Council Priority: Environmental Sustainability

Summary Title: Direct Staff to Pursue the Four-Component Organics Facilities Plan

Title: Staff Requests Direction From Council on Pursuing the Four-Component Organics Facilities Plan for Food Scraps, Yard Trimmmings, and Biosolids, Which Includes: Recommending No Near-Term Uses for the Measure E Site, Developing New Biosolids Facilities That May Also Process Food Scraps at the Palo Alto Regional Water Quality Control Plant, and Continuing With Off-Site Composting of Yard Trimmmings in the Immediate Future, and Rejecting All Proposals in Response to the Energy Compost Facility or Export Option Request for Proposals

From: City Manager

Lead Department: Public Works

Recommendation

Staff recommends that Council direct Staff to:

1. Reject all proposals received in response to the “Energy/Compost Facility or Export Option for Food Scraps, Yard Trimmmings, and Biosolids” Request for Proposals (E/CF RFP) process.
2. Begin to pursue the Organics Facilities Plan (OFP, Attachment A) by hiring a Program Management firm.
3. Apply for a State Water Resources Control Board State Revolving Fund (SRF) loan for Component One of the Organics Facilities Plan (OFP).
4. Initiate design of Component One of the OFP, Biosolids Dewatering and Truck Haul-Out Facility, including direction to prepare related modifications to the Regional Water Quality Control Plant (RWQCP) partner agency agreements.
5. Initiate predesign of Component Two, Development of a Thermal Hydrolysis Process Wet Anaerobic Digestion (THP AD) facility, at the RWQCP; Component Three, Food Scrap Preprocessing; and Component Four, Yard Trimmings Processing of the OFP, including the following:
   a. Determine the price of electricity that the RWQCP will receive for power generated by the facility;
   b. Establish the optimum size of the THP AD facility built to accommodate biosolids for a 30-year planning horizon as well as capacity for food scraps, which Palo Alto and any other jurisdiction would commit to bring to the facility;
   c. Establish a list of contributing partner agencies who commit to bring food scraps to the facility;
   d. Finalize a financing plan for Component Two of the OFP;
   e. Determine the appropriate purchasing and project delivery mechanisms that should be utilized to develop the OFP; and
   f. Determine the required CEQA documentation for the Components of the OFP.

6. Update the existing timeline and schedule in December, 2014 for all Components of the OFP including next steps for the development of Component Four, Processing of Yard Trimmings, where Staff will seek to identify and pursue technologies to harness the energy and resource potential of yard trimmings that could be located on the relatively flat 3.8-acre portion of the Measure E site or elsewhere.

Executive Summary
Rather than select any of the proposals submitted in response to the E/CF RFP, staff instead recommends that the City of Palo Alto pursue an OFP, which staff has developed in concept based on the review of proposals submitted in response to the E/CF RFP and the draft Biosolids Facilities Plan (BFP). (www.cityofpaloalto.org/energycompost)

The OFP provides the City and the Regional Water Quality Control Plant (RWQCP) partners the best option for short-term resilience, long-term cost savings, energy production, and reduction in greenhouse gas emissions (GHG). A Graphic Summary of the OFP is presented on the last page of Attachment A.
In brief, the OFP consists of four components:

**Component One:** Biosolids Dewatering and Truck Haul-Out Facility.

**Component Two:** Wet Anaerobic Digestion Facility utilizing the Thermal Hydrolysis Process.

**Component Three:** Food Preprocessing Facility; Preprocessed food scraps would then be fed into the anaerobic digester (Component Two above).

**Component Four:** The pursuit of technologies to harness the energy and resource potential of yard trimmings.

In connection with its approval of the OFP, staff recommends that the City Council reject all proposals submitted in response to the E/CF RFP. Staff’s recommendation is based on issues related to economics, competitiveness, operational issues, as well as legal procurement considerations.

Table 1 compares the costs and GHG emissions for the OFP, E/CF RFP Proposals (Synagro, Harvest Power, and We Generation (Cambi Services)), and current conditions (biosolids incineration, off-site composting of commercial food scraps, and all yard trimmings):

<table>
<thead>
<tr>
<th>Net Present Value (20 years) of all costs</th>
<th>Synagro</th>
<th>Harvest Power</th>
<th>We Gen (Cambi)</th>
<th>Current Conditions</th>
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<tr>
<td>$76.8 M</td>
<td>$98.9 M</td>
<td>$97.1 M</td>
<td>$107 M</td>
<td>$98 M</td>
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</table>

<table>
<thead>
<tr>
<th>Annual Greenhouse Gasses (MT CO₂e) Total (includes truck trips)</th>
<th>-5,260 MT</th>
<th>1,153 MT</th>
<th>-3,263 MT</th>
<th>-5,291 MT</th>
<th>3,057 MT</th>
</tr>
</thead>
</table>

From an economic and competitive perspective, the costs for the OFP are lower than any of the three E/CF RFP proposals available to the City at this time.

Existing proposals submitted in response to the E/CF RFP cannot be modified, or combined to implement the OFP that staff proposes here. As a threshold matter,
the OFP is substantially different, and more advantageous as compared with the scope of work requested in the E/CF RFP and proposed by bidders in response. Key differences include:

- The OFP contemplates the City acting as the owner-operator of the Anaerobic Digester (AD) facility, while the E/CF RFP asked proposers to provide a privately funded and operated facility. This structural change results in significant financial benefits over time, including efficiencies in staffing and management.
- Reduced overall cost resulting from the recently announced 30-year loan terms available to the City and its regional wastewater partners, through the State Revolving Fund (SRF) loan program;
- Reduced risk to the City and its ratepayers through a phased approach to development that matches investment in capital facilities with the growth of the food scraps program.

While two of the bidders have subsequently offered to combine and modify their proposals in an attempt to match staff’s improved OFP proposal, this combined proposal would not comply with the existing RFP which requested a third party operated facility. However, the current bidders would not be barred from submitting subsequent proposals and bids. Further, now that staff has better refined its preferred approach staff believes it will receive additional and more cost effective proposals and bids in response to more narrowly focused RFPs and Invitation For Bids (IFB).

For these reasons, staff recommends that the Council exercise its authority pursuant to section 2.30.470(b) of the Palo Alto Municipal Code and reject all proposals submitted in response to the City’s E/CF RFP.

All four components of the OFP will be initiated and pursued as soon as possible, through a series of new RFPs. The existing E/CF RFP proposers may reference their existing proposals in new RFP submittals beginning with the first RFP to select an overall Program Management Firm. Subsequent RFPs will select Project Designers, and potentially Design/Build or Design/Build/Operate firms as appropriate. The existing timeline will be updated this fall and submitted to Council. Key next steps and tentative milestones are contained in the “Next steps” Section, below.
Background
The organic waste streams of wastewater solids (also called sewage sludge), food scraps from municipal solid waste, and yard trimmings, can be converted from sources of GHG emissions to fuels for renewable energy generation, which would dramatically reduce the City’s carbon footprint. Two factors contributed to a reconsideration of the current organics’ processing options. First, capping the closed Palo Alto Landfill led to the closure of the Palo Alto Composting Facility, a facility that had been in operation for 30 years. Secondly, the RWQCP Long Range Facilities Plan called for the replacement of the incinerators due to their advanced age and regulatory concerns.

Passage of Measure E in 2011 and the BFP Evaluation
These two events were brought together by the citizen initiated Measure E, passed in 2011, which called for consideration of processing all three waste streams (biosolids, food scraps, and yard trimmings) on 10 acres of the closed Palo Alto landfill, adjacent to the RWQCP. As part of the Action Plan developed after the passage of Measure E (the 2011 Action Plan), the E/CF RFP was developed and issued to proposers in March, 2013. The E/CF RFP allowed proposers to use the 10-acre Measure E site as well as a half-acre site within the RWQCP.

Concurrent with the E/CF RFP process, the BFP evaluated a range of options for biosolids along with the E/CF RFP. Both the E/CF RFP proposals and the BFP evaluation indicate the development of proven wet AD as the preferred technology for biosolids treatment and food scraps. All of the competitive E/CF RFP proposals utilized aerobic composting for the processing of yard trimmings. These conclusions yielded an OFP that provides significant GHG reductions for the City by generating local energy while increasing the RWQCP’s sustainability and operational resilience. The OFP does not define a specific use for the Measure E site and would limit any future use of the Measure E site to the “flat” 3.8-acre area. This would free up the remaining 6.2 acres to be reconsidered as parkland.

Council and Community Involvement
Progress towards the recommendation of this report and development of the OFP can be found in Staff Report ID# 4051, which accompanied the February 10, 2014, Council study session. Since the study session, Staff continued an open dialog with
the community. Staff had direct conversations with citizen panel members, who represent both the groups that supported and opposed the November 2011 Ballot Measure E. The OFP was also presented to the public at community meetings on April 1 and 5, 2014; and at a RWQCP Partners’ meeting on April 7, 2014.

A summary of the questions and discussion from Council, the community, and the six-member community panel are included in Attachment B. Staff also discussed the OFP with representatives from Harvest Power and We Generation (Cambi Services), two of the competitive proposers. A fundamental question discussed with all parties and reflected in the summary of the questions addresses the exploration of options available to modify the E/CF RFP, modify a proposal, or combine the proposals, in order to allow for a low risk, cost competitive and more timely project. Discussions were held to identify a legal and effective way to modify the E/CF RFP process for procurement of an organics processing facility. However, based on legal, purchasing, and competitiveness concerns, a path forward to develop a project using the current E/CF RFP proposals is not possible. Therefore, staff recommends canceling the E/CF RFP as necessary to move forward with the procurement steps for the OFP. The rationale for E/CF RFP cancelation is discussed in greater detail in the Discussion section.

**Discussion**

**Staff Recommends that the Council Direct Staff to Initiate and Pursue the Organics Facilities Plan (OFP).**

The OFP includes four components:

- **Component One:** *Biosolids Dewatering and Truck Haul-Out Facility*
  - Wastewater Treatment Fund
  - City Owned and Operated

- **Component Two:** *Wet Anaerobic Digestion Facility utilizing the Thermal Hydrolysis Process*
  - Wastewater Treatment Fund and potentially Refuse Fund
  - City Owned and Operated

- **Component Three:** *Food Preprocessing Facility, which feeds the Wet Anaerobic Digester*
Component Four: The pursuit of technologies to harness the energy and resource potential of yard trimmings

Components One, Two, and Three are fundamentally interrelated to process both wastewater solids and food scraps. Work can begin concurrently on all four components, but the components will not be completed by the same date.

The development of Component Four, yard trimmings research and development, has little bearing on the development of Components One, Two, and Three, and will be planned somewhat independently. A more complete discussion of the timeline for the development of the Four Components is included in Timeline/Next Steps section below. A graphic summary of all four components of the OFP is presented on the last page of Attachment A.

Staff has prepared the following preliminary list of Next Steps. These will be reviewed further as the existing project Timeline is updated and submitted to Council in December, 2014.

1. Coordination Meetings with the RWQCP Partners Apr 2014
2. Issuance of Program Management Firm RFP Apr 2014
4. Selection of Program Management Firm Sept 2014
5. Deliver Updated Project Timeline to Council Dec 2014
6. Issue Component One Design/CEQA RFP Jan 2015
7. Commence Pre-Design Work on Components Two through Four Feb 2015
8. Finalize Coordination with RWQCP Partners (Food Scraps and Financing) Mar 2015
10. Completion of Component One 2018 - 2019
11. Initial Retirement of Incinerators 2018 - 2019
12. Demolish Incinerators 2019 - 2020
13. Completion of Component Two 2020 - 2022
14. Completion of decision making & potential construction of Components Three & Four

Component One of the OFP: Development of Biosolids Dewatering and Truck Haul-Out Facility

Overview
The City’s consultant, CH2M HILL, produced a BFP, which builds on the RWQCP’s Long Range Facilities Plan. Component One, a Biosolids Dewatering and Truck Haul-Out Facility is a key priority in the plan. This facility will provide the necessary resilience to allow the RWQCP to transport biosolids in the case of a disaster, emergency, or failure of the primary (current or future) biosolids handling system. With proper planning the facility can be built ahead of, and still be compatible with, various options for Component Two (see Attachment C Q7).

The Biosolids Dewatering and Truck Haul-Out Facility will allow the RWQCP to decommission the sewage sludge incinerators and reduce GHG emissions by 2,343 tons per year. Additionally, the demolition of the incinerators will open-up another half-acre at the RWQCP and allow more site planning options for Component Two, the Thermal Hydrolysis Process AD Facility.

Estimated Cost and Timeline
Component One is both essential for the RWQCP’s reliable operations and a necessary first step towards the development of an AD facility. It is anticipated to cost $12 million (2015 dollars) and be completed by 2018. Annual operational costs are estimated to be $1.6 to $2.0 million, depending on the final transportation and disposal costs of the biosolids. Two currently viable and environmentally preferable destinations for the dewatered solids are: (1) the Synagro Central Valley Compost Facility in Merced County, the same facility in the Synagro E/CF RFP proposal, and (2) the East Bay Municipal Utility District (EBMUD) wastewater treatment plant in Oakland, CA. Other options may be identified as part of Component One.

Component Two: The Development of Thermal Hydrolysis Process (THP) Anaerobic Digester (AD)

Overview
Component Two is the development of THP AD. Anaerobic digestion is a proven wastewater technology for stabilizing sludge and biogas generation. Wastewater treatment plants worldwide use wet AD systems to treat sludge. Due to the high water and low solids content of sludge, wet AD is an appropriate technology, and still compatible with the addition of the higher solid food scraps. At least two publicly-owned wastewater treatment plants in the Bay Area – EBMUD in Oakland and Central Marin Sanitation Agency in San Rafael – are using wet AD to process and “co-digest” combined wastewater solids and food scraps.

The BFP provides an evaluation of three wet AD technologies and preprocessing options. The option that provides the greatest biogas yield, smallest physical footprint, and the highest quality biosolids, was the combination of THP with wet AD. The smaller physical footprint offers a significant advantage for dealing with site planning constraints within the available area. According to the BFP recommendations, THP AD technology provides clear non-monetary benefits for treatment and disposal of sewage sludge and favorable overall project economics. See Table 1 above.

**THP AD Technology**
The most established THP AD system under development in North America is a proprietary technology sold by CAMBI, Norway; CAMBI is also the technology provider included in the We Generation (Cambi Services) E/CF RFP proposal. The CAMBI THP technology has been installed and operated at 40 wastewater treatment plants throughout Europe, South America, Japan, and Australia. A new CAMBI THP system will begin operation in July 2014 at the Washington, D.C. Blue Plains wastewater treatment plant, the first CAMBI THP system in North America and largest in the world. A CAMBI THP system is in design for the Hampton Roads Sanitation District wastewater treatment plant in Virginia Beach, VA. The San Francisco Public Utilities Commission (SFPUC) Southeast Wastewater Treatment Plant is evaluating the use of a CAMBI THP system as part of its new digester project. The SFPUC project is also contemplating co-digesting food scraps into the CAMBI THP AD system. SFPUC staff have successfully pilot tested the co-digestion of food scraps with their wastewater solids.

**Pre-design, Estimated Cost and Timeline**
Prior to moving forward with Component Two, design development (predesign) is needed to answer vital questions related to project sizing, the use and sale of
electricity, project financing, site considerations, project delivery options, and RWQCP Partner approval considerations. It is anticipated to cost $57 million (2015 dollars) and be completed between 2020-2022. Initial annual operational costs are estimated to be approximately $400,000.

Biogas generated by the THP AD facility would fuel an onsite combined heat and power system. The energy is 100 percent renewable power and heat for the RWQCP, offsetting purchased power, and providing 4,560 tons of GHG reduction per year.

Ultimately, moving forward with Component Two will require selecting a project delivery method that takes into account the costs, speed of delivery, quality of the project, ability to operate, risk, and City control. Staff will consider both design-bid and design-build project delivery options.

The predesign of Component Two (THP AD), which will define the project, is estimated to take about seven months when staff can return to Council with the next steps to release an RFP for the design or a design-build contract for the THP AD system. The CEQA process could also begin at this next step.

The project can take advantage of the area in the RWQCP opened up by the decommissioning and demolition of the incinerators. The goal would be to complete the design phase of the THP AD development by 2018. Construction could begin shortly thereafter with the THP AD facility fully operational for the processing of biosolids in 2022. These preliminary time frames will be reviewed and an updated Timeline will be submitted to Council in December, 2014.

