility. However, even with direct access, the electricity is still delivered by the utilities.

Transmission

Electric power transmission is the process of delivering or distributing electricity to residents and businesses. The utilities receive the electricity they sell from a large network of high-voltage transmission wires interconnected to 11 western states, two Canadian provinces and Mexico — all supplying wholesale electricity to California.

Today, IOUs own approximately 70 percent of the transmission system, while municipal utilities and other public power entities own the remaining 30 percent. With the exception of some municipal grids, the system is operated by the California Independent System Operator (CAISO), a non-profit, for-the-public interest entity responsible for ensuring the system’s reliability and making sure electricity is transmitted in a non-discriminatory way that doesn’t favor one area, user or generator over another.
IOUs maintain ownership of their transmission facilities while operational control is the responsibility of the CAISO which serves as the impartial liaison between the power plants and utilities.

Since some of California’s electricity is transmitted from areas outside of the state, CAISO is regulated by the Federal Energy Regulatory Commission (FERC), an independent federal agency.

**Generation**

The electricity flowing through California’s transmission and distribution lines is produced by generators using the most diverse mix of resources in the world.

Natural gas, water, coal, wind, nuclear power, solar, geothermal steam, agricultural waste and other biomass products are all used to produce electricity for California homes and businesses.

Clean-burning natural gas generates about 38 percent of the electricity we use. Some industries like refining and food processing are maximizing energy efficiency with a process called “co-generation,” in which natural gas and other fossil fuels are used to make steam. The steam is used twice — to generate electricity to power the plant, and again for industrial processing.

About 20 percent of California’s electricity comes from coal-fired plants, most of which are located in other states. Coal is an abundant fuel and emerging technologies are working to lessen its impact on global warming.

Nuclear power plants in California and Arizona generate about 14.5 percent of the state’s electricity. To preserve resources and protect the environment, California has long encouraged renewable technologies that use wind, solar power, water, geothermal steam or organic waste to generate electricity. Today, about 11 percent of our electricity comes from these renewable energy sources.

Wind power is an increasingly important source of clean electricity in California and is generated from four main areas — San Gorgino, Altamont, Montezuma Hills and Tehachapi. Today’s wind turbines are increasingly efficient, producing about one-half percent of the state’s electricity.

Geothermal facilities using clean, naturally occurring steam or hot brine from deep in the earth generate about five percent of California’s electricity and are located in Geyers, Coso, Imperial Valley, Mammoth and Nevada.

About two percent of our electricity comes from biomass facilities that turn agricultural, forest product and municipal waste into power by either burning the waste directly or burning the methane gas generated by waste in landfills.

While solar power now provides less than one percent of California’s electricity, the state has adopted policies to increase its use. Some solar technologies use photovoltaic cells to convert sunlight into electricity. Other technologies use the sun’s thermal energy to run large turbines. Both technologies are clean and renewable.
Nineteen percent of the energy we use comes from hydroelectricity, in which flowing water turns turbines to generate power. Hydropower is produced here in California and imported from the Northwest, British Columbia and the Colorado River.

The state’s IOUs generate about 25 percent of California’s electricity. Public power generates about 17 percent and about 58 percent comes from private-sector energy companies competing in the state’s wholesale electricity market.

**IEP — Part of the Solution**

The Independent Energy Producers Association (IEP) is California’s oldest and leading trade association representing both the interests of developers and operators of independent energy facilities and independent power marketers. Members include the merchant generators who have invested billions to build and modernize power plants in California, and California’s “Qualified Facility” energy producers who use clean and renewable technologies like co-generation, wind, solar, geothermal and biomass to generate electricity.

These clean-energy technologies are not only important for sustaining the state’s electricity system, but essential for meeting the 2006 goals created by Governor Schwarzenegger and the California Legislature. These goals include legislation to cut the state’s greenhouse emissions back to 1990 levels by the year 2020.

At the forefront of this important effort will be the member companies of IEP — whose pioneering spirit and entrepreneurial know-how, with private-sector investments will continue creating better and more efficient ways to power California into a clean-energy future.

In addition to protecting the environment, investing in California’s independent energy sector will create thousands of new jobs, generate millions in additional tax revenue and provide the clean, reliable and affordable electricity required for the state’s thriving economy.
The Global Climate Challenge: Investing in Renewable Energy Technologies

The Power of California

In June 2005, Governor Arnold Schwarzenegger issued an executive order addressing global climate change. Just a year later, the Legislature passed two bills, AB 32 and SB 1368, signed by Governor Schwarzenegger, and designed to lower California’s greenhouse gas emissions to 1990 emission levels by 2020.

