THE BOARD OF SUPERVISORS OF THE COUNTY OF STANISLAUS
BOARD ACTION SUMMARY

DEPT: Environmental Resources

BOARD AGENDA:7.1
AGENDA DATE: November 12, 2024

SUBJECT:
Acceptance of an Update on the Termination of the Service Agreement Among Stanislaus County, City of Modesto and Reworld, Inc. Regarding the Waste-to-Energy Facility Located in Crows Landing, CA

BOARD ACTION AS FOLLOWS: **RESOLUTION NO. 2024-0676**

On motion of Supervisor Withrow **Seconded by Supervisor** Chiesa
and approved by the following vote,
Ayes: Supervisors: B. Condit, Chiesa, Withrow, C. Condit, and Chairman Grewal
Noes: Supervisors: None
Excused or Absent: Supervisors: None
Abstaining: Supervisor: None

1) X **Approved as recommended**
2) _____ **Denied**
3) _____ **Approved as amended**
4) _____ **Other:**

MOTION:

Elizabeth A. King

ATTEST: ELIZABETH A. KING, Clerk of the Board of Supervisors

File No. C-6-S-3

THE BOARD OF SUPERVISORS OF THE COUNTY OF STANISLAUS
AGENDA ITEM

DEPT: Environmental Resources BOARD AGENDA:7.1
AGENDA DATE: November 12, 2024

CONSENT ☐

CEO CONCURRENCE: YES 4/5 Vote Required: No

SUBJECT:

Acceptance of an Update on the Termination of the Service Agreement Among Stanislaus County, City of Modesto and Reworld, Inc. Regarding the Waste-to-Energy Facility Located in Crows Landing, CA

STAFF RECOMMENDATION:

1. Accept an update on the termination of the service agreement among Stanislaus County, City of Modesto and Reworld, Inc. regarding the waste-to-energy facility located in Crows Landing, CA

DISCUSSION:

In 1983, Stanislaus County began exploring the feasibility of resource recovery as a waste disposal alternative in conjunction with the incorporated cities and the California Waste Management Board (CalRecycle). Through this time, the County explored a variety of options such as composting and waste-to-energy transformation. In 1985, the City of Modesto and Stanislaus County (Contracting Communities) formally agreed to partner with the Stanislaus Waste Energy Company (Company) to build and develop a waste-to-energy facility (Facility). The Stanislaus Waste Energy Company was a subsidiary of Ogden Martin Systems which had the intellectual rights of the technology to be used at the Facility. The Facility was to be funded through the sale of bonds from the Contracting Communities and equity capital from the Company. The County would act as treasurer for the Contracting Communities and establish the Resource Recovery Account to fund the operation and maintenance of the Facility. The developed Facility would be sited at the existing Fink Road Landfill (Landfill). The Company would operate the Facility, which was to be owned by the Contracting Communities with a land-lease agreement from the County.

The Facility would be designed and built to process approximately 800 tons of municipal solid waste (MSW) per day, with an annual guarantee of 243,300 tons based on facility availability and heating value of the materials delivered. The MSW delivered to the Facility is deposited directly into a refuse pit and loaded via crane into two separate boilers that ultimately incinerates the waste to produce steam. The steam generated through the process powers a turbine generator which generates 22 megawatts of electricity, which is enough to power approximately 13,000 homes. On the back end of the transformation process, the remaining product is ash and metal. The ash is disposed of on-site at a monofil at the Landfill and there is a metals recovery system that recovers nearly 6,000 tons of metal each year. The remnant ash from the

processed MSW is reduced in weight by ~60%, and reduced in volume by ~90%, which adds significant lifespan to the Landfill.

The Facility began operation under the initial service agreement in January 1989 and started accepting MSW from the local franchise waste haulers at that time. The facility processed both franchised waste and waste that was procured by the Company for a higher tip fee (Special Waste). Over the course of the initial service agreement and its amendments, the Facility processed an average of ~260,000 tons of MSW per year from the Contracting Communities and the other incorporated cities of the County. After running at an operating loss for several years, the Contracting Communities and Company restructured their service agreement in 2012 to transition ownership of the facility to the Company. The restructuring reduced the risk exposure for the Contracting Communities from 100% to 25% for unforeseen circumstance costs, established more predictable tipping fees, and prevented further operating loss to the Resource Recovery Account. In exchange, the Contracting Communities ceded capacity of up to 12,000 tons per year (up from 7,300 tons per year) of Special Waste. The 2012 service agreement provided the Contracting Communities with 15 years of disposal at the Facility through June 2027.

Through the past decade, the facility has been challenged financially through stringent increases in regulation. In October 2015, SB 350 removed the renewable energy designation that the Facility had benefited from since 2002. The loss of renewable energy credits caused a drop in the revenue received for the electricity generated at the Facility. To sustain the operation financially, the Contracting Communities and the Company amended the service agreement in 2017 to eliminate the Contracting Communities' financial exposure due to unforeseen circumstances in exchange for allowing the Company to procure up to 30,000 tons per year of Special Waste. Later that year, the California Air Resources Board (CARB) eliminated the exemption of waste-to-energy facilities from the cap-and-trade program which caused the Company to incur additional costs to purchase carbon credits for the Facility. The Facility was afforded transitional assistance through CARB's program through 2024, at which point additional financial exposure would be imminent.

CARB continued to increase regulations on emissions at the Facility in 2021. Rule 4352 was adopted which required the Facility to install additional equipment to decrease nitrogen dioxide emissions by January 1, 2024. The equipment was installed at the facility in 2023 to successfully meet the new emissions requirements. In 2022, AB 1857 removed the ten percent diversion credit that was afforded to jurisdictions who sent waste to the Facility. The diversion credit assisted the Contracting Communities in meeting the waste diversion mandates of Assembly Bill 939 (AB 939) since its inception in 1989. The loss of the diversion credit dealt a significant blow to the beneficial use of the facility for the Contracting Communities.

Due to ongoing regulatory changes, the Contracting Communities began examining the waste management practices in Stanislaus County. The Contracting Communities contracted with HDR, Inc. in January 2023, to explore potential options for the MSW stream that was destined for disposal at the Landfill and the Facility. HDR examined several options for the Contracting Communities based on the following criteria:

1. The ability to process MSW. Composting and anaerobic digestion were to be excluded from the study since the County had adequate capacity for its organic

waste stream at various composting sites.

2. A presence of one or more vendors operating one or more existing full scale commercial facility with current operations in North America for a minimum continuous three-year period
3. A processing throughput capacity equal to, or greater than, the solid waste flow for the Contracting Communities

HDR presented the Contracting Communities with five potential paths forward for waste management when the current service agreement with the Company expired. The five options presented were chemical transformation, gasification-to-biofuels, mixed waste processing facility, landfill-centric disposal with continued use of the Facility, and landfill-centric disposal discontinuing all use of the Facility. The Contracting Communities partnered with representatives from the other incorporated cities in the County to further examine the potential options and the prospective advantages and disadvantages of each. The anticipated costs to utilize the Facility were expected to double if a new agreement was reached in 2027 based on HDR's report. After closer analysis, the workgroup recommended that the County and the cities continue the use of the Facility through the life of the current service agreement, and then pivot towards a landfill-centric disposal model in 2027 without further use of the Facility due to significant cost increases and reliability issues. All other proposed options did not provide significant diversion benefit and were determined not be economically viable for the County's waste management stream.

In October 2023, the Company began to express serious concern regarding the financial sustainability of their operation in Stanislaus County. The Facility had been operating at a financial loss for several years, and changes in regulations in California would continue to further strain the financial resources of the Company without a significant increase to the tip fee. In December 2023, the Company sent correspondence to the Contracting Communities that proposed three options to mitigate the financial hardship at the Facility:

1. Mutually agreed upon early termination of the service agreement, ceasing operations on June 30, 2024.
2. Significantly increase the tip fee at the Facility and/or increase the amount of Special Waste to be delivered to the Facility.
3. The Company could determine it had met its contractual obligations to effectively terminate the agreement early.

Due to the severity of the financial challenges facing the Company, the Contracting Communities determined that the best path forward for the partnership would be to allow the Company to exit the agreement early. After a series of negotiations, all parties have agreed to cease deliveries to the Facility on December 2, 2024, and allow the Company to fully decommission and demolish the Facility. The demolition of the Facility is expected to take approximately 24 months and conclude in 2027.

The landfill's life expectancy, initially projected to last until 2050 with the use of waste-to-energy technology, is now expected to decrease by approximately 9-11 years due to the closure of the Facility, pushing the landfill's anticipated closure to 2039-2041 depending on the tonnage received. This change presents new challenges for the waste

management system in Stanislaus County. Previous waste management plans relied heavily on the Facility's ability to significantly reduce the volume of MSW received. In response to the loss of the Facility, the Department of Environmental Resources (Department) is actively working to increase staffing, equipment, and operating hours to handle the additional tonnage that will now need to be sent to the Landfill. The County remains dedicated to exploring new opportunities for reducing landfill waste, with a strong focus on adopting cost-effective, efficient, and environmentally sustainable waste management solutions.

The County and the nine cities are currently operating under Memorandums of Understanding (MOU) to direct the majority of franchised waste flows of each jurisdiction to the Facility or the Landfill. In exchange for their waste stream, all cities receive access to the Household Hazardous Waste (HHW) facility for their residents. All cities except Ceres and Modesto enjoy two annual mobile HHW events (Ceres and Modesto do not due to close proximity to the permanent HHW facility). The County also performs grant administration, education and outreach, and annual waste reporting requirements to CalRecycle for all cities except Modesto. The MOUs dictate that all tonnage that is delivered to the Facility will be charged $7/ton in administrative and programs fees as follows:

- $3/ton to the Household Hazardous Waste Facility
- $3/ton to the AB-939 program
- $0.50/ton to the Fink Road Landfill for scalehouse operations
- $0.25/ton to the City of Modesto for administrative costs
- $0.25/ton to Stanislaus County for administrative costs

The closure of the Facility will mean that these revenue sources will eventually need to transition to the MOU tip fees at the Landfill. The current MOUs are set to expire on June 30, 2025, and the Department is currently working with HDR to determine the appropriate tip fee necessary to be charged with the increased operating costs of the Landfill. The new fee structure will include program revenue for HHW and AB 939, while removing the need for the administrative costs for the scalehouse, Modesto, and County staff. The final determination from HDR will be used to negotiate new MOUs with the cities to send franchised waste to the Landfill. It is anticipated that the new MOUs will be presented to the Board in June 2025.

Upon termination of the agreement, the Contracting Communities will receive a settlement of $4 million from the Company. The Joint Powers Agreement between the City of Modesto and County dictates that 58% of the settlement ($2.32 million) will be distributed to the City of Modesto and 42% of the settlement ($1.68 million) will be distributed to Stanislaus County. The Resource Recovery Account will also be dissolved and distributed in the same proportions. It is anticipated that the remaining balance of the Resource Recovery Account will be approximately $8 million, of which approximately $4.64 million will be distributed to the City of Modesto and $3.36 million will be distributed to Stanislaus County. The County's portion of the settlement and Resource Recovery Account distribution will be used to fund additional equipment and staffing needs at the Landfill, which will help stabilize the garbage rates to the residents of Stanislaus County.

POLICY ISSUE:

Staff is providing an update on the termination of the service agreement and operational status of the waste-to-energy facility to the Board of Supervisors.

FISCAL IMPACT:

The County will receive $1.68 million from the early termination of the service agreement and approximately $3.36 million from the dissolution of the Resource Recovery Account, which will be transferred to the Fink Road Landfill budget. Both funding sources will support additional equipment and staffing needed to stabilize disposal rates.

