

City of Riverside

**WASTEWATER COLLECTION AND TREATMENT
FACILITIES INTEGRATED MASTER PLAN**

**VOLUME 9: ENERGY MANAGEMENT
CHAPTER 3: EXISTING AND FUTURE ENERGY USES**

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**WASTEWATER COLLECTION AND TREATMENT
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**VOLUME 9: ENERGY MANAGEMENT
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EXISTING AND FUTURE ENERGY USES

3.1 PURPOSE

The purpose of this chapter is to summarize the existing energy uses at the City of Riverside (City) Regional Water Quality Control Plant (RWQCP) and provide projections for future uses.

3.2 BACKGROUND

The RWQCP is a tertiary wastewater treatment plant that currently treats approximately 33 mgd annual average flow. The RWQCP has a rated capacity of approximately 40-mgd annual average flow. The City seeks to develop an Integrated Master Plan for the Wastewater Systems Facilities to identify and plan for expansion and replacement needs for up to the year 2025. Energy systems are an integral part of the RWQCP operation. With proper planning and appropriate implementation of energy system improvements, the RWQCP will reduce the need for outside sources of energy (power and natural gas) and be able to cost effectively treat and dispose of wastewater solids.

3.3 EXISTING ENERGY USES

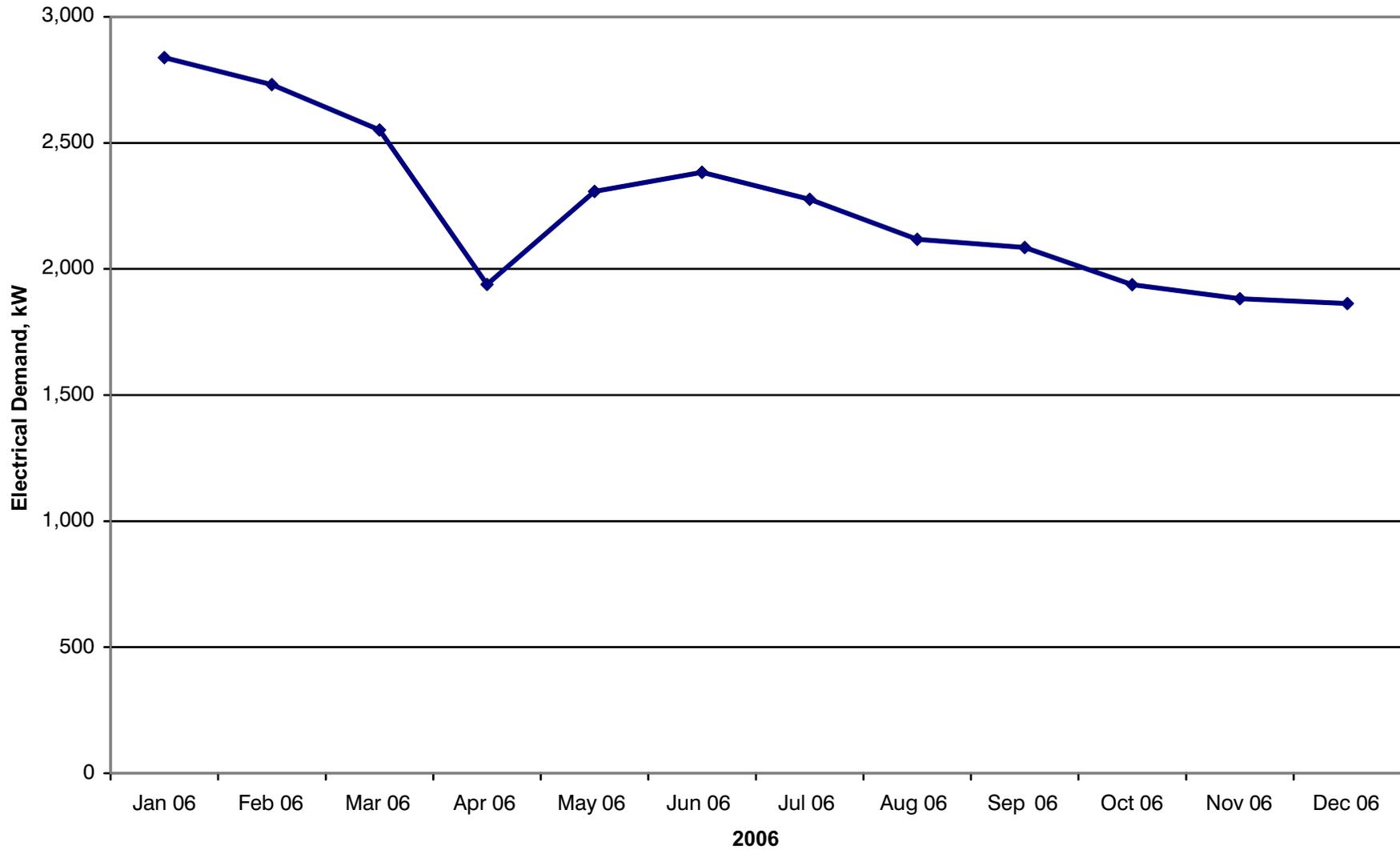
The existing energy systems of the plant consist of an electrical power system, natural gas system, digester heating system, and digester gas system.

