

General Commission Comments Received as of 4/18/18

Comments received from Commissioners are in black. Clements response is in green.

- Expand Executive Summary - We can include a summary of the estimated product values, capital costs, and operating expenses. The net cost was provided (cost per ton). All of this can be provided at no additional cost to the Executive Summary.
- Policy and non-economic considerations – We can easily incorporate a general list of other considerations used in the assessment.
- GHG emissions evaluation – Some GHG emissions data is included in the report, but to conduct a comparative analysis of the GHG reductions for each strategy would be an additional cost. We would like the City and NRC to provide the scope of work they are looking for {e.g. collection hauling GHG, system (e.g. AD or composting) GHG, product hauling GHG, product use GHG (e.g. compost application, CNG, electricity)}. GHG emissions can be very broad and we want to ensure the City and NRC find the work useful. Please provide us with a scope for the GHG emissions comparative analysis, and we can provide an estimated cost.
 - AD systems are closed-loop, therefore do not emit GHG under normal operating conditions. AD systems do have a flare for safety reasons.
 - Composting systems, on the other hand, emit GHG. We described at length the emissions reductions applied to different composting technologies.
 - We did not evaluate potential truck traffic from the City Center to each prospective organics processing facility. This is since the trucks are currently driving to YCCL (6 miles), this is nearly identical to the distance to the City’s WWTP (6.5 miles) and to UCD AD (~6 miles). I believe this is described in the full report. Some separate truck data was included on the Recology option.
- Financial Pro Forma. This was not included in the scope of work. We can provide this by removing all of the formulas and providing all data into text for an extra fee.
- Evaluation of UCD AD System - UCD AD cannot accept the City’s organic waste. It is a liquid digester and does not accept greenwaste.
- “Environmental glory” has no value. - We made the assumption that environmental advocacy and sustainable waste practices did have a value. We will change to “City-owned project increases the City’s reputation for environmental stewardship”.
- The bases for the calculations are not well documented. Factors are used whose origin is not provided so that it is difficult to judge their applicability or accuracy.
- Options of sending the waste to YCCL and Recology are discussed but not included in the economic comparison. Since they are options open to the city, they should be compared with the others. There are endless potential combinations, but one I think deserves more attention is using the existing UCD digester with Davis waste. The interesting features of this option are the use of existing equipment and revenues from power sales. - The information collected from YCCL was essentially only timeline and cost per ton. YCCL was not open to discussions, partnerships, or negotiations with the City at the time of this study. No economics were collected from or shared by Recology for the purposes of this study other than the team’s knowledge of their tip fees and facilities. UCD AD is not an available outlet for the City of Davis’ organic waste.
- The report needs a statement about whether these options meet state mandates. - There is a section in our report that summarizes current key state regulations. All options provide waste diversion from landfill which is a key requirement for current mandates, however, the waste collection and outreach programs are of equal importance to achieve the diversion.
- The big take-away message from the economics is that AD options cost more than compost-only options. From a cost point of view, choosing AD or not seems to be a bigger decision than who owns or operates the different kinds of facilities. Some discussion of non-economic benefits and risks would help a reader decide whether paying more for AD is worthwhile. In particular, differences in GHG emissions should be discussed.