BOARD OF SUPERVISORS' PRIORITY:

Approval of the recommended actions support the Board of Supervisors' priority of *Enhancing Community Infrastructure* by promoting a safe and healthy environment and improving the quality of life in the community, through a balance of science, education, partnerships, and environmental regulation.

STAFFING IMPACT:

It is anticipated that the Fink Road Landfill will require additional staffing resources and the Department will return to the Board of Supervisors at a later date with staffing requests.

CONTACT PERSON:

Rob Kostlivy, Director of Environmental Resources	209-525-6700
Will Richards, Solid Waste Manager	209-525-6740

ATTACHMENT(S):

1. Lease Termination and Release Agreement
2. Service Agreement Termination and Release Agreement
3. Stanislaus Facility Assessment and Alternative Report

LEASE TERMINATION AND RELEASE AGREEMENT

This Lease Termination and Release Agreement (this "***Agreement***") dated as of November 5, 2024 is entered into by and between Reworld Stanislaus, Inc. (f/k/a Covanta Stanislaus, Inc.), a California corporation (the "***Company*** ") and the County of Stanislaus, a political subdivision of the State of California acting by and through its Board of Supervisors (the "***County***") (each, a "***Party***" and collectively, the "***Parties***").

RECITALS

WHEREAS, the Company, the County and the City of Modesto (the "***City***" and the County and the City, collectively, the "***Contracting Communities***") are parties to that certain Amended and Restated Service Agreement for the Supply and Acceptance of Solid Waste dated as of July 1, 2012 (the "***Service Agreement***") pursuant to which the Company agrees to accept, process and/or dispose of Acceptable Waste (as hereinafter defined) and the Contracting Communities agree to deliver Acceptable Waste or cause Acceptable Waste to be delivered to the Facility (as hereinafter defined);

WHEREAS, the County and the Company are parties to that certain Amended & Restated Facility Site Lease Agreement dated as of July 1, 2012 (the "***Lease***") pursuant to which the County leases the Facility Site to the Company;

WHEREAS, the Company and the County acknowledge that the current regulatory landscape in California has made it economically unsustainable to continue to operate the Facility;

WHEREAS, the Company and the Contracting Communities now mutually desire to terminate the Service Agreement, upon the terms and conditions of that certain Service Agreement Termination and Release Agreement dated as of the date of this Agreement between Company and the Contracting Communities (the "***Service Agreement Termination Agreement***"); and

WHEREAS, the Company and the County now mutually desire to terminate the Lease, upon the terms and conditions of this Agreement.

NOW, THEREFORE, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties enter into the following agreement.

AGREEMENT

1. Definitions. Capitalized terms not otherwise defined in this Agreement shall have the meanings assigned to them in the Service Agreement and the Lease.

2. Termination. Subject to the terms and conditions of this Agreement, the Company and the County agree that the Lease shall terminate, effective at 11:59 p.m., PST, on December 2, 2024 (the "***Termination Date***").

3. Post Termination Liabilities and Obligations. The Company and the Contracting Communities agree that except for the specific liabilities and obligations set out below in this

Section 3 (the "**Post Termination Liabilities and Obligations**"), neither the Company nor the County shall have any further liabilities or obligations under or in connection the Lease upon the termination of the Lease on the Termination Date.

(a) Ash Indemnification. For a period of five (5) years from the Termination Date (the "***Indemnification Period***"), the Company shall defend, indemnify and hold harmless the County from and against any and all claims, losses, damages, fines, penalties, suits, fees, judgments, costs and expenses (including reasonable attorneys' fees) arising out of any claim brought by the California Department of Toxic Substances Control or any other state or federal regulatory agency against the County for noncompliance with the California Hazardous Waste Control Law and any other applicable laws and regulations, caused by ash from the Facility that is incidentally transported by the Company off the Facility Site along with recyclable ferrous metal and/or ash returned to the Landfill after transferring recyclable ferrous metal to a metal recycler (a "***Claim***"). Upon becoming aware of a Claim, the County shall give prompt written notice of such Claim to the Company. The Company shall compromise or defend, at its own expense and counsel, any such Claim. The County shall have the right, at its option to participate in the settlement or defense of any such Claim, with its own counsel and at its own expense, provided that the Company shall have the right to control such settlement or defense, except that the Company shall not have the right to bind the County to take or refrain from taking any particular action without the County's consent. The Company and the County shall cooperate in any such settlement or defense and give each other full access to all relevant information.

(b) Assignment of Water Well Easement Rights/Water Well Operation During Decommissioning and Demolition. The Company will use commercially reasonable efforts to try to assign its water well easement rights under that certain Grant of Easement and Maintenance Agreement dated November 24, 1985, as amended, between the Company as the "Grantee" and Daniel B. Tabar and Deborah L. Tabar as the "Grantor" ("***Well Easement Agreement***") to the County, with such assignment to be effective upon the Company's completion of its Facility Closure Obligations (as hereinafter defined) and subject to the terms and conditions of the Well Easement Agreement and Applicable Law. The County shall use commercially reasonable efforts to cooperate with the Company in trying to have such water well easement rights under the Well Easement Agreement assigned to the County. The Company and the County's obligations pursuant to this Section 4 (b) (the "***Easement Obligations***") shall become effective on the Termination Date and shall expire on the second (2nd) anniversary of the Termination Date (the "***Easement Obligations Period***"). Notwithstanding and without prejudice to the foregoing, the Parties acknowledge and agree that the Company will continue to operate the water wells under the Well Easement Agreement from the Termination Date until the Company's completion of the Facility Closure Obligations (the "***Facility Closure Period***").

(c) Facility Decommissioning and Demolition. The County as Lessor under the Lease hereby exercises the Decommission Option pursuant to section 7.04 (a) of the Lease. The Company as Lessee under the Lease shall perform its decommissioning, demolition and removal obligations pursuant to section 7.04 (c) of the Lease (the "***Facility Closure Obligations***"), provided that the one (1) year period from the exercise date of the Decommissioning Option specified in sections 7.04 (c) and 7.04 (e) of the Lease shall be revised to be a two (2) year period from the Termination Date (or such longer period to the extent the Company's performance of its decommissioning, demolition and removal obligations are delayed due to any delay in obtaining

any required regulatory approvals) such that the Company has two (2) years from the Termination Date (or such longer period to the extent the Company's performance of its decommissioning, demolition and removal obligations are delayed due to any delay in obtaining any required regulatory approvals) to perform the Facility Closure Obligations, and Section 7.04 of the Lease shall be deemed to have been amended accordingly.

(d) Facility Site. The County hereby acknowledges that the Company shall have, and the County hereby grants the Company, the right to access the Facility Site at all times during the Facility Closure Period as reasonably required for the Company to perform the Facility Closure Obligations. The County further grants the Company those rights of ingress and egress to and from the Facility Site as specified in section 7.05 of the Lease during the Facility Closure Period as reasonably required by the Company to perform the Facility Closure Obligations. The Company and the County hereby acknowledge that they have executed and entered into that certain Access Agreement dated as of the date of this Agreement to further set out their rights and obligations with regard to the foregoing.

(e) Provision of Disposal Site. During the Facility Closure Period, the County shall provide disposal capacity at the Fink Road Landfill (the "***Landfill***") for the Company's disposal of Process Residue, Unacceptable Waste and By-Pass Waste from the Facility. The Company may dispose of all Process Residue, Unacceptable Waste and By-Pass Waste from the Facility at the Landfill and shall pay to the County: (i) a tipping fee of $36.16 for each Ton of Process Residue, and the (ii) then-posted gate rate at the Landfill for By-Pass Waste delivered to the Landfill (collectively, the "***Landfill Tipping Fees***"). The Company may dispose of Unacceptable Waste delivered to the Facility by or on behalf of the Contracting Communities at the Landfill free of charge. Any Unacceptable Waste which cannot be accepted at the Landfill will be disposed of by the County within a reasonable period of time, failing which the Company may dispose of such Unacceptable Waste at the County's sole cost and expense. The Contracting Communities shall not be obligated to pay to the Company any tipping fee for Unacceptable Waste delivered to the Facility by or on behalf of the Contracting Communities but shall only pay to the Company substantiated incremental handling, removal and transport costs for removing such Unacceptable Waste from the Facility, provided the County makes the Landfill available to the Company for disposal of such Unacceptable Waste free of charge. The County shall keep the Landfill open for the receipt of Process Residue, Unacceptable Waste and By-Pass Waste during its normal operating hours. If because of an Unforeseen Circumstance, the County is unable to make or continue to make the Landfill available to the Company, the County shall nevertheless make available to the Company other properly permitted sanitary landfills or suitable emergency disposal sites on the same financial terms sufficient to satisfy the provision of this Section.

(f) Landfill Weighing Facilities. The Company and the County acknowledge that the weighing facilities at the Landfill, including the scale, the scale house, the scale house computer system and the customary office equipment related thereto (the "**Weighing Facilities**"), will not be subject to the Company's decommissioning, demolition and removal obligations pursuant to section 7.04 of the Lease even though the Company currently owns the Weighing Facilities. Effective on the Termination Date, the Company shall transfer ownership of the Weighing Facilities to the County, and the Company and the County shall execute such further documents as required to so transfer ownership of the Weighing Facilities. On and from the Termination Date, the County shall bear the full cost of operation, maintenance and repair of the Weighing Facilities.

During the Facility Closure Period, the County shall continue to operate the Weighing Facilities during the Receiving Times, and the County shall permit and hereby grants the Company a license to use the Weighing Facilities free of charge during the Receiving Times throughout the Facility Closure Period.

(g) The Parties acknowledge that the provisions of section 7.04 of the Lease, as amended pursuant to this Agreement, shall survive the termination of the Lease pursuant to this Agreement and remain in full force and effect until the Company's completion of the Facility Closure Obligations.

4. Limited Post Termination Liabilities and Obligations/Parent Guaranty.

(a) The Company and the County agree that effective upon the termination of the Lease on the Termination Date neither the Company nor the County shall have any further liabilities or obligations to each other under or in connection with the Lease except for the Post Termination Liabilities and Obligations. The Company's indemnification obligations pursuant to Section 3 (a) of this Agreement shall expire upon the expiration of the Indemnification Period. The Parties' Easement Obligations shall terminate upon the earlier of the completion of the assignment of the Company water well easement rights under the Well Easement Agreement to the County or the expiration of the Easement Obligations Period. The Company's Facility Closure Obligations shall terminate at the end of the Facility Closure Period. The County's obligations pursuant to Sections 3 (d) and (e) of this Agreement shall terminate at the end of the Facility Closure Period.

(b) The Parties acknowledge that effective upon the termination of the Service Agreement pursuant to the Service Agreement Termination Agreement, the Parent Guaranty has been terminated with regard to the Parent's guarantee of the full and prompt performance of all obligations of the Company to the Contracting Communities under the Service Agreement, and the Parent's only remaining obligation under the Parent Guaranty shall be to guaranty the full and prompt performance of the obligations of the Company under section 7.04 of the Lease, which such obligation shall expire at the end of the Facility Closure Period.