**Component Three – Food Scrap Preprocessing**

**Overview**

In order to successfully process food scraps in a THP AD, the food scraps must be preprocessed so that contaminants are removed and the food can be pumped into the THP AD facility. Since food scraps provide energy potential by increasing the digester’s biogas output, the marketplace has been active in developing new technologies to preprocess food scraps.
The City currently collects commercial food scraps (12,100 tons annually) but not residential food scraps (estimated at 3,400 tons annually). Staff plans to evaluate the costs and benefits for increased collection and handling costs needed to separate food scraps from the residential garbage and yard trimmings, and will be reporting back to Council in fall 2014. THP AD facility predesign will identify the initial available excess capacity for food scraps. This capacity will help determine how much additional food could be accepted into the facility or if additional THP AD capacity should be built to accommodate available feedstocks.

Food waste tonnage and its source(s) will also help define not only the size of the preprocessing equipment but also its potential location. Despite the constrained footprint of the RWQCP, the preprocessing facilities might be able to be located on the RWQCP site next to the THP AD facility. Conversely, the food scrap preprocessing could be located at an off-site location where the food scrap loads could be tipped, preprocessed into slurry and consolidated into larger trucks to be pumped into the THP AD facility. Staff observed an example of this in the We Generation (Cambi Systems) proposal submitted in response to the E/CF RFP, which included the Shoreway Environmental Center in San Carlos as a preprocessing site. Other material recovery options could include transfer stations, like the Sunnyvale Material Recovery and Transfer (SMaRT) Station, where Palo Alto is a partner.

Inclusion of Palo Alto’s commercial food scraps in the digester has the potential to increase biogas production and further reduces the City’s GHG emissions by 1,825 tons of CO$_2$e. Collecting residential food scraps suitable for an AD system presents some unique challenges. Staff may recommend the co-composting of residential food scraps with yard trimmings as a more cost effective, convenient, and sustainable processing option. Staff also will continue to actively support and encourage home composting.

**Estimated Costs and Timeline**

Due to the uncertainty about the sizing and location of a preprocessing facility, staff’s cost estimates for Component Three are preliminary, and will be later refined as the research noted above is completed. At this time, and subject to later revision, capital costs are estimated at $8.9 million. The capital costs along with RWQCP treatment costs will be recovered through food scrap tipping fees. The preliminary food scrap tipping fee estimate is $46 per ton, also refined later.
The development time for a food preprocessing system could be relatively short. The technology is modular and relatively compact. However, for food preprocessing and digestion in Component Three to begin, the RWQCP must be certain that the THP AD facility is fully operational and that it meets regulatory requirements. Therefore, the full deployment of Component Three would be completed between 2020-2022, at least one year after the THP AD facility begins operation.

Component Four – Yard Trimmings Processing

While aerobic composting is an established and environmentally sound processing option, new technologies are being developed to harness the energy and resource potential of yard trimmings. The San José/Santa Clara Regional Wastewater Facility recently approved a one-year small scale demonstration project to gasify wood waste with biosolids. Staff will continue to follow these emerging technology developments and improvements in composting technology to evaluate whether a local facility on the 3.8-acre relatively flat portion of the Measure E site is a sustainable option. Staff recommends no change to the current yard trimmings compost operations in the near term.

Staff Recommends that the Council Reject all Proposals Submitted in Response to the E/CF RFP

In connection with its approval of the OFP, staff recommends that the City Council reject all bids submitted in the E/CF RFP. Staff’s recommendation is based on issues related to economics, competitiveness, as well as legal procurement considerations. A description of the E/CF RFP and the specific proposals received is described in detail in the February 10, 2014 staff report (Staff Report ID# 4051).

The E/CF RFP was designed to provide firm pricing and test the market for novel or new technologies to process food scraps, yard trimmings, and biosolids. The expectation was that there would be synergy associated with processing the three waste streams together and that would warrant the associated risk. However, the technologies proposed were generally considered conventional with a limited amount of risk. Therefore, while the three E/CF RFP proposals were competitive, the shift in staff understanding of the cost-benefit potential of a THP AD system based on the findings in the BFP and the realization that a City owned-and-
operated facility would provide long-term savings with minimal risk exposure has led staff to recommend canceling the E/CF RFP and rejecting proposals. The We Generation (Cambi Services) proposal provides a technology solution similar to the OFP. Unfortunately, due to the low score and the fact that the We Generation (Cambi Services) was also the highest cost proposal, the E/CF RFP process was not an appropriate procurement vehicle to secure the THP AD technology. Staff, as shown in the cost section, has illustrated how it can deliver a more robust project at a lower cost over the 20-year term than the proposals.

While not the goal of the E/CF RFP process, staff noted that the E/CF RFP proposals validated the technology suite (AD and composting) that forms the basis of the OFP. Both the proposers and city consultants have confirmed that staff should focus on these technologies. Technologies like dry AD and gasification do not appear to be viable solutions in the near term. Staff would allow the E/CF RFP proposers to reference their proposals in any subsequent OFP procurement process.

Economic and Competitive Factors Support Rejection of all Proposals.
The four-component OFP provides the City with a more cost effective, environmentally robust, and flexible option for processing food scraps, yard trimmings, and biosolids, than the E/CF RFP proposals. To illustrate this, staff compared the three competitive E/CF RFP proposals to the OFP and current operations. The key parameters being compared are costs, GHG, and technical factors. For a full description of the E/CF RFP proposals and how the proposals were screened, see Staff Report ID# 4051 from February 10, 2014.

Cost
To compare the overall costs of the project, staff converted proposal data into equivalent terms for key criteria in order to determine the comparable net present value for the different project proposals. For the economic model, staff used an inflation rate of 2.5 percent per year, a net present value discount rate of 4 percent, a sale price of energy at 10.4 cents / kilowatt hour (kWh), a 20-year financing period, a borrowing rate of 4.5 percent for privately funded projects, and a borrowing interest rate of 2.5 percent for publicly funded projects. The different alternatives used the same assumptions for the three feedstocks. Changing any of these variables would have an impact on the overall economics of any project. The price that the City’s utilities will pay for any renewable energy
generated by the project can be an important variable that influences projects economics when comparing an export option for biosolids and food with an onsite AD.

Table 2 compares the proposals submitted in response to the E/CF RFP with the OFP and current conditions as follows:

1. The Four-Component Organics Facilities Plan
2. The Synagro (export) proposal
3. The We Generation (Cambi Services) proposal with outside food scraps
4. The Harvest Power proposal with outside food scraps, and
5. Current conditions (biosolids incineration, off-site composting of food scraps and yard trimmings)

While the E/CF RFP responders each proposed multiple alternatives, the chart includes only the option that provides the most favorable pricing to the City over a 20-year term. A 30-year option is also presented for the OFP and the Harvest Power proposal – the only E/CF RFP proposal to include a 30-year option.

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Comparison of the OFP, E/CF RFP Proposals, and Current Conditions</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Organics Facilities Plan</td>
</tr>
<tr>
<td>Net Present Value (20 years) of all costs</td>
<td>$76.8 M</td>
</tr>
<tr>
<td>Annual GHG Emissions (MT CO₂e) Total (includes truck trips)</td>
<td>-5,260 MT</td>
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<td>Annual Truck Trip Greenhouse Gasses (MT CO₂e)</td>
<td>284 MT</td>
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<td>RFP Rank Scoring (1 = Best)</td>
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Notes: 20 year term, all three feed stocks (food scraps, yard trimmings, biosolids)
2.5% Inflation
4% Net Present Value Discount Rate
City Financing at 2.5% Interest
Private Financing at 4.0% Interest
Harvest Power and We Generation (Cambi Services) will accept outside food scraps

The OFP provides the lowest overall net present value (NPV) over the 20-year time horizon ($76.8 million NPV). This is a result of the lower borrowing costs for the City (2.5% interest) as compared to the private sector (4% interest). Additionally, the bulk of the expense in the OFP, especially for biosolids, is a capital expense, which does not increase over the 20-year term. The E/CF RFP proposals have much higher operating and maintenance costs that were estimated to escalate over the term annually at a 2.5% inflation rate. The operation and maintenance of a City-operated facility can be completed with existing staff. Therefore, this escalation yields an overall higher net present value for the E/CF RFP proposals and the current conditions.

An additional Synagro proposal to export and process only biosolids (not shown in the table) is the lowest priced option ($53 million NPV). When considering the addition of composting food scraps at Z-Best into the Synagro proposal ($70 million NPV), the OFP ($64 million NPV) comes in at a lower price.

CH2M HILL, in their analysis of the E/CF RFP proposals noted the relatively low-cost estimates the proposers provided for capital costs and voiced concerns that a project built by the proposers would need to be “replaced” after a 20- or 30-year term. The quality of materials used for the BFP cost estimate (concrete digesters, full redundancy for major equipment, etc.) is distinctly different than the quality of materials (and expected life) assumed in the E/CF RFP proposals. On the other hand, the OFP engineering estimates provide for facilities that are designed to have a 30-year functional life and could be extended to 50 years (as is true at other wastewater treatment plants). The OFP may be a higher capital cost, but it will be less expensive over a 30-year term and provide a reliable facility long into the future.

Greenhouse Gas (GHG) Emissions
GHG emissions estimates are based on the latest 2013 emissions estimates for the RWQCP incinerators, the 2011 Energy/Compost Facility Feasibility Study completed by Alternative Resources Inc. (ARI), and the analysis provided by CH2M HILL in the BFP. As mentioned earlier, a large reduction in CO₂ equivalent anthropogenic GHG is a result of the decommissioning of the RWQCP sewage
sludge incinerator. The RWQCP will see its annual GHG emissions change from its current 3,057 metric tons to a new 714 metric tons (2,343 metric ton reduction per year) by constructing a solids dewatering and truck haul-out facility, retiring the incinerators, and hauling to the Central Valley. Staff will continue evaluating hauling the sludge to either the Central Valley for composting or to EBMUD in Oakland; the hauling price with EBMUD is still negotiable. EBMUD offers an option where GHG emissions would offset RWQCP GHG emissions approximately 1,660 metric tons because EBMUD already has existing digesters and electricity producing equipment and sells renewable energy to the Port of Oakland.

By adding THP AD, the City will see a further change in emissions from producing 714 metric tons of CO$_2$e to offsetting 3,846 metric tons (i.e., a total 4,560 metric ton reduction). The OFP, the We Generation (Cambi Services) proposal, and the Harvest Power proposal, all achieve similar greenhouse gas emission reductions. The Synagro proposal, which uses aerobic composting to process biosolids and food scraps, is an improvement over the current operations, but does not achieve the reductions associated with digestion and the generation of renewable energy.

Food scraps added to the THP AD system will provide dramatic increases in biogas production. The addition of Palo Alto’s commercial food waste will result in nearly 5 million kWh of renewable power every year. When compared to the existing composting operations, the resulting power will yield a reduction in GHG emissions by 1,795 metric tons of CO$_2$e.

Implementing the OFP will see emissions drop by over 8,000 metric tons of CO$_2$e – the equivalent of removing over 1,500 cars from the road.

*Technical Analysis*

The BFP compared a variety of different technologies, including the three technologies offered by the E/CF RFP: composting by Synagro; traditional AD with thermal drying by Harvest Power; and THP AD by We Generation (Cambi Services). The BFP compared cost, energy output, and a number of different qualitative factors; the BFP identified the THP AD technology as the best long-term option for the RWQCP with traditional mesophilic AD as a close second option. Aerobic composting of biosolids or transport to EBMUD for AD were seen as good interim solutions during construction of an on-site facility. CH2M HILL
also provided technical support on the E/CF RFP evaluating and supporting the efficacy of the technology in the proposals.

The City’s consultant, Alternative Resources Inc. (ARI), supported staff in the evaluation of the E/CF RFP proposals. The proposal scoring was 50 percent technical (or non-cost) and 50 percent cost. The costs are evident in the table. The nonmonetary evaluation was comprised of six sections:

1. Quality of Proposal (5%)
2. Technical Resources and Experience (15%)
3. Financial Resources/Strength of Proposal (15%)
4. Record of Performance/Reliability of Technology (25%)
5. Technical Approach (25%)
6. Business Proposal (15%)

Seven reviewers who represented the City Departments of Public Works, Utilities, and Administrative Services, along with representatives from Stanford and the City of San José, provided scores, which were based on the submitted proposal and an interview.

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<thead>
<tr>
<th>Proposal</th>
<th>Qualitative Score</th>
<th>Cost Rank</th>
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<tr>
<td>We Generation (Cambi Services)</td>
<td>51.43</td>
<td>3</td>
</tr>
</tbody>
</table>

Five of the seven reviewers ranked Synagro number one and two ranked Harvest Power number one.

Legal Considerations Support a Rejection of All Proposals

The current RFP contemplated a third party operated facility, rather than one operated by the City. While the proposals technically comply with the requirements in the RFP, the RFP process itself has convinced staff that certain third party owned and operated facilities are no longer the best approach. In addition, while the RFP contemplated an emerging technology (though did not require it), none of the bidders proposed it. Accordingly, the more conservative risk allocation structure contained in the RFP served to add unnecessary cost to
the proposal. While some of the proposals technically comply with the RFP, the RFP no longer represents staff’s modified OFP proposal.

While two of the bidders have subsequently offered to combine and modify their proposals in an attempt to match staff’s improved OFP proposal, this combined proposal would not comply with the existing RFP which requested a third party operated facility. However, the current bidders would not be barred from submitting subsequent proposals. Further, now that staff has better refined its preferred approach staff believes it will receive additional and more cost effective proposals and bids in response to more narrowly focused RFPs and Invitations For Bids.

Responding to Key Issues
In the development of the OFP, Staff has received many comments from the Council, the E/CF RFP proposers, RWQCP partner agency staff, the six-member community group of Measure E supporters and Byxbee Park open space advocates, and formal community meetings. Staff has provided response to the comments received in Attachment C to this staff report.

Timeline/Next Steps
Staff has prepared the following preliminary list of Next Steps. These will be reviewed further as the existing project Timeline is updated and submitted to Council in December, 2014.

1. Coordination Meetings with the RWQCP Partners Apr 2014
2. Issuance of Program Management Firm RFP April 2014
4. Selection of Program Management Firm Sept 2014
5. Deliver Updated Project Timeline to council Dec 2014
6. Issue Component One Design/CEQA RFP Jan 2015
7. Commence Pre-Design Work on Components Two through Four Feb 2015
8. Finalize Coordination with RWQCP Partners (Food Scraps and Financing) Mar 2015
10. Completion of Component One 2018 - 2019
11. Initial Retirement of Incinerators 2018 - 2019
12. Demolish Incinerators  2019 - 2020
13. Completion of Component Two  2020 - 2022
14. Completion of decision making & potential construction of Components Three & Four  2020 - 2022

Resource Impact
In the following sections, the resource impact for the Wastewater Treatment Fund, the Refuse Fund, and the Gas and Electric Funds are discussed. Components One and Two will be budgeted primarily in the Wastewater Treatment Fund and Components Three and Four will be budgeted primarily in the Refuse Fund. As referenced in the “Recommendations” section of this staff report Council authorization to pursue a design contract is only being requested for Component One. As this plan, if approved by the City Council, moves forward, staff will bring forth related resource impact descriptions to the City Council.

Wastewater Treatment Fund Financial Resource Impacts
The project and operating costs for the Component One (biosolids dewatering and haul-out), and Component Two (THP AD) facilities will be funded by the City of Palo Alto Wastewater Treatment Fund. For more information on how partners fund the Wastewater Treatment Fund, see Attachment C Q12. At Council direction, staff will initiate work with all five partner agencies to modify agreements, as needed, and bring the recommended project to partner agencies for approval before bringing back the modified agreements to Council for final approval.

For Components One (dewatering and haul-out facilities) and Two (biosolids THP AD), the Wastewater Treatment Fund’s new debt service expense (approximately $3.3 million / year) will be recovered through partner and sewer fund billing and paid to the State of California under terms of an SRF loan (discussed under project delivery in Attachment C Q16). Staff will return to Council for adoption of the resolution authorizing the application of the SRF loan. As of March 2014, the state SRF loan rate is 1.9% on a 30-year repayment term, which is a public financing rate much more favorable than that available to the RFP proposers through private financing. Staff will return to Council for authorization of a funding agreement for the loan. Financing tables for a $69 million SRF loan are included in Attachment E.
A THP AD facility, especially one designed in part for food scrap digestion, is a strong candidate for grant funds. CalRecycle and the California Air Resources Board have prioritized food scrap AD as an excellent technology to reduce GHG in the solid waste sector. Grant funds are generally made available to “shovel-ready” projects in the construction stage after design, permitting, and environmental work has been completed. While staff cannot currently secure any grant funds, staff can evaluate the general availability of grants and will pursue grants to reduce capital cost, improve project financing, and reduce ratepayer impact.