- AD systems are essentially closed-loop and do not release GHG emissions during normal operations. This would be a null comparison. If the City would find useful, we can provide a brief, general write-up about the GHG emissions differences between AD and composting. Outside scope and budget to provide technical specifications of emissions data for specific technologies.
- Some of the policy and non-economic considerations should be reviewed. Of particular note is the apparent assumption that it is better for the city to own and operate its own facility as opposed to letting another entity take the waste. Doing this saddles the city with risks, responsibilities, staff needs, and debt that might not be desirable. The option of a joint waste entity should be explored as a way to reduce risks of uncontrolled costs and perhaps capturing economies of scale. Another item that needs to be reviewed is the value of environmental “glory” and whether the city loses diversion credit if it does not own its own facility. - Some policy and non-economic considerations were reviewed: Technical and Environmental aspects. It sounds like this additional policy and non-economic considerations are ones that the City needs to conduct based on this feasibility assessment. The City does not lose diversion credit if it does not own its own facility. As long as the waste is diverted, it counts. The environmental “glory” refers to publicity and other feel-good awards, recognition, and funding.
- Caveats on the accuracy of the information contained in the report should be provided. A range of potential error in the cost calculations would be useful (i.e. $\pm 25\%$?). - There are a lot of calculations in this report. The purpose of this report is to provide the City with enough information to determine if further exploration is necessary. Range of error in cost calculations is not applicable for these types of projects. The costs were calculated using real costs obtained by a combination of the team’s expert knowledge and experience, as well as vendors. There is not a way to provide a range of error in the technical sense. This is not a statistical calculation. This is a bottom’s up calculation on a set of assumptions and known industry knowledge, and assuming the current industry environment. As is, it is reasonable to assume a 15% contingency for unknown cost factors. However, if any of the assumptions change for any reasons including, operational, political, economic, legal, etc., the cost will change accordingly. A sensitivity analysis can be performed which would consist of several “what-if” scenarios that would assumed changes to some of the critical cost factors. A sensitivity analysis would increase the cost of the study.
- Some guidance for where to go next would be useful. What’s the next step in making a decision? Are there any crucial questions need to be answered or data that need to be collected before proceeding? Is there any value in considering a phased a solution (e.g., giving the waste to Recology in the short term while a city-owned AD/compost facility is planned for the future) or should the city jump into a fully-developed solution right away? - This is a good idea. Unsure if it is within scope for Clements to make a recommendation, but we could provide some “next steps” evaluation criteria that could help the City make a decision. However, this is really in the City’s hands to determine what has the most value, or most risk. The assessment’s purpose was to provide the City with enough information to determine if further analysis is of interest.
- **Spreadsheets Claimed as Proprietary must be Open for Verification and Sensitivity Analyses** - This is common practice with regards to proprietary products. We did offer the City an alternative: We would consider removing all the formulas and converting all input into text. There would be an additional fee associated with any data not already provided and most likely an amount the City would not be interested in spending.
- **Inadequate Assessment of Impact of Transfer of Waste Hauling Franchise Agreement** - - This occurred after the assessment was complete. The team did add some discussion of Recology as a potential outlet for waste, but did not have the resources to dedicate to this option.

Specific Comments by Page

page	
2	Clarify whether the 48 tpd collected by the city includes monthly/seasonal street-collected waste. Also, state whether this includes the WWTP sludge. - Wood to be recovered from C&D. The wood cannot be disposed of in a landfill. We used a 15% wood recovery from C&D per reference data from CalRecycle. It does not include WWTP sludge.
5	Clarify whether the costs are net or gross. In other words, are the revenues from the various products included in the costs? Also clarify whether this is an annualized cost including capital and operating expenses.- There are other areas of the report to obtain this information as referenced in the Exec Summary. Only the key information was included in the Exec Summary. The cost per ton is essentially total cost of the project by incoming ton. Total cost of the project is broken down in other areas of the report, and the financial appendix.
5	Table doesn't include the Yolo or Recology options and the text doesn't indicate why these are excluded. - Those options are significantly different than the other four and will not be included in the overall financial calculations. We can provide a sentence following this table that the current estimates received from YCCL was \$63 per ton. No specific tip fee cost from Recology was obtained, only general tip fees.
10	4.1.2 Toters are not used <u>exclusively</u> for organics collection. There's street collection. – This will be edited.
12	Table 4.1 – Numbers don't add up. Total org line: $12674/3 \neq 1056$. The numbers in yellow are sums of the column above except for the last two. Add footnotes to explain calculation of these. - The numbers do add up. A quarter is three months. The total organics you make reference to is the total organics over 4 quarters. That number would first need to be divided by 4, then by 3. Please refer to footnotes under table 4.1 for clarification.
12	Students are not the reason the 4 th quarter values are high. Notice that organics cart wastes are actually lower than 1 st and 2 nd quarters. The jump in 4th quarter numbers is primarily due to street pile pick-up. One the other hand, the absence of students is the reason the 3 rd quarter is low. Again, look at the cart numbers. - This is not the conclusion that was made during our feedstock study. It would be interesting to see the foundation for this claim.
20	The weight percentages seem to be based on visual assessments over 4 days. How accurate is this? How accurate does it have to be? I think a caveat that these numbers should be measured more carefully in future studies would be appropriate.- These numbers came from the CalRecycle Waste Characterization studies. The CalRecycle website has details on the process and justification for this process.
25	I understand the reasoning behind the decision to take WWTP sludge out of consideration. However, I will point out that the biosolids in the new WWTP will have been treated by AD and should be little different from solid waste AD digestate, which is proposed to be blended into the composting system. Perception is the main obstacle. Because of the relatively small size of biosolids feed, I'm not sure it is worth re-doing any of this report. However, in the future, this organic feed should receive more attention. - Perception is the main obstacle. Also, biosolids are still able to be sent to landfill as ADC and count for diversion. I believe this is in the report. The rules are slightly different, but do not limit using sludge.