5. Mutual Release. In consideration for the Post Termination Liabilities and Obligations and other consideration, the sufficiency of which is hereby acknowledged by the Parties, to the maximum extent permitted by law, each of the Company and the County, each on behalf of itself and its affiliates, subsidiaries, successors, predecessors, assigns, agents, servants, parents, officers, employees, and legal representatives (collectively, the "***Releasor***") hereby forever releases, discharges and covenants not to sue the other Party and its affiliates, subsidiaries, successors, predecessors, assigns, agents, servants, parents, officers, employees, and legal representatives (collectively, the "***Releasees***") with respect to any and all claims, demands, lawsuits, obligations, promises, administrative actions and causes of action whatsoever, both known or unknown, choate or inchoate, suspected or unsuspected, contingent or absolute, both in law and in equity or otherwise, which Releasor ever had, now has, or may have against any of Releasees, for, upon or by reason of the Lease, that occurred up to and including the Termination Date, but excluding the Post Termination Liabilities and Obligations (each, a "***Released Claim***" and collectively, the "***Released Claims***"). The release contained in this Section 5 is intended to be effective as a full and general release of and bar to each and every Released Claim. Each Releasor hereby waives the benefits of, and any rights that Releasor may have under, any statute or common law regarding

protection of release of unknown claims in any jurisdiction constituting Released Claims. Without prejudice to the generality of the foregoing, the Parties acknowledge that they have been advised by legal counsel and are familiar with the provisions of California Civil Code Section 1542 which provides as follows:

> "A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS THAT THE CREDITOR OR RELEASING PARY DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE, THAT IF KNOWN BY HIM OR HER, WOULD HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR OR RELEASED PARTY."
>
> BY INITIALING BELOW, THE UNDERSIGNED, BEING AWARE OF SAID CODE SECTION HEREBY EXPRESSLY WAIVES ALL RIGHTS THEY MAY HAVE THEREUNDER, AS WELL AS ANY OTHER STATUTES OR COMMON LAW PRINCIPLES OF SIMILAR EFFECT PERTAINING TO THE RELEASES SET FORTH HEREIN.

COMPANY'S INITIALS

COUNTY'S INITIALS

Notwithstanding the foregoing, nothing contained in this Section 5 shall act as a release of any claim the Company or the County may have against each other relating to enforcement of this Agreement or breach of any representation, warranty or covenant made by the other Party under this Agreement. No Releasor shall commence or institute or encourage or assist any other person or entity to commence or institute, any legal actions, including litigation, arbitration or any other legal proceedings of any kind whatsoever, in law or equity, or assert any claim, demand, action or cause of action (i) to attempt to invalidate the release contained in this Section 5; or (ii) concerning the Released Claims.

6. No Admission of Liability. The Parties acknowledge that each Party denies any and all alleged wrongdoing and liability whatsoever in connection with the Lease, and that this Agreement is made solely for the purpose of fully and finally terminating the Lease and avoiding the time and expense of litigation and appeals associated with such alleged wrongdoing and liability, if any. It is expressly understood and agreed by the Parties that nothing contained in this Agreement shall constitute or be treated as an admission of any wrongdoing or liability on the part of either Party. Except to enforce the terms of this Agreement, the Parties agree that this Agreement shall not be offered, received, or admitted as evidence in any action or proceeding whatsoever or requested or produced in discovery in any action or proceeding.

7. Confidentiality. The Parties expressly understand and agree that, except to the extent it is already a matter of public record, the existence of this Agreement, the discussions leading up to and related to this Agreement, and the contents of this Agreement (including, but not limited to, the fact of payment and the amounts to be paid hereunder) (collectively, the "***Confidential***

Information"), shall remain confidential and shall not be disclosed to any third party whatsoever, except the Parties' respective counsel, accountants, financial advisors, and tax professionals retained by such Party, any federal, state, or local governmental taxing or regulatory authority, the City and except to enforce the terms and conditions of this Agreement or as otherwise required by law or order of court. Any person identified in the preceding sentence to whom Confidential Information is disclosed shall be deemed to be bound by this confidentiality provision and the disclosing Party shall be liable for any breaches of confidentiality by persons to whom such Party has disclosed information about this Agreement in accordance with this paragraph. In the event a Party is required by law, including but not limited to the California Public Record Act or the Ralph M. Brown Act, or a valid and effective subpoena or order issued by either a court of competent jurisdiction or a governmental body to disclose any Confidential Information, such Party shall, to the extent permitted by law, promptly notify the other Party in writing of the existence, terms, and circumstances surrounding such required disclosure so that such other Party may seek a protective order, or have the Party seek such protective order on their behalf, or other appropriate relief from the proper authority. Each Party shall cooperate with the other Party in seeking such order or other relief. If a Party is nonetheless required to disclose Confidential Information, it will furnish only that portion of the Confidential Information that is legally required and will exercise all reasonable efforts to obtain reliable assurances that such Confidential Information will be treated confidentially to the extent possible.

8. Acknowledgements. The Parties acknowledge and agree that this Agreement is intended to finally terminate the Lease and resolve any and all disputes and liabilities between the Parties and their affiliates under and in connection with the Lease except for the Post Termination Liabilities and Obligations.

9. General Provisions.

(a) Recitals. The Recitals set forth above are expressly incorporated herein by reference as though fully set forth herein.

(b) Further Assurances. Each Party shall execute and deliver such instruments and take such other actions as the other Party may reasonably request in order to carry out the intent of this Agreement.

(c) Entire Agreement. This Agreement constitutes the entire agreement of the Parties with respect to the subject matter hereof and supersedes all prior agreements and undertakings, both written and oral, between them or any of them with respect to the subject matter hereof.

(d) Successors and Assigns. The terms and conditions of this Agreement shall inure to the benefit of and be binding upon the respective successors and assigns of the Parties. Nothing in this Agreement, express or implied, is intended to confer upon any party other than the Parties or their respective successors and assigns any rights, remedies, obligations or liabilities under or by reason of this Agreement, except as expressly provided in Section 5 of this Agreement with respect to the Releasors and Releasees.

(e) Severability. If any term or other provision of this Agreement is invalid, illegal or incapable of being enforced by any law or public policy, all other terms and provisions of this Agreement shall nevertheless remain in full force and effect so long as the economic or legal substance of the transactions contemplated hereby is not affected in any manner materially adverse to either Party. Upon such determination that any term or other provision is invalid, illegal or incapable of being enforced, the Parties shall negotiate in good faith to modify this Agreement so as to effect the original intent of the Parties as closely as possible in an acceptable manner in order that the transactions contemplated hereby are consummated as originally contemplated to the greatest extent possible.

(f) Assignment. This Agreement may not be assigned by either Party by operation of law or otherwise without the express written consent of the other Party.

(g) Governing Law; Consent to Jurisdiction. This Agreement shall be interpreted in accordance with and the rights of the Parties shall be determined by the laws of the State of California, without regard to the conflicts of law provisions thereof. Each Party for itself and its legal representatives, successors, and permitted assigns, hereby (i) agrees that any legal action, suit, or proceeding arising out of or related to this Agreement shall be brought exclusively in the Superior Court of California for the County of Stanislaus, (ii) consents to personal jurisdiction over it and them in such courts in any such legal action, suit, or proceeding, and (iii) irrevocably waives, to the fullest extent permitted by law, any objection which it may now or hereafter have to the laying of the venue of any such legal action, suit, or proceeding brought in such a court and any claim that any such action, suit, or proceeding brought in such a court has been brought in an inconvenient forum. Each Party agrees that a final judgment in any such action, suit or proceeding brought in such a court, after all appropriate appeals, shall be conclusive and binding upon it. EACH PARTY ACKNOWLEDGES THAT ANY CONTROVERSY THAT MAY ARISE UNDER THIS AGREEMENT IS LIKELY TO INVOLVE COMPLICATED AND DIFFICULT ISSUES AND, THEREFORE, EACH SUCH PARTY IRREVOCABLY AND UNCONDITIONALLY WAIVES ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN RESPECT OF ANY LEGAL ACTION ARISING OUT OF OR RELATING TO THIS AGREEMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY.

(h) Captions. Captions and section headings included herein are for convenience only and do not define or limit any term of this Agreement.

(i) Sophisticated Parties Represented by Counsel; Interpretation. Each Party acknowledges, accepts, warrants and represents that (i) such Party is a sophisticated party represented at all relevant times during the negotiation and execution of this Agreement by counsel of its choice, and that it has executed this Agreement with the consent and on the advice of such independent legal counsel, and (ii) such Party and its counsel have determined through independent investigation and robust, arm's-length negotiation that the terms of this Agreement shall exclusively embody and govern the subject matter of this Agreement. In the event an ambiguity or question of intent or interpretation arises, this Agreement shall be construed as if drafted jointly by the Parties and no presumption or burden of proof shall arise favoring or disfavoring any party by virtue of the authorship of any of the provisions of this Agreement. The words "herein", "hereof", "hereby" or "hereto" shall refer to this Agreement unless otherwise expressly provided. The use of the word "including" and similar expressions means "including

without limitation" and, unless the context otherwise requires, "neither," "nor," "any," "either" and "or" shall not be exclusive. Any reference in this Agreement to an Article or Section shall be a reference to an Article of, or a Section of, this Agreement unless the context otherwise requires.

(j) Counterparts. This Agreement may be executed in multiple counterparts, each of which will be deemed an original, but all of which together will constitute one and the same instrument. Counterparts may be delivered via electronic mail (including .pdf or any electronic signature complying with the U.S. federal ESIGN Act of 2000, e.g., www.docusign.comor Adobe sign) or other transmission method and any counterpart so delivered shall be deemed to have been duly and validly delivered and be valid and effective for all purposes.

(k) Notices. Any notices or communication required or permitted under this Agreement shall be in writing and shall be sufficiently given if (i) delivered in person, (ii) sent by overnight courier and evidence of delivery is obtained, (iii) sent by e-mail with evidence of receipt of such e-mail, or (iv) sent by certified or registered mail, return receipt requested, postage prepaid, in each case properly addressed as provided below. Notice addresses for the Parties are as follows:

If to the Company:

Reworld Stanislaus, Inc.
445 South Street
Morristown, NJ 07960
Attention: Daniel Moran, Chief Commercial Officer, East Region
E-Mail: dmoran@reworldwaste.com

With a copy to:
Reworld Waste, LLC
445 South Street
Morisstown, NJ 07960
Attention: General Counsel
E-Mail: generalcounsel@reworldwaste.com

If to the County:

Chairman, Stanislaus County Board of Supervisors
1010 Tenth Street, Suite 6500
Modesto, CA 95354
E-Mail: COBSupport@stancounty.com

With a copy to:
County Counsel
1010 Tenth Street, Suite 6400
Modesto, CA 95354
E-Mail: cocolaw@stancounty.com

Changes in the respective addresses to which such notices may be directed may be made from time to time by each Party by written notice to the other Party.

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first above written.

REWORLD STANISLAUS, INC.

By: _____

Name: Daniel Moran

Title: VP, Chief Commercial Officer

Address: 445 South Street
Morristown, NJ 07960

Email: dmoran@reworldwaste.com

COUNTY OF STANISLAUS

By: _____

Name: Jody Hayes

Title: Chief Executive Officer

APPROVED AS TO FORM:

Thomas E. Boze

County Counsel

By: _____

Name: Thomas E. Boze

Title: County Counsel

SERVICE AGREEMENT TERMINATION AND RELEASE AGREEMENT

This Service Agreement Termination and Release Agreement (this "***Agreement***") dated as of November 5, 2024 is entered into by and among Reworld Stanislaus, Inc. (f/k/a Covanta Stanislaus, Inc.), a California corporation (the "***Company*** "), the County of Stanislaus, a political subdivision of the State of California acting by and through its Board of Supervisors (the "**County**"), and the City of Modesto, a municipal corporation, acting by and through its City Council (the "***City***") (each, a "***Party***" and collectively, the "***Parties***"). The County and the City are collectively referred to herein as the "***Contracting Communities***."

