

7.16 ENERGY

7.16.1 INTRODUCTION

This section describes the existing environmental conditions and the consequences of the Monterey Agreement on power production and power consumption. It evaluates and discusses the consequences associated with the operation of the proposed project. Significance of impacts is determined by applying significance criteria set forth in the State CEQA Guidelines.

The SWP is one of the largest water and power systems in the world. Hydroelectric and coal-fired facilities, along with contractual arrangements, are the major power sources for SWP power operations. The California Department of Water Resources (Department) uses its power resources primarily to run the pumps that move SWP water to California farmlands and cities and to provide peak power to utilities. Because the Department has the flexibility to regulate SWP pumping on an hourly basis, maximum SWP pumping is generally scheduled when power costs are low. By scheduling as much off-peak pumping as possible, the Department is able to take advantage of less expensive surplus electrical generation. Conversely, the Department maximizes its power generation for the benefit of the interconnected electrical grid during the on-peak hours when electric demand is highest. In this manner, the Department is able to manage a comprehensive power resources program that helps minimize the cost of water deliveries to SWP water supply contractors while maximizing the benefits to the statewide electric grid.¹

The Department's power planning process begins with a review of all projected loads and resources including pump load, generation from the Department's facilities, generation from joint facilities, sales, purchases, and exchanges. The net of these loads and resources yields a power portfolio in which the Department often has a net deficit during the off-peak hours and a net surplus in the on-peak hours. The Department then procures the deficit and markets the surplus in stages; baseline amounts are transacted in advance, and the remaining deficit and surplus quantities are transacted as the year progresses and more information becomes available regarding hydrology, water demands, etc. SWP is generally a net purchaser of electric energy.

In 2002, energy used by the SWP pumping and generating facilities totaled 8,390 Giga-Watt hours (GWh). In 2002, the Department sold 1,170 GWh of energy to 15 utilities and 13 power marketers, totaling about \$58 million in revenue. The Department received an additional \$24 million in revenues for capacity and exchanges. To meet SWP energy demands in 2002, the Department purchased 2,090 GWh of energy.² In 2000, operating the SWP pumping and generating plants required 9,190 GWh of energy to deliver approximately 3.6 million acre-feet (AF) overall and approximately 1.8 million AF to southern California.³ In 2000, the Department sold approximately 2,920 GWh of energy to 24 utilities and 16 power marketers.⁴ The Department also purchased 2,940 GWh of energy in 2000.⁵

For more details on energy used, generated, purchased, sold, and transmitted as part of the SWP, refer to the annually released Bulletin 132: Management of the State Water Project (<http://www.swpao.water.ca.gov/publications/>).

7.16.2.1 Content

The area of analysis for the evaluation of potential effects on power generation and consumption due to implementation of the Monterey Agreement includes power plants, pumping plants, and associated facilities along the SWP. Also in the analysis are facilities not owned by the SWP (Figure 7.16-1).

Three Monterey Plus model studies have been post-processed to evaluate power impacts. The studies evaluated represent 1994 Baseline condition, the 2020 Pre-Monterey condition, and the 2020 Post-Monterey condition. Power generation and consumption for the SWP are calculated using the SWP Power spreadsheet. This is the Department-approved method of calculating power from CALSIM II output.

7.16.2.2 Standards of Significance

The environmental consequences of the proposed project will be measured in terms of how it will affect the net energy requirements of the SWP. This is consistent with the significance criteria used in the CALFED Bay-Delta Program Final Programmatic EIS/EIR⁶ and the South Delta Improvements Program EIS/EIR.⁷

Project effects on the SWP net energy requirements would be considered potentially significant if the proposed project would:

- result in a substantial increase, of more than 10 percent, in net electricity consumption.

An increase of more than 10 percent would be considered an unavoidable significant effect of the project if it could not be (a) eliminated, (b) avoided or minimized by redesign or relocation of some components of the proposed project, (c) reduced to a less-than-significant level, or (d) compensated for by mitigation of equal extent and value.