There will be no net change in total personnel to operate the system. Similar to other wastewater plants, staff recommends that a post-construction startup and support phase be included to ensure safe and reliable operation and proper transfer to city operations staff.

Wastewater Treatment Fund Operating Cost Reductions
Implementing Component Three (food preprocessing) and using surplus THP AD capacity may reduce operating cost impacts in the Wastewater Treatment Fund. The project may also be eligible for grants, which will be pursued if the project meets requirements. Specific financial grant opportunities are summarized in the BFP report.

Food scrap revenue estimates are preliminary and at the early investigative stage. Food scrap revenue can be realized by setting the tipping fee for potential customers at a point that is below or at market rate and above the treatment costs. Staff believes that the market rate is approximately $45 to $50/wet ton tipping fee for treatment of food scraps. Collection and transport costs vary by agency. Treatment costs for a new food scrap system are still being estimated and depend on the commitment period required for return on investment as well as available surplus capacity in the THP AD over time. Because of the need for cost recovery for the initial capital cost of an onsite food processing system, it appears that little available revenue from receiving food scraps would be available to defray wastewater treatment fund operating expenses. Taking in food scraps from offsite pre-processing systems might offer better wastewater treatment fund cost defrayal opportunities and yield higher long-term operational reliability. More research is needed. Given the speculative nature of food scrap revenue and the lack of current commitments for solid waste food scrap treatment, staff is not currently considering this revenue as guaranteed over the life of the digester.
facility. Partner agencies will be granted first rights of refusal to available surplus capacity on a first-come, first served basis; surplus capacity is estimated at 19,000 dry pounds per day (9.5 dry tons per day), which is approximately equivalent to the tonnage of Palo Alto commercial food scraps currently collected. Staff has been and will continue to evaluate interest and commitment level from partner agencies.

**Refuse Fund Resource Impacts**
Staff believes that there would be no adverse Refuse Fund impacts from participating in the OFP. The Refuse Fund currently pays its hauler to accept commercial food scraps for composting at the Z-Best Composting Facility near Gilroy. The City’s agreement term with GreenWaste of Palo Alto terminates in July 2017 unless extended. With a new or revised contract the City could divert its food scraps to a City operated organics facility. The tip fee is not defined at this time.

While the Refuse Fund can take advantage of surplus digester capacity, some additional upsizing might be needed for the food wastes (or use standby equipment). A rough estimate of a capital costs needed ($8.9 million) for an onsite food scrap handling system is in addition to the estimated $69 million needed for the wastewater treatment equipment for biosolids handling (Components One and Two). To offset the capital costs, the Refuse Fund would most likely pay a “tip fee” to the Wastewater Fund. The Refuse Fund would need a 20- to 30-year commitment to process food scraps at the RWQCP in order for the project to be economically feasible.

**Electric and Gas Fund Resource Impacts**
An AD project’s economics are very sensitive to the price that Utilities will pay for any renewable energy generated from the project. The project’s electric rate is a critical factor in realizing local benefits. The price of electricity must be approved by Council following recommendations and discussions among Public Works, Utilities, and ASD. Activities to discuss the price of electricity are shown in the Next Steps and include starting discussions with the Utilities Advisory Commission in June, 2014 and returning to Council by year end.

Total RWQCP energy use in 2013 was 16,493 MWh/year in electric use and 412,129 therms of natural gas. The Component One biosolids dewatering and
truck haul-out component of the project will reduce the RWQCP’s natural gas and electric expenses by approximately $441,000\(^1\) and $151,878\(^2\) per year, respectively (approximately 400,000 therms of natural gas and 1,487 MWh/year of electricity).

Component Two, the THP AD system, produces more energy than it needs to run itself. A summary table is shown below; net energy for the THP AD system for biosolids only is 15,573 MWh/year. Adding food scraps as part of Component Three will produce an additional 5,424 MWh/year of power.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Quantity</th>
<th>Conversion kWh/unit</th>
<th>Energy kWh/year</th>
</tr>
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<tbody>
<tr>
<td>Truck Vehicle Miles</td>
<td>Miles/year</td>
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<tr>
<td>Diesel Petroleum Consumed</td>
<td>Gallons/year</td>
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<td>Natural Gas Consumed</td>
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<td>0</td>
</tr>
<tr>
<td>Power Consumed</td>
<td>kWh/year</td>
<td>1,722,857</td>
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<td>1,722,857</td>
</tr>
<tr>
<td>Power Produced</td>
<td>kWh/year</td>
<td>-14,231,597</td>
<td>1</td>
<td>-14,231,597</td>
</tr>
<tr>
<td>Heat Produced</td>
<td>MBTU/year</td>
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<td>293</td>
<td>-3,614,523</td>
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<tr>
<td>Landfill Emissions</td>
<td>dry tons landfilled/year</td>
<td>0</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

|                                |                 |          |                     | -15,573,436     |

Net heat produced (3,615 MWh/year) will be used to heat the biosolids building and for process heat. The electric energy produced (14,231,597 kWh/year from two 800 kW engines) would be subject to an Interconnection Agreement between City of Palo Alto Utilities (CPAU) and the RWQCP providing for the interconnection with the City grid; the agreement would be subject to Council approval. If purchased by CPAU, the potential 14,232 MWh/year of produced RWQCP electric energy would supply approximately 1.5%

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\(^1\) $441,000 is approximately 1.13% of the adopted FY 14 budget’s $38,866,000 expected annual gas fund revenue
\(^2\) $151,878 is approximately 0.11% of the adopted FY14 budget’s $135,255,000 expected annual electric fund revenue
of CPAU’s electric needs of 972,000 MWh/year\(^3\), and it would add to the City’s renewable energy portfolio.

The RWQCP’s produced electric energy can either (a) offset RWQCP electric needs and/or (b) be sold to electricity buyers. More specifically, options include:

1. Offset RWQCP power (currently purchased at 10.214 cents/kWh under E-18/E-18G) and pay standby charges pursuant to rate E-7 when the engines are offline, not producing electricity; or
2. Sell the produced power:
   a. Sell all produced power to CPAU at market value (currently about 9.53 cents/kWh) through a 20-year power purchase agreement (PPA) subject to Council approval, retaining the option to offset plant power and pay standby charges under rate E-7-G; or
   b. Sell all produced power on the open market (e.g., to Stanford, PG&E, etc.) through a 20-year PPA and pay a “wheeling charge” for the transmission costs; or
   c. Sell all produced power to CPAU through a 20-year PPA subject to Council approval capturing the benefits of a yet-to-be-determined incentive rate for renewable baseload power (feed-in-tariff rate for local solar is currently 16.5 cents/kWh). This option is not yet available but the current 20-year levelized value of local baseload (24 hours/day) renewable energy production is 9.53 cents/kWh. This would require a change to Council policy.

Using biogas energy to offset RWQCP power needs instead of selling the power to CPAU may provide a greater financial benefit for the RWQCP, unless a buyer offers a purchase price much higher than the 20-year electric expenses of the RWQCP. In January 2013, Council approved a policy on the pricing of energy that would be purchased by CPAU from potential green waste-to-energy facilities (Staff Report #3432). The policy states that CPAU committed to purchasing the electricity at the market rate for renewable energy (including any avoided transmission or other costs) at the time the contract is signed. Based on current market conditions staff estimates that price to be about 9.53 cents/kWh for a 20-year purchase commitment. In the interest of providing some level of certainty around the energy price, the resolution also committed CPAU to purchasing the

\(^3\) Fiscal Year 2012 purchase = 972 GWh
electricity at a default floor price of 7.7 cents/kWh. Both the 7.7 cents/kWh and the 9.53 cents/kWh is well below the price needed to make the project financially viable for RWQCP partners. Utilities Department staff have indicated that a price equivalent to the 16.5 cents/kWh Palo Alto CLEAN rate for local solar generation, would result in a cost increase of approximately $1 million/year for the Electric Fund, which is equivalent to an electric retail rate increase of 0.9% to all electric rate payers in Palo Alto. Staff expects to begin the discussion about the value of local energy and the community’s desire to pay a higher price with the Utilities Advisory Commission in June 2014 and bring a recommendation to Council by the year end.

**Project Delivery**
Staff recommends that the City employ the resources of consultants to design and manage the project. Staff will utilize a program manager to obtain services for the loan application and manage scope development for the numerous RFPs needed for project delivery. The anticipated RFPs are listed in Attachment F (Wastewater Major CIP Projects Delivery). Staff will return to Council in approximately September 2014 for program manager contract approval. See Attachment C Q16 and Q17 for more information on project and service delivery.

**Policy Implications**
Implementing Components One, Two, and Three of the OFP will yield significant reductions in GHG emissions (over 8,000 CO₂e MT) to help Palo Alto reach its Climate Action Plan goals. The OFP supports the recommendations in the RWQCP’s Long Range Facilities Plan, Council’s directive to decommission the incinerator, and provide a beneficial use for biosolids. The OFP allows for the City to maximize the beneficial use of commercial and residential food scraps by creating energy and compost as specified in the 2007 Zero Waste Operational Plan. Ultimately, the OFP provides a sustainable path forward for organics management by creating local, reliable renewable energy, keeping costs down, and reducing citywide GHG emissions.

**Environmental Review**
The project’s CEQA process for Components One, Two, and Three is expected to be either a Mitigated Negative Declaration (MND) or an Environmental Impact Report (EIR). If Council selects a proposal or if a Component Four (Yard Trimmings technology) project is considered that utilizes any of the 10-acres defined in
Measure E, an EIR would likely be prepared and the process may take up to two years.

**Attachments:**
- Attachment A: Organics Facilities Plan (PDF)
- Attachment B: Graphic Summary of the Organics Facility Plan (PDF)
- Attachment C: Answers to Council and Related Questions (PDF)
- Attachment D: Draft Biosolids Facilities Plan Executive Summary (PDF)
- Attachment E: Financing Analysis Tables (PDF)
- Attachment F: Wastewater Major CIP Projects Delivery (PDF)
- Attachment G: Key Terms (DOCX)
- Attachment H: 042914 4550 Doc Letters 04-29-14 Organic Facilities Plan (PDF)
The Organics Facilities Plan (OFP), has resulted from Palo Alto’s review of proposals submitted in response to the “Energy/Compost Facility or Export Option for Food Scraps, Yard Trimmings, and Biosolids” Request For Proposals (E/CF RFP) and the draft Biosolids Facilities Plan (BFP). The OFP provides the City of Palo Alto (City) and the Regional Water Quality Control Plant (RWQCP) partners the best option for short-term resilience and long-term cost savings, energy production and a reduction in greenhouse gas emissions (GHG\(^1\)) of greater than 8,000 metric tons CO\(_2\)e.

The OFP consists of four Components:

**Component One**: Biosolids Dewatering and Truck Haul-Out Facility

**Component Two**: Wet Anaerobic Digestion (AD) Facility Utilizing the Thermal Hydrolysis Process (THP)

**Component Three**: Food Preprocessing Facility

**Component Four**: The Pursuit of Technologies to Harness the Energy and Resource Potential of Yard Trimmings

Components One and Two, recommendations from the Biosolids Facilities Plan (BFP) prepared by CH2M Hill, address Biosolids from the RWQCP and will be paid for by the Wastewater Fund. Components Three and Four will be funded by the City Refuse Fund. Components One, Two, and Three are interconnected and will be planned concurrently. Work can begin concurrently on all four components, but the components will not be completed by the same date.

Component One is a Biosolids Dewatering and Truck Haul-Out Facility. This will allow the RWQCP to both operate during emergencies and to decommission the sewage sludge incinerators as soon as practical, per Council direction. The incinerators are the City’s largest point source of City-generated GHG.

The development of the Component One Biosolids Dewatering and Truck Haul-

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\(^1\) Reported as annual metric tons (MT) of anthropogenic CO\(_2\)-equivalent greenhouse gas emissions throughout report
Out Facility can begin immediately and can be completed by 2018 at an estimated cost of $12 million. Once this dewatering and haul-out facility is constructed, the City will export its dewatered sludge for further treatment, retire the incinerators, and provide an approximate annual reduction of 2,343 tons of GHG.

Component Two develops a THP\(^2\) AD facility at the RWQCP to process sewage sludge into biosolids for ultimate disposal. Component Two uses Component One for final dewatering and truck load-out. The THP AD process beneficially creates biogas (e.g., methane), which combuts into renewable energy.

The THP AD facility can also receive food scraps under the OFP’s Component Three. Under Component Three, staff will evaluate potential preprocessing technology options and locations.

Predesign and financial analysis of the Component Two THP AD Facility and the Component Three Food Preprocessing Facility requires staff to define the price for the facility’s renewable energy output and its optimal size (i.e., quantifying capacity for food scraps). Component Two is estimated to cost $57 million.

Component Four, yard trimmings research and development, involves research into emerging technologies to capture the energy and resource potential embedded within yard trimmings. The deployment of such a technology could be on the 3.8-acre flat portion of the 10-acre Measure E site on the closed Palo Alto Landfill or another location. Until such a facility is developed, the current aerobic composting conducted near Gilroy, CA, provides the best value for the City with relatively moderate GHG. The development of Component Four is independent of the development of Components One, Two, and Three, and will be planned separately.

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\(^2\) THP is a high-pressure steam pretreatment for downstream AD systems; the thermal hydrolysis step disintegrates cell structures and dissolves naturally occurring cell polymers into an easily digestible feed for AD; the pretreatment step also makes the sludge more flowable, allowing a smaller footprint for the digesters, which is a real advantage for the constrained 25-acre RWQCP site; THP increases organic biodegradability, yielding more biogas and energy and offsetting more GHG than other AD systems; THP yields a final dewatered solids up to 40%, much higher than traditional AD systems at 28% solids, resulting in less hauling and land application costs; the final THP dewatered biosolids are sterilized and pathogen free due to 165C treatment for 20 minutes.
More detail on the four Components follows:

1. **Component One: The Development of Wastewater Solids Dewatering and Truck Haul-Out Facility**

CH2M HILL has completed a final draft of the Biosolids Facilities Plan. Component One is a key priority. The Wastewater Solids Dewatering and Truck Haul-Out facility will provide the necessary resilience to allow the RWQCP to transport solids in the case of a disaster, emergency, or failure of the current solids handling system. The facility can be designed and built ahead of Component Two.

Component One allows the RWQCP decommission and demolish the sewage sludge incinerators. This component reduces 2,343 annual tons of GHG. The demolition of the incinerators opens up another half-acre for efficient design and construction of the Component Two.

Component One is both essential for the RWQCP’s reliable operations and a necessary first step towards the development of an AD facility. It is anticipated to cost $12 million (2015$) and be completed by 2018. Annual operational costs are estimated between $1.6 and $2.0 million. Design and construction details and cost will vary depending on the final disposition of the dewatered solids. Two currently viable and environmentally preferable destinations for the dewatered solids are: (1) aerobic composting at the Synagro Central Valley Compost Facility in Merced County, the same facility in the Synagro E/CF RFP proposal, and (2) anaerobic digestion and energy recovery at the East Bay Municipal Utility District (EBMUD) wastewater treatment plant in Oakland, CA.

2. **Component Two: The Development of THP AD**

Component Two is the development of THP AD. Anaerobic digestion is a proven wastewater technology for stabilizing wastewater solids (also referred to as sludge) and biogas generation. Wastewater treatment plants worldwide use wet AD systems to treat sludge. Wet AD is an appropriate technology for high water and low solids content sludge. Wet AD is compatible with the
addition of the higher solid food scraps\(^3\). At least two wastewater treatment plants in the Bay Area (EBMUD in Oakland and Central Marin Sanitation Agency in San Rafael) are using wet AD to process and “co-digest” combined wastewater solids and food scraps.

The BFP evaluated three wet AD technologies and preprocessing options. The option that provides the greatest biogas yield, smallest physical footprint, and the highest quality biosolids, was the combination of the THP with wet AD. According to the BFP recommendations, THP AD technology provides clear non-monetary benefits for treatment and disposal of sewage sludge and favorable overall project economics. THP AD is a proprietary technology currently sold by CAMBI, Norway; CAMBI is the technology provider to the We Generation E/CF RFP proposal. The CAMBI THP technology has been installed and operated at 40 wastewater treatment plants throughout Europe, South America, Japan, and Australia. New CAMBI THP systems will begin operation in July 2014 at the District of Columbia Wastewater Treatment Plant, the first CAMBI in North America and largest in the world. A CAMBI system is in design for the Hampton Roads Sanitation District Wastewater Treatment Plant in Virginia Beach, VA. The San Francisco Public Utilities Commission (SFPUC) Southeast Wastewater Treatment Plant is evaluating use of a CAMBI THP system as part of its new digester project. The SFPUC project could also incorporate food scraps into the CAMBI THP AD system.