24	State the basis for assuming that food percentages will increase to 5 or 10%. - The basis is stating in the report. “Based on the team’s experience of established organics programs...”
29	Duplicated word (printed printed). I appreciate your comment that composting paper may not be its highest and best re-use. – The duplicated word will be edited.
31	The 0.67 ton of compost per ton of waste is a very important number and needs to be documented better. In particular it might be affected by dissimilarities between the plant it came from and the Davis/UCD feedstock composition. - I’m unsure if we can share our source. This is information obtained from a compost producer in California. This is in the report. There are not many composting operations in California that are willing to share this information for a study that will be posted to the public, even anonymously.
32	Table 5.1. The revenue numbers don’t seem to serve much purpose in this discussion. Delete? What would be helpful is listing the potential compost demand of each crop (i.e. the tons/acre/yr applied). That way the reader could tell if the local market is large enough to absorb the 17000 ton/yr that would be produced. - Would rather delete then spend time modifying.
33	How big is a bag? Based on \$6 per ft ³ and \$6 per bag, one would conclude 1 ft ³ per bag. But the calculations don’t bear that out. (17100 ton feedstock)(0.67 ton compost/ton feed)(2000 lb/ton)(27 ft ³ /cy)/(1200 lb/cy) =515,500 bags, not 855,000. Please clarify this calculation. - In the same sentence it reads, “is equal to approximately 40 pounds”. The calculation is correct. Please note the 17,100 tons is of compost product, not feedstock.
34	Table 5.2 is confusing. The first column looks like the cost per ton of additive (e.g. bat guano costs \$500/ton of guano), but if you follow the numbers, column 1 is the cost of that additive per ton of compost. Please clarify in table headings. It would help if you added a column stating the amount of additive per ton of compost used in the calculation. Also, the table shows numbers for 25 and 35% profit, but those numbers are not justified anywhere. Given the expected price for custom blended compost and subtracting out manufacturing costs, can the city expect to make this much profit? – Possibly change the title to “Approx. cost of Amended Compost/Ton”. Clements will run this by Diversion Strategies to ensure change is consistent with information provided.
40	Line 3. Shouldn’t mechanical removal of contaminants be <i>upstream</i> of the AD if it is to be a pre-treatment step? Typo? – Typo. This will be corrected.
40	Explain why the example is for only 50 tpd. Later on (p 67) the text implies that the UCD is waste is incompatible (or at least undesirable) for AD. Why this is, may not be evident to the reader, especially given that UCD has an AD unit for these wastes. This would be a good location to provide this information.- This is explained through Table 4.6 and 4.7.
41	Please provide a reference for the specific biogas yield and % methane. - The provided specific gas yields and percent methane content are based on in-house data where certain assumptions were made (sources used: various literature data, project experience and operational data). To arrive at biogas characteristics that are derived from available local feedstock characteristics one could consider performing biomethane potential tests and perform additional data analysis. It shall be noted that feedstock characteristics are greatly dependent on location (incl. maturity of organics program, population composition, type of housing stock, seasonal fluctuation).