3.3.1 Existing Power Uses

Historical data for electrical power demand and consumption at the RWQCP were obtained for the period of January 2006 to December 2006. A summary from the 2006 utility data is as follows:

Average Demand	2,456 kW
Peak Demand	
Off Peak	3,179 kW
Mid Peak	3,179 kW
On Peak	3,096 kW
Average Power Cost	\$0.0919/kWh

Figure 3.1 shows the monthly average electricity demand at the RWQCP for the year 2006.



**RWQCP 2006
MONTHLY AVERAGE
ELECTRICITY DEMAND**

FIGURE 3.1

3.3.2 Existing Heat Uses

Hot water is utilized within the plant for building and process uses as described below. The primary heat use is for process heating of the digesters. Volume 9, Chapter 1 - Existing Energy Systems, presents information on the existing digester heating system. In addition, existing heat uses include using hot water to provide space heating and cooling for the Administration Building. These uses are further presented in Volume 8, Chapter 2 - Summary of Planning Studies.

3.4 FUTURE ENERGY USES

The future energy systems of the plant will continue to consist of an electrical power system, natural gas system, digester heating system, and digester gas system.

3.4.1 Future Power Uses

Based on the master plan, the anticipated future loads for the RWQCP are as follows:

Headworks	Additional 186 kW in year 2023
Primary Clarifier, Primary EQ, MBR and Sludge Thickening	Additional 1955 kW in year 2013; increase to 3047 in year 2025
Acid Digester	Additional 186 kW in year 2013
Disinfection	Additional 8 kW in year 2020
UV/Ozone	Possible addition of 583 kW in year 2020
WAS Thickeners	Additional 34 kW in year 2027

Figure 3.2 shows the anticipated electrical demand at the RWQCP for the next 20 years.

