

4.8 ENERGY AND MINERAL RESOURCES

4.8.1 SETTING

Petroleum and natural gas supply most of the energy consumed in California. Petroleum (used primarily for transportation) provides about 50 percent of the state's energy needs, and natural gas provides about 29 percent (California Energy Commission, 1994). The remaining comes from a variety of energy resources, including coal, nuclear, wind, geothermal, and hydropower.

Roughly 21 percent of California's total energy use is consumed as electricity. Geothermal, hydropower, nuclear and "other" account for 50 percent of the electricity generated, natural gas fuels 31 percent, and coal accounts for 19 percent of the generated power. Petroleum accounts for less than 1 percent. The major users of electricity are: commercial, 13 percent; industrial, 10 percent; and residential, 10 percent.

The California Energy Commission has formulated and adopted a set of energy policies. These include policies to develop programs that meet energy and environmental quality needs; to promote competitive markets and energy efficiency technologies; to balance energy, economic, and environmental goals; to collaborate with the electricity and natural gas industries to redefine government's energy regulatory role; and to implement policies to achieve cost-effective building and appliance efficiency (California Energy Commission, 1994).

Specific plans, recommendations, and actions include the following:

- Increased efficiency should supply most of California's new energy needs because it is usually the least expensive and most environmentally benign option.
- California should encourage the most cost-effective and efficient operation of its existing electricity generation, transmission and distribution systems to minimize the economic and environmental impacts of existing facilities or new construction.
- The full costs and benefits of environmental impacts should be included in the economic evaluation of all proposed energy activities to capture the full benefits of the marketplace (California Energy Commission, 1991).

The plants to be divested use three primary fuels: natural gas, distillate, and at the Geysers, geothermal steam.

GEYSERS GEOTHERMAL PLANT

Regarding the Geysers Geothermal Plant, since 1960, many electric power generating units have been built on The Geysers Known Geothermal Resource Area (KGRA) to convert geothermal heat into electrical energy. The Geysers now generate more energy than any other developed geothermal field in the world. However, the geothermal steam fields have been in gradual decline for several years.

The Geysers KGRA was once touted as a geothermal baseload resource of up to 2,400 MW and boasted 1,984 MW of installed capacity in 1989. However, although all installed units initially were operated as baseload, the projected capacity was never achieved and probably never will be. It is not a “unitary” steam field: i.e., each operator is not “assigned” a percentage of the field to utilize. Instead, the more wells an operator builds, the more the operator is free and able to tap the resource. As a result, too many wells have been used to tap the KGRA. The steam resource is being unsustainably drawn upon, and the steam pressure from the field has been dropping for many years, currently to as low as 200 pounds per square inch (psi) from a peak of 500 psi.¹

As the steam fields declined, maintaining plant efficiency has become more difficult due to the decrease in available energy from each pound of steam. As a result, over 40 percent of installed capacity has been shut down or lost due to reduced steam pressure, and more shutdowns are expected. In the long term, total Geysers dependable capacity may drop to as low as 700 MW. Except in a few cases, it no longer serves as a baseload resource. (Additional information is presented in Attachment C.)

PG&E has performed modifications to the power production equipment and processes that affect the efficient conversion of the steam energy to electrical energy. Condensate water from the generating units at the Geysers plant is returned to the steam suppliers for reinjection into the steam fields. Injection of water into the steam fields increases the recoverable steam reserves and enhances the steam deliverability by reducing the pressure decline. The quantity of condensate available for reinjection depends on the consumptive use of condensate (for cooling purposes -- which in turn depends on weather conditions), but it amounts to from 5 percent to 30 percent of the steam supplied to the Geysers plant (PG&E, 1998b). Wastewater from domestic and sanitary uses also is reinjected into the steam fields.

In addition to the steam condensate and plant wastewater, municipal wastewater is being injected into the steam fields. The Lake County Wastewater Pipeline Project (the “Southeast Regional Wastewater Treatment Plant Facilities Improvement Plan and Geysers Effluent Pipeline and Effluent Injection Project”) was developed with the dual purpose of providing expanded wastewater treatment capabilities in the region, and providing the steam fields with a dependable supply of water by injecting the wastewater effluent directly into the Geysers geothermal field. The system began operation in 1997 (PG&E, 1998b).

Although the overall effects are not yet known fully, the Lake County wastewater injection project could produce additional steam that could provide as much as an additional 70 MW of generation capacity, roughly half of which would be available for the Geysers plant. As a result of these actions, the steam rate (i.e., pounds of steam per kWh) has remained fairly constant (PG&E, 1998b).

¹ Economic curtailment has also contributed to recent decreases in geothermal generation. This occurred because the price of Geysers generation has been higher than the price of generation from other sources during some time periods, due to the terms of the steam pricing contract. For example, the economic energy curtailment for the 12 units with steam supplied by Unocal-Thermal amounted to 1.7 billion kWh in 1996 (PG&E, 1998b). The two units supplied by Calpine were curtailed 0.066 billion kWh because of excess hydro generation in 1996.