In 2004, California’s energy agencies began adopting policies designed to address global climate changes from energy generation, including priority given for (in order) energy efficiency, demand-side management (DSM programs consist of planning, implementing and monitoring activities of utilities designed to encourage consumers to modify electricity usage), renewable energy and gas generation. In 2006, the Legislature enacted into law a carbon adder (a means of accounting for possible future costs of mitigating global climate emissions) for procurements and established a performance standard through SB 1368.

The Climate Action Team (CAT) estimates that California’s global climate change emissions are at more than 10 Tons/Year with 20 percent of these emissions from electricity generation. IEP believes we can reduce these emissions by further development of renewable technologies and replacing existing older, inefficient generators with new, state-of-the-art generating facilities. In addition, these important investments that will create additional jobs and a stronger tax base for California.

Renewable energy technologies make electricity production more efficient and environmentally sound, as well as reduce reliance on imported fossil fuels. Several different renewable, clean-air energy generation technologies are being explored at this time, including co-generation, biomass energy, solar power, small hydropower, geothermal power and wind power.

These technologies are the forefront of generation alternatives for independent energy producers as they continue to build these new, improved generation facilities for a brighter, cleaner California energy future.

Co-generation Energy

Co-generation is utilized by the refining and food processing industries to maximize energy efficiency using natural gas and other fossil fuels, converting them to steam. The resulting steam is used twice — once to generate electricity to power the plant and again for industrial processing.

Biomass Energy

According to the U.S. Department of Energy, biomass generation or biopower is second only to hydropower as a renewable energy source.

Using conventional boilers, most biomass energy today is produced by direct combustion, burning agricultural waste to produce steam. This steam is used to spin a turbine which activates a generator that in turn produces electricity.
Concentrating Solar Power

Concentrating Solar Power (CSP) is a relatively low-cost way to deliver power during peak demand periods.

Long parabolic mirrors called parabolic troughs are used to collect solar thermal energy. Sunlight is reflected by the mirror and a heat transfer fluid, usually oil, runs through a Dewar tube to absorb the concentrated sunlight. The heat transfer fluid is used to heat the steam in a turbine generator, converting it to electricity.

Since CSP technologies function most efficiently in the southwestern United States, this technology could play a major role in California’s future needs for distributed sources of energy.

Hydropower

The U.S. Department of Energy lists hydropower as the largest and least expensive source of renewable electricity produced in the nation. Most hydropower projects use a dam and a reservoir to retain water from a river. When the water is released, it rotates turbines, which in turn spin generators to produce electricity. The water stored in reservoirs is accessible at a moment’s notice for use during high demand.

Currently, 19 percent of the state’s energy comes from hydropower, produced in California, as well as imported from the Northwest, British Columbia and the Colorado River.

Geothermal Power

Geothermal power uses heat from the Earth to generate electricity and is becoming more cost-effective and competitive with fossil fuels. There are three types of geothermal power plants: dry steam, flash steam and binary cycle. The most common type of geothermal power plant is the flash steam plant. As the hot water flows up through wells in the ground, the decrease in pressure causes the water to boil into steam. The steam is then used to power a generator with any remaining water returning to the reservoir.

Today, drilling technology limits the development of geothermal resources to relatively shallow water, most of which are found in the western part of the United States. However, researchers are currently developing new technologies for capturing the heat in deeper, dry rocks, supporting drilling almost anywhere.

The Future

The global climate challenge will be the principle driver in California’s energy policy for the next decade with IEP as the driving force in exploring innovative, yet practical solutions to ensure this challenge is addressed correctly.

Through IEP’s commitment to the environment, renewable energy technologies, California consumers and the state, we will continue creating better and more efficient ways to power California into a vibrant, successful clean-energy future.
Key Legislation 1996–2006
The Power of California

Summary:
Provided the framework for the deregulation of the electricity market in California, created the Independent System Operator (ISO) and the Power Exchange, and established the public goods surcharge for investor-owned utilities. The surcharge funded public interest programs including the Public Interest Energy Research (PIER) program and renewable energy programs under the Energy Commission and efficiency programs under the California Public Utilities Commission (CPUC).

Summary:
Authorized the Department of Water Resources to enter into long-term contracts to buy electricity for resale to retail end-use customers and with exceptions to municipal utilities.