In addition to the significance criteria discussed in the previous paragraph, the significance criteria listed below is based on Appendix G of the State CEQA Guidelines. The project would have a significant impact on utilities and service systems if the proposed project would:

- require or result in the construction of new water, wastewater treatment, or electrical power generation facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

7.16.3 ENVIRONMENTAL SETTING

7.16.3.1 Energy Sources

The SWP is the largest single user of electrical power in California. The electrical power needed to operate the SWP comes from a combination of SWP hydroelectric facilities, the coal-fired Reid Gardner Power Plant, and contracts with other energy producers.⁸

Hydroelectric

The SWP conveys an annual average of about 2.4 million AF of water through its 17 pumping plants, 8 hydroelectric power plants, 3 pumping-generating plants, 29 dams and reservoirs, and about 675 miles of aqueduct and pipelines. As water is released from SWP reservoirs, the



FIGURE 7.16-1
Energy Components of the State Water Project

generation facilities produce power that is either used by the SWP or sold to electric utilities and marketers. Hydroelectric generation from SWP facilities is the largest power source for the SWP. Approximately 1.401 giga-watts (GW) of capacity is available from hydroelectric facilities (Table 7.16-1). The combined Hyatt Pumping-Generating Plant and Thermalito Pumping-Generating Plant (Hyatt-Thermalito), near Oroville in Butte County, generate about 2,200 GWh of energy in a median water year. The Thermalito Diversion Dam Power Plant, downstream of Lake Oroville, generates 24 GWh of energy per year. Other SWP plants that generate energy include:

- Alamo,
- Devil Canyon,
- Gianelli,
- Mojave Siphon, and
- Warne.

Power Type	Name	County	Maximum Capacity (GW)
Hydroelectric			
	Thermalito Diversion Dam	BUTTE	0.003
	Hyatt-Thermalito	BUTTE	0.759
	Gianelli	MERCED	0.222
	Alamo	LOS ANGELES	0.018
	Warne	LOS ANGELES	0.078
	Mojave Siphon	SAN BERNARDINO	0.030
	Devil Canyon	SAN BERNARDINO	0.291
		TOTAL	1.401
Coal	Reid Gardner		0.235
<small>Source: California Department of Water Resources 2005. 160-05. California Water Plan Update 2005.</small>			

Together, these five plants provide 17 percent of the total energy used by the SWP. Table 7.16-1 provides the county locations and power capacity of each plant.

Coal

Since July 1983, the Department has been receiving energy from Reid Gardner Power Plant, a coal-fired facility near Las Vegas, Nevada, under the "Participation Agreement Reid Gardner Unit No. 4" with Nevada Power Company (NPC). Under this agreement, the Department owns 67.8 percent of Unit 4 and receives up to 0.235 GW (90.4 percent of capacity) from it while NPC owns the remainder of Unit 4 as well as all of Units 1, 2, and 3. In addition, the capacity of Unit 4 was upgraded by 0.015 GW in June 1990,⁹ and the Department's entitlement of this 0.015 GW of capacity and associated energy began in September 1998. However, starting in August 2004, due to heat rate issues related to new environmental restrictions, Unit 4 has not been able to operate above its original capacity. Consequently, until this issue is resolved, the Department will not be receiving any energy associated with the upgrade capacity. Under the agreement, NPC has limited right to interrupt the Department's energy deliveries during specific periods; NPC is obligated to pay the Department for the interrupted energy deliveries based on NPC's combustion turbine costs. In year 2013, ownership of Unit 4 will revert back to NPC.

Contractual Resource Arrangements

The Department has several short-term and long-term contracts for electricity purchases, exchanges, transfers, and sales with electric utilities in California and other western states. The Department has an existing contract with Pacific Gas & Electric that terminates in 2014 for the transmission service in northern California; the balance of transmission service required to operate the SWP is obtained through the California Independent System Operator.¹⁰

The energy needed to operate the SWP that is not provided by SWP facilities and the Reid Gardner Power Plant is obtained through joint development, exchanges, and purchases from other energy suppliers as indicated in the following sections:

Joint development:

- In 1966, the Department entered into a contract with the Los Angeles Department of Water and Power (LADWP) for the joint development of the West Branch of the California Aqueduct. LADWP constructed and operates the Castaic Power Plant from which the Department receives capacity and energy based on weekly water schedule through the West Branch. In 2002, the Department received 757.076 GWh of energy generated at Castaic Power Plant.¹¹
- Other joint facilities include Gianelli Pumping-generating plant, a joint hydroelectric facility between the Department (0.222 GW) and the Bureau of Reclamation (0.202 GW).
- As described above, Reid Gardner Power Plant Unit 4 is also a joint SWP and NPC facility.