RECITALS

WHEREAS, the Company and the Contracting Communities are parties to that certain Amended and Restated Service Agreement for the Supply and Acceptance of Solid Waste dated as of July 1, 2012 (the "***Service Agreement***") pursuant to which the Company agrees to accept, process and/or dispose of Acceptable Waste (as hereinafter defined) and the Contracting Communities agree to deliver Acceptable Waste or cause Acceptable Waste to be delivered to the Facility (as hereinafter defined);

WHEREAS, the County and the Company are parties to that certain Amended & Restated Facility Site Lease Agreement dated as of July 1, 2012 (the "***Lease***") pursuant to which the County leases the site for the Facility to the Company;

WHEREAS, the Company and the Contracting Communities acknowledge that the current regulatory landscape in California has made it economically unsustainable to continue to operate the Facility;

WHEREAS, the Company and the Contracting Communities now mutually desire to terminate the Service Agreement, upon the terms and conditions of this Agreement; and

WHEREAS, the County and the Company now mutually desire to terminate the Lease, upon the terms and conditions of that certain Lease Termination and Release Agreement dated as of the date of this Agreement between the Company and the County (the "***Lease Termination Agreement***").

NOW, THEREFORE, in consideration of the foregoing recitals and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties enter into the following agreement.

AGREEMENT

1. Definitions. Capitalized terms not otherwise defined in this Agreement shall have the meanings assigned to them in the Service Agreement.

2. Termination. Subject to the terms and conditions of this Agreement, the Company and the Contracting Communities agree that the Service Agreement shall terminate, effective at 11:59 p.m., PST, on December 2, 2024 (the "***Termination Date***").

3. Termination Payment. As consideration for the Contracting Communities' agreement to terminate the Service Agreement pursuant to this Agreement and the County's agreement to terminate the Lease pursuant to the Lease Termination Agreement, the Company shall pay to the Contracting Communities Four Million Dollars ($4,000,000), with One Million Six Hundred Eighty Thousand Dollars ($1,680,000 to be paid to the County and Two Million Three Hundred Twenty Thousand Dollars ($2,320,000) to be paid to the City. The Company shall pay the Termination Payment within five (5) business days of the Termination Date by wire transfer to the respective bank accounts of the County and City, the details of which the County and City shall provide to the Company by written notice at least five (5) business days prior to the Termination Date.

4. No Post Termination Liabilities and Obligations/Parent Guaranty. The Company and the Contracting Communities agree that effective upon the termination of the Service Agreement on the Termination Date: (a) neither the Company nor the Contracting Communities shall have any further liabilities or obligations to each other under or in connection with the Service Agreement; and (b) the Parent Guaranty shall automatically terminate with regard to the Parent's guarantee of the full and prompt performance of all obligations of the Company to the Contracting Communities under the Service Agreement, with the Guaranteed Obligations (as defined under the Parent Guaranty but excluding the obligations of the Company under Section 7.04 of the Lease) being deemed to have been fully performed and the Parent having no further liabilities or obligations to the Contracting Parties under the Parent Guaranty in relation to the Service Agreement.

5. Mutual Release. In consideration for the Termination Payment and other consideration, the sufficiency of which is hereby acknowledged by the Parties, to the maximum extent permitted by law, each of the Company and the Contracting Communities, each on behalf of itself and its affiliates, subsidiaries, successors, predecessors, assigns, agents, servants, parents, officers, employees, and legal representatives (collectively, the "***Releasor***") hereby forever releases, discharges and covenants not to sue the other Party(ies) and its or their affiliates, subsidiaries, successors, predecessors, assigns, agents, servants, parents, officers, employees, and legal representatives (including without limitation, the Parent in the case of the Company) (collectively, the "***Releasees***") with respect to any and all claims, demands, lawsuits, obligations, promises, administrative actions and causes of action whatsoever, both known or unknown, choate or inchoate, suspected or unsuspected, contingent or absolute, both in law and in equity or otherwise, which Releasor ever had, now has, or may have against any of Releasees, for, upon or by reason of the Service Agreement and/or the Parent Guaranty, that occurred up to and including the Termination Date (each, a "***Released Claim***" and collectively, the "***Released Claims***"), but excluding the Post Termination Liabilities and Obligations as defined and set out in section 3 of the Lease Termination Agreement. The release contained in this Section 5 is intended to be effective as a full and general release of and bar to each and every Released Claim. Each Releasor hereby waives the benefits of, and any rights that Releasor may have under, any statute or common law regarding protection of release of unknown claims in any jurisdiction constituting Released Claims. Without prejudice to the generality of the foregoing, the Parties acknowledge that they have been advised by legal counsel and are familiar with the provisions of California Civil Code Section 1542 which provides as follows:

"A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS THAT THE CREDITOR OR RELEASING PARTY DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE, THAT IF KNOWN BY HIM OR HER, WOULD HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR OR RELEASED PARTY."

BY INITIALING BELOW, THE UNDERSIGNED, BEING AWARE OF SAID CODE SECTION HEREBY EXPRESSLY WAIVES ALL RIGHTS THEY MAY HAVE THEREUNDER, AS WELL AS ANY OTHER STATUTES OR COMMON LAW PRINCIPLES OF SIMILAR EFFECT PERTAINING TO THE RELEASES SET FORTH HEREIN.

COMPANY'S INITIALS

CITY'S INITIALS

COUNTY'S INITIALS

Notwithstanding the foregoing, nothing contained in this Section 5 shall act as a release of any claim the Company or the Contracting Communities may have against each other: (a) relating to enforcement of this Agreement or breach of any representation, warranty or covenant made by the other Party(ies) under this Agreement; or (b) for the payment of money under the Service Agreement or indemnification pursuant to sections 9.02 and 9.03 of the Service Agreement, arising from the conduct of the Parties prior to the Termination Date, provided that any such indemnification claims shall be limited to liabilities, actions, damages, claims, demands, judgments, losses, costs, expenses, suits and attorneys' fees and suits and appeals ("***Indemnification Claims***") for personal injury or death, or loss of or damage to property, arising out of the negligent acts, negligent omissions or intentional wrongful conduct of the Company or the Contracting Communities and specifically exclude any Indemnification Claims for the nonperformance of the Company's or the Contracting Communities' obligations under the Service Agreement. No Releasor shall commence or institute or encourage or assist any other person or entity to commence or institute, any legal actions, including litigation, arbitration or any other legal proceedings of any kind whatsoever, in law or equity, or assert any claim, demand, action or cause of action (i) to attempt to invalidate the release contained in this Section 5; or (ii) concerning the Released Claims.

6. No Admission of Liability. The Parties acknowledge that all Parties deny any and all alleged wrongdoing and liability whatsoever in connection with the Service Agreement, and that this Agreement is made solely for the purpose of fully and finally terminating the Service Agreement and avoiding the time and expense of litigation and appeals associated with such alleged wrongdoing and liability, if any. It is expressly understood and agreed by the Parties that nothing contained in this Agreement shall constitute or be treated as an admission of any wrongdoing or liability on the part of any Party. Except to enforce the terms of this Agreement,

the Parties agree that this Agreement shall not be offered, received, or admitted as evidence in any action or proceeding whatsoever or requested or produced in discovery in any action or proceeding.

7. Confidentiality. The Parties expressly understand and agree that, except to the extent it is already a matter of public record, the existence of this Agreement, the discussions leading up to and related to this Agreement, and the contents of this Agreement (including, but not limited to, the fact of payment and the amounts to be paid hereunder) (collectively, the "***Confidential Information***"), shall remain confidential and shall not be disclosed to any third party whatsoever, except the Parties' respective counsel, accountants, financial advisors, and tax professionals retained by such Party, any federal, state, or local governmental taxing or regulatory authority, and except to enforce the terms and conditions of this Agreement or as otherwise required by law or order of court. Any person identified in the preceding sentence to whom Confidential Information is disclosed shall be deemed to be bound by this confidentiality provision and the disclosing Party shall be liable for any breaches of confidentiality by persons to whom such Party has disclosed information about this Agreement in accordance with this paragraph. In the event a Party is required by law, including but not limited to the California Public Records Act or the Ralph M. Brown Act, or a valid and effective subpoena or order issued by either a court of competent jurisdiction or a governmental body to disclose any Confidential Information, such Party shall, to the extent permitted by law, promptly notify the other Parties in writing of the existence, terms, and circumstances surrounding such required disclosure so that such other Parties may seek a protective order, or have the Party seek such protective order on their behalf, or other appropriate relief from the proper authority. Each Party shall cooperate with the other Parties in seeking such order or other relief. If a Party is nonetheless required to disclose Confidential Information, it will furnish only that portion of the Confidential Information that is legally required and will exercise all reasonable efforts to obtain reliable assurances that such Confidential Information will be treated confidentially to the extent possible.

8. Acknowledgements. The Parties acknowledge and agree that this Agreement is intended to finally terminate the Service Agreement and the Parent Guaranty as it relates to the Service Agreement and resolve any and all disputes and liabilities among the Parties and their affiliates under and in connection with the Service Agreement and the Parent Guaranty as it relates to the Service Agreement.

9. General Provisions.

(a) Recitals. The Recitals set forth above are expressly incorporated herein by reference as though fully set forth herein.

(b) Further Assurances. Each of the Parties shall execute and deliver such instruments and take such other actions as the other Parties may reasonably request in order to carry out the intent of this Agreement.

(c) Entire Agreement. This Agreement constitutes the entire agreement of the Parties with respect to the subject matter hereof and supersedes all prior agreements and undertakings, both written and oral, between them or any of them with respect to the subject matter hereof.

(d) Successors and Assigns. The terms and conditions of this Agreement shall inure to the benefit of and be binding upon the respective successors and assigns of the Parties. Nothing in this Agreement, express or implied, is intended to confer upon any party other than the Parties and the Parent or their respective successors and assigns any rights, remedies, obligations or liabilities under or by reason of this Agreement, except as expressly provided in Section 5 of this Agreement with respect to the Releasors and Releasees.

(e) Severability. If any term or other provision of this Agreement is invalid, illegal or incapable of being enforced by any law or public policy, all other terms and provisions of this Agreement shall nevertheless remain in full force and effect so long as the economic or legal substance of the transactions contemplated hereby is not affected in any manner materially adverse to any Party. Upon such determination that any term or other provision is invalid, illegal or incapable of being enforced, the Parties shall negotiate in good faith to modify this Agreement so as to effect the original intent of the Parties as closely as possible in an acceptable manner in order that the transactions contemplated hereby are consummated as originally contemplated to the greatest extent possible.

(f) Assignment. This Agreement may not be assigned by any Party by operation of law or otherwise without the express written consent of the other Parties.

(g) Governing Law; Consent to Jurisdiction. This Agreement shall be interpreted in accordance with and the rights of the Parties shall be determined by the laws of the State of California, without regard to the conflicts of law provisions thereof. Each Party for itself and its legal representatives, successors, and permitted assigns, hereby (i) agrees that any legal action, suit, or proceeding arising out of or related to this Agreement shall be brought exclusively in the Superior Court of California for the County of Stanislaus, (ii) consents to personal jurisdiction over it and them in such courts in any such legal action, suit, or proceeding, and (iii) irrevocably waives, to the fullest extent permitted by law, any objection which it may now or hereafter have to the laying of the venue of any such legal action, suit, or proceeding brought in such a court and any claim that any such action, suit, or proceeding brought in such a court has been brought in an inconvenient forum. Each Party agrees that a final judgment in any such action, suit or proceeding brought in such a court, after all appropriate appeals, shall be conclusive and binding upon it. EACH PARTY ACKNOWLEDGES THAT ANY CONTROVERSY THAT MAY ARISE UNDER THIS AGREEMENT IS LIKELY TO INVOLVE COMPLICATED AND DIFFICULT ISSUES AND, THEREFORE, EACH SUCH PARTY IRREVOCABLY AND UNCONDITIONALLY WAIVES ANY RIGHT IT MAY HAVE TO A TRIAL BY JURY IN RESPECT OF ANY LEGAL ACTION ARISING OUT OF OR RELATING TO THIS AGREEMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY.

