City of Riverside

WASTEWATER COLLECTION AND TREATMENT FACILITIES INTEGRATED MASTER PLAN

VOLUME 9: ENERGY MANAGEMENT
CHAPTER 7:
IMPLEMENTATION SCHEDULE AND COST

FINAL
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7.1 PURPOSE

The purpose of this chapter is to present the costs and schedules of the projects for the Energy Management volume for the City of Riverside (City) Regional Water Quality Control Plant (RWQCP) Integrated Master Plan. The selected projects are derived from the analyses performed and presented in Chapters 1 through 6 of this volume of the Master Plan.

7.2 CONCLUSIONS AND RECOMMENDATIONS

- Install a 1,000-kW digester gas fueled fuel cell cogeneration system.
- Add a new digester gas fueled 1,200-kW fuel cell cogeneration system prior to 2012 to replace the three existing 3,300-kW engine/generator cogeneration systems; retrofitting the existing engine generators to become natural gas fueled standby generators.
- Install a low-pressure digester gas holder to assist with digester gas control.
- Upgrade the existing RWQCP cogeneration, control, and electrical system to provide standby power and distribution reliability.
- Retrofit the existing eddy-current drives with Variable Frequency Drives (VFDs) for the three 250-hp filter influent pumps and two 100-hp waste backwash pumps. Replace the pump motors with premium efficiency motors.

7.3 BACKGROUND

The existing energy management systems are described in Volume 9, Chapter 1 - Existing Energy Systems. The City's plan to receive and treat Fats, Oils, and Greases (FOG), as noted in Volume 9, Chapter 1 - Existing Energy Systems, will generate additional digester gas beyond that which can be used by the fuel cell system currently being installed. Conservative estimates of digester gas production show that between 450 and 700 scfm of digester gas could be generated consistently based on the existing and planned digestion capacity. The planned digester gas fueled 1,000-kW fuel cell cogeneration system will require approximately 220 scfm. In order to use the additional digester gas which will be generated and to replace another of the three existing cogeneration engine generators when they are removed from cogeneration service to meet the air quality management district requirements, the plant plans to install a new digester gas fueled 1,200-kW fuel cell cogeneration system. This new cogeneration system will require 260 scfm. The remaining digester gas, if any, will be available for use in plant boilers to supplement the heat provided from the fuel cell systems for use within the plant.

7.4 COST AND SCHEDULE CRITERIA

The implementation schedule for each project consists of a planning/design period and a construction/start-up period. A 2-year duration for the planning and design period is used for each project to include a conservative schedule at the master plan level. Because the projects for energy management are relatively small, if completed as separate projects, 1.5 years may be used for the construction and start-up period. The construction and start-up period is based on the contractor being able to perform approximately $2 million per month worth of construction. When final implementation projects are established, adjustments to this schedule should be made based on experience, looking at factors such as project sequencing and equipment procurement times. For some of the projects, it may be possible to shorten the planning/design and construction/start-up schedules. However, for the master plan, the schedules will be presented based on the criteria described above.

The costs for these projects are based on the information presented in the previous chapters for Volume 9. They are based on costs in August 2006 dollars. These costs will be adjusted to their midpoint of construction before placement in the Capital Improvement Plan (CIP), which is presented in Volume 10, CIP and Overall Implementation Schedule.