Power exchange (Power Contract and Capacity Exchange Agreement):

- The Department and Southern California Edison (SCE) had two power agreements that expired at the end of 2004: the 1979 Power Contract and the 1981 Capacity Exchange Agreement (CEA).¹²
- Under the 1979 Power Contract, the Department provides to SCE the following: 1) up to 0.350 GW (about 40%) of the energy from Hyatt-Thermalito; 2) up to 0.120 GW of capacity and all the energy from Devil Canyon Power Plant Units 1 and 2; 3) up to 0.015 GW of capacity and all the energy from Alamo Power Plant; and all the energy produced at the Metropolitan Water District of Southern California's electric recovery plants that are made available to the Department. In return, the Department received off-peak energy from SCE equal to the amount of energy provided to SCE plus an additional amount of energy.¹³
- Under the CEA, the Department provided 4.125 GWh of energy to SCE during on-peak periods at the maximum delivery rate of 0.225 GW. In exchange, SCE returned approximately 110 percent of this energy during mid-peak and off-peak periods to the Department. In addition, SCE waives 75 percent of its charges to the Department for specified transmission service used for SWP pumping and generating facilities, and SCE also makes an annual payment of \$900,000 to the Department.
- Under the Settlement Agreement on December 26, 2002, the Department and SCE agreed to revise certain agreement provisions regarding SCE's right to curtail energy deliveries to the Department. SCE paid the Department \$30 million as compensation for curtailing exchange energy in 2000 and 2001.

Purchases

The Department also obtains energy for the SWP through long-term and short-term purchase agreements including the following:

- The Department obtains about 400 GWh of energy in a median water years from the Pine Flat Power Plant, which is owned and operated by Kings River Conservation District.
- The Department obtains energy from five hydroelectric plants (with 0.03 GW of capacity) that are owned and operated by Metropolitan Water District of Southern California (MWD); in 2004, the Department purchased 498 GWh.
- From 1991 through 2004, the Department purchased from PacifiCorp 0.1 GW of capacity and associated energy. This contract was terminated in 2004.
- The Department has an agreement with MWD to enter into short-term purchases and exchanges of surplus energy from MWD's Colorado River Aqueduct system.
- Through the Western Systems Power Pool agreement, the Department purchases energy from member utilities and power marketers as needed for SWP operations.¹⁴

To meet future SWP energy requirements, the Department evaluates new energy resources and reviews SWP power requirements with consideration for the following factors:

- ability to meet energy demand for pumping;
- transmission access;
- anticipated water deliveries;
- cost of resource and cost of financing;
- environmental impacts and mitigation costs;
- and operating characteristics.¹⁵

7.16.4 IMPACTS AND MITIGATION MEASURES

Electrical energy demand in California will vary depending on economic and population trends. As a result, peak electrical energy demand within the state is expected to increase by approximately 0.01 GW per year for the foreseeable future.¹⁶ Based on the evaluations of recent demand and population trends, fuel costs, power generation capability and construction, meteorological conditions, actions outside California, and other factors, the California Energy Commission (CEC) concluded that, for the foreseeable future, capacity additions will exceed the peak demand growth in California. While various factors may trigger calls for load curtailments, supply reserve margins should be adequate to meet the reasonably foreseeable demands.

7.16-1 Implementation of the proposed project would potentially result in increased demand for energy.

1996 — 2003

The post-processed power results were only ran for the 2020 Level-of-Development. The 2020 conditions show a total long-term net load increase of only 1.6 percent (see Future Impacts section). It is reasonable to conclude that the increase would have been less between 1996 through 2003. In addition, the amount of power required was within the limits of the planned

power supply since no new facilities were built to fulfill energy needs from the proposed project. Therefore, this is a ***less-than-significant impact***.

Mitigation Measures

None required.

Future Impacts

The post-processed power results show that there is a minimal increase in the long term net power load when going from a Pre-Monterey condition to a Post-Monterey condition at the 2020 Level-of-Development. The total long-term net load increase was 2.02 percent (Table 7.16-2).

Under the 2020 Post-Monterey conditions, when compared to 2020 Pre-Monterey condition, some of the powerplants would generate less energy (Alamo, Mojave, and Devil Canyon), some would produce the same amount of energy (Gianelli, Oroville, and Thermalito), and some would produce more energy (Warne and Castaic) (Table 7.16-3). An overall increase of 128 GWh in energy loads at the pumping plants is also observed; about 75 percent of this increase occurs at South Bay and Edmonston Pumping Plants. Four other pumping plants show a decrease in energy loads: Dos Amigos, Las Perillas, and Badger Hill (Table 7.16-3).

SWP pumping facilities are designed to meet the anticipated demands of the SWP Contractors, and this rated capacity would not be exceeded by implementation of the proposed project. The amount of additional power required would be within the limits of the planned power supply, and no expansion or construction of new facilities to generate power would be required. No new long-term or short-term contracts would be necessary under the 2020 Post-Monterey conditions. Additionally, with a total long-term net load increase of 2.02 percent due to the proposed project, the impact to electrical power would be ***less than significant***.