Summary:
Established the renewable portfolio standard, requiring retail sellers of electricity to increase procurement of electricity from renewable energy sources by at least one percent of retail sales per year until their portfolio of renewable energy increases to 20 percent. Set the deadline for reaching this threshold at 2017. Required municipal utilities to implement and enforce their own such program.

Summary:
Required the CPUC in consultation with the ISO to establish resource adequacy requirements for most load serving entities. The bill also required the Energy Commission to report in each Integrated Energy Policy Report publicly owned electric utility progress towards meeting resource adequacy.
Summary:
Enacted the Global Warming Solutions Act of 2006, requiring the Air Resources Board to adopt regulations aimed at curbing CHG emissions.

Summary:
Accelerated the 20 percent target of the Renewable Portfolio Standard from 2017 to 2010. Also redirected funds toward the Existing Renewable Resources Account to achieve competitive and self-sustaining renewable facilities.

Summary:
Requires the Energy Commission to adopt a CHG emissions performance standard for long-term procurement of electricity by publicly owned utilities. This standard must be consistent with the standard adopted by the CPUC for load-serving entities under their jurisdiction.

Source: California Energy Commission Office of Governmental Affairs
IEP Background

The Power of California

The Independent Energy Producers Association (IEP) is California’s oldest and leading trade association representing both the interests of developers and operators of independent energy facilities and independent power marketers.

Independent Energy Producers include producers of renewable products derived from biomass, geothermal, small hydro, solar and wind, as well as producers of highly efficient cogeneration and owners/operators of gas-fired merchant facilities.

IEP has been active in representing the interests of the industry before California’s regulatory commissions and the legislature since 1982. IEP’s primary goals are to safeguard the interests of operating independent energy projects, ensuring that California remains a healthy market for development in the independent energy industry.

Today, IEP’s focus is also on the environment, supporting research and development of renewable energy technologies that will reduce greenhouse emissions while increasing generating efficiency and output — at no risk to ratepayers.
California’s Major Electric Transmission Lines Map

The Power of California

LEGEND
- Pacific Gas and Electric (PG&E)
- Pacificorp (PP&L)
- Sac. Municipal Utility Dist. (SMUD)
- Western Area Power Authority (WAPA)
- Southern California Edison (SCE)
- LA Dept of Water and Power (LADWP)
- San Diego Gas & Electric (SDG&E)
- Imperial Irrigation District (IID)
- All Others

Pacific AC Intertie (Oregon/Washington/Canada)

Pacific DC Intertie (Oregon/Washington)

Intermountain DC Tie

Desert Southwest Interties (Arizona/Colorado)

Desert Southwest Interties (Arizona)

Desert Southwest Interties (Arizona)

Mexico Ties

Mexico Ties

Mexico Ties

SAN FRANCISCO

SACRAMENTO

LOS ANGELES

SAN DIEGO

ARIZONA
Surprise Valley
Lassen
Area served by both
Lassen & Plumas-Sierra
Plumas - Sierra
Truckee - Donner
Sierra Pacific
Mountain Utilities

LADWP - Owens Valley
Valley Electric

PG&E

SCE

SDG&E

IID
Glossary

The Power of California

Alternating Current (AC) — Flow of electricity that constantly changes direction between positive and negative sides. The majority of power produced by electric utilities in the U.S. moves in current that shifts direction at a rate of 60 times per second.

Ancillary Services — The services other than scheduled energy required to maintain system reliability and meet WSCC/NERC operating criteria. Services include spinning, non-spinning, replacement reserves, regulation (AGC) and voltage control and black start capability. This additional energy can be self-provided by Load Serving Entities (LSE) on behalf of their customers.

Average Cost — The revenue requirement of a utility divided by the utility’s sales. Average cost includes the costs of existing power plants, transmission and distribution lines, as well as other facilities used by a utility to serve its customers. Average cost also includes operating and maintenance, tax and fuel expenses.

Average Demand — The energy demand over a period of time in a certain area. The number of kilowatt-hours used in a 10 hour period divided by 10 will indicate the average demand for that period and area.

Baseload Generation — One of three types of generation, baseload generation is intended to run constantly at near capacity levels almost all of the time.

Bi-Lateral Transaction — A transaction between two willing parties who negotiate an agreement. For example, the sale of electricity from an Independent Power Producer (IPP) to utility customers and other large customers is often the result of a bi-lateral transaction.