Prior to moving forward with Component Two, design development (predesign) is needed to answer vital questions related to project sizing and site considerations.

A THP AD Facility would supply electric energy through biogas combustion generated by the AD units. The energy is 100 percent renewable electric energy and provides 4,560 tons of GHG reduction.

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\(^3\) Much of the debate in the Measure E campaign revolved around the potential to use dry AD. The Feasibility Study in 2011 also looked at dry AD for much of the analysis. Since wastewater solids made up the majority of the material to be processed, dry AD was deemed infeasible. One E/CF RFP proposal included dry AD technology, but did not meet minimum qualifications and was not considered. Dry AD was also not likely to be an appropriate technology for the food scraps and yard trimmings only due to the ratio of the material. The dry AD facility recently constructed in San Jose has a yard trimming to food scrap ratio of 20:80, while the Palo Alto ratio of materials is closer to 50:50. This ratio would provide a low biogas yield, resulting in poor project economics.
2a Project Sizing
The THP AD system will be designed to accommodate the projected 30-year increase in wastewater solids loads based on population growth projections from the Association of Bay Area Governments (ABAG). While THP AD systems allow for some modularity for future expansion (e.g., adding a tank), the system will be designed to accommodate future capacity. The THP AD system will have that initial extra capacity available for the addition of food scraps as part of Component Three.

There are many questions that remain on sizing the food scrap systems. A food receiving station, energy generation equipment, and dewatering equipment may require upsizing to accommodate food scraps. Food scraps can be processed to maximize THP, digester, and dewatering use of surplus capacity until the initial excess capacity is needed for wastewater solids. This initial excess capacity might allow a THP AD system at the RWQCP to process most, and possibly all of Palo Alto’s commercial food scraps for a period of time which would be determined during the predesign phase.

2b Site Considerations
The THP AD facility will impact existing RWQCP operations. The RWQCP has numerous underground utilities including large diameter pipes. The half-acre location set aside in the E/CF RFP for on-site digestion can be used, but cannot be optimized for Component Two until the incinerator is decommissioned and demolished. The removal of the incinerator prior to construction of the THP AD system will allow for the optimal design and minimal disturbance to existing operations.

Careful consideration will need to be given to truck ingress and egress. Food waste trucks would arrive at the site (either small local haul trucks with approximately 6 tons of capacity or larger consolidated trucks with approximately 22 tons of capacity). The number of trucks will depend on the capacity of the facility and the acceptance of outside sources. Trucks will also leave the site transporting residual solids for either land application, further composting, or for further processing or energy production such as at the regional Bay Area Biosolids to Energy Project.

Closely linked to the site considerations is the location, on the RWQCP or
offsite, of the food preprocessing component (Component Three). Onsite preprocessing requires a truck scale, a fully enclosed tipping floor to contain odors, and space for the preprocessing equipment to remove contaminants from the food scraps and turn the scraps into a slurry for injection into the THP AD system. An offsite food scraps processing facility handles the preprocessing, but the onsite RWQCP system requires a food receiving station with rock trap, dilution water tank, pumps, and screening facility to protect the THP AD System. Onsite solid waste facilities at the RWQCP require permits from CalRecycle through the Local Enforcement Agency (LEA) at Santa Clara County.

3. Component Three – Food Scrap Preprocessing

Preprocessing of food scraps involves removal of contaminants and physical conversion into a pumpable mixture for delivery into the THP AD Facility. Food scraps provide energy potential by increasing the digester’s biogas output and the marketplace has been active in developing new technologies for efficient preprocessing.

The City collects an estimated 12,100 tons of commercial food scraps. The City does not currently collect the estimated 3,400 tons of residential food scraps. Staff is evaluating the effectiveness of the Residential Two-Cart Pilot Program, which is, in part, designed to evaluate the potential to capture residential food scraps. Staff will evaluate the costs and benefits for increased collection and handling costs needed to separate food scraps from the residential garbage and yard trimmings, and will be reporting back to Council in the fall 2014.

The THP AD facility predesign will identify the initially available excess capacity for food scraps. This will help determine how much additional food could be accepted into the facility or if additional THP AD capacity should be built to accommodate available feedstocks. Additionally, the food waste tonnage and its source(s) will help define not only the size of the preprocessing equipment but also its potential location. The preprocessing facilities may be located on the RWQCP site next to the THP AD Facility despite the limited space. Conversely, the food scrap preprocessing could be located at an alternate location where the food scrap loads could be tipped, preprocessed into slurry, and consolidated into larger trucks to be pumped into the THP AD Facility. The
We Generation (Cambi Systems) proposal included the Shoreway Environmental Center in San Carlos as a preprocessing site. Other material recovery options include transfer stations, like the Sunnyvale Material Recovery and Transfer (SMA RT) Station, where the City of Palo Alto is a part investor.

The cost estimates are rough due to the current uncertainty regarding the sizing and location of a preprocessing facility. Capital costs are estimated at $8.9 million for preprocessing and digester preparation of the food scraps. Operating costs with built-in capital recovery in the tip fee is estimated at $46/per wet ton. Further research is needed to refine these estimates.

The development time for a food preprocessing system could be relatively short. The technology is modular and relatively compact. However, for food preprocessing and digestion in Component Three to begin the RWQCP must be certain that the THP AD Facility is fully operational and that it meets regulatory requirements. The full deployment of Component Three would be completed between 2020 and 2022 which is at least one year after the THP AD Facility begins operation.

The inclusion of food scraps in the digester increases biogas production and further reduces the City’s GHG. Nevertheless, staff continues to support home composting and may consider the co-composting of residential food scraps with yard trimmings as a suitable and sustainable processing option.

4. Component Four – The Evolution of Yard Trimmings Processing

Aerobic composting is an established and environmentally sound processing option. However, new technologies are being developed to harness their energy and resource potential. The San José/Santa Clara Regional Wastewater Facility recently approved a demonstration project to gasify woody waste with biosolids. Staff will continue to follow these technology developments and improvements in composting technology to evaluate whether a local facility is a sustainable option.

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4 Gasification is a thermal process using extremely high temperatures in the absence of oxygen that transforms a solid material into a synthesis gas that can be combusted to create energy. While gasification is a thermal process, it does not yield the same air pollutants as incineration. See BFP gasification Technical Memorandum on status of gasification for biosolids.
Attached is a visual representation of the OFP.

Organics Facilities Plan

Proposed Organics Facilities Plan

- **Biosolids Dewatering and Truck Off-Haul Component #1**
- **Anaerobic Digestion Component #2**
- **Food Scrap Pre-processing Component #3**
- **Yard Trimmings Component #4**

- **Design and Construction**
- **Contracting and Design**
- **Construction**
- **Interim Hauling**
- **Biosolids Processing**
- **Food Scrap Preprocessing Development**
- **Add Food to Digester**

**Consider Alternatives to Current Aerobic Composting and New Locations**

- **B** Biosolids – Wastewater Treatment Fund
- **F** Food Scraps – Refuse Fund
- **Y** Yard Trimmings – Refuse Fund

City of Palo Alto
## Proposed Organics Facilities Plan

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<th>Component</th>
<th>Details</th>
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<td>BIOSOLIDS – WASTEWATER TREATMENT FUND</td>
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<tr>
<td>Anaerobic Digestion Component #2</td>
<td>FOOD SCRAPS – REFUSE FUND</td>
</tr>
<tr>
<td>Food Scrap Pre-processing Component #3</td>
<td>FOOD SCRAPS – REFUSE FUND</td>
</tr>
<tr>
<td>Yard Trimmings Component #4</td>
<td>YARD TRIMMINGS – REFUSE FUND</td>
</tr>
</tbody>
</table>

- **B**: Biosolids – Wastewater Treatment Fund
- **F**: Food Scraps – Refuse Fund
- **Y**: Yard Trimmings – Refuse Fund

**Diagram Notes**:
- Biosolids Processing
- Emergency Backup
- Add Food to Digester
- Consider Alternatives to Current Aerobic Composting and New Locations

**Key Points**:
- Design and Construction
- Contracting and Design
- Construction
- Interim Hauling

*Attachment B*
1. What are the major differences between the Organics Facility Plan (OFP) and the proposals submitted in response to the Energy/Compost Facility or Export Option for Food Scraps, Yard Trimmings, and Biosolids Request for Proposal (E/CF RFP)?

Answer: 
*City as Owner-Operator*
The OFP is based on the City acting as the owner-operator of the anaerobic digestion facility. The E/CF RFP was designed to limit the risk to the City in adopting a less-proven technology like gasification or Dry anaerobic digestion (AD) for biosolids and having the proposers own and operate the facility. The E/CF RFP proposals included proven technologies like Wet AD and aerobic composting, which coincided with the BFP recommendations for biosolids treatment. Staff identified significant long-term operations and maintenance (O & M) cost savings by acting as the owner-operator.

*Site Constraints*
The OFP allows for the optimal use of the RWQCP site. The THP AD facility size impacts existing RWQCP operations. The RWQCP has numerous large diameter underground utilities. The half-acre location set aside in the E/CF RFP for on-site digestion can be used, but cannot be optimized for Component Two until the incinerator is decommissioned and demolished. The removal of the incinerator prior to construction of the THP AD system will allow for the optimal design and minimal disturbance to existing operations.

Careful consideration will need to be given to truck ingress and egress. Food waste trucks would arrive at the site (either small local haul trucks with approximately 6 tons of capacity or larger consolidated trucks with approximately 22 tons of capacity). The number of trucks will depend on the capacity of the facility and the acceptance of outside sources. Trucks will also leave the site transporting residual solids for either land application, further composting, or for further processing or energy production such as at the regional Bay Area Biosolids to Energy Project.
Closely linked to the site considerations is the location of the food preprocessing component (Component Three). No final decision on location has been made. On-site preprocessing requires a truck scale, a fully enclosed tipping floor to contain odors, and space for the preprocessing equipment to remove contaminants from the food scraps and turn the scraps into slurry for injection into the THP AD system. An off-site food scraps processing facility handles the preprocessing, but the onsite RWQCP system requires a food receiving station with rock trap, dilution water tank, pumps, and screening facility to protect the THP AD system. Onsite solid waste facilities at the RWQCP require permits from CalRecycle through the Local Enforcement Agency (LEA) at Santa Clara County.

Due to the accelerated timing of the E/CF RFP proposals, their AD facilities were limited to a half acre, which would present significant logistical and planning challenges for the RWQCP.

**RWQCP Operations**

Lastly, the component approach in the OFP will allow the RWQCP to ensure that the AD facility and the later inclusion of food scraps will not adversely impact the other operations and permit restrictions of the RWQCP.

### 2. What are the reasons for rejecting the E/CF RFP proposals?

Answer: The E/CF RFP proposals do not provide the best value for the City and long-term GHG reductions. Staff developed the OFP with Component Two (THP AD Facility) as an owner-operated facility after the E/CF RFP proposals were evaluated.

The Synagro (export) proposal scored as the highest technical analysis and lowest cost option, but this proposed solution does not provide the other benefits identified by the City of Palo Alto as critical elements of an organics facilities plan. Staff believes that there is long-term value to the City in stabilizing sewage sludge on-site, reducing GHG emissions, and generating local energy, which is why Staff recommends canceling the E/CF RFP and pursuing an onsite organics facility. The We Generation (Cambi Services) proposal, the proposal using the preferred technology identified in Component Two, was the lowest scoring of the three proposals under consideration and would render it less preferable for selection.
3. Can we modify the E/CF RFP to accommodate our preferred project and service delivery method?

Answer: No. The differences between the E/CF RFP and the OFP are too great. The most significant difference being the shift from a contractor owned and operated facility to a City owned and operated facility.

The AD and composting technologies proposed in the E/CF RFP proposals validated the conclusions in the BFP and the cost savings possible with an owner-operated facility. Had staff known that only proven and well-established technologies would be submitted in the E/CF RFP process, staff could have issued an addendum to the E/CF RFP for an owner-operated option. However, this was not a viable option at the time. Issuing a new RFP for the Components will allow for new proposers to participate.

4. Can we negotiate with the proposers for a modified or joint contract?

Answer: No.

*Competitiveness*

Staff would like to encourage new proposals to satisfy the requirements in the OFP. Further, the likely project description of Component Two of the OFP that calls for the construction of a THP AD facility may include the CAMBI technology but there are other technology providers that may be interested in participating in a bid. At the start of the THP AD design, staff will return to Council with a request for sole source approval for CAMBI should other emerging THP technology provider(s) be unreliable and unproven in the wastewater treatment market.

*Purchasing/Fairness*

If the City were to allow a combined proposal of multiple proposers, this would set an unfair precedent to the other bidders and future bidders. For example, if the City elected to combine the Harvest Power proposal with the We Generation (Cambi Services) proposal, that opportunity should be provided to other proposers or potential proposers who did not submit under the original E/C RFP. Any RFP process is designed to provide an equal playing field for the proposers, where the City cannot “pick-and-choose” whatever scenarios it wants despite the results of the process. Selecting We Generation (Cambi Services) or some
combination of the proposals would violate the integrity of the purchasing process and potentially invite protests and claims from the other proposers. Other teams, who either proposed or elected not to propose, would need to be provided with the same opportunity to create this type of proposal. A desire to create this combination would require the development of a new RFP.

5. What is the risk to the City if the facility is owned and operated by the RWQCP?

Answer: Staff does not believe that the Four-Component OFP is risky. The AD technology is proven and established. Staff has always planned to consider publicly financed and owner operated biosolids treatment systems alongside the E/C RFP proposals. The original RFP was developed with the intent of procurement through a design-build-own-operate and maintain (DBOOM) project and service delivery model. The primary reason for selecting the DBOOM model was to reduce risk exposure inherent with selecting a novel approach or emerging technology that could handle all three waste streams. Through the E/CF RFP process, and with the responses received, it became apparent that at this time the options available to the City (wet AD and aerobic composting) are, in fact, relatively standard and can be more economically implemented, with the RWQCP as the owner-operator. Through discussions with consultants and technology vendors (including CAMBI, Norway) the City staff is confident that, with the appropriate engineering and project management assistance, the City can control the remaining risk exposure by taking the time to identify and answer the appropriate questions needed to craft the OFP’s component RFPs.

6. How much planning is required before initiating Component One (Biosolids Dewatering and Haul-Out Facility)?

Answer: The bulk of the planning was completed as part of the RWQCP’s Long Range Facilities Plan in 2012. The initial step will be to hire a program manager to oversee and develop Components One and Two.

7. Can Component One (Biosolids Dewatering and Haul-Out Facility) be designed and built without limiting future options? How does this affect the overall sizing of the Facilities?
Answer: Yes.

Compatibility
The dewatering and truck haul-out facility is necessary for and can be designed to be fully compatible with the THP AD technology in Component Two. The provider of thermal hydrolysis technology, CAMBI, has confirmed that Component One can be designed and installed prior to installation of Component Two. Combining the pre- and post-dewatering into one building with reduced redundancy in dewatering equipment is feasible. This option was suggested by a proposer. However, staff recommends separating these systems and using independently redundant equipment for pre- and post-dewatering necessary for the THP process.

Project Sizing
Components One and Two will be designed for a projected 30-year growth in wastewater solids loads. While the facilities allow for some modularity for future design (e.g., adding a tank), the facilities likely will need to be designed to allow for the future capacity to be in place on the first day of operations. In other words, the facilities will have extra capacity on operational day one to account for the future solids loading.

The THP AD system will be designed for a projected 30-year (2045) growth in wastewater solids loads, which results in excess capacity upon commissioning. Hence, the excess capacity of the THP AD system can be used at the beginning of the planning period to accommodate food scraps, which can be co-digested with the wastewater solids. If and when growth occurs in the RWQCP service area, the THP AD system might need to be expanded to accommodate both service area growth and projected growth of the food waste program. This allows for a cautious approach to infrastructure investment, while opportunistically leveraging the economics of the excess capacity of the system. It allows Palo Alto to better assess the economics of the co-digestion program; so, in the future, when expansion is required either to accommodate more material for co-digestion or more solids loading from growth, then an informed decision can be made as to how best to expand the system based on the historical economic and environmental performance. At that time there will also less uncertainty regarding the quantity of co-digestion material, such as food scraps, that are available.
8. Would incinerators be kept as a back-up?