42	<p>Clarify that Figure 5.2 is for AD-C digesters. – Yes. Also, is there a reference to support the increase of the food waste fraction to 5% (and then 10%)? - Please see Section 4.3.1 on page 24. These food waste percentages are, “Based on the team’s experience of established organics programs, five percent food content in residential organics and ten percent food content in commercial organics would be an optimistic, but achievable near term goal, which may likely rise in future years as the program matures.” Therefore these percentages were used to represent the likely organic fraction that will be present in the City’s organics program in the future.</p> <p>Finally, please describe the basis of the 62.5 cfm gas rate at 10% food waste. – HS-C AD Process:</p> <p>Assumptions:</p> <p>10% FW of total; GW amount stays the same:</p> <p>GW = 12,985 tpy; FW = 1,445 tpy; Total = 14,430 tpy</p> <p>Specific BG yield of GW + FW = 2,276 ft³/ton => BG production/yr = 32,842,680 ft³/yr</p> <p>=> BG flow = 62.5 scfm</p>
44	<p>The statement that the WWTP is currently flaring all of its methane is at odds with the City’s website which states proudly that it is being captured and run through a 75kW co-gen unit which reduces electrical costs \$100-140 per day. In addition the city’s website also says the average gas production is 26,000 ft³/d which disagrees with Figure 5.3 which estimates the gas production rate at 69,120 ft³/d. Please check this out and adjust the text as needed. It’s likely that the 69,120 figure is based on the new WWTP treatment train, but then it should be referenced so that the city is not contradicting itself. - City Staff verified that the WWTP manager. There is no co-gen anymore. The methane runs the hot water broiler that heats the digester. The average gas production is 80,000 ft³/d.</p>
44	<p>Typo in Table 5.5 (digesiton) - This will be corrected.</p>
46	<p>Figure 5.6. Please verify whether the BioCycle costs include the cost of producing the gas. Presumably the California commercial price (and others shown on the figure) include the whole cost of producing each KWH and not just the cost of generating a KWH from available biogas. The point is that the comparison between the bottom lines and the top ones should be on the same basis. - The source of these charts are provided if you would like additional information.</p>
47	<p>It would be helpful in this section (or elsewhere) to state how much electricity could be produced to give a sense of scale. Youi might express it in terms of the number of households that the facility could service. Without this, the reader can’t judge whether this is a significant power source. Will it power the whole city, the WWTP, a neighborhood, or a couple of houses? – Is this referring to Table 5.5? This is something we can provide.</p>
48	<p>Top line. There is a fleet of CNG vehicles locally, Unitrans. Presently, Unitrans is looking at converting to electric vehicles, but if presented with renewable CNG, an analysis of GHG emissions might favor burning the biogas in the bus rather than burning it in a generator and then using that electricity to charge bus batteries.- No mention of Unitrans. The only CNG fleet the team was aware of was DWR’s CNG truck fleet which has its own CNG fueling station.</p>
52	<p>Table 6.1. Feedstocks. Same as Project #3-2? - You are correct; yes this was a typo.</p>
52	<p>Table 6.1. Need some explanation in the text about the GHG credits and why the city would or would not get them depending on the project chosen. - GHG credits is board, we are mainly trying to showcase that the City will not get “glory” credit if using a non-City organics processing facility. Having your own facility gives you access to GHG grants and loans. Without your own facility, you lose access to</p>

