

## Energy Management Master Plan Plant Energy Facilities Plan Plant Energy Projects



**Project Proposer/Manager:** Alan Grooms / Matt Seib

### **Project Purpose:**

This project has evolved from the previous “Plant Energy Generation and Management Projects” business case (2019 CIP) and is now reflective of the effort going into and expected outcomes from the “Energy Management Master Plan” (in planning phase). The project purpose is to take a broad look at how the district uses energy and potential energy in plant with the goal of visioning the best future direction for the District for energy management, and from that plan informing decisions to be made on aging infrastructure. This may involve outcomes such as (but not limited to) replacing generators, retiring generators and selling upgraded biogas, creation of other value-added products from the products of anaerobic digestion, etc. The master plan will update and build upon the 2014 Energy Baseline and Optimization Roadmap study, but will also be inclusive of areas not evaluated as part of that study (such as biosolids) as well as considering new developments in the field.

### **Project History and Status:**

Brown and Caldwell/Strand Associates performed an energy study (2014 Energy Baseline and Optimization Roadmap) with the purpose of providing a roadmap for the district to achieve energy independence. The roadmap included ways to reduce energy usage, improve the utilization of digester gas, and produce more energy. Many of the projects were associated with the aeration system, the largest use of energy at the Plant. Several projects (pertaining to aeration) in the 2016 Liquids Process Facilities Plan (LPFP) originated from ideas covered in that study.

One major area not addressed in the 2014 study pertained to biosolids handling and distribution. Additionally, the 2014 study was intended to be periodically updated to reflect changes in technology, system changes, and changes in the regulatory and rate environment. With the recent issues with aging biogas powered engines, the addition of air permit requirements, and new opportunities for biogas upgrading and sale of RIN (Renewable Identification Number) credits, updating the energy plan was deemed a sensible next step to determine best use of energy infrastructure.

As of April 2019 the district is engaged in preparing an RFQ for energy master planning to help determine the best course for energy infrastructure for the near future.

**Preliminary Path:**

At this time the full scope and timing of any resulting project(s) beyond the study is yet to be determined. Staff anticipates project evaluation will include (but may not be limited to) the following items:

1. An evaluation of the capacity of the existing digesters
2. A determination of the need for additional digesters or different types of digesters
3. An evaluation of the remaining life for the existing gas-driven engines and potential replacements
4. A review of heat recovery systems and hot water system, and how waste heat might be used or dissipated
5. A review and evaluation of the district's ancillary energy systems
6. An assessment of how the district should maintain and refurbish its existing gas generating equipment and ancillary systems in the event that new energy generation systems are not installed and/or their implementation is significantly delayed.
7. An evaluation of the best uses for digester gas

In early 2019 the district is engaged in crafting an RFQ for professional services to assist with the energy master planning effort. This planning is anticipated to commence in early 2020 with results expected by mid-2021. It is hoped that facilities planning for infrastructure to upgrade or replace the biogas powered systems on site will start immediately after the master plan is accepted and approved, which would place the timing approximately in the latter part of 2021 into 2022.

This period (mid-2021 into 2022) would be when a more refined cost estimate could be made for the next phase of this project; at present it is difficult to provide a meaningful cost estimate given the uncertainties in the direction of the facilities planning and design efforts. For planning purposes the costs associated with upgrading the biogas powered engine generators is left in place, but should not be construed as an endorsed option at this time but rather as an approximate (order of magnitude) placeholder for cost.

**Alternatives**

As discussed in the previous paragraph, specific alternatives have been opened from consideration from those considered coming out of the 2014 energy study. It is expected that in general the most likely scenarios will be (1) Alternative 1 – Central Cogeneration (with or without High Strength Waste Receiving as sub-options), and (2). Alternative 2 – Removal of biogas powered engines and replacement with gas treatment and pipeline injection. That said, several other options (or variations on these options) are possible and it is likely at least one other option will arise for serious consideration.

**Key Risks and Issues**

As the project is further defined, additional risks and issues may surface. At this time, the key risks and issues include:

1. Failure of one or more key elements of the current biogas infrastructure before planning has progressed far enough to indicate best future direction. The system (especially the engines) are aging and demanding an ever-increasing input of time and material to keep running. Should a failure occur that is costly or impossible to fix the District may lack clear direction on best path forward.
2. Air emissions from additional combustion units could place the treatment plant in a higher air regulatory category, which may result in additional air permit controls and costs.

### **Economic Analysis**

Detailed economic analyses will be conducted during facilities planning. A “budgetary estimate” level of economic analysis is expected to be conducted during the master planning study (prior to facilities planning).

### **Recommended Option:**

Continue with master planning efforts, with intention to move immediately following conclusion of master planning into facilities planning and then design for improvements. As master planning studies clarify a more distinct scope, facilities planning efforts to define the best alternative and facilities required begin in 2022.

In the meantime, continue to improve plant efficiency by completing cost effective smaller plant energy projects such as lighting and motor replacements as opportunities arise. In addition, continue to provide proactive maintenance and overall support of existing energy generation systems to minimize the life cycle cost of this equipment and to ensure that all aspects of the district’s WDPES discharge permit and air permit are met.

### **Project schedule:**

	Start Date	Completion Date
Master Planning	2019	2021
Facilities Planning	2022	2023
Design	2024	2025
Construction	2026	2027

The Capital Improvements Plan anticipates facilities planning in 2022-2023 followed by design in 2024-2025 and construction in 2026-2027. The actual schedule and budget will depend upon several factors including study/planning outcomes.

**Financial Summary & Fiscal Allocation (2019\$):**

Energy Infrastructure Management Plan & Plant Energy Facilities Plan

	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>
Master Planning	\$400,000	\$200,000	\$0	\$0
Facilities Plan	\$0	\$0	\$425,000	\$425,000

Plant Energy Projects (design and construction)

	<b>2024</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>
Design	\$510,000	\$765,000	\$0	\$0
Construction/Engineering	\$0	\$0	\$7,650,000	\$5,100,000
Total	\$510,000	\$765,000	\$7,650,000	\$5,100,000

The project cost is assumed at approximately \$14 million (2019 dollars), but specific identification of costs, description of project, and identification of timing cannot be completed until further into master planning process. For planning purposes at this stage the assumed \$14 million project is based upon the previous option of a central cogeneration facility without high strength waste receiving and processing station. These assumptions will be further refined pending the results of the master planning and facility planning processes.