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independent investigation and robust, arm's-length negotiation that the terms of this Agreement shall exclusively embody and govern the subject matter of this Agreement. In the event an ambiguity or question of intent or interpretation arises, this Agreement shall be construed as if drafted jointly by the Parties and no presumption or burden of proof shall arise favoring or disfavoring any party by virtue of the authorship of any of the provisions of this Agreement. The words "herein", "hereof", "hereby" or "hereto" shall refer to this Agreement unless otherwise expressly provided. The use of the word "including" and similar expressions means "including without limitation" and, unless the context otherwise requires, "neither," "nor," "any," "either" and "or" shall not be exclusive. Any reference in this Agreement to an Article or Section shall be a reference to an Article of, or a Section of, this Agreement unless the context otherwise requires.

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Reworld Stanislaus, Inc.
445 South Street
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Attention: Daniel Moran, Chief Commercial Officer, East Region
E-Mail: dmoran@reworldwaste.com

With a copy to:
Reworld Waste, LLC
445 South Street
Morisstown, NJ 07960
Attention: General Counsel
E-Mail: generalcounsel@reworldwaste.com

If to the County:

Chairman, Stanislaus County Board of Supervisors
1010 Tenth Street, Suite 6500
Modesto, CA 95354
E-Mail: COBSupport@stancounty.com

With a copy to:
County Counsel
1010 Tenth Street, Suite 6400
Modesto, CA 95354
E-Mail: cocolaw@stancounty.com

If to the City:

City Manager, City of Modesto
1010 Tenth Street
Modesto, CA 95354
E-Mail: joelopez@modestogov.com

With a copy to:
City Attorney
1010 Tenth Street
Modesto, CA 95354
E-Mail: jsanchez@modestogov.com

Changes in the respective addresses to which such notices may be directed may be made from time to time by any Party by written notices to the other Parties.

[Remainder of page intentionally left blank]

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first above written.

REWORLD STANISLAUS, INC.

By: _____

Name: Daniel Moran

Title: VP, Chief Commercial Officer

Address: 445 South Street
Morristown, NJ 07960

Email: dmoran@reworldwaste.com

COUNTY OF STANISLAUS

By: _____

Name: Jody Hayes

Title: Chief Executive Officer

APPROVED AS TO FORM:

Thomas E. Boze
County Counsel

By: _____

Name: Thomas E. Boze

Title: County Counsel

CITY OF MODESTO

By: _____

Name: Joe Lopez

Title: City Manager

Address: 1010 Tenth Street
Modesto, CA 95354

Email: joelopez@modestogov.com

Facility Assessment and Alternatives Report

Prepared for:

Stanislaus County

Stanislaus County, California
December 20, 2023
Revised April 19, 2024

Contents

Tables

Figures

Appendices

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1 Introduction

Stanislaus County (County) and the City of Modesto, California (City), or together referred to as Contracting Communities, currently utilize the Stanislaus County Resource Recovery Facility (Facility or waste-to-energy (WTE) Facility) located at 4040 Fink Road, Crows Landing, California for much of their post-recycling waste treatment, processing and disposal. The Facility is owned and operated by Covanta, and the operating contract between Covanta and the Contracting Communities is set to expire on July 1, 2027, unless renewed for an additional 15-year term (or otherwise amended). The Fink Road Landfill (Landfill) has approximately 12.7 million cubic yards of municipal solid waste (MSW) capacity remaining and landfill life under the current operation is projected to last until 2050. If the Facility were to close or the Contracting Communities and Covanta fail to reach an agreement on an extension of the operating contract by July 2027, that diverted tonnage from the Facility to the Landfill would significantly reduce the current life expectancy of the Landfill. Based on existing waste generation rates and the consumption of landfill airspace, the Contracting Communities desire to evaluate other alternatives, such as viable alternative waste reduction technologies to reduce the amount of waste going to the Landfill. All data, assumptions, and analysis in this report are based on the Landfill status (i.e., current landfill life and tipping fees) and current solid waste management system and practices (i.e., current franchised waste flow) at the time of the project (December 2022). The impact to the landfill caused by changes to the disposal quantities are estimated using high level planning estimates and have not been evaluated to the level of prior engineering study efforts.

1.1 Objective of Study and Project Approach

In response to the issues regarding waste disposal options and availability, the County and cities of Stanislaus County tasked HDR with evaluating viable alternatives for future waste management and to report these alternatives in this Facility Assessment and Alternatives Report (Report). This study is focused only on the mixed solid waste stream, and does not include the recyclables or organics waste streams. The purpose of this study is to assess the technical feasibility and economic costs associated with potential alternatives, and at this time does not include any human or environmental health impact analyses. The later will be conducted for separately for the preferred option or options during the next steps of planning, permitting, and development. At the end of the contract term in 2027, the Facility will be nearly forty years old and some of the major equipment and systems will require capital investment for refurbishment or replacements projects to extend the useful operating life and reliability of the Facility. One aspect of this Report is to evaluate the advantages and disadvantages of continued operation and the necessary life extension capital projects needed. Alternatives to this approach include a review of other waste management technologies to either be retrofitted to the existing infrastructure or to replace the entire Facility with a different, commercially viable, waste management technology.

A key directive of this analysis is that all technology alternatives need to be proven in a commercial operation for post-recycled municipal solid waste assuming that much of the

available food and other organic wastes are managed separately and of limited quantities in the waste stream. For the purpose of this analysis, HDR is defining "commercial viability" as:

1) An ability to process a heterogeneous mix addressing the breadth of components (paper, plastics, metals, some residual organics, and glass) and physical and chemical properties found in a typical MSW stream;

2) A presence of one or more vendors operating one or more existing full scale commercial facility current operating in the North America for a minimum continuous three (3) year period processing typical MSW; and

3) A processing throughput capacity equal to or greater than the solid waste flow for the Contracting Communities.

1.2 Evaluation Committee

Stanislaus County is located in the San Joaquin Valley in Central California. It includes nine cities: Ceres, Hughson, Modesto, Newman, Oakdale, Patterson, Riverbank, Turlock, and Waterford. As of 2023, the County has an estimated population of roughly 564,400.

Stanislaus County and the cities formed an Evaluation Committee comprised of at least one member from each of the cities listed above. The Evaluation Committee met monthly throughout the project and offered guidance and perspective as the analysis progressed. The formation of the Evaluation Committee was critical to the study as all nine cities and the unincorporated County utilize the Facility as a means of disposal, as defined by state statute.

2 Background Data

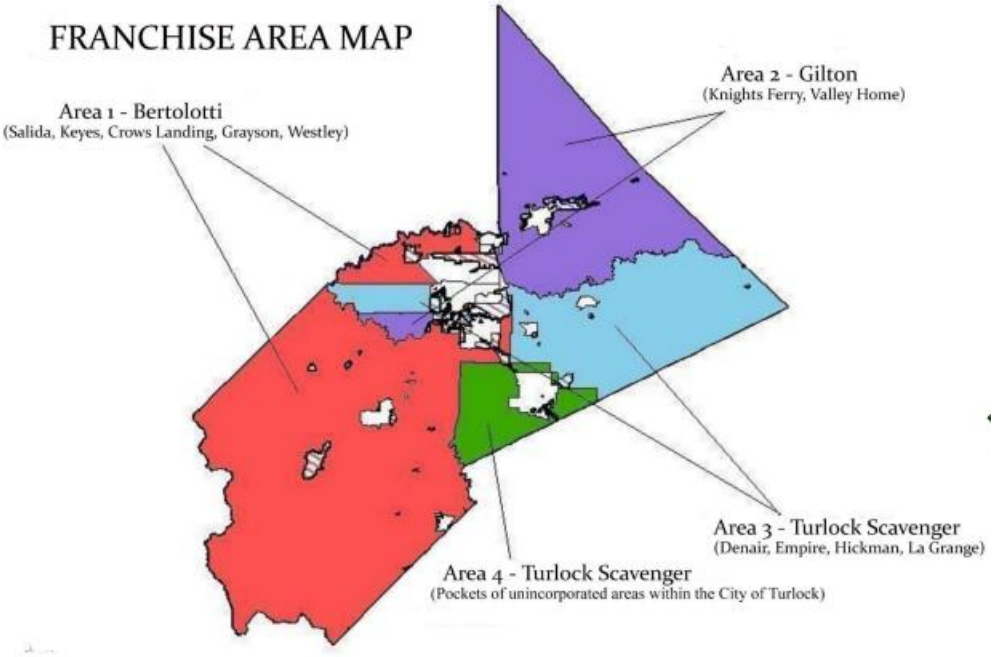
Prior to evaluating the technology alternatives, there are a few critical components to assess in relation to understanding the County and cities' current waste management system, identifying viable proven alternatives, reviewing regulations as they relate to transformation (e.g., waste-to-energy or WTE) and/or disposal technologies in California, and a summary of the Facility and its current operations.

2.1 Stanislaus County Regional Agency's Waste Management System

Bertolotti Disposal, Gilton Solid Waste, and Turlock Scavenger are the three franchised haulers that provide residential and commercial MSW collection services in the unincorporated areas of Stanislaus County. The County is split into four areas which are each managed by one of the disposal companies. Bertolotti manages Area 1, which is comprised of Salida, Keyes, Crows Landing, Grayson, and Westley. Gilton manages Area 2, which is comprised of Knights Ferry and Valley Home. Turlock Scavenger manages Areas 3 and 4 which include Denair, Empire, Hickman, La Grange, and other unincorporated areas within the City of Turlock. **Figure 1** shows the franchise area map.

The tonnages for Stanislaus County Regional Agency and the City of Modesto are detailed in **Table 1**. It is important to note that although the combined MSW disposal and transformation is roughly 650,000 tons per year, the Regional Agency and City of Modesto only control about 400,000 tons of MSW per year through their franchise agreements as shown in **Table 2**. This Study assumes all franchised waste included in Table 2 is sent to Fink Road Landfill for disposal, which may or may not be the case in the future. The rest of the MSW is disposed of at various landfills throughout the region, including Foothill Sanitary, Forward Landfill, and Merced Highway 59 Landfill. This is due to the proximity of other landfills to the member cities that prove to result in more economical transportation and disposal of MSW.

Figure 1. Stanislaus County Franchise Area Map



Source: December 14, 2021, Board of Supervisors of the County of Stanislaus Agenda

Table 1. Disposal Tonnages for Stanislaus County Regional Agency and City of Modesto

Disposal Tonnages			
	Stanislaus County Regional Agency[1]	City of Modesto[2]	Combined
Disposal (Tons per Year)	263,000	190,000	453,000
Transformation (Tons per Year)	121,000	84,000	205,000
Disposal (Tons per Day)[3]	854	617	1,471
Transformation (Tons per Day)[3]	393	273	666

[1]From 2022 Disposal Modification

[2]From 2022 Recycling and Disposal Reporting System

[3]Based on 308 operating day**Table 2. Stanislaus County Franchised Tonnages (2023)**

Jurisdiction	Tons per Year
Stanislaus-Unincorporated	99,678
Ceres	48,359
Hughson	4,206
Modesto	145,373
Newman	9,608
Oakdale	17,384
Patterson	20,413
Riverbank	12,860
Turlock	40,000
Waterford	4,967
Total	**402,848**

2.2 Description of Alternatives

The Evaluation Committee has requested HDR review potential alternatives that could be implemented to improve the economic viability of the Facility and thus make it possible for continued operation by Covanta. In the event that operation is not possible, HDR has been tasked to look at specific ways the Facility could be converted to another technology or otherwise modified to improve the economics. If it is not possible to convert the facility into a viable technology, certain specific alternative technologies may be considered to reduce the impact of losing the Facility operation. Lastly, HDR has been tasked with looking at the air space and reduced life span impacts of a landfill-centric waste management scheme where all waste must be managed using the landfill.