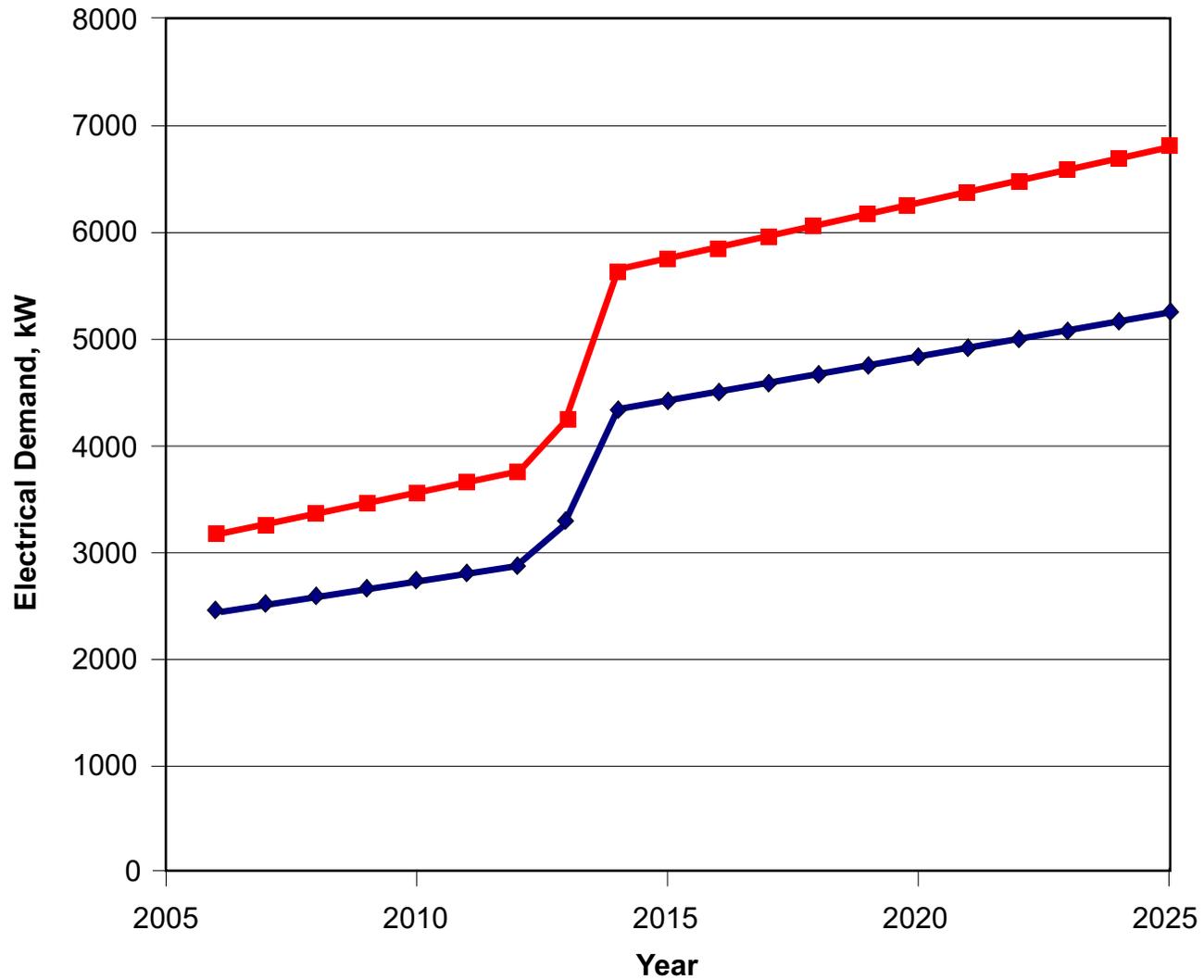
3.4.2 Future Heat Uses

Future heat uses will include additional heat needed to provide additional digester heating required as a result of increased plant loading and flow. Projections of future digester heating through 2025 are presented in Table 3.1. The basis for future projections is presented in Volume 9, Chapter 1 - Existing Energy Systems.

Table 3.1 Estimated RWQCP Digester Heat Demand Wastewater Collection and Treatment Facilities Integrated Master Plan City of Riverside					
	Flow, Year mgd	No Grease: Average Heat Demand, Btu/hr	No Grease: Peak Heat Demand, Btu/hr	Grease Addition: Average Heat Demand, Btu/hr	Grease Addition: Peak Heat Demand, Btu/hr
2006	33.5	3,255,000	5,077,000	4,055,000	6,077,000
2007	34.7	3,374,000	5,263,000	4,174,000	6,263,000

Table 3.1 Estimated RWQCP Digester Heat Demand Wastewater Collection and Treatment Facilities Integrated Master Plan City of Riverside					
Year	Flow, mgd	No Grease: Average Heat Demand, Btu/hr	No Grease: Peak Heat Demand, Btu/hr	Grease Addition: Average Heat Demand, Btu/hr	Grease Addition: Peak Heat Demand, Btu/hr
2008	36.0	3,493,000	5,448,000	4,293,000	6,448,000
2009	37.2	3,255,000	5,077,000	4,055,000	6,077,000
2010	38.4	3,342,000	5,213,000	4,142,000	6,213,000
2011	39.4	3,440,000	5,365,000	4,240,000	6,365,000
2012	40.4	3,537,000	5,517,000	4,337,000	6,517,000
2013	41.5	3,634,000	5,668,000	4,434,000	6,668,000
2014	42.5	3,731,000	5,820,000	4,531,000	6,820,000
2015	43.5	3,828,000	5,971,000	4,628,000	6,971,000
2016	44.4	3,887,000	6,062,000	4,687,000	7,062,000
2017	45.2	3,945,000	6,153,000	4,745,000	7,153,000
2018	46.1	4,003,000	6,244,000	4,803,000	7,244,000
2019	46.9	4,061,000	6,335,000	4,861,000	7,335,000
2020	47.8	4,120,000	6,426,000	4,920,000	7,426,000
2021	48.7	4,178,000	6,517,000	4,978,000	7,517,000
2022	49.6	4,236,000	6,608,000	5,036,000	7,608,000
2023	50.4	4,304,000	6,714,000	5,104,000	7,714,000
2024	51.3	4,363,000	6,805,000	5,163,000	7,805,000
2025	52.2	4,421,000	6,896,000	5,221,000	7,896,000

Table 3.1 presents the anticipated average and peak digester heating demand both with and without grease addition through 2025. The heat demands were calculated by ratioing the values, noted above, to projected RWQCP flows. The RWQCP flow estimate is from Volume 2, Chapter 3 - Population and Flow Projections.



◆ Ave Load, kW
■ Peak Load, kW

PROJECTED FUTURE ELECTRICAL DEMAND AT RWQCP

FIGURE 3.2