	these benefits. We can add some clarification. We are not referring to diversion. The City will get diversion credit for any of these options.
59	Using the \$63/ton is not very conservative, especially given that we know Northern's costs will go up. Even if it is wrong, it would be better to increase this by some nominal 10-20% amount to be conservative in the cost calculations. - This is a real number received from YCCL on what they expect their tipping fee to be for the organics processing.
61	The considerable advantages of the YCCL option are laid out well. The disadvantage, though, needs some further explanation as to why it is a disadvantage. Sure costs might go up, but presumably long-term contracts would be signed so that costs could be predicted at least over the term of the contract. It's true that the city would lose control over other diversion options, but (1) what other diversion options are more attractive in the short run, and (2) the city could re-gain control at the end of the contract. Somewhere in the document, there should be some discussion of phasing and consideration should be given to this option as the first phase. If at the end of a 10-20 year contract there are better alternatives available, the city could move away from YCCL at that time. - In 20 years, the permitting and technological landscape for these facilities would be significantly different. In the last 5 years regulations, state mandates, and technology systems have already gone through multiple shifts and changes. This may be something for the City to conduct internally.
61	Another alternative that should be mentioned is the potential for creating a joint operations entity for the organics processing facility. That way, the city can exercise some degree of control and perhaps protect itself from future monopolistic price increases. In fact, based on Table 4.2, the county feedstock is pretty evenly divided among the three large cities (Davis 30%, Woodland 31%, Winters 3%, West Sac 36%). A joint powers authority with all of the cities might have advantages in terms of control. (UCD might contribute an amount equal to about half of the major cities, about 13,000 tpy, and might want to be a partner as well.) - This was not within the scope of work. This would need a much larger budget to coordinate with these Cities and review their current waste franchise agreements to review rates, potential costs, routes, site locations, etc.
61	Finally, perhaps not here, but somewhere in the report, a discussion of economies of scale should be included. A county facility that included UCD would be about 4 times the size of a facility operated by Davis alone (based on feedstock streams) and 2.5 times the size of a joint Davis/UCD facility. Are economies of scale (and spreading the risk) reflected in the economic analysis later in the report? - No. It may be easy to show one cost option without UCDavis' feedstocks so the City can see potential cost associated with only the City's feedstock.
64	Agree that old Davis landfill should not be seriously considered. - This determination was made by the City, not the consultants.
68	Figure 6.7 doesn't seem to show anything that Figure 6.6 doesn't. Is it needed? - Figure 6.6 shows the conceptual organics processing facility in relation to the WWTP. Figure 6.7 is zoomed in to show the details of the organics processing facility. Both site plans have the same conceptual site design.
73	Please clarify what is meant when you say AD achieves "significant diversion" if the digestate is composted. Does this mean that 60-80% of the organics are converted to gas? Why does this rely on marketing the composted residue? - The residue and biogas production are not exchangeable, one is solid and one is gas. The incoming feedstock is reduced in size by 50% (Table 6.5). Volatile solids can be up to 80% of the incoming feedstock, but only ~55% is methane (e.g. biogas) (Table 5.3). Yes – the