Answer: No. Incinerators will not be kept as a backup. After a successful startup of Component One (Biosolids Dewatering and Truck Haul-Out Facility) the demolition of the incineration building can begin so that space is made available for Component Two (THP AD Facility).

9. Can the City save time (i.e., have a facility up and running earlier than the OFP) by utilizing the E/CF RFP and not canceling it?

Answer: Staff does not believe that using the E/CF RFP is an appropriate option for legal, purchasing, and business reasons. Nevertheless, even if Staff could recommend using the E/CF RFP, the construction of a privately owned and operated facility would not yield significant time savings. The core time uncertainties revolve around contracting and permitting. All documentation to comply with the California Environmental Quality Act (CEQA) must be completed prior to executing a design-build contract. This environmental documentation process may be completed in one to two years. The timing of this type of project delivery in the E/CF RFP (design-build-own-operate-maintain or DBOOM) relies on the assumption that all contracting issues will be resolved prior to the completion of the CEQA documents. However, due to the complexity of operating a private facility within the operational area of the RWQCP, the contracting relationship may require more time to develop, which could add an additional year to the schedule.

In addition to City land use approvals, permitting a facility at the RWQCP requires a wastewater discharge permit amendment and approvals from the San Francisco Bay Regional Water Quality Control Board, the Bay Area Air Quality Management District, and CalRecycle. All projects, whether privately owned or City owned will need to obtain these approvals. The permitting process is complex and requires significant City involvement. Permitting could easily add one year to a project schedule.

Any proposal, like Harvest Power’s proposal, that uses the Measure E site would require additional permitting and could be subject a legal challenge. Tying the development of Component One, the Biosolids Dewatering and Truck Haul-Out Facility, to the Measure E site may result in unforeseen delays in the vital
decommissioning of the incinerators. While it is important to develop the energy
generation THP AD project in Component Two (or as proposed by Harvest Power
and We Generation (Cambi Services)), a large reduction in GHG and quick way to
create a more sustainable use for biosolids is to develop Component One without
delay. As noted earlier, there are many unresolved concerns, including the sizing
of the facility for food scraps and energy considerations that need to be resolved
before designing and constructing a THP AD facility.

10. What is the over-all timing for the OFP?

Answer: The timing for Components One, Two, and Three are linked. While the
specific steps and a detailed timeline are being developed by staff and will be
presented to Council in fall 2014, staff can provide a basic outline of the major
milestones. The overall program goals include: decommissioning the incinerator
and completing Component One (Biosolids Dewatering and Truck Haul-Out
Facility) by 2018; would be to complete the design phase of the THP AD
development by 2018. Construction could begin shortly thereafter with the THP
AD facility fully operational for the processing of biosolids sometime between
2020 and 2022. Food scraps, as part of Component Three, could be added to the
THP AD system between 2020 and 2023. Staff will provide a more detailed
timeline for Component Four (Yard Trimmings technologies) in fall 2014.

11. Will the proposed AD Facility import wastes from other communities?

The City Manager and Mayor have sent letters to neighboring cities and RWQCP
partners to gauge their interest in sending food scraps to a future AD Facility at
the RWQCP. To date, no other agencies have made commitments.

There are many questions that remain on sizing food scrap systems. New capacity
would be needed for some facilities and surplus capacity can be utilized for
others. A food receiving station, energy generation equipment, and dewatering
equipment require upsizing for food scraps. Food scraps can be processed to
maximize THP, digester, and dewatering use of surplus capacity until the initial
excess capacity is needed for wastewater solids. This additional capacity might
allow a THP AD system at the RWQCP to process most, and possibly all of Palo
Alto’s commercial food scraps for a period of time which would be determined
during the predesign phase. Utilizing surplus digester capacity for food scraps
might defray some operational and maintenance costs for the RWQCP’s wastewater treatment fund partners, however further study is needed to quantify this amount.

12: How are the RWQCP Partners being involved?

The Wastewater Treatment Fund recovers costs from the Palo Alto Wastewater Collection Fund and from the City’s five partner agencies. Each agency bills their respective sewer ratepayers for associated sewer and treatment costs. Approximately 230,767 residents are served by the six agencies contributing sewage to the RWQCP. For biosolids dewatering, digestion, and haul-out facilities, the Wastewater Treatment Fund’s new debt service expense (approximately $3.3 million / year) will be recovered through partner billing and paid to the State of California under terms of an SRF loan. The billing share will be based on a contract-defined treatment capacity allocation. The expected capacity share allocation for this project is shown below and is based on the existing contract capacity share allocation for major capital improvement projects.

<table>
<thead>
<tr>
<th>Agency</th>
<th>Capacity MGD*</th>
<th>Capacity %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palo Alto</td>
<td>15.30</td>
<td>38.16</td>
</tr>
<tr>
<td>Mountain View</td>
<td>15.10</td>
<td>37.89</td>
</tr>
<tr>
<td>Los Altos</td>
<td>3.80</td>
<td>9.47</td>
</tr>
<tr>
<td>East Palo Alto Sanitary District</td>
<td>3.06</td>
<td>7.64</td>
</tr>
<tr>
<td>Stanford University</td>
<td>2.11</td>
<td>5.26</td>
</tr>
<tr>
<td>Los Altos Hills</td>
<td>0.63</td>
<td>1.58</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>40.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

* Capacity expressed in annual average flow, million gallons per day

Funding of design and construction requires debt financing. The design and construction project will need to be approved by the Mountain View and Los Altos City Councils, Stanford University, and the Board of the East Palo Alto Sanitary District as part of an agreement requirement with each of the Plant partners; these four partners have “veto” rights for capital projects. A veto has never occurred since agreements were originally authorized but is a possible outcome. The agreement with Los Altos Hills does not require partner approval
for the construction project, however, Los Altos Hills is being kept apprised of the project. Over many years, staff met with partner agencies at the staff and board/council level, explaining the need to both retire the existing sewage sludge incinerators and build a new solids handling system. Staff at the partner agencies met regarding this project (most recently on April 7, 2014); staff continues to keep our partners informed of progress. Meetings are being scheduled for spring 2014 for a Los Altos city council study session and with the East Palo Alto Sanitary District engineering committee; staff are assisting Mountain View staff who intend to communicate to their Council with informational reports and study sessions, as warranted. At Council direction, staff will initiate work with all four partner agencies to modify agreements, as needed, and bring the recommended project to partner agencies for approval before bringing back the modified agreements to Council for final approval.

13. Should the City prioritize the development of yard trimmings compost on the 3.8 acre Measure E site?

At this time, there is no local composting generation in Palo Alto other than from home composters. Two advantages can be realized if the City elected to compost yard trimmings on the Measure E site: (1) the City would have control over the operations and not rely on a contractor for capacity; and (2) the City would achieve a small reduction in GHG due to a decrease in truck vehicle-miles traveled. However, the GHG levels resulting from transportation are relatively insignificant compared to the overall benefits of the OFP. Components One, Two, and Three result in a net GHG emissions benefit of removing nearly 5,000 metric tons of CO$_2$e from the atmosphere. Of the 267 metric tons of anthropogenic CO$_2$e GHG emissions related to composting yard trimmings, 157 metric tons of CO$_2$e are emissions resulting from transportation. The transportation related to yard trimmings is only 3 percent of the total OFP GHG emissions. Relocating aerobic composting technology 50 miles to the north (from Gilroy to Palo Alto) also will require a significant capital investment. This expense does not achieve significant value for the City or reduce greenhouse gases significantly.

Additionally, new technologies are being developed and refined to harness the energy potential in yard trimmings and wood waste. The City of San José is developing a pilot project to gasify wood waste and biosolids at the San José/Santa Clara Regional Wastewater Facility. Staff believes these technologies
will continue to mature and could be an appropriate activity on the 3.8-acre Measure E site, on the RWQCP, or elsewhere, as part of Component Four of the OFP. If that were to happen, then local compost would again be available to residents. The cost estimate to develop an aerated static pile composting facility that could manage all of the City’s yard trimmings was estimated and presented to Council as part of the Blue Ribbon Task Force on Composting efforts in 2009. The estimated 2009 capital cost of $3 million adjusted for inflation at 3% per year is approximately $3.5 million in 2014 dollars; however, capital costs may be more expensive as new stormwater and air quality regulations have been promulgated since the 2009 estimate.

14. What are the rates of home composting and what are the trends? Would more aggressive home based programs change the need for a local composting facility?

Answer: Staff does not keep a record of the number of home composters in Palo Alto. While home composting is the best, most sustainable method to deal with the City’s residential yard trimmings and food scraps, there are not nearly enough residents currently composting at home to manage all of the City’s yard trimmings to impact the projected sizing of Components Two, Three, and Four in the OFP. However, with the implementation of an expanded home composting campaign in 2014, Staff will be able to reassess the impact of home composting on projected tonnages of yard trimmings and food scraps.

This expanded home composting campaign will be a focused outreach and incentive-based campaign that will augment and add emphasis to the City’s traditional, ongoing, multi-partner program for home composting, water conservation, and pollution prevention programs. The goals of the expanded campaign are to: 1) raise awareness about the benefits of home composting; 2) increase the number of people composting at home; and 3) increase the number of people using compost in their yard/garden.

The expanded campaign will encourage residents to compost at home through education of how composting conserves water and energy while reducing waste and pollution, and through incentives, such as the City providing a limited number of free home composting bins to Palo Alto residents. Bins have been given away at the Great Race for Saving Water on April 19, 2014, and at all Palo Alto compost
workshops during 2014. Staff will also be holding a free compost give-away event on May 17, 2014, at the entrance to the closed Palo Alto Landfill.

15. Can we include levee protection and have Partner agencies share cost?

The new facilities built as part of the OFP will be designed above the Base Flood Elevation (elevation 7.7) in order to provide 100-year flood protection for the new facility. Reduction of the risk from tidal flooding and storm surge in Palo Alto, including at the RWQCP, is part of a regional study being conducted by the US Army Corps of Engineers (USACE), with substantial support from the Santa Clara Valley Water District. The regional and federal project is the optimum solution for providing tidal flood protection. Staff recommends that no levees be included in the proposed projects for the Organics Facilities Plan. Isolated sections of levee improvements would not be effective in providing flood protection to the RWQCP and surrounding areas.

The USACE South San Francisco Bay Shoreline Study is currently evaluating levee improvements in Alviso. The next stage of the study will be the northern portion of the Santa Clara County shoreline, which will be funded 50/50 by the USACE and Santa Clara Valley Water District (i.e., the local sponsor). Construction of levee improvements along Palo Alto’s shoreline may be identified in the USACE study; the future improvements can be funded through a combination of federal and local sources (i.e., a 35/65 local/federal cost share, minimum, up to a 50/50 local/federal cost share, maximum). It is too early to commit to a local source for the funding. A local assessment district is one potential mechanism to generate the required matching funds. Because the RWQCP is one of the many parcels at risk in Palo Alto’s tidal flood zone, the RWQCP partner agencies and the Palo Alto Wastewater Collection Fund would be obligated to share in any assessed fees for the levees, as ultimately approved by Council.

16. How is Component Two (THP AD Facility) delivered (design and construction) and how are services provided (ownership)?

Answer

Project Delivery

Staff recommends that the City employ the resources of consultants to design and manage the project. After completion of California Environmental Quality Act
(CEQA) review, staff will evaluate the merits of a design-bid-build (DBB) approach and a design-build (DB) approach. The design-build approach is not expected to significantly alter the project timeline, so the evaluation between these two approaches will focus on potential cost savings, innovation, risk exposure and the level of needed control over the quality of the design by the City.

The E/CF RFP allowed for less-common, innovative, and/or emerging technologies to be proposed like gasification and dry AD. To reduce the risk to the City, the E/CF RFP asked proposers to take on all of the financial and performance risk through a design-build-own-operate-maintain (DBOOM) procurement process. The City would pay a “tipping fee” for each feedstock only if the proposer could guarantee performance. Since no gasification proposals were received and no dry AD proposals progressed past the minimum criteria evaluation, staff reevaluated the risk issue associated with being the owner operator of a wet AD. A wet AD system is a well-established technology and often owner operated.

Most importantly, the City realizes significant savings as the owner-operator of a THP AD system. The 20-year net present value of the City OFP is over $20 million less than the most competitive E/CF RFP proposal with expenses shifting from operations and maintenance to long-term capital.

Traditionally, projects at the RWQCP have been secured using the design-bid-build project delivery process. This process is a step-by-step approach to project delivery. The City prepares a scope of work for the design of a project, an RFP is released, environmental design engineering firms respond, and the City selects a consultant to complete final design of the project. The City then prepares a bid package for the construction of the project. The construction contract is awarded to the lowest responsive bidder. There are a few shortcomings of this process: one, the process to respond to differences between the design and the needed construction fixes can result in change orders; two, the procurement process takes additional time with two bid periods; and three, the procurement requires the selection of the lowest responsive bid.

As a response to tradeoffs with design-bid-build process, many communities employ design-build project delivery. The initial engineering is more conceptual and the engineering and construction tracks begin simultaneously. The construction is also able to adapt more quickly to changes on the ground.
However, some conceptual design must be completed prior to the preparation of a DB project and CEQA documents must be completed prior to a DB award. The DB process can be structured to allow more (or less) control by the City, but requires strong project management.

Another significant risk related to the DB process is that the contractor is incentivized to reduce construction costs (value engineering) that may be at the expense of operational costs. One solution to this problem is to couple DB with operations (aka, DBO). This forces the DB contractor to consider the long-term operational costs. However, as noted earlier, the City could save over $1 million a year by operating the facility. This would make the DBO option less attractive.

However, another project delivery option is design-build-own-operate-transfer (DBOOT). This delivery option is similar to the DBO option, but has the contractor finance the facility and transfer or sell the facility to the public entity. This option allows for the RWQCP to set the terms of the transfer (3-5 years) and use lower interest rates to finance the subsequent years of the project. In some cases, the private entity can take advantage of tax breaks unavailable to public agencies. Like DBOOM, the DBOOT provides fewer opportunities for oversight by the owner as compared to design-bid-build. Staff does not see Components One or Two as candidates for DBO or DBOOT models. However, a DBO procurement model may be more appropriate for Components Three and Four.

After Council acceptance of the OFP recommendations, staff will direct CH2M HILL to begin a Component One (Biosolids Dewatering and Truck Haul-Out Facility) predesign report (Staff Report ID # 3383, C13147733, Task 11). Staff has developed a scope of work for program management; proposals are expected in May 2014. Staff will return to council in approximately July 2014 for program manager contract approval. The program manager will manage the contracting for the major capital improvement work and apply for a financial SRF loan for the project. Program management for the RWQCP’s Long Range Facilities Plan covers $197 million of work over a 10-year timeframe; annual program management costs are estimated to be $450,000 with the expense for preparation of a state SRF loan expected to be approximately $100,000. The initial tasks of the program manager will be to:
• Assist with preparation of an SRF application and SRF specific environmental reporting requirements,
• Prepare of a design RFP for Component One Biosolids Dewatering and Truck Haul-Out Facility,
• Prepare the RFP for pre-design on the AD system,
• Provide support services during the bid phase, and
• Provide engineering services during the construction management phase.

The work of the program manager is for the biosolids project and the other major capital projects of the wastewater treatment fund shown below:

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Project Start Year</th>
<th>Project Cost</th>
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</thead>
<tbody>
<tr>
<td>Program Management Services</td>
<td>2014</td>
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</tr>
<tr>
<td>Solids Handling Facility</td>
<td>2014</td>
<td>$69,000,000</td>
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<tr>
<td>Primary Sedimentation Tank Rehabilitation</td>
<td>2014</td>
<td>$7,313,000</td>
</tr>
<tr>
<td>Lab &amp; Environmental Services Building</td>
<td>2014</td>
<td>$17,903,763</td>
</tr>
<tr>
<td>Fixed Film Reactors Structure and Equipment</td>
<td>2017</td>
<td>$19,420,440</td>
</tr>
<tr>
<td>Headworks Facility (including Grit Removal System)</td>
<td>2020</td>
<td>$38,856,627</td>
</tr>
<tr>
<td>Recycled Water Filters and Chlorine Contact Tank</td>
<td>2022</td>
<td>$14,209,044</td>
</tr>
<tr>
<td>Joint Interceptor Sewer</td>
<td>2022</td>
<td>$30,800,000</td>
</tr>
<tr>
<td><strong>Total Long Range Facilities Plan (Major CIP)</strong></td>
<td></td>
<td><strong>$202,102,874</strong></td>
</tr>
</tbody>
</table>

The State Water Resources Control Board (SWRCB) Division of Financial Assistance funds publicly-owned wastewater treatment projects with low-interest loans through the Clean Water State Revolving Fund. The City of Palo Alto will be the applicant for a loan for Component 1 and 2 (approximately $69 million). Staff will return to Council for adoption of the resolution authorizing the application of the SRF loan. The SWRCB will review the application for funding eligibility and prepare a standard agreement for funding the project. After drafting the agreement, staff will return to Council for authorization of the agreement. The terms of an SRF loan would be a 30-year term with the first payment due approximately one-year after construction completion. The City likely would apply
for an agreement for funding. The SWRCB would review the application for funding eligibility and prepare a standard agreement for funding the project.