HDR prepared a Technical Memorandum describing the potential viable technology alternatives that may be available to the Evaluation Committee. This memo is included in **Appendix A**. To reduce the amount of disposed of at the landfill, the following technologies have been selected by the Evaluation Committee for assessment on whether they provide feasible alternatives to landfill disposal if implemented into the current solid waste program.

Option 1 — Status Quo: Evaluate what is reported to be necessary to maintain the Facility and look for changes that could be implemented to keep the Facility operational as a traditional combustion-based WTE Facility;

Option 2 — Gasification to Biofuels: Evaluate the potential to convert the Facility to a gasification facility or to construct a new facility.

Option 3	Mixed Waste Processing Facility (MWPF): Evaluate the benefit of building a mixed waste materials processing facility as a means of increasing waste diversion, recovering recyclables, and other potentially useful materials; and
Option 4	Landfill-Centric Model: Evaluate utilizing the existing landfill until end of life, develop a new landfill cell, or transfer MSW to other viable landfills for disposal.
Option 5	WTE with Landfill Disposal: Evaluate combining the use of future WTE capacities with a landfill-centric model.

2.3 High-Level Regulatory Review

2.3.1 California Diversion Mandates

2.3.1.1 Transformation Credit Repealed

The California Integrated Waste Management Act of 1989 (AB 939) implemented two important diversion mandates. The first required each city or county plan to show an implementation schedule to divert 25% of all solid waste from landfill and transformation facilities by source reduction, recycling, and composting, effective January 1, 1995. The second mandate required 50% diversion by January 1, 2000. The mandate authorized plans submitted after January 1, 1995, to accept up to 10% of its diversion goal to be met with transformation.

In September 2022, AB 1857 passed and repealed the provision authorizing 10% diversion credit through transformation and requires compliance (50% diversion) strictly through source reduction, recycling, and composting. Anaerobic digestion is also an acceptable method of waste diversion. As of the end of 2023, the Regional Agency was achieving 50-percent diversion. While use of ash as alternative daily cover (ADC) at landfills is typically an acceptable beneficial use in other jurisdictions, it is not accepted for this use at Fink Road Landfill due to the handling requirements of the Department of Toxic Substances Control (DTSC) for the ash generated at the WTE Facility.

2.3.1.2 Other Applicable Waste Regulations

AB 1826 states that businesses and multifamily residential dwellings of five or more units that generate two or more cubic yards of organic waste are required to recycle said waste. For the purpose of this bill, organic waste is defined as food waste, green waste, landscape and pruning waste, nonhazardous waste, and food-soiled paper waste that is mixed in with food waste. AB 1826 was effective on and after April 1, 2016. The bill also required local jurisdictions to implement an organic recycling program to divert organic waste, effective January 1, 2016.

AB 341 established a policy goal of the state that 75% of solid waste would be reduced, recycled, or composted by the year 2020 and required the department to provide a report that provides strategies to achieve that goal. This bill became effective January 1, 2014. It also requires a business that generates 4 cubic yards or more of commercial solid waste per week to arrange recycling services.

SB 1383 is a waste reduction mandate that was signed into legislation in 2016 that mandated a 75% reduction of organic waste from landfill from 2014 levels by 2025.

In June of 2022, SB 54 was introduced requiring that 100% of packaging in the state is to be recyclable. It also requires a 25% cut in plastic packaging and that 65% of all single-use packaging be recycled.

2.3.2 California Cap-and-Trade Program

The Cap-and-Trade Program is an emissions trading program managed by the California Air Resources Board (CARB). The program sets a declining limit on the amount of emissions permitted by the government each year. This “cap” is split into allowances that can be bought and sold by polluters. The number of allowances typically decreases by four percent every year. The program was started in response to AB 32 and SB 32 that together required statewide greenhouse gases (GHG) to be lowered 40% below 1990 levels by 2020.

The auction price for emission allowances changes quarterly and is currently estimated at $35.20 per metric ton of carbon dioxide equivalent ($MTCO_2e$). According to the 2021 GHG Facility and Entity Emissions published by CARB, Covanta emitted 247,067 MTCO2e in 2021. From these emissions, 93,466 $MTCO_2e$ were covered emissions and 153,601 $MTCO_2e$ were non-covered emissions. Non-covered emissions are emissions that are excluded from having a compliance obligation under the Cap-and-Trade Program and are eligible for an exemption. Assuming Covanta is only responsible for covered emissions (i.e., emissions having a compliance obligation under the Cap-and-Trade Program), Covanta would spend approximately $3.29 million on allowances per year and is only set to continually increase with the decrease in available allowances and increase in price. Historically, the price of allowances has seen modest fluctuation of about four percent on average per year, sometimes decreasing in price. However, since the COVID-19 pandemic, the average fluctuation has inflated to around 19%, with a 30% increase between August 2022 and August 2023.

2.3.3 San Joaquin Valley Air Pollution Control District Rule Update

In an effort to limit the emissions of nitrogen oxides (NOx), carbon monoxide (CO), sulfur oxides (SOx), and particulate matter ($PM_{2.5}$ and PM_{10}) from solid fuel fired boilers, steam generators, and process heaters, San Joaquin Valley Air Pollution Control District (SJVAPCD) introduced Rule 4352. This rule limits NOx emissions of MSW to 165 parts per million by volume (ppmv) corrected to 12% CO_2. In December of 2021, this rule was amended to lower the limit to 110 ppmv corrected to 12% CO_2 in a 24-hour average and 90 ppmv corrected to 12% CO_2 on a rolling 12 month average effective on and after January 1, 2024. Based on recent Facility modifications undertaken by Covanta, the Facility should be able to demonstrate compliance by the effective date. Covanta is currently retrofitting the facility to include Covanta’s Low NOx (LN®) technology. LN modifies the combustion air distribution and optimizes the ammonia reagent injection to enhance NOx control.

2.3.4 Technology Regulatory Requirements

2.3.4.1 Gasification Regulatory Requirements

Gasification as defined by California Public Resources Code (PRC) Section 40117 is the conversion of solid waste to a clean burning fuel for the purpose of generating electricity through a non-combustion thermal process.

Of particular importance to note is that the regulation requires that the technology may not use air or oxygen in the conversion process and may only use ambient air to control temperature. This is technically infeasible as most gasification technologies require some substoichimetric quantities of air or even pure oxygen in the conversion reaction, as well as to control the temperature in the gasifier.

Other requirements of gasification facilities include:

- It may not produce discharges of the following air contaminants or emissions: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, or nitrogen trifluoride.
- It may not discharge to surface or groundwaters of the state or produce hazardous waste.
- It must remove recyclable materials and marketable green waste compostable materials from the influent waste stream to the maximum extent feasible.
- The facility must certify to CalRecycle that any local agency sending solid waste to the facility is in compliance with this division and has diverted waste through reduction, recycling, or composting to the maximum extent feasible to a minimum of 30%.

2.3.4.2 Engineered Municipal Solid Waste Conversion (EMSW Conversion) Regulatory Requirements

As detailed in PRC Section 40131.2, “Engineered municipal solid waste conversion” or “EMSW conversion” must meet a series of process requirements to quality. Of particular importance to note, the waste to be converted contains less than 25-percent moisture and less than 25-percent noncombustible waste, the facility must not take more than 500 tons of waste per day, and the waste has an energy content equal to or greater than 5,000 BTU per pound.

2.3.4.3 Definitions of Relevant Terms

“Solid waste” as defined in PRC Section 40191 means all putrescible and nonputrescible solid, semisolid, and liquid wastes including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, dewatered, treated, or chemically fixed sewage sludge that is not hazardous, manure, vegetable or animal solid and semisolid wastes, and other discarded solid and semisolid wastes. Solid waste does not include hazardous waste, radioactive waste, or medical waste.

"Transformation" as defined in PRC Section 40201 means incineration, pyrolysis, distillation, or biological conversion other than composting. "Transformation" does not include composting, gasification, EMSW conversion, or biomass conversion.

2.4 Resource Recovery Facility Overview

The Stanislaus County Resource Recovery Facility (Facility or waste-to-energy (WTE) Facility) is a large municipal solid waste combustion facility. The Facility is located on an approximately 15-acre site at 4040 Fink Road in Crows Landing, California. **Figure 2** is a vicinity map showing the location of the Facility in relation to other jurisdictions within the County, such as the City of Modesto. **Figure 3** is an aerial view of the Facility. The site is part of a County-owned parcel which also includes the Fink Road Landfill (Landfill). It was developed by the Contracting Communities and Covanta Energy (formerly Ogden Martin Systems). The Facility was substantially complete in 1989 with commercial operation commencing after the successful completion of acceptance testing. The Facility is approaching 35 years of operation at the time of this report.

Figure 2. Covanta WTE Facility in Stanislaus County Vicinity Map

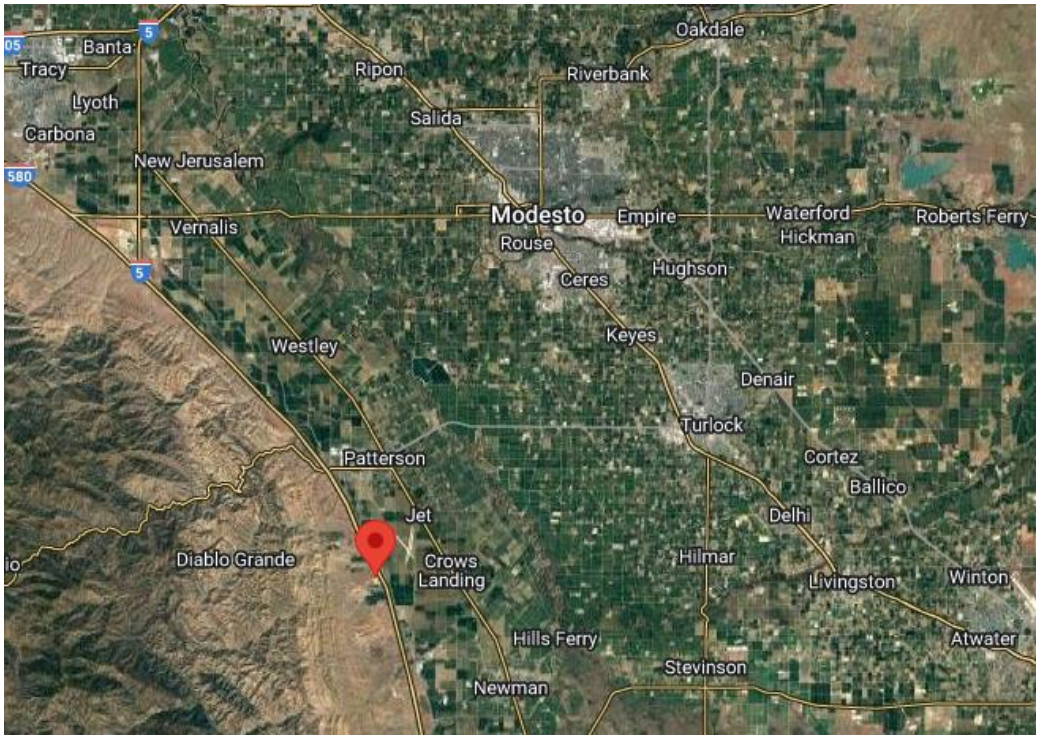


Figure 3. Covanta WTE Facility in Stanislaus County (Aerial)

The Facility consists of two large mass burn type processing trains both nominally designed to process up to 400 tons per day (TPD), or nominally 250,000 tons per year (TPY) of municipal solid waste. Waste is processed on a continuous 24/7 basis with annual scheduled maintenance, which typically occurs twice a year on each boiler, and unscheduled or “forced” downtime. The Facility is equipped with a 22-Megawatt (MW) turbine generator and normally generates approximately 16 MW of electricity for sale. Some of the electricity generated (roughly 12-15%) is used in-house to power the Facility’s equipment and critical systems so purchasing electricity from the utility is not required.