	digestate will need an outlet as either: direct land application (stringent regulations), sent to composting facility, or landfill (not counted as diversion).
75	“Eisenmann has shown to achieve 80% digestate”. Does this mean 80% reduction in volume of the feedstock? Clarify. Also, how does this statement square with the 50% digestate production in Table 6.2? - There are variations across technologies and within the same technologies across facilities. Technological data from the vendors have shown that these systems are designed to achieve 50% size reduction. Some facilities produce less than expected, some more. This can vary by day. We will check on the source of the 80%, I believe this is 80% digestate production from the incoming feedstock.
78	Need for a stormwater berm. Check with the city. It is likely that similar protection is required to keep surface runoff from entering the overland flow area, so an additional berm may not be needed. – City staff verified this with the WWTP: There is no levee berm around the WWTP overland flow area. They are in the process of building a levee around the WWTP.
80	In line with earlier comments, explain why it is a significant advantage for the city “to control its destiny”. At a city-owned facility, the city has control, but also has the responsibility of handling the waste. To the average citizen, turning that responsibility (and risk) over to another entity for a competitive fee would appear advantageous. I think the assumption here is that the city is exposed to some risk if it doesn’t control its destiny, but that risk isn’t apparent and some discussion of this topic is in order. - There are advantages and disadvantages to a City-owned facility. This assessment focused on potential organics processing options for the City. Other than YCCL and Recology, the City would either need to develop their own facility or contract out the development/owner/operator to develop a facility within the region.
80	On pg 23 the text says that the UCD AD is operating at only 60% capacity. In the list here, though, there is no mention of Davis waste contributing to the 40% of capacity not being utilized. In fact, due to the campus waste being less valuable for AD (as implied on pg 67), it would seem advantageous for the campus to replace some of its waste going to AD with city waste. Can you explain why using the campus AD is not mentioned as an alternative here? - UCD AD is not an option for the City’s waste. The UCD AD system does not accept greenwaste nor comingled greenwaste and foodwaste. It is a liquids digester.
81	Figure 6.16 gives no context. No one knows where 28068 is. Can you show where this facility is in relation to identifiable landmarks or say in the text (e.g. east of Pedrick Rd X miles south of the Primate Center or X miles south of Hutchinson Dr.)? It would help the reader understand the sensitive receptors discussion. - The UCD AD facility is labeled and called out on the site plan.
88	The air emissions regulations discussion here doesn’t seem consistent with the discussion on pg 79. There you say that the San Joaquin Valley Air Pollution Control District (SJVAPC) has BACT-certified static pile composting with 6-inches of finished compost cover that provides 60/60 (VOC/NH3) reductions. Here you say that SJVAPCD has adopted rules that provide 80/50 reductions, and imply that these levels might be required. Please check for consistency. - Both are correct. These emission reductions refer to two different systems. 60/60 = 6-inches of finished compost cap + watering system. 80/60 = positively aerated system.
89	Could not sudden changes in tipping fees be mitigated by negotiation of long-term contracts? Again, I think the “glory” and “credit for diversions” argument is specious. The city must meet state requirements for waste diversion and the accounting entity is the city. Isn’t the accounting based on city

	waste generation? Who owns the actual diversion facility doesn't matter. What matters is whether the city-generated waste is diverted. - Possibly – I think this is requesting more detail from the City about the City's goals and willingness to engage in a long-term contract. At the time of this study, the City was adverse to committing to a long-term contract with YCCL. Hence the reason for the study in the first place. There was no discussion of long-term contract with Recology.
90	Table 7.1 is for Davis-owned facilities, I understand. But the range of Davis options includes YCCL and Recology. Shouldn't costs for these options be included for comparison? - The costs for YCCL and Recology can only be shown on a cost per ton basis as these projects are significantly different than the other options. We can include on the table.
93	It should be pointed out that the electricity made at this plant would be renewable, and therefore might command a premium price on the market. Using the city's average electricity cost is perhaps too conservative? - Not for electricity. The "premium price" is all dependent on PPA and some renewable energy systems PPA's are not being renewed at the premium rates.
94	I know that there are endless options and limited budget, but I think that the option of using UCD's existing AD unit with high-quality city feedstock in conjunction with composting would be sufficiently different and attractive to warrant at least a cursory economic analysis. In the compost-only UCD alternatives, is the existing AD unit simply going to be written off as a loss? - The existing UCD AD will continue to serve UCD. The UCD AD system cannot handle the City's organic waste.
94	The big take-away message from Tables 7.3 and 7.4 is that there is a big cost difference between compost-only options and AD-compost options. In fact that difference seems bigger than the effects of who owns and operates the facility. So I think it would be worthwhile to end the report with a summary of the non-economic benefits and risks that would help a reader decide. In particular, differences in GHG emissions should be discussed. The extra money from going to AD does reduce net GHG emissions. Another item that was brought up in Section 4.3.2 is state regulations. It would be helpful to a decision-maker to know if and how well each of the options discussed meets state mandates. - Please clarify what GHG emissions the City would like to see. As stated, AD systems are closed-loop and do not have the same potential emissions as composting operations. We can include a general statement to this effect. Each option would satisfy the diversion mandates as they could handle all of the City's organic wastes.