The SRF loan interest rate is one-half of the current state general obligation bond rate. As of March 2014, the SRF loan rate is 1.9% on a 30-year repayment term, which is a public financing rate much more favorable than that available to the RFP proposers through private financing. The loan can fund hard costs (e.g. construction) as well as soft costs, which include program management, environmental documents, planning, design, value engineering, construction management, and administration costs. Land and right-of-way costs are ineligible. However, no new land or right-of-way is needed for the project. The Wastewater Treatment Fund will be responsible for loan payments to the State. The partner agreements will be modified to include approval of this project and a commitment to repay debt obligations by each agency. Financing tables for a $69 million SRF loan are included in Attachment E.

**Wastewater Treatment Fund Staffing and Service Delivery**

There will be no net change in total personnel to operate the system; a change in the type of personnel is needed, subject to Council approval of the budget for staffing. When the incinerator is retired, staff expects to eliminate approximately 2.0 FTE WQC Plant Operator II (SEIU Job Class #509) positions through attrition. The new system will require some operational attention and some specialized maintenance:

- The new dewatering and AD systems will be highly automated so the new facilities will not require the level of close operator attention that the City’s current sewage sludge incinerator and air pollution control systems have needed for the last 42 years; and
- The new Combined Heat and Power system (CHP) system (a.k.a., turbines or internal combustion engines) will convert biogas into electricity; these are specialized engines requiring skilled mechanics for maintenance. Nearly all Bay Area wastewater plants with anaerobic digesters utilize a CHP to convert biogas to energy.

For proper maintenance of the new digestion and CHP system, the RWQCP will need to fill approximately 2.0 new FTE Maintenance Mechanic positions (SEIU Job
Class #505). After startup, the City will utilize a service contract for the engines to ensure RWQCP staff is properly trained on operation and maintenance.

17: Can the City operate the Component One and Two biosolids handling and treatment systems?

Local municipalities commonly own and operate facilities similar to the recommended biosolids facilities in Components One and Two of the OFP. In correspondence and conversations with the CAMBI-US managing director, engineering consultants, and other municipal operators of the CAMBI thermal hydrolysis system, all indicated that a municipally owned wastewater treatment plant, such as the RWQCP, could operate and maintain a CAMBI thermal hydrolysis process (THP) system. The District of Columbia Sewer and Water Authority (DC Water) will be starting up a CAMBI THP system in July 2014; DC Water is the first CAMBI THP system in North America and will be the largest in the world. The DC Water wastewater treatment facility is about 16 times larger than the RWQCP. The Hampton Roads Sanitation District Atlantic Treatment Plant (slightly larger than the RWQCP) is in the design stage on a CAMBI THP system. These agencies will also be the owner operator of the CAMBI THP system.

Similar to other wastewater plants, staff recommends that a post-construction startup and support phase be included to ensure safe and reliable operation and proper transfer to City operations staff, specifically:

- The City will require six months of smooth and successful operation with the new facility;
- After construction of the thermal hydrolysis and AD system, qualified THP staff from the THP provider will operate the thermal hydrolysis system onsite for approximately eight months and train City staff on safe and reliable operation;
- Following the THP training and startup, the City will require a two year service contract for THP operational support (offsite support);
- After startup of the thermal hydrolysis process and AD facility and prior to the addition of food scraps, the new facilities will require one year of successful operation prior to the addition of any food scraps; and
- The addition of pre-processed food scraps will be progressively staged in a phased manner while staff gains experience operating the new system.
18. Can the THP AD system biogas be converted into renewable fuel instead of renewable electricity?

Converting biogas into a renewable fuel is technically feasible but not pursued for the project. An analysis of biogas energy value showed that use of the electricity to meet THP AD process heat demands was a far more efficient use of the energy than combusting a biofuel in a vehicle. Similarly, clean-up and compression of the biogas for injection into the City gas distribution system is relatively complex and not as valuable a use compared to converting the embedded energy into renewable electricity. Converting the biogas into electricity maximizes the use of the project’s energy production. The electric energy has four times the value of biofuel energy (approximately $12/million BTU versus $3/million BTU).
Executive Summary

Introduction

The City of Palo Alto has operated the Regional Water Quality Control Plant (RWQCP) to consistently provide reliable, cost-effective, and environmentally responsible wastewater treatment for its citizens and regional partners for more than 45 years. The City’s vision for future biosolids management encompasses the need to address the RWQCP’s aging solids handling infrastructure, to proactively comply with changing and uncertain regulations affecting biosolids, and to respond to community goals to increase the beneficial use of recovered organic resources city-wide. Palo Alto strives to create renewable energy and offset greenhouse gas emissions while being mindful of the financial impact on the RWQCP’s rate payers.

This Biosolids Facility Plan (BFP) provides a long-term roadmap to enable the City to reliably and sustainably manage and beneficially reuse the wastewater solids produced at the RWQCP through year 2045.

The focus of the BFP is to develop and evaluate sustainable biosolids-only processing and reuse alternatives. In parallel with the BFP, the City of Palo Alto is evaluating how other recovered organics (i.e., food scraps and yard trimmings) can possibly be processed with biosolids. As part of this evaluation of integrated organics management, the City of Palo Alto is comparing the results of the City’s Energy/Compost Facility or Export Option for Food Scraps, Yard Trimmings, and Biosolids Request for Proposals in concert with the outcomes of the BFP. Together, the BFP and the energy/compost projects offer an important opportunity to define a comprehensive and integrated approach to organics management and recovery.

Palo Alto’s City Council has prioritized the decommissioning of the RWQCP multiple-hearth furnaces (MHFs) by the year 2019. The MHFs currently incinerate the RWQCP wastewater residuals; therefore, the City must evaluate options for wastewater residuals management. Hence, the City prepared the BFP to select a cost-effective biosolids management strategy to protect public health and the environment and to position the City to respond to rapidly evolving biosolids regulatory, technological, and end-use opportunities.

This BFP is developed as a companion document to the City of Palo Alto Long Range Facilities Plan for the Regional Water Quality Control Plant Final Report (LRFP) (Carollo Engineers, 2012). The BFP builds on the LRFP, allowing solids processing recommendations in the BFP to move forward in concert with other planned improvements at the RWQCP (as defined in the LRFP). Together, the two documents provide a comprehensive long-term plan for the RWQCP.

Summarized in this Executive Summary, the BFP includes:

- RWQCP residuals projections
- Description of evaluation methodology
- Development of viable alternatives
- Alternatives evaluation results
- Description of the recommended alternative
- Phasing and implementation plan

RWQCP Residuals Projections

Based on a planning period of 30 years from the base year 2015, the 2045 maximum month projections for primary sludge, secondary or waste activated sludge, and fats/oils/grease were used for alternative facility sizing and associated capital costs estimation, while the 2015 annual average solids projections were used for the evaluation of annual operations and maintenance costs. The projected quantities are summarized in Table ES-1. Note that for the BFP, food scraps and yard trimmings were not included in the analysis;
However, the onsite alternatives could be designed to coprocess food scraps with the primary sludge and waste activated sludge.

### TABLE ES-1
**Primary Sludge, Waste Activated Sludge, and Fats/Oils/Grease Projections**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>2015 Average Annual (dry pounds per day)</th>
<th>2045 Maximum Month (dry pounds per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Sludge and Waste Activated Sludge Dry Mass</td>
<td>44,460</td>
<td>64,516</td>
</tr>
<tr>
<td>Fats/Oils/Grease/Scum Dry Mass</td>
<td>2,200</td>
<td>2,200</td>
</tr>
</tbody>
</table>

### Alternatives Evaluation Methodology

Generally, for biosolids facility projects, the wastewater residuals stabilization technology is initially dictated by the biosolids end-use options. For this project, in addition to the end-use options, the selection of the treatment technology and final biosolids end–uses will be determined by the evaluation criteria. The criteria are reflective of Palo Alto staff and stakeholder values. The key criteria to evaluate biosolids management alternatives are listed here and also shown in Figure ES-1:

- Technical viability and reliability
- Potential impacts on and benefits for the community and the environment
- Capital and operation and maintenance costs
- Minimizing greenhouse gas emissions
- Finding a beneficial use for the biosolids generated
- Producing renewable energy
- Managing organics and residuals at the local level
- Potential to integrate recovered organics from the Zero Waste Program with the biosolids
- Meeting current and future regulations
- Minimizing odors and other environmental impacts

**Figure ES-1**
**Value Hierarchy and Criteria Categories for Palo Alto RWQCP Alternatives Evaluation**
Development of Viable Alternatives

Specific to the Palo Alto RWQCP, the viable options for biosolids management include onsite biosolids processing solutions (e.g., anaerobic digestion) and solutions that involve trucking dewatered raw sludge for further processing at an offsite processing facility.

Production of an anaerobically digested Class B biosolids cake will require management of the product in a land-based solution. Production of a Class A biosolids cake would allow for more beneficial land-based reuse opportunities, as well as alternative reuse opportunities, should the City decide to create a product for local public distribution. For example, the City of Tacoma, Washington, blends its Class A cake with sawdust to produce Tagro™, which is distributed to the public and sold in home and garden stores alongside conventional soil amendments. Production of a thermally hydrolyzed and anaerobically digested Class A biosolids can be sold or used as a soil amendment by blending with soil or another amendment such as recovered wood chips. These onsite anaerobic digestion options allow for integration of food scraps collected through the Palo Alto Zero Waste program.

For bulk agricultural land application in Northern California, there is currently not a clear advantage to producing a Class A product rather than a Class B product. However, given that local management of organics has been expressed as a community value for the City and given the ongoing pressure on land application sites in California, production of a Class A product opens up future opportunities for biosolids management, either locally or through production and distribution of a bulk material. In the long term (during the course of the BFP planning period), the City of Palo Alto will want facilities that can produce a Class A product, leaving multiple outlets and reuse opportunities available for RWQCP biosolids.

The following technology alternatives were considered for biosolids management:

1. Dewater and Haul (Raw Sludge) Solutions:
   a. Synagro Central Valley Compost Facility
   b. East Bay Municipal Utility District (EBMUD) Anaerobic Digestion
   c. Kirby Canyon Landfill Facility
   d. Future Synagro Bay Area Compost Facility
   e. San José/Santa Clara Regional Wastewater Facility
      1. Zero Waste Energy Natural Gas Production Demonstration Project
      2. Anaerobic Digestion at San José/Santa Clara Regional Wastewater Facility
2. Onsite Processing Solutions (with truck haul to land application, or landfill alternative daily cover):
   a. Mesophilic Anaerobic Digestion with Biogas-fueled Combined Heat and Power
   b. Temperature Phased Anaerobic Digestion with Biogas-fueled Combined Heat and Power
   c. Thermal Hydrolysis Process and Mesophilic Anaerobic Digestion with Biogas-fueled Combined Heat and Power
   d. Dewatering and Landfill Gas-fueled Thermal Drying
   e. Dewatering and Thermal Drying/Gasification

To develop a robust analysis of each alternative, non-financial criteria were developed and analyzed in addition to the economic analysis. The process, called multi-attribute utility analysis, includes a structured evaluation of the risks and benefits of a decision in comparison to costs. Multi-attribute utility analysis is recommended in situations where making a wrong decision could result in substantial financial risk, collaboration and buy-in is essential to achieving desired outcomes, and the complexity or number of alternatives is high. This type of analysis enables a decision-making process that explains the financial benefits and risks inherent in the strategies considered, and is used to prioritize multiple activities so the balance of economic, technical, environmental, and social factors is optimized.
Alternatives Evaluation Results

During the initial screening of possible alternatives, two of the dewater and haul alternatives (Alternatives 1d and 1e, above) were identified as non-viable at this time and dropped from additional consideration. Partnership opportunities with other wastewater agencies were reexamined to confirm the current viability of the remaining dewater and haul options. The remaining eight viable alternatives were further developed to allow for a planning-level evaluation. The financial analysis results from this evaluation are summarized in Table ES-2, with the net present worth of the alternatives illustrated in Figure ES-2. The net present worth for each alternative was estimated for the planning period of 30 years using a real discount rate of 1.5 percent.

### TABLE ES-2
Alternatives Evaluation Financial Summary

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Biosolids Classification</th>
<th>Biosolids End-use</th>
<th>Capital ($million)</th>
<th>2015 Annual O&amp;M ($million/year)</th>
<th>2015 Net Present Worth ($million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a Dewater and Haul to Synagro Central Valley Compost Facility</td>
<td>Class A</td>
<td>Compost</td>
<td>14</td>
<td>1.6</td>
<td>53</td>
</tr>
<tr>
<td>1b Dewater and Haul to EBMUD Anaerobic Digestion</td>
<td>Class B</td>
<td>Land application</td>
<td>14</td>
<td>2.0</td>
<td>62</td>
</tr>
<tr>
<td>1c Dewater and Haul to Kirby Canyon Landfill</td>
<td>Unclassified</td>
<td>Landfill</td>
<td>14</td>
<td>2.3</td>
<td>69</td>
</tr>
<tr>
<td>2a Mesophilic Anaerobic Digestion with Biogas-fueled Combined Heat and Power</td>
<td>Class B</td>
<td>Land application</td>
<td>53</td>
<td>0.5</td>
<td>64</td>
</tr>
<tr>
<td>2b Temperature Phased Anaerobic Digestion with Biogas-fueled Combined Heat and Power</td>
<td>Class A</td>
<td>Land application</td>
<td>70</td>
<td>0.5</td>
<td>83</td>
</tr>
<tr>
<td>2c Thermal Hydrolysis Process and Mesophilic Anaerobic Digestion with Biogas-fueled Combined Heat and Power</td>
<td>Class A</td>
<td>Land application</td>
<td>69</td>
<td>0.4</td>
<td>79</td>
</tr>
<tr>
<td>2d Dewatering and Landfill Gas-fueled Thermal Drying</td>
<td>Class A</td>
<td>Land application</td>
<td>57</td>
<td>1.6</td>
<td>95</td>
</tr>
<tr>
<td>2e Dewatering and Thermal Drying/Gasification</td>
<td>Ash</td>
<td>Landfill</td>
<td>53</td>
<td>2.2</td>
<td>106</td>
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</tbody>
</table>

Of the viable alternatives, two of the three sludge dewater and haul solutions emerged as economically most feasible in comparison to the onsite processing solutions. Hauling to the Synagro Central Valley Compost Facility (Alternative 1a) achieved the lowest positive (best) net present worth, followed by hauling to EBMUD (Alternative 1b). It is recognized that beneficial use of biosolids is a project goal and that there are increasing pressures to reduce or eliminate the disposition of unclassified sludge in landfills. Therefore, Alternative 1c, which assumes the landfilling of unclassified sludge (not alternative daily cover), is recognized as the least desirable dewater and haul alternative, and only considered as an emergency backup solution for the RWQCP.

Of the onsite biosolids processing solutions, mesophilic anaerobic digestion (Alternative 2a) achieved the lowest net present worth, followed by the thermal hydrolysis process (Alternative 2c) and temperature phased anaerobic digestion (Alternative 2b). The anaerobic digestion solutions include a combined heat and power system to beneficially utilize biogas generated by the anaerobic digestion process, thereby, resulting in the most economical long-term solution. The thermal drying and gasification alternatives (Alternatives 2e and 2f) were the highest cost alternatives.
EXECUTIVE SUMMARY

Figure ES-2
Alternatives Net Present Worth Comparison

Net energy and anthropogenic greenhouse gas (GHG) emissions were estimated for each alternative as summarized in Table ES-3, and illustrated in Figures ES-3 and ES-4, respectively.