Waste received at the facility passes over an inbound truck scale and proceeds to the enclosed tipping floor. Waste is discharged onto the floor and inspected prior to placing in the refuse pit. Two overhead refuse bridge cranes are used to charge the feed hoppers on the processing trains. Ram feeders push the waste from the feed chutes located below the hoppers onto the inclined combustion grates. The facility utilizes reverse reciprocating Martin GmbH grate technology for combustion. Air passes through the grates and additional air is injected above the furnace area to complete combustion. The furnace is connected to a waterwall multi-pass boiler where the latent heat generated from the combustion of the waste is transferred through the boiler tubes and turns the water inside the tubes into superheated steam. The energy in the steam spins the turbine that is connected to the generator to produce electricity. As noted above,

some electricity is used in-house for Facility operational needs and the rest is sold to the utility.

The remaining ash and residue from the combustion process are discharged from the grate system and conveyed to the ash residue building. Metals are recovered from the ash and the remaining ash residue is hauled to the landfill for disposal. Combustion air is strategically injected into the furnace area to control carbon monoxide (CO). Each processing train is equipped with an ammonia-based nitrogen oxide (NOx) control system. The Selective Non-Catalytic Reduction (SNCR) system is currently being replaced with LN™ (Low NOx) technology to increase the reduction of NOx emissions per SJVAPCD latest update to Rule 4352. After passing through the boiler and economizer, the flue gas is treated prior to discharge. Pebble lime is slaked on site and the resulting lime slurry is sprayed into the spray dryer absorber (scrubber) for acid gas control. Additional water is also injected in the scrubber to cool the flue gas. Activated carbon injection for mercury and dioxin control is injected in the flue gas ductwork. A baghouse removes fly ash particulate, spent byproducts from the scrubber, and the activated carbon resulting in particulate and metals control. An induced draft (ID) fan located downstream of each baghouse is used to maintain negative draft through the combustion and air pollution control train. The cleaned flue gas is exhausted from the ID fan through a dedicated flue inside a common stack.

A cooling tower is used for heat rejection from the steam exhausted from the turbine. An extensive water treatment system is used to produce the high-quality water necessary for the boiler and turbine operation. Ancillary facilities on site provide other services including but not limited to maintenance operations, administration facilities, and fire protection.

2.4.1 Prior Facility Modifications

The Facility has not required significant modification to the air pollution control equipment since it was equipped with spray dryer absorbers and baghouses when it was initially constructed. However, the Facility has undergone some upgrades in the past largely to remain in compliance with changes in regulatory requirements. These modifications included the addition of an activated carbon injection system to enhance control of dioxins and mercury. Requirements for additional nitrous oxides (or “NOx”) controls also have resulted in some changes to the ammonia-based control system. Currently, Covanta is incorporating some additional enhancements to the NOx controls system that includes the addition of their Low NOx (or “LN™”) technology to further reduce NOx emissions. In addition to the upgrades to the air pollution control systems at the Facility, other equipment and boiler components have been replaced and/or upgraded as needed to keep the Facility fully functional. Boiler waterwall tube replacements, boiler tube bundles, and other related work required have been completed by Covanta when required to extend the useful operating life of key equipment and systems. A less common modification completed for this Facility was the replacement of the turbine in 2012. The post-combustion metals recovery system, which originally only recovered ferrous metals, has been modified to include nonferrous metal recovery and to keep the ferrous recovery systems operational. The contractual arrangement between Covanta and the Contracting Communities means that Covanta is fully responsible for all Facility

preventative and capital maintenance. This responsibility also extends to Covanta for any changes in law that would require upgrades to meet regulatory requirements.

3 Option 1: Status Quo; Facility Assessment

3.1 General

The Stanislaus Facility is owned, operated, and maintained by Covanta Holding Corporation (Covanta). Covanta is responsible for funding repairs and replacement of critical equipment and systems to ensure reliable and efficient operations, as well as for funding modifications to emissions controls and monitoring systems or other equipment to keep the facility in compliance with changes in law (specifically, AB 1857 as noted above). When the Facility is no longer viable, Covanta is also responsible for facility shutdown, dismantling, and cleanup of the site. In exchange for taking the Contracting Communities' post-recycled waste, Covanta receives a tipping fee (processing fee) per ton of waste processed and retains all operational revenue from the production and sale of electricity and recovered metals.

The County desires to maximize the life of their existing landfill and continue waste diversion in a cost-effective manner. The Facility has proven to be an effective means of waste diversion and extending the life of the County's landfill; however, recently WTE is no longer recognized by the State as a method of meeting the State's diversion requirements and currently counts as disposal, similar to the landfill. Covanta is also facing challenges that are impacting the economics of the facility. The original Power Purchase Agreement (PPA) has expired, and the current market rate for power sold is significantly lower than the original PPA price. In addition, there have been changes to California's cap-and-trade program which has resulted in increased costs for carbon emissions. This in combination with the emission of NOx from the Facility and the increasing expenses to operate and maintain an aging plant have also contributed to the strain on Facility economics.

3.2 Plant Reported Physical Condition

As part of HDR's assessment of Option 1, we performed a desktop evaluation of the operating and maintenance history of the Facility to compare the performance and condition with our experience at other WTE facilities in North America, including other facilities operated by Covanta. Our assessment was limited to the accuracy of the information provided to us by Covanta, and we used our industry experience and professional engineering judgement to verify some information when feasible. As noted previously, Covanta is responsible for Facility upkeep and ongoing operations. HDR had several discussions with Covanta requesting information related to the current condition of the Facility and maintenance practices and future capital investments. Limited information was provided in response to our requests and discussions. In addition, obtaining the necessary information was complicated by management changes on a corporate level with Covanta (i.e., Covanta Holding Corp. was acquired by EQT Infrastructure Partners in July 2021) and the fact that the current Facility Manager has only been in their position for a short time. However, our discussions with Covanta's

Business Manager and Plant Manager provided helpful insight into the facility's current and future operations. These discussions expanded on the condition of the equipment and various systems throughout the plant as well as addressed a few other needs that would benefit the Facility and help sustain the plant during ongoing operation. Covanta recognized that the Facility is aging and will require some life extending capital investment. Generally, discussions addressed issues that might be significant over approximately the next fifteen years. Covanta indicated that the Plant Manager had recently relocated from the East Coast and was not entirely aware of all of the Facility maintenance priorities and the associated capital investment but had a reasonable understanding of ongoing major projects and Facility needs. The Plant Manager has a WTE background and is knowledgeable of the specific needs of these types of facilities.

Covanta indicated that the past few years have been tough operationally with some extended outages, unplanned outages and other needs impacting availability. Operating without a plant manager did not help. Several projects discussed below that are now behind the Facility should improve availability although the plant is old and will have some continued replacement issues. The following discussion addresses what is known to be required for ongoing maintenance and operation of the Facility. As noted, HDR has attempted to supplement the lack of some specific Facility maintenance information with information from similar evaluations we have performed recently at other similar WTE facilities in the U.S. and Canada.

3.2.1 Waste Reception

Waste is received at the Facility and passes over the truck scales. The scalehouse is currently awaiting refurbishment for leaks and mold damage. No known issues with the truck scales or associated software were shared with HDR. However, it is anticipated that the scales are routinely calibrated and any issues with their reliability or adequacy for maintaining records will be addressed as they develop. Typically, the truck scales will require re-decking every 8-10 years. This is relatively inexpensive (typically $100,000 per occurrence) but will be necessary to keep the Facility operating into the future, as well as the possibility that computers and software may require upgrades or replacement. No other significant site or roadway issues were noted in discussions with Covanta.

3.2.1.1 Tipping Floor and Building

The primary issue for tipping floors is the wearing and spalling of the concrete. Over time the concrete is worn away due to the heavy equipment traffic and waste dumped on the floor, which can be corrosive and cause chemical breakdown to the concrete in combination with abrasion. Patching and repairs are likely completed by Covanta every few years, however. The current condition of the floor is unknown but was not noted by Covanta to be a major future expense that would need to be addressed. Overhead doors, siding, structural, lighting, fire protection, and other associated equipment is subject to a tough environment and potential damage from heavy equipment. Generally, these components are repaired, replaced, or upgraded as needed for safe compliant operation. It can be anticipated that work will be required to replace high wear areas of the tipping and some door repairs, siding and other repairs will be needed. If for example, the lighting and exhaust fans are old, they may require replacement. No special needs were noted by Covanta to sustain operation into the future.

3.2.1.2 Refuse Pit

The refuse pit is constructed of heavy-duty concrete and is not anticipated to require much attention even for the anticipated extended life unless there is a structural problem and no issues were noted by Covanta.

3.2.2 Refuse Cranes

The refuse cranes are still the original units, but one crane was refurbished approximately seven years ago with a full VFD motor upgrade that was reported to have greatly improved operation. The second crane is scheduled for a similar upgrade in 2025. Currently Covanta reported the biggest issue is with the festoon cabling system, but the bridge and trolley will also get overhauled with the upgrade to VFD motors. Cranes have a typical useful operating life of 25-30 years if a thorough preventative maintenance program is utilized. These cranes will continue to need attention if the Facility is to operate for another fifteen years, but the more significant work is likely five years or more out. Grapples see a lot of wear and tear; Covanta reported they will be replaced around the end of this year. Covanta did not mention any particular work required in the coming years on the bridge rails, but it is likely some work or a complete replacement will be needed in the next fifteen years.

3.2.3 Fuel Feed Systems

No specific issues were noted by Covanta as a major concern for the fuel feed systems. The following discussion addresses normal maintenance and repairs that Covanta will likely need to complete.

3.2.3.1 Hoppers and Feed Chute (Plate and Water-Cooled Section)

The hoppers and feed chutes are exposed to high abrasion as waste slides on the metal plating. The lower portion of the feed chute is water cooled with a double wall watertight construction. Water is maintained between the steel plating and cools the steel if the furnace flame creeps too high up the grate or into the feed chute. If the water seal is lost and the water jacket cannot be maintained, the feed chute lining can overheat and warp. This can cause catch points and contribute to feed chute plugs which can escalate operations stability issues. Covanta will need to maintain the water jacket, or they will need to rebuild the feed chutes every few years. Even with the water jacket, Covanta will need to replace some or all of plating over the next fifteen years. Hardox or other abrasion resistant steel slows the wear but does not fully eliminate the need for periodic replacement. At least some repairs and replacements should be expected during a contract extension but can be scheduled and maintained under preventative maintenance (PM) programs.

3.2.3.2 Hydraulic Feeders (Units and Ram)

No major issues were noted during discussions with Covanta and thus it is assumed PM measures have replaced and repaired components as needed. The hydraulic systems should continue to perform through one contract extension with the County with continued proper care and overhauls. Repairs and replacement of some components or

systems may need to be completed either due to failure or obsolescence but are not expected to be a major operational issue.

3.2.4 Grate

The grate system is a wear item that will need continual attention and replacement of grate bars throughout the term of the agreement. Covanta indicated that a full overhaul of the Unit 2 grate system is currently underway. A similar scope is schedule for Unit 1 next year. Completion of this work should position the Facility well for an extended period of time. Individual grate bars, plating, linkages and other components will be necessary under PM programs.

3.2.4.1 Siftings System

The under-grate siftings, hoppers, and combustion air system also could need some attention. A re-build was not specifically discussed with Covanta and may be necessary. It may be included with the grate overhaul scope of work. If not, it can be expected the Facility will need to complete a re-build at some point during the next fifteen years as well as routine repairs and replacements.