Mitigation Measures

None required.

TABLE 7.16-2

SWP ENERGY LOAD AND GENERATION FOR MONTEREY PLUS EIR ALTERNATIVES (AVERAGE ANNUAL GWH AT PLANT)

Period	1994 Baseline			2020 Pre-Monterey			2020 Post-Monterey			2020 Difference (GWh) MPP minus baseline			2020 Difference (%) MPP minus baseline		
	Load	Generation	Net load	Load	Generation	Net load	Load	Generation	Net load	Load	Generation	Net load	Load	Generation	Net load
	1922-93	7,363	4,283	3,080	10,082	5,019	5,063	10,210	5,045	5,165	128	26	102	1.27	0.52
1929-34	6,108	3,018	3,090	5,531	2,762	2,769	5,326	2,686	2,640	-205	-76	-129	-3.71	-2.76	-4.65
1987-92	5,525	2,777	2,748	5,790	2,780	3,017	5,833	2,796	3,037	37	17	20	0.63	0.60	0.67

Source: California Department of Water Resources, 2007.

TABLE 7.16-3

ENERGY AND FLOW AT SWP POWERPLANTS AND PUMPING PLANTS (1922-1993 AVERAGE ANNUAL)

	1994 Baseline		2020 Pre-Monterey		2020 Post-Monterey		2020 Difference MPP minus baseline		2020 Difference (%) MPP minus baseline	
	Energy	Flow	Energy	Flow	Energy	Flow	Energy	Flow	Energy	Flow
	(GWh)	(TAF)	(GWh)	(TAF)	(GWh)	(TAF)	(GWh)	(TAF)	(%)	(%)
Powerplant										
Oroville	2,035	3,695	2,014	3,727	2,015	3,724	0	-3	0.02	-0.09
Thermalito	236	2,926	237	2,949	237	2,946	0	-3	-0.11	-0.11
Gianelli	101	470	128	604	128	552	0	-53	-0.21	-8.72
Alamo	98	936	116	1,109	115	1,100	-1	-9	-0.84	-0.84
Mojave	85	892	122	1,287	122	1,280	-1	-7	-0.54	-0.54
Devil Canyon	988	887	1,412	1,168	1,405	1,262	-7	-6	-0.48	-0.48
Warne	279	488	373	652	385	673	12	21	3.25	3.25
Castaic	462	478	616	638	638	661	22	23	3.58	3.57
Total	4,284	-	5,018	-	5,045	-	25	-	-	-
Pumping Plant										
Banks	873	2,940	946	3,186	949	3,167	3	-19	0.34	-0.59
South Bay	112	140	126	158	147	184	21	26	16.72	16.72
Del Valle	1	15	2	24	2	24	0	0	1.03	1.03
Gianelli	144	523	176	643	194	722	19	78	10.77	12.14
Dos Amigos	387	2,805	419	3,042	396	2,869	-24	-173	-5.70	-5.70
Las Perillas	9	118	12	158	10	126	-2	-32	-19.96	-19.96
Badger Hill	24	118	32	158	25	126	-6	-32	0.65	-19.96
Buena Vista	371	1,532	522	2,157	525	2,171	3	14	0.65	0.65
Teerink	451	1,528	635	2,153	639	2,167	4	14	0.65	0.65
Chrisman	937	1,467	1,354	2,120	1,376	2,153	21	33	1.58	1.58
Edmonston	3,280	1,467	4,739	2,120	4,814	2,153	75	33	1.58	1.58
Oso	137	490	183	654	190	677	6	23	3.46	3.46
Pearblossom	637	906	936	1,331	944	1,342	8	11	0.85	0.85
Total	7,363	-	10,082	-	10,212	-	128	-	-	-

Source: California Department of Water Resources, 2007.

ENDNOTES

1. California Department of Water Resources 2004. Bulletin 132-03. Management of the California State Water Project – Calendar Year 2002.
2. California Department of Water Resources 2004. Bulletin 132-03. Management of the California State Water Project – Calendar Year 2002.
3. California Department of Water Resources 2002. Bulletin 132-01. Management of the California State Water Project – Calendar Year 2000.
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6. CALFED Bay-Delta Program 2000. *Final Programmatic Environmental Impact Statement/Environmental Impact Review*. July 2000.
7. South Delta Improvements Program EIS/EIR 2005 (Draft).
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16. California Energy Commission. 2002. 2002-2012 Electricity Outlook Report.