Relative to the existing solids handling system, the anaerobic digestion solutions, Alternatives 2a, 2b, and 2c result in significant net energy production since these include a combined heat and power system to beneficially utilize energy from biogas from the anaerobic digesters. Alternative 1b (Dewater and Haul to EBMUD Anaerobic Digestion) also results in net energy production based on the energy recovered by the combined heat and power system at EBMUD from the sludge that would be sent from the RWQCP.

These anaerobic digestion alternatives also result in significant GHG emission offsets. Both of these criteria (net energy production and GHG emission offsets) are recognized as two of the most significant environmental benefits of the anaerobic digestion solutions in comparison to the existing solids handling system as well as the other biosolids processing alternatives evaluated. In addition to these, the volume of anaerobically digested and dewatered biosolids to be hauled offsite and the related number of truck trips annually are substantially lower than hauling dewatered sludge. With the thermal hydrolysis process upstream of anaerobic digestion, greater volatile solids destruction would occur, further reducing the quantity of biosolids hauled and also enhancing energy production.
## TABLE ES-3
### Alternatives Environmental Analysis Summary

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Net Energya (MWh/year)</th>
<th>Anthropogenic GHG Emissionsb (MT CO₂e/year)</th>
<th>Hauling Miles (truck miles/year)</th>
<th>Number of Trucks from RWQCP (vehicles/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a Dewater and Haul to Synagro Central Valley Compost Facility</td>
<td>-2,576</td>
<td>714</td>
<td>311,300</td>
<td>1,354</td>
</tr>
<tr>
<td>1b Dewater and Haul to EBMUD Anaerobic Digestion</td>
<td>5,482</td>
<td>-1,660</td>
<td>101,500</td>
<td>1,354</td>
</tr>
<tr>
<td>1c Dewater and Haul to Kirby Canyon Landfill</td>
<td>-1,255</td>
<td>3,104</td>
<td>92,000</td>
<td>1,354</td>
</tr>
<tr>
<td>2a Mesophilic Anaerobic Digestion with Biogas-fueled Combined Heat and Power</td>
<td>13,481</td>
<td>-3,642</td>
<td>135,900</td>
<td>755</td>
</tr>
<tr>
<td>2b Temperature Phased Anaerobic Digestion with Biogas-fueled Combined Heat and Power</td>
<td>12,515</td>
<td>-3,335</td>
<td>129,500</td>
<td>719</td>
</tr>
<tr>
<td>2c Thermal Hydrolysis Process and Mesophilic Anaerobic Digestion with Biogas-fueled Combined Heat and Power</td>
<td>14,219</td>
<td>-3,846</td>
<td>91,280</td>
<td>507</td>
</tr>
<tr>
<td>2d Dewatering and Landfill Gas-fueled Thermal Drying</td>
<td>-4,706</td>
<td>1,061</td>
<td>55,590</td>
<td>397</td>
</tr>
<tr>
<td>2e Dewatering and Thermal Drying/Gasification</td>
<td>-341</td>
<td>101</td>
<td>4,170</td>
<td>61</td>
</tr>
</tbody>
</table>

*a* Negative net energy represents net energy *consumption*, while positive net energy represents net energy *production*.

*b* Negative GHG emissions represent reduction in emissions, while positive GHG emissions represent increase in emissions.

MT CO₂e/year = metric tons equivalent carbon dioxide per year.

MWh/year = megawatt-hours per year.
Figure ES-3
Alternatives Net Energy Production Summary

Net Energy Production
(energy produced minus energy demand)

<table>
<thead>
<tr>
<th>Net Energy Production (MWh/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RWQCP Existing Solids Handling System</td>
</tr>
<tr>
<td>-15,007</td>
</tr>
</tbody>
</table>
The non-financial criteria were evaluated for each alternative to assist in the identification of the preferred alternative. The total benefit scores for the alternatives were compared as illustrated in Figure ES-5. Alternative 2c (Thermal Hydrolysis Process and Mesophilic Anaerobic Digestion with Biogas-fueled Combined Heat and Power) received the highest benefit score. Hauling to Synagro Central Valley Compost Facility and to the EBMUD anaerobic digestion system alternatives involve the hauling of unclassified sludge, leaving the sludge processing and final biosolids product disposition to outside parties, outside the control of the RWQCP. These dewater haul solutions were evaluated as viable near-term solutions for the RWQCP, but they are likely not viable solutions for the entire 30-year planning period. Although the dewater and haul alternatives have relatively low net present worth values, the net energy, GHG offsets, and non-financial scores were not as favorable as the anaerobic digestion alternatives.

Alternative 2c (Thermal Hydrolysis Process and Mesophilic Anaerobic Digestion with Biogas-fueled Combined Heat and Power) received the highest benefit score, the best net energy production, and highest GHG offsets, thereby emerging as the recommended approach to sustainable biosolids management that best reflects Palo Alto and its stakeholders’ interests and values.
Recommended Biosolids-only Alternative

The recommended alternative for biosolids management is Alternative 2c: Thermal Hydrolysis Process and Mesophilic Anaerobic Digestion with Biogas-fueled Combined Heat and Power. As presented in Figure ES-6, primary sludge, waste activated sludge, and fats/oils/grease are blended and predewatered, and then undergo thermal hydrolysis followed by mesophilic anaerobic digestion. The digested solids, which are a Class A Equivalent product (Exceptional Quality), are dewatered and land applied; however, many other end-use distribution options are available to Palo Alto with this end product.

The biogas produced by anaerobic digestion is routed to a cogeneration system for production of power and heat. By combining the captured landfill gas with the biogas, it is estimated that the system could produce 1.6 megawatts of power (equivalent to powering approximately 1,000 homes) and sufficient heat to sustain the treatment process without supplemental fuel. Hence, the recovered resources from the system include the nutrients in the biosolids reused by land application, energy converted to renewable power, and heat for use by the RWQCP.

Cambi technology is assumed for the thermal hydrolysis process, as it is the most proven to date. Other vendor processes, such as Veolia Kruger Exelys, can also be considered during predesign of the system. Cambi has experience with food hydrolysis and digestion, which is an added benefit of this technology if the City decides to coprocess food waste at the RWQCP in the future. The source-separated food would be hydrolyzed making the more recalcitrant material amenable to anaerobic digestion, thereby improving the
EXECUTIVE SUMMARY

biogas production and helping Palo Alto beneficially utilize food scraps as part of its overall organics management program. Other advantages of the thermal hydrolysis process are improved dewatering and lower odor associated with the biosolids end-product. After blending with soil, the biosolids product could be locally distributed by Palo Alto or a third party, such as Synagro.

Figure ES-6 shows the process flow diagram for Alternative 2c, including 2015 mass/energy balance and key design criteria for the major unit processes.

**Figure ES-6**

Process Flow Diagram for Alternative 2c: Thermal Hydrolysis Process and Mesophilic Anaerobic Digestion with Biogas-fueled Combined Heat and Power

---

**TPS+TWAS+FOG**

- **Filtrate**
  - 143,574 gpd
  - Ave TKN: 1571 ppd
  - Ave NH3: 1310 ppd

**Biosolids**

- 46,645 gpd
- 19,304 dppd
- 6.1 MMBTU/H

**THP Sludge**

- 48,645 gpd
- 44,517 dppd

**Filtrate**

- 143,574 gpd
- Ave TKN: 1571 ppd
- Ave NH3: 1310 ppd

**Biosolids Cake**

- 9.2 dtpd
- 30.6 wtpd

**CHP**

- Active units: 2
- Standby units: 1
- Electric/unit: 800kW
- Installed: 2,400kW

**Landfill Gas**

- 396,000 cf/d
- 6.6 MMBTU/h

---

*(cf/d = cubic feet per day; CHP = combined heat and power; CY = cubic yards; dppd = dry pounds per day; dtpd = dry tons per day; FOG = fats, oils, and grease; gpd = gallons per day; kW = kilowatts; lb/hr/m = pounds per hour per meter; M = meter; MG = million gallons; MMBtu/h = million British thermal units per hour; ppd = pounds per day; MW = megawatts; TBD = to be determined, THP = thermal hydrolysis process, TKN = total Kjeldahl nitrogen, TPS = thickened primary sludge; TWAS = thickened waste activated sludge; wtpd = wet tons per day; WWTP = wastewater treatment plant.)*
Phasing and Implementation

Because of the requirement to decommission the MHFs by 2019, several unknowns regarding the quantity and approach to organics management in Palo Alto, and final disposition of the Energy/Compost Facility, a phased approach to implementation is recommended:

- **Component 1**: Design and construct a sludge dewatering and loadout facility onsite at the RWQCP. This facility can be planned, designed, and constructed by the end of 2017. To ensure the best hauling and tipping fee rates, it is recommended that the RWQCP continue to negotiate with both EBMUD and Synagro as potential sludge receiving facilities. Once the facility is in service, after a typical 6 month testing and performance period, the decommissioning and demolition of the MHFs may commence, with completion by the end of 2018. This will open up more space on the RWQCP site for the Component 2 facilities, in the central part of the site.

- **Component 2**: Design and construct Alternative 2c (Thermal Hydrolysis Process and Mesophilic Anaerobic Digestion with Biogas-fueled Combined Heat and Power) facilities that would utilize the dewatering and loadout facility (Component 1). The development of Component 2 can occur in parallel with the construction and startup of Component 1, with construction of the Component 2 facilities planned to begin immediately after the demolition of the MHFs. During this phase, it is recommended that the RWQCP continue to explore the most economical end-use options for the biosolids product. Construction of Component 2 facilities can be completed by the end of 2021. During start-up, the new biosolids facilities would be integrated with the existing dewatering and loadout facility and then the performance period of the entire system can be conducted.

The implementation schedule for Components 1 and 2 is summarized in Figure ES-7.

**Figure ES-7**
Overview of Implementation Schedule for Components 1 and 2
### Table 1

<table>
<thead>
<tr>
<th>Year</th>
<th>Debt Payment</th>
<th>Expense Reduction (i.e. savings) by Retiring Incinerators with THP AD Alternative</th>
<th>New Annual WWT² Fund Expense for Project</th>
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<tbody>
<tr>
<td></td>
<td>&quot;A&quot;</td>
<td>&quot;B&quot;</td>
<td>&quot;A&quot; - &quot;B&quot;</td>
</tr>
<tr>
<td>2019</td>
<td>$3,296,657</td>
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<td>$3,296,657</td>
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1: State SRF Loan=$69 mn, i = 2.5%, 30-y term, 1st payment starts 1-y after construction completion
2: WWT = Wastewater Treatment
## Table 2

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$13,232,578 $12,984,811 $3,035,060 $3,440,313 $1,259,857 $740,775

1: East Palo Alto Sanitary District
2: WWC = Wastewater Collection

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<th>Mountain View</th>
<th>Los Altos</th>
<th>EPASD</th>
<th>Stanford</th>
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4/14/2014 11:16 AM
Attachment F
Wastewater Major CIP & Organics Facility Plan Program Management & Projects Delivery

First RFP → Overall Program Management (Consultant)
- Development of RFPs
- Applying for Grants and Loans
- Pre-Design Work on Components No. 2-4
- Prepare Financing Plans and Timelines for Each Component

Second RFP → Component No. 1 Design (Possibly Design/Build)

Third RFP → Component No. 2 Design (Possibly Design/Build)

Fourth RFP → Component No. 3 Design/Build/Own/Operate/Maintain (Possibly Fewer Functions) (Possibly Outside Palo Alto & “No Project” Needed)

Fifth RFP → Component No. 4 Design/Build/Own/Operate/Maintain (Possibly Fewer Functions) (Possibly Outside Palo Alto & “No Project” Needed)
Attachment G: List of Key terms

**Anaerobic Digestion (AD):** Anaerobic digestion is a collection of processes by which microorganisms break down biodegradable material in the absence of oxygen.

**Anthropogenic and biogenic greenhouse gas emissions:** Anthropogenic GHG emissions originate from human activity, which are different from biogenic GHG emissions originating in the natural world. For example, the combustion of biogas from a digester is considered biogenic while the combustion of natural gas and other fossil fuels is considered anthropogenic.

**Bay Area Biosolids to Energy Project (BAB2E):** The RWQCP is 1 of 19 partners in the Bay Area Biosolids to Energy Project (BAB2E). BAB2E is evaluating two technologies: AquaCritox by SCFI and gasification by MaxWest. MaxWest Environmental Systems, Inc., has been selected to enter into negotiations for a 20-year contract to design, build, own, and operate a biosolids management system to benefit BAB2E project. This commercial-scale gasification facility proposed by MaxWest Environmental Systems, Inc., will process 67,000 wet tons of biosolids per year. The facility will be hosted at a BAB2E coalition member’s site, though not in Palo Alto, and will also receive biosolids from neighboring Coalition members. MaxWest was not a proposer for the E/CF RFP.

**Biosolids:** Biosolids is a term used to describe stabilized sludge, that is, the wastewater solids after treatment. The term sludge and wastewater solids are interchangeable; they refer to the residual material separated from the liquid stream in the wastewater treatment process. The solids are residual material prior to stabilization or pathogen removal. Biosolids is a term used to describe stabilized sludge, that is, the wastewater solids after treatment. Biosolids are highly regulated through the Environmental Protection Agency Title 40 Code of Federal Regulations Part 503 Rule (often referred to as the “503 Biosolids Rule”). Biosolids, which are high in organic carbon and nutrients, can be used as a fertilizer, land amendment, alternative daily cover for landfills, and as a fuel. Technically, wastewater solids off-hauled and not stabilized through treatment should be referred to as sludge or wastewater solids and not biosolids.
Dewatering: Dewatering removes water from sludge so that AD systems are properly sized, to reduce hauling costs, and to maximize biogas production and treatment efficiency. Combining the pre- and post-dewatering into one building with reduced redundancy in dewatering equipment is feasible but increases risks from an operational reliability perspective. This option was suggested by a proposer. A fundamental reason for having separate facilities is that the THP and AD process provide a pathogen free exceptional quality biosolids product. Handling of these treated and untreated solids streams in the same building, and indeed with the same equipment, presents the opportunity for cross contamination; hence, staff recommends separating these systems and using separate and independently redundant equipment for pre- and post-dewatering.

Dry Anaerobic Digestion: Much of the debate in the Measure E campaign revolved around the potential to use dry AD. The Feasibility Study in 2011 also looked at dry AD for much of the analysis. Since wastewater solids made up the majority of the material to be processed, dry AD was deemed infeasible. One E/CF RFP proposal included dry AD technology, but did not meet minimum qualifications and was not considered. Dry AD was also not likely to be an appropriate technology for the food scraps and yard trimmings only due to the ratio of the material. The dry AD facility recently constructed in San Jose has a yard trimming to food scrap ratio of 20:80, while the Palo Alto ratio of materials is closer to 50:50. This ratio would provide a low biogas yield, resulting in poor project economics.

Gasification: Gasification is a thermal process using extremely high temperatures in the absence of oxygen that transforms a solid material into a synthesis gas that can be combusted to create energy. While gasification is a thermal process, it does not yield the same air pollutants as incineration. See BFP gasification Technical Memorandum on status of gasification for biosolids.

Greenhouse Gas (GHG): Reported as annual metric tons (MT) of anthropogenic CO₂-equivalent greenhouse gas emissions throughout staff report
**Mesophilic Wet Anaerobic Digestion:** Mesophilic digestion takes place optimally around 30 to 38°C to develop proper micro-organisms – about the same temperature as the human body.

**State Revolving Fund (SRF):** The State Water Resources Control Board Division of Financial Assistance administers the SRF loan program. The SRF loan can fund wastewater treatment projects. Between February 2005 and March 2014, SRF interest varied between 1.7 and 3.0% with an average of 2.37%, standard deviation of 0.29%; the interest rate used in the Biosolids Facilities Plan is 2.5%; between 1989 and January 23, 2014, the SRF loan term was capped at 20 years with limited exception; as of January 23, 2014, new SRF projects including the city’s biosolids project can take advantage of 30-year terms.