Biomass Facility — Electricity produced by biomass facilities turn agricultural, forest product and municipal waste (biomass) into power by burning the waste directly or burning the methane gas generated by waste in landfills. Currently, about two-percent of California’s electricity comes from biomass facilities.

California Independent Service Operator (CAISO) — CAISO is a not-for-profit public benefit corporation charged with operating the majority of California’s high-voltage wholesale power grid.

Capacity — The amount of electric power for which a generating unit, generating station or other electrical apparatus is rated by either the user or manufacturer. The term is also used for the total volume of natural gas that can flow through a pipeline over a given amount of time, depending on compression and pipeline size.

Coal-Fired Plant — Coal is an abundant fuel, but non-renewable. Emerging technologies in coal-burning plants are being developed to lessen its impact on global warming. About 20-percent of California’s electricity comes from coal-fired plants.

Cogeneration — Maximizing energy efficiency by utilizing natural gas and other fossil fuels to make both electrical and thermal energy. The steam is used to generate electricity to power a facility and then again for industrial processing.
Combined Cycle Gas Turbine Plant — Combined cycle gas turbine plants utilize more than one cycle to generate electricity with waste heat used to make steam, generating additional electricity through a steam turbine.

Competitive Power Supplier — An entity that owns and/or operates one or more independent power facilities that are not regulated under the traditional terms. These suppliers are regulated and monitored by the Federal Energy Regulatory Commission (FERC).

Contingency — Disconnection or separation, planned or forced, of one or more components from the electric system.

California Public Utilities Commission (CPUC) — CPUC regulates investor-owned utility companies (IOUs) and sets the rates customers pay for electricity.

Day-Ahead Market — The forward market for the supply of electrical power at least 24-hours before delivery to buyers and end-use customers.

Demand Side Management (DSM) — Measures or programs undertaken by a utility designed to influence the level or timing of customer demands for energy in order to optimize the use of available supply resources, in turn allowing suppliers to defer the purchase of additional generating capacity.

Direct Access — Affording generators, marketers and large users of electricity the ability to receive transmission services to serve load directly without exercising the traditional method of going through the utility.

Distribution — The manner in which electricity is distributed to homes and businesses by both IOUs and municipal utilities.

Federal Energy Regulatory Commission (FERC) — FERC is an independent agency regulating the interstate transmission of electricity, natural gas and oil, and responsible for maintaining system reliability, ensuring electricity is transmitted in an unbiased manner, and establishing the price of ancillary services necessary for reliable system operation.

Generation — The manner in which electricity is generated. The electricity that flows through California’s transmission and distribution wires is produced by generators using diverse resources including natural gas, water, coal, wind, nuclear power, solar, geothermal steam, agricultural waste and other bio-mass products.

Geothermal Facility — Facilities that use clean, naturally occurring steam or hot brine from deep in the earth. Today, about five-percent of California’s electricity is produced by geothermal facilities.

Grid — The transmission and distribution system that links power plants to customers through high power transmission line service.

Hour-Ahead Market — The electric power futures market that is established one-hour before delivery to end-user customers.

Hydroelectricity — The process using flowing water to turn turbines to generate power. Nineteen percent of the energy the state uses comes from hydroelectricity.
Independent Energy Producers (IEP) — California’s oldest and leading trade association representing the interests of QFs, new generator owners, power marketers and project developers participating in California’s restructured energy markets. Initially established in 1982, IEP has traditionally focused on representing the interests of alternative and renewable energy projects. Since deregulation in 1998, IEP has represented several of the new owners of generation units acquired through divestiture. In total, IEP represents more than 24,000 MW of generation, nearly one-half of California’s total capacity.

Independent Power Producer (IPP) — A type of competitive power supplier. The term is synonymous with merchant generator, co-generator, non-utility generator, private power producer, qualifying facility (QF) and exempt wholesale generator.

Independent System Operator (ISO) — A non-profit entity established by AB 1890 to operate the transmission system in a safe, reliable manner; one form of a Regional Transmission Organization.

Integrated Gasification Combine Cycle Plant (IGCC) — IGCC power plants add to the electricity supply, replace aging coal power plants and replace expensive natural gas power plants. Using coal, IGCC plants produce a synthetic gas, the pollutants are removed and electricity is generated using combined cycle technology.

Interconnection — In a competitive power producer context, the point at which the transmission lines carrying the electricity output of a power facility connects with the utility grid, usually the local utilities nearest substation.