4.8.2 SIGNIFICANCE CRITERIA

For the purposes of this report, an impact would be considered significant if the project would promote exploitation of an energy or mineral resource in a wasteful or inefficient manner.

A project that conflicted with established energy conservation plans would also be considered to have a significant impact.

4.8.3 IMPACTS AND MITIGATION MEASURES

Impact 4.8-1: The project would not conflict with adopted energy conservation plans. (Less than Significant)

Specific plans and recommendations of the California Energy Commission were listed in the Setting; the project would not appear to conflict with any of these.

A legislative goal of electrical restructuring, of which divestiture is a part, is to lower California's price of electricity below today's levels and cause more businesses to locate or expand their operations in California. Divestiture of power plants in California should decrease electricity rates by promoting open competition among generators. A decrease in electricity rates could result in an increase in electricity consumption due to factors related to supply and demand; basic economic theory holds that a lower delivered price for a commodity will increase consumption of that commodity. The rate or proportion of increase is termed the price elasticity. The price elasticity for electric demand has been estimated to be from 0.1 to 1.0, with the elasticity generally growing over time as consumers adapt to changing prices. This means that a 1 percent reduction in the cost of electricity could eventually cause up to a 1 percent increase in new demand (McCann, 1998).

Generation costs will likely be less than one-third of the average electric rate paid by consumers, and increased competition in generation resulting from divestiture of utility power plants throughout California is unlikely to lower generation costs by more than 5 percent. Thus, the average electricity rate is likely to fall by less than 2 percent. Given these projections, electricity demand due to decreases in consumer costs is unlikely to rise by more than 2 percent over the long term. Given that divestiture over all would not create a significant increase in demand, the change in demand as a result of this project would be less than significant.

One of the key features of AB 1890, of which divestiture is a direct result, is that it contains provisions for supporting energy efficiency and research, development and demonstrations (R&D) activities. Under the preferred policy, the PUC will require minimum renewable resource purchases with tradable credits. Energy efficiency programs, low income assistance programs, and public goods research development and demonstration will be funded by a non-bypassable surcharge. R&D activities in support of new generation technologies will be encouraged to occur in the entrepreneurial market. None of these programs, which stem from restructuring, would conflict with any conservation plans.

The California Energy Commission (1994) discusses measures to achieve cost-effective energy efficiency that would promote energy conservation. These include:

- market-oriented programs to create market advantages for energy-efficient buildings,
- better compliance with existing standards and improved installation of new equipment,
- improving quality, availability, and credibility of consumer information on energy use and potential savings from energy efficiency measures,
- coordination of future standards updates with industry, and
- promotion of cost-effective energy efficiency technologies and practices for consumers.

Energy conservation programs sponsored by PG&E are tied to the distribution side (e.g. the consumer). These include energy-saving tips such as home insulation, energy-efficient lighting, lowering the thermostat, installing energy-efficient windows, and so on. Electricity generators are not involved in any of these programs, so that the programs would not be affected by divestiture.

Divestiture does not appear to conflict directly with any adopted energy conservation plans, even though as discussed above, energy use may increase slightly with divestiture versus without divestiture. Therefore, this would be a less-than-significant impact.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Proposed in This Report

None required.

Impact 4.8-2: The project would not promote wasteful or inefficient use of non-renewable resources. (Less than Significant)

Operational changes by new owners of divested plants are not precisely known at this time, although it is reasonable to expect that the prime outcome of divestiture -- lower electricity prices -- would result from the increased supply of energy generated by the divested plants.

The California Energy Commission addressed electricity supply efficiency in its discussion of energy policy (1994), and in its biannual Energy Report (1997). It is expected that increased efficiencies would take place through technological advances, rebuilding of older power plants using new generation technologies and through improved information systems that allow owners to locate system problems and make corrections faster, as well as allow consumers to make informed choices regarding their energy suppliers.

PG&E is planning to sell its older fossil-fueled power plants. The new owners, with higher initial capital costs to recover, might be inclined to run the plants at higher capacity factors than they are operated at present (see Attachment C). However, the sale would not affect the efficiency of the electrical generating units. Whereas future air quality emission controls are likely to slightly reduce the fuel efficiency of the plants for sale (for the benefit of better air quality), new owners are expected to operate the plants efficiently so that fuel is not wasted.

As described in the setting, the steam fields in the Geysers area are being managed to prolong the steam resources to the extent possible. The obvious incentive is for the new owner of the Geysers Power Plant to efficiently use the remaining geothermal steam resources.

This impact would be less than significant.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Proposed in This Report

None required.

Impact 4.8-3: The project would not result in loss of availability of known mineral resources. (Less than Significant)

The projected increase in electricity consumption from the project would require additional fuel. However, divestiture would not be expected to significantly affect the availability of known resources, because the increased fuel demand would be met by existing in-state and out-of-state resources. Other mineral resources would not be affected by the project. No impact would occur.

Mitigation Measures Proposed as Part of Project

None.

Mitigation Measures Identified in This Report

None required.

REFERENCES - Energy and Mineral Resources

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