7.5 ENERGY MANAGEMENT FACILITIES SCHEDULE

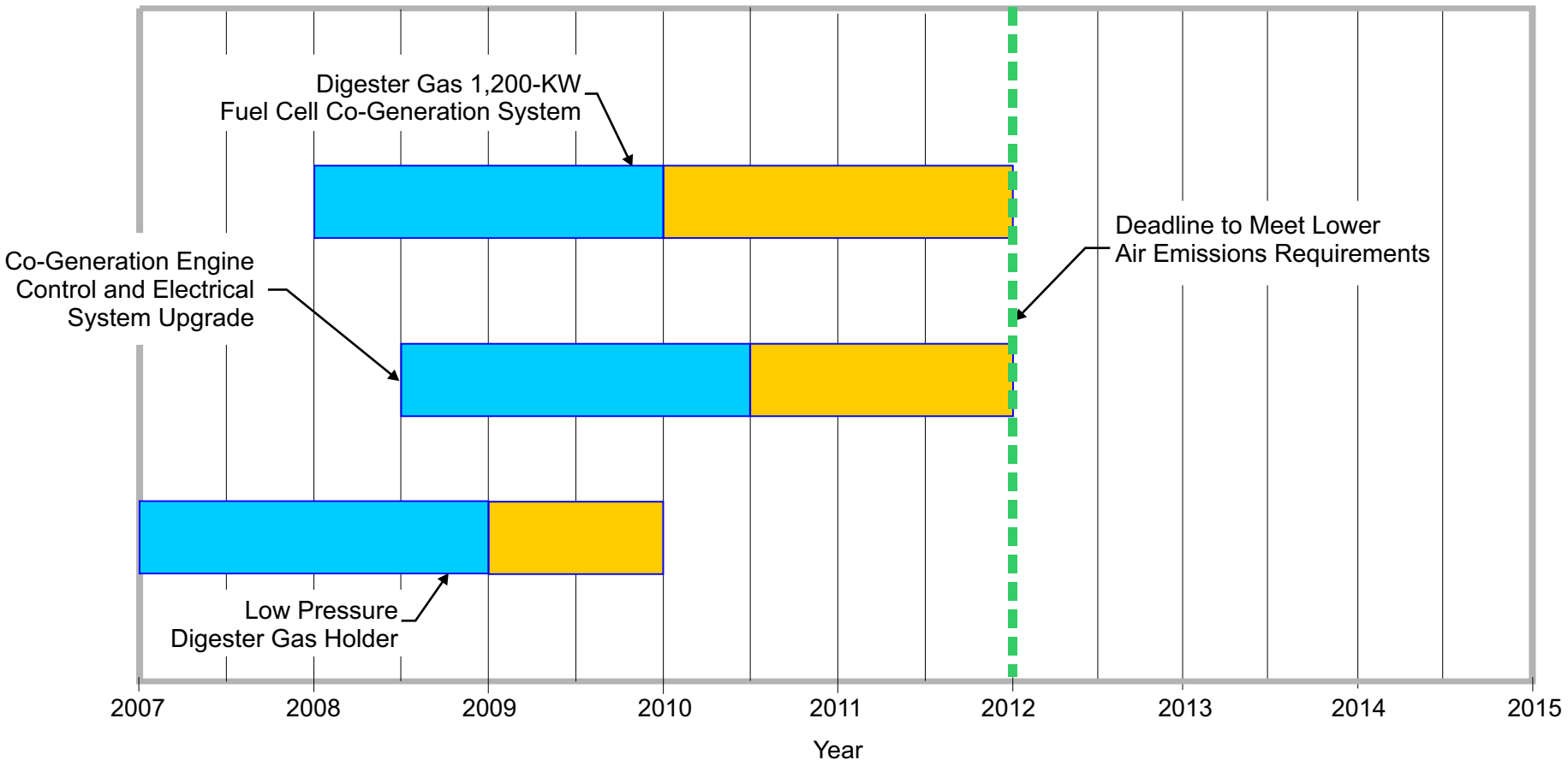
Figure 7.1 shows the schedule of the energy management facilities projects.

7.5.1 Digester Gas Fueled 1,200-kW Fuel Cell Cogeneration System

As described in Volume 9, Chapter 5 - Power Supply Alternatives, install a new digester gas fueled 1,200-kW fuel cell cogeneration system. Based on a 2-year planning/design period and a 2-year construction/start-up period this project would need to begin in 2008 to ensure additional cogeneration capacity is available when the existing engine generators are converted to standby generation use in 2012.

7.5.2 Low-Pressure Digester Gas Holder

In order to assist the plant to better manage digester gas production, a new low-pressure digester gas holder should be added as soon as possible. Gas management is currently a concern and issue at the plant and will become more of an issue as added gas production is realized from the plan to generate additional digester gas from the addition of FOG. The proposed schedule includes a 2-year planning/design period and 1-year construction/start-up period.



ENERGY MANAGEMENT FACILITIES SCHEDULE

FIGURE 7.1

7.5.3 Existing Cogeneration Engine, Control, and Electrical System Upgrade

This project should be implemented as soon as possible after the planned 1,000-kW fuel cell cogeneration system is up and running, to provide necessary standby power to the plant. The schedule is based on a 2-year planning/design period and 2-year construction/start-up period.

7.5.4 Retrofit Eddy-Current Drives with Variable Frequency Drives

This project will retrofit existing eddy-current drives with VFDs for the three 250-hp filter influent pumps and two 100-hp waste backwash pumps. It will also replace the pump motors with premium efficiency motors. This will be a small project that can be implemented independent of other energy management projects or be included in the cogeneration upgrade project.

7.6 IMPLEMENTATION COST

The total project costs of the new liquid and solids stream facilities for energy management are summarized in Table 7.1. The costs are based on an Engineering News-Record (ENR) value of 8,570 (Los Angeles, August 2006). The midpoint construction costs, adjusted for the phasing and schedule, are presented in Volume 10, CIP and Overall Implementation Schedule.

Table 7.1 Total Project Cost for Proposed Expansion of Energy Management Facilities
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Project Description[1]	Project Cost[2]
Digester Gas Fueled 1,200-kW Fuel Cell Cogeneration System	$13.2 M
Low-Pressure Digester Gas Holder	$1.4 M
Cogeneration Engine, Control, and Electrical System Upgrade	$4.1 M
Retrofit Eddy-Current Drives with Variable Frequency Drives	$1.0 M
Total Cost	**$19.7 M**

Notes:
(1) Details discussed in Volume 9, Energy Management.
(2) As present value (ENR value of 8,570 for Los Angeles in August 2006).