**Thermal Hydrolysis Process (THP):** THP is a high temperature and pressure pretreatment process upstream of AD systems; the thermal hydrolysis step disintegrates cell structures and dissolves naturally occurring cell polymers into an easily digestible feed for AD; the pretreatment step occurs at a very high concentration and also makes the sludge more flowable, allowing a smaller digester volume and footprint, which is a significant advantage for the constrained 25-acre RWQCP site; THP increases organic biodegradability, yielding more biogas and energy and offsetting more GHG than other AD systems; THP yields a final dewatered solids at 30-40%, much higher than traditional AD systems at 18-25% solids, resulting in less hauling and land application costs; the final THP dewatered biosolids are sterilized and pathogen free due to 165°C at 20 minute treatment. CAMBI, Norway, is one of the providers of THP technology. Other technology providers of THP do not have the same patents as CAMBI and are in earlier stages of development (e.g., Veolia Kruger Exelys); staff will continue to monitor other THP technology providers.
Mayor Shepherd and City Council Members

Attached is my letter supporting the Staff’s recommendation re the Organics Facilities Plan.

Thanks for your attention.

Enid Pearson, Former PA Councilmember
April 19, 2014

Mayor Shepherd and Members of the Palo Alto City Council
Re: Staff Recommendation re Organics Facilities Plan

I support the staff’s recommended proposal for developing a Four-Component Organics Facilities Plan. I urge you to support it without further changes.

I have read the staff report and have several comments.

Your staff is to be commended for giving you a viable proposal to develop, fund and complete several very complicated projects. It will take at least ten years to see all projects to their completion. Many of you, including myself, one way or another, will be long gone from this scene. But you have a chance to at least start these projects without messing around.

The difference between what the voters of Palo Alto were lobbied on and what may truly be built is striking. Most of the greenhouse gas reductions will come from retiring the RWQTP’s incinerators and combining sewer sludge with food waste. This was already in the RWQTP’s long range plan before the E campaign was even started. I concede only that the time table may have been brought forward.

This report confirms that the dry anaerobic process touted by E was not feasible and had not been used anywhere in the world. And no where in the report is the one big selling point of E that all industrial buildings needed for the processes would be hidden by acres of a roof-top green garden implying no impact on park land. The report noted two vendors used no park land (very commendable) and the third very little.

Campaign pressure has been on you since 2007 and millions of dollars and thousands of hours have been spent by the city on studies, staff work, compost task forces and meetings. Thousands of pages of misinformation have been tossed around by the uninformed. You, and we, the public, now have something we can finally believe and accept. Don’t mess up this chance.

Your desire to please voters is expected, but we also want you to make decisions that honor and effect bigger and tougher goals. Support staff’s direction and you can reduce GHG’s while still protecting parks, open space and conservation lands – particularly our Baylands.

Please, move forward. Support your staff’s recommendations for a Four Component Organics Facilities Plan.

Enid Pearson, former Palo Alto Councilmember
1019 Forest Ct
Palo Alto, CA 94301
Dear Mayor Shepherd and Members of the Council:

We support the Staff’s recommended Four Point Organics Facilities Plan in the Baylands. It is technically the best plan for the City’s needs and the most financially superior plan to get results for greenhouse gas reduction for Palo Alto.

Sincerely, Robert H. Carlstead and Mary L. Carlstead
147 Walter Hays Drive
Palo Alto CA 94303-2924
Byxbee Park Composting

Mayor Shepherd and Councilmembers;

Next week you will be discussing the responses to the RPF sent out to seek suppliers who can comply with the composting required by Measure E. Based on the staff report it appears that no vendor or proposal provided an acceptable response. Six companies responded to the RFP. Three were disqualified and of the three remaining proposals, only one proposed to use any of the Measure E park land. None of the proposals saved any money for the city’s ratepayers.

Staff is recommending rejecting all of the proposals and instead is recommending that the City Council adopt a Four Component Organics Facilities Plan (OFP) for a City operated facility. The first three components are on the Regional Water Quality Control Plant site and the fourth component may potentially use a portion of the Measure E site.

Please reject the RFP proposals and adopt the Staff recommended Organics Facilities Plan without amendments because:

1. It provides the City and the Regional Water Quality Control Plant partners the best option for short-term resilience, long-term cost savings, energy production and reduction in greenhouse gas emissions.
2. The costs for the OFP are lower than any of the three RFP proposals available to the City.
3. Using a Thermal Hydrolysis process combined with Wet Anaerobic Digestion for the Sewage Sludge (Biosolids) and food scraps provides the greatest biogas yield, smallest physical footprint, and the highest quality biosolids residual.

Yours very truly,

Bob Moss
4010 Orme St.
Palo Alto 94306
I have been following your review of the staff recommendation, and request that you support the Four-component Organics Plan.

Thank you.

Elizabeth Weingarten
Dear Council members - I closely followed the evolving information and thinking regarding the compost/energy plant. I viewed the City Council's recent study session on the matter and read the staff report.

I strongly urge you to ratify staff's recommendations regarding the Organics Facilities Plan. The recommendations provide the path to the best possible outcome given the amassed research, information, proposals, analysis, financial projections, etc. That we can reduce GH gas emissions, deal with bio-solids more responsibly, and produce energy without destroying parkland set aside by Measure E is great news for everyone.

Winter Dellenbach
April 21, 2014
Mayor Shepherd and Members of the City Council:

At your meeting on April 29, 2014 you are being asked to consider the responses to the Request for Proposal (RFP) for organics management in Palo Alto. Concurrent with the RFP for organics, the City, at your direction, has also been working on a long range Biosolids Facilities Plan for the Sewage Plant. I support the Staff proposed Organics Management Plan, which merges information from both processes.

Four of the City's Enterprise Funds affect and are affected by the decisions you will make -- the Refuse Fund, the Sewage Fund, the Electric Fund, and to a lesser extent the Gas Fund. Rates for those funds will be affected. And ratepayers in Palo Alto, as well as our partner entities in the Sewage Plant, will be affected.

As former Mayor Burt correctly recalled at your Study Session, when the RFP was issued, it was widely believed that there might be a magic technology out there which would process all three organic streams together, appearing to necessitate additional land near the Sewage Plant. Anaerobic Digestion had been touted as the panacea for all our organics. The City and the voters were told that we would 1) Save over $1 million per year, 2) Reduce greenhouse gases (GHG) by 20,000 tons per year, and 3) Produce enough energy to power 1400 homes.

The responses to the RFP have produced a different and more conventional result. None of the proposals uses a single process for all three organic streams. None of them saves over $1 million a year. Almost all of the GHG reduction is a result of retiring the incinerator at the Sewage Plant, which was already known at the outset of the process. On the plus side, the combined use of Thermal Hydrolysis and Wet Anaerobic Digestion on the Sewage Plant site will produce about 2.3 MW of electricity which is about 1.5% of the City's usage.

Staff has had a very difficult task of combining the results of the two separate endeavors -- the long range Biosolids Facilities Plan and the RFP for organics. To their credit, they have come up with a proposed Organics Management Plan that merges information gained from the two processes and makes efficient use of City resources, including land.

As for land, I assert that the Harvest Power proposal, the only one that uses Measure E land, should have been disqualified. It did not comply with the RFP or Measure E by providing access on Embarcadero WAY, it did not fully enclose noisy and smelly yard trimming operations as required by Measure E, it utilized RWQCP land not allocated in the RFP and worst of all, it showed an administration building and commercial compost yard on dedicated Byxbee Park (not part of Measure E).

You will, no doubt, be told all sorts of things the VOTERS want, but the truth is that voters were told that Measure E was needed in order for the City to STUDY ways to better utilize our organics streams. They were told that surplus millions ($) saved by a new process could pay for park development. When signatures were gathered, the flier showed a “green roof” over the entire Measure E site. No one can know for sure exactly what the voters were voting for, because so many claims were made about what Measure E would do.

Now, you have the results of two separate studies and need to review those results with a full understanding of your fiduciary role in the Enterprise Funds as well as the technical recommendations coming from your professional staff. I urge you to approve the Staff recommended Organics Management Plan.
I urge you to accept the Staff recommended Organics Facility Plan.

Thank you.

Shauny Moore
666 Kellogg Avenue
Palo Alto, CA 94301
Please reject the RFP proposals and adopt the Staff-recommended Organics Facilities Plan for Bixby Park unamended for the following reasons:

1. It provides the City and the Regional Water Quality Control Plant partners the best option for short-term resilience, long-term cost savings, energy production, and reduction in greenhouse gas emissions.

2. The costs for the OFP are lower than any of the three RFP proposals available to the City at this time.

3. Using a Thermal Hydrolysis process combined with Wet Anaerobic Digestion for the Sewage Sludge (Biosolids) and food scraps provides the greatest biogas yield, smallest physical footprint, and the highest quality biosolids residual.

Thank you for your attention to environmental quality and park preservation.

Caroline Garbarino, homeowner, 734 San Carlos Court, Palo Alto
Dear Mayor Shepherd and Members of the Council,

Please adopt the Four Components Organics Facilities Plan (OFP) as recommended by City Staff. It is notably the best option for short-term resilience, long-term cost savings, energy production and reduction in GHG emissions. The recommended technology will yield the highest biogas, the highest quality biosolids residual, and will require the smallest footprint in this sensitive location adjacent to Byxbee Park and the Bay.

As a long time defender of the Bay and our public parklands, I consider this latter benefit reason alone to endorse the Staff recommended plan, but clearly the other benefits of this option are also commendable.

Sincerely,

Lennie Roberts
Dear Council Members

Please Vote for the Organic Facilities Plan on April 29, 2014. Reject the three remaining RFP proposals as staff recommends. The 10 acre Measure E site should be returned to parkland. Thank you.

Jean Olmsted
We went to one of the study sessions and are writing to urge you to reject the Energy/Compost Request for Proposals and to support the staff report recommending the Organics Facility Plan (OFP) for a city operated facility for these reasons:

1. It provides the City and the Regional Water Quality Control Plant partners the best option for short-term resilience, long-term cost savings, energy production and reduction in greenhouse gas emissions.

2. The costs for the OFP are lower than any of the three RFP proposals available to the City at this time.

3. Using a Thermal Hydrolysis process combined with Wet Anaerobic Digestion for the Sewage Sludge (Biosolids) and food scraps provides the greatest biogas yield, smallest physical footprint, and the highest quality biosolids residual.

I especially appreciate the fact that you wouldn't be using the Measure E site for ordinary composting.

Thank you,

David and Jane Moss
347 Ferne Ave
Dear Council members,

Next Tuesday you will be considering proposals for an energy/compost facility at Byxbee Park. I have closely followed the proposals since before Measure E was placed on the ballot. I am pleased that City Staff is recommending you reject all the RFP proposals and, instead, recommends you adopt a Four Component Organics Facilities Plan.

I urge you to adopt the plan recommended by Staff. It seems to be a lower cost than any of the RFP proposals, it provides the greatest biogas yield, and it uses the smallest physical footprint.

I do not think Measure E voters expected the property to be used for ordinary composting and it would not do so under the plan proposed by Staff.

Thank you for your consideration,
Anne Ercolani

Anne J. Ercolani
Telephone: 650.852.0620
To City Council Council
April 22, 2014
Mayor Shepherd and Members of the City Council:

To City Council Council
April 23, 2014
Mayor Shepherd and Members of the City Council:

I was a member of a citizen's advisory group that met with City staff members (principally Matt Krupp) over the past several months to discuss City Staff proposals for managing the City's three waste streams. The advisory group included both sides of the Measure E debate. I think it is fair to say that everyone in the group—regardless of Measure E credentials—was impressed with the fairness and objectivity of the process and was supportive of the thrust of recommendations in the Staff's Organics Management Plan.

The Staff recognizes that the most urgent goal in the City's organics management is to retire the incinerator and construct a Thermal Hydrolysis and Wet Anaerobic Digestion facility on the Sewage Plant site. The technology for such a facility is available and proven, and the facility would eliminate the majority of the GHG emission from Palo Alto's waste stream while generating up to 1.5% of the City's total electricity needs.

The Anaerobic Digester envisioned in the Plan allows for additional anaerobic digestion from pre-processed food. However, the Staff was mindful of the facts that pre-processing food waste involves a less proven technology, would require a major investment by the City, and the returns in GHG reduction and energy generation would be relatively modest compared with waste sludge digestion. The Plan wisely phases in the food-waste component only after the waste sludge operation has been established.

The last component for phase in under the Plan is aerobic composting. Here the decision is whether to carry out yard-trimmings composting off site, as is now done, or on existing park land (the Measure E site). I support the Staff's decision to delay the decision on yard-trimmings composting for a number of reasons:

1. There is currently no practical method for extracting energy from composted yard trimmings. Therefore the only reduction in GHG emissions would come from reduced truck trips between Palo Alto and the current Smart Station composting center in Sunnyvale (currently about 2 truck trips per day).

2. Any small savings in GHG emissions would pale beside the GHG emissions from building materials, construction machinery, and energy for operations of an onsite composting facility, which contemplates a huge covered structure. In any case, the proponents of local composting have not addressed this issue, and until they do, the City should proceed slowly down this path, as the Plan recommends. This will ensure that the spirit of Measure E (to make Palo Alto a green city) is not undermined by a zeal for justifying undedication of park lands.

3. Nor have the proponents of local composting addressed the problems of noise or odor at the Measure E site that would result from a local yard composting operation. A walk in Byxbee Park will tell you that the constant hum of machinery is not conducive to enjoying the serenity of nature. Add to that the odor of the operation, and the visual blight of a covered composting facility, and you have a significantly degraded open-space experience. If that's the way we want the priorities of Palo Alto to be remembered, at least let's put off the composting decision until the local proponents of local composting can address these problems.

Sincerely, Peter J. Dehlinger, 58 Roosevelt Circle, Palo Alto
Honorable Members of the City Council

Some time ago I wondered what the carbon footprint of the anaerobic digestion (AD) electrical generation process might be, but could find no reference to it in the ARI or other publications. That seemed a strange omission because the analysis is not difficult; a high school chemistry student could do it.

So I did it. The result is that, per kiloWatt-hour or MegaWatt-hour or any other measure of saleable energy produced, the AD carbon footprint is double that of a coal-fired generator, which in turn is the universal benchmark of carbon-dirty energy. The attached graphics show how this comes about.

The analysis is based on data in the document by C. de La Beaujardiere cited in the graphics, so the data should be uncontroversial.

Some people call AD “renewable energy” because, presumably, vegetation picks that carbon out of the air and we can cycle it through the AD process again and again. However, to return that carbon to the air, we must build an expensive, spectacularly inefficient plant that produces a minute amount of our energy needs (the Measure E dreamboat would have delivered only 1% of Palo Alto’s demand). As the attached analysis shows, only 1/8 of the energy in that carbon could be called renewable; 7/8 is waste and overhead. Perpetual motion does not exist.

Nature has sequestered the carbon in the biomass feedstock from the CO2 in the air. Done. On the other hand, my trade publications describe heroic, expensive efforts to sequester the CO2 produced by commercial coal and gas-fueled electrical generators.

We, however, are urged to put that naturally-sequestered carbon back into the air, at great capital outlay, for a very small return, via an inefficient and very dirty process. That makes no sense to this engineer.

Isn’t leaving that sequestered carbon sequestered the wisest, most effective, most progressive way to deal with global warming?

David Bubenik
Electrical Engineer
420 Homer Avenue
Palo Alto
City Council:
We are writing to ask you to reject the RFP proposals and to adopt the Staff recommended Organics Facilities Plan. This sounds like the best of several plans.
Lynn & Marilyn Hunwick, University South Neighborhood, 1110 Webster Street, Palo Alto 94301.
Councilmembers;

Speaking as an ex Palo Altan, thank God, I find the Staff’s Organic Facilities Plan much to be preferred over the option of a comprehensive anaerobic digestion plant. It appears to be as carbon efficient as the comprehensive approach, and at far lower cost and disturbance to its surroundings. It strikes me as one of those half-vast measures which work far better than a final solution.

Too bad it’s not likely to provide the “green points” or attention or rewards and environmental citations you hunger for. You’re just going to have to suck that up in favor of acting in the best interests of your constituents.

Respectfully,

Michael Goldeen
804 Lexington Avenue
Carson City, NV 89703

775-297-3688
michael@goldeen.com
Dear Council Members,

Please adopt the Staff recommended Organics Facilities Plan unamended for the following reasons:

1. It provides the City and the Regional Water Quality Control Plant partners the best option for short-term resilience, long-term cost savings, energy production and reduction in greenhouse gas emissions;

2. The costs for the OFP are lower than any of the three RFP proposals available to the City at this time; and

3. Using a Thermal Hydrolysis process combined with Wet Anaerobic Digestion for the Sewage Sludge (Biosolids) and food scraps provides the greatest biogas yield, smallest physical footprint, and the highest quality biosolids residual.

Please do not use the Measure E site (formerly the Byxbee Park habitat corridor) for ordinary composting.

Thank you.

Joe Hirsch