Intermediate Generation — One of three types of generation, intermediate generation moves up and down throughout the day.

Investor Owned Utilities (IOUs) — A utility entity whose assets are owned by investors, for example, PG&E, Southern California Edison and San Diego Gas & Electric.

Kilowatt (kW) — One thousand (1,000) watts. A unit of measure of the amount of electricity needed to operate given equipment.

Load — An end-use device or an end-use customer receiving power from the electric system. Load should not be confused with demand, which is the measure of power that a load receives or requires.

Load-Serving Entities — Utilities, marketers or aggregators who provide electric power to a large number of end-use customers.

Local Publicly Owned Electric Utilities — A municipal corporation, a municipal utility district, an irrigation district or a joint power authority (which can include one or more of the agencies mentioned above) furnishing electric services over its own transmission facilities, or furnishing electric service over its own or its members’ distribution system.

Long-Term Fixed Contract — A bilateral transaction often for an extended period of time at a set amount. Contracts may be one, five or 10 years and could be for peak or off-peak hours or a full-day contract.

Market Clearing Price — The price at a location at which supply equals demand. All demand at or above this price has been satisfied and all supply at or below this price has been purchased.
Megawatt — A unit of power equal to one million watts.

Must Take Resources — Generation resources including QF generating units, nuclear units and pre-existing power purchase contracts with minimum energy requirements that are dispatched by the ISO before PX or Direct Access Generation.

Municipal Utilities — A municipal corporation, municipal utility district, an irrigation district or a joint power authority furnishing electric services over its own transmission facilities, or furnishing electric service over its own or its members’ distribution system. These include SMUD (Sacramento Municipal Utility District) and LADWP (Los Angeles Department of Water and Power).

Natural Gas — A non-renewable resource, natural gas is a mixture of hydrocarbon gases occurring with petroleum deposits, mainly combining methane with varying quantities of ethane, propane, butane and other gases. Used as a fuel and for manufacturing organic compounds. This type of gas generates about 38-percent of the state’s electricity.

North American Electric Reliability Council (NERC) — NERC’s mission is to improve the reliability and security of the bulk power system in North America.

Nuclear Power Plant — Generating about 14.5-percent of California’s electricity, nuclear power plants in California and Arizona use nuclear energy and convert it into heat for use in producing steam for turbines, which drive generators that produce electric power.

Obligation To Serve — A regulatory obligation of a utility to provide electric planning services for all customers and to assure adequate supply of electricity now and in the future.

Peakers Generation — One of three types of generation, peakers generation is only used at peak-use periods.

Performance Based Ratemaking (PBR) — Regulated rates based on performance objectives, not actual costs.

Qualified Facilities (QFs) — An individual or corporation owning and/or operating a generation facility, but not primarily engaged in the generation or sale of electric power. QFs are either renewable power production or co-generation facilities that qualify under Section 201 of PURPA.

Real-Time Market — The competitive generation market controlled and coordinated by the ISO for arranging real-time imbalance power. Also referred to as “spot market.”

Regional Transmission Organization (RTO) — A regional transmission organization established to operate the high-voltage interstate transmission system in a reliable, non-discriminatory manner, and to coordinate with other critical entities, such as participating utilities and generators, neighboring RTOs and power exchanges.
**Reliability** — The degree of performance of the elements of the bulk electric system that results in electricity being delivered to customers within accepted standards and in the amount desired. May be measured by the frequency, duration and magnitude of adverse effects on the electric supply.

**Solar Energy** — Heat and light generated from sunlight.

**Scheduling Coordinator** — An entity authorized to submit to the ISO a balanced generation or demand schedule on behalf of one or more generators and one or more end-user customers.

**Transmission** — The manner in which electricity is transmitted to homes and businesses. Utilities receive the electricity they sell from a vast network of high-voltage transmission wires interconnected to eleven western states, two Canadian provinces and Mexico.

**Unbundle** — Separating a utility’s generation, transmission and distribution assets in terms of cost of accounting treatment into separate business accounts.

**Unbundled** — Separating and itemizing the costs of generation, transmission and distribution of a customer’s bill.

**Utility Distribution Company** — A distribution wired business and a regulated retailer who serves end-use customers.

**Wind Power** — The process of converting kinetic energy from the wind into different types of energy, including thermal, mechanical and electrical. Presently, about 1.5-percent of the state’s electricity is through wind turbines.