3.2.5 Furnace

The furnace refractory, chill tubes, plating, nozzles, access doors, insulation, and other components in the high temperature furnace area require routine inspections and repairs. If maintenance is maintained routinely, these repairs should be reasonable and not require an extensive replacement. Discussions with Covanta did not point to the need for a major re-build in the furnace other than for waterwall, chill tubes, and possibly headers, and other pressure part replacements. Besides the pressure parts replacement, if the Facility has kept up with routine maintenance of refractory and other component repairs during normal outages, continued proper and timely repairs should be able to maintain operation.

3.2.6 Steam Generating Facility Equipment

The various boiler components are all subject to corrosion and erosion in the boiler gas path. First and second pass waterwall sections usually require replacement somewhere between every 10 to 20 years of operating life. Evaporator tubes, pendants, and screen tubes also have a similar life span. The highest temperature superheater bundles and the first rows of other superheater bundles generally have a life span of three to seven years and the remaining superheater bundles have a slightly longer life span. Economizer tube bundles should have a longer life span, possibly as much as twenty years. The first and last bundles may see more issues due to higher inlet temperatures and the possibility of acid gas corrosion developing in the last bundle.

Covanta has had some difficulty with increased tube leaks and boiler downtime in recent operation. They have reported that they have been in a two to three year overhaul of the boilers. Upgrades due to the addition of Covanta's Low NOx (or "LN") control technology have been completed. Replacement of other required waterwall sections and tube bundles were implied by Covanta but limited specific details were not provided. Currently Unit 2 is replacing one or more superheater bundles and a similar replacement

will occur on Unit 1 next year. Covanta has indicated that this work will complete this round of major pressure part upgrades and replacements for the boilers. Covanta will need to continue making an investment in some sections of the boilers if the Facility is going to continue to operate beyond the end of the current term for an extended period. As that time duration is determined, it is likely that capital investment will occur strategically to maintain availability. It is possible, depending on what boiler sections and components were replaced during this current overhaul, that not all sections will be addressed. If Covanta does not keep up with adequate and appropriate repairs and operational practices, reduced availability will result.

3.2.7 Air Pollution Control Equipment

The air pollution control (APC) ductwork, scrubber vessels, baghouses, lime slaking and injection components, ID fans, and other components are highly susceptible to corrosion and wear. The acid gases in the flue gas, especially if they are allowed to condense, will causing thinning and eventually holes in the component and ductwork walls. This allows tramp air to be pulled into the boiler and is known as “air in-leakage”. Once in-leakage begins, the cooler ambient air accelerates metal loss. Some repairs are completed during nearly all outages to address wall thinning or holes through spot repairs or larger replating/resurfacing activities.

Covanta reported that the Facility scrubber vessels were replaced approximately ten years ago. The Facility indicates they have established a five-year inspection program, and the next round of inspections will occur in the coming year. Similarly, the baghouses are maintained using a scheduled plan and Covanta reports that they replace two hoppers per year. The Plant Manager has not had a chance to inspect the ductwork, but no draft issues or other major problems are evident. Covanta reports that this PM program has been successful with no major failures or major unplanned repair requirements in any particular year. Continued PM review is important and it is likely that a number of areas of the APC equipment will require repairs during an extended operating period. It is possible that the scrubber vessels and/or baghouses will require major repairs or replacement during a fifteen-year period.

The induced draft (ID) fans help maintain draft from the furnace through the baghouse. The Facility has plans to replace the rotor on the Unit 1 ID fan. During last April’s outage, inspections identified some damage that needed to be addressed. The fans are on a five-year inspection plan.

Similarly, the stack is on a ten-year inspection plan. The next inspection is due in the April/May major outage this coming year. The flues within the stack are bottom supported and are currently braced with some metal supports. At some point in the past one or more of the braces, guides, or flues became unstable and partially collapsed. Thus, the stack is a long-term operations risk. During the upcoming inspection more will be learned about the condition of the flues and any change in condition that have occurred. At some point the stack may require the flues to be relined. Replacing the flues is complicated and will require significant coordination but may be completed during the Facility outage schedule. The cost for such work is difficult to estimate without more information.

As noted above, the decision to replace the SNCR NOx systems with LN NOx control systems occurred in 2017. These systems are currently undergoing commissioning and

fine tuning and already performance at the required emission levels have been achieved. If the decision is to extend operation, Covanta will need to address critical items to maintain compliance. It is also possible that regulatory requirements for Cap and Trade may tighten, to the point where selective catalytic reduction (SCR) control systems will be required on both units. Adding SCR control systems would result in a major capital investment stressing the Facility economics. Potentially this could occur around or after 2030.

As part of the Facility's APC equipment the Continuous Emission Monitoring Systems (CEMS) require periodic replacement of analyzers and components as they become obsolete. The Plant Manager could not confirm the age of the current system but did say a couple analyzer upgrades were completed this year and there are some more scheduled for the next couple of years. Covanta also commented that the Facility has a history of good CEMS reliability. Over a fifteen-year period it is likely that other upgrades will be necessary. While not excessively expensive, costs combined with other Facility repairs add up.

Compliance test results completed at least annually for both units can offer insights into areas where the APC systems may require attention. A margin between the test performance level and the permit limit is normally maintained to avoid exceedances. The Plant Manager has not been Plant Manager while compliance testing has been completed yet but was not aware of any concerns or issues. Even NOx, which has not been tested with the new LN systems, was almost able to achieve the new limits without LN in place.

Covanta is also responsible for addressing all other changes in law emission control upgrades that are required. Currently EPA has announced that they are reviewing the Maximum Achievable Control Technology (MACT) requirements for large municipal solid waste facilities. How the rules will change is not known yet. With LN technology added, the Facility should be well positioned with reliable technologies. However, there are several measures that EPA could address that might still impact the Facility making compliance with the revised regulations more difficult. For instance, additional CEMS could be required such as for HCl or mercury emissions. Additional training or reporting requirements could add costs. It is possible that new APC equipment might be necessary to reliably meet requirements.

Covanta did not express any needs regarding the APC equipment other than those noted for the ID fan, stack, CEMS equipment and the scheduled PM work on all equipment once the LN system is installed. However, Covanta did express that the Facility is getting older, and this could mean that extended operation would require additional work on the APC systems.

3.2.8 Turbine Generator

Covanta indicated that the turbine had been replaced in 2012. It recently went through an extended two-month overhaul and thus should be in reasonable shape for two to three years when a minor overhaul might be scheduled. A small oil leak has been identified but it is not critical and does not impact cooling and lubrication of bearings or other systems so it will likely be addressed during the minor overhaul. No other vibration, noise, other performance issues have been identified for the turbine or generator and none are

expected that would need to be addressed in the next minor or major overhaul. A major overhaul would follow during the contract extension and possibly a second minor outage. These outages are a major expense and will need to be factored into Covanta's planning. That cycle should only need to be completed once during a fifteen-year contract extension.

3.2.9 Residue Handling System

Ash and residue are highly abrasive and corrosive making residue handling and metals recovery high maintenance systems. Residue systems require periodic re-building and equipment replacements. Covanta indicated the building itself is undersized for good metal preparation and storage and may need some expansion to improve operations. The building has experienced some corrosion and other damage and needs some structural repairs. A seismic review has been completed and will be addressed. These issues are not thought to be pressing but will be addressed if operations are extended into the future.

Regarding the processing equipment, Covanta stated that the ash dischargers and chutes are currently being replaced with one replaced this year and one scheduled for next year. The vibratory main bottom ash Slipstick conveyor continues to perform well and is in good shape. There are some issues with the metals recovery conveyors, but these may be addressed through operational measures. The ferrous magnet is routinely ultrasonically tested (UT) for metal loss and no issues were noted. The eddy current separator (ECS) is also performing okay. Some metals recovery replacements will be required if operations are extended.

Covanta indicated that the ash conveyors receive routine maintenance and continue to function adequately. Screw conveyors are used for most fly ash transport. Covanta indicated a few will need to be replaced over time but in general the system is functioning properly. In summary, if the contract is extended, some of the ash conveying and/or metals recovery equipment components will require replacement but should be managed without a complete re-build of the residue handling system.

The Facility has been working on some potential issues with residue and the metals recovery system. California uses the Soluble Threshold Limit Concentration (STLC) sometimes called the CalWET test method to determine whether the Facility residue needs to be managed as a hazardous waste. The facility has a special "F-letter" exemption from the California Department of Toxic Substances Control Agency (DTSC or Agency) addressing testing requirements allowing ash disposal in the monofil. The exemption addresses lead and cadmium levels in the leachate. The Agency has been reviewing all exemptions previously issued to various facilities and opened discussions regarding this exemption. A comparison review completed by the Agency of some historical data has also shown that levels of copper and zinc may have increased over time. Potentially the Facility may need to treat the ash residue with phosphoric acid WES-PHix treatment and/or cement at some point in the future and this process is expensive.

The Agency is also reviewing an associated issue that has developed due to some residual ash that may cling to ferrous metal sent to the recycler. The Facility is working with the Agency on a pilot program designed to separate the ash from the metal and not

transport the ash to and from the recycler. Metal is shaken at the Facility to attempt to separate the ash from the metal then magnets are used to load the metal for transport. However, some ash remains and addressing the residual may result in additional requirements.

Discussions with the Agency are ongoing, and a resolution has not been determined. Covanta has applied for a continued variance and the review by the DTSC is in the final stages.

3.2.10 Electrical Equipment and Controls

Equipment in this category includes transformers, switchgear, breakers, Motor Control Centers (MCCs), the Distributed Control System (DCS), Uninterruptable Power Supply (UPS), cables and raceways and other related equipment. The status of much of the electrical equipment and controls is not known and depending on the component will have different anticipated useful lifespans. Some of the major substation and power distribution equipment i.e., transformers, switchgear, etc. have estimated useful life of 35 years while the DCS is typically replaced every 12 to 15 years. The primary transformer T1 is scheduled to be replaced next year during a black plant outage. It has had some gassing issues, which is an indication it needs attention. No other major concerns have been identified. Electrical gear and instrumentation often have a limited life due to obsolescence and in HDR's experience many other WTE facilities of similar design and age as this one are now upgrading their major substation and power distribution equipment. These are preventative replacements to ensure that if there is an issue with a transformer, for example, the replacement parts are readily available and significant downtime can be avoided. Many electrical components have significant (one year or more) lead times from the order date, which places further emphasis on long term planning. If the contract is extended, some electrical systems and controls will need to be replaced. Covanta indicated they expect routine failures and are replacing components such as breakers as needed.

Covanta recently had an unfortunate event with a lightning strike. Significant costs were incurred recovering from the event. Whether there are some lingering issues to be addressed or if some electrical systems were updated as a result is not known. The Facility does not have an emergency generator. The Control Room has been updated with new controls. A Citech system is in place to assist with data analysis and Facility management.

3.2.11 Balance of Plant

The Facility has numerous Balance of Plant (BOP) systems necessary to keep the Facility operational. Examples include but are not limited to feedwater, condensate, cooling water, closed cooling water, compressed air, instrument air, and other systems. All these systems require maintenance and replacement of components when they reach the end of their useful life. It was noted by Covanta that a major concern is the circulating water piping systems will need to be replaced or require major repairs in the near future. The repairs may be limited to replacement of the large underground piping systems to and from the cooling tower and main condenser or may involve more work such as replacement of pumps or other components.

A few other components and systems were discussed with Covanta and a few issues noted. The air preheaters for both boilers are showing their age and will need some work to improve heat transfer. The combustion air and other facility fans are inspected on a five-year basis, but no major issues were noted.

Water treatment and associated water side equipment had a few items of note. The Facility uses well water and needs some extra treatment to get water quality to boiler makeup standards. Thus, the system is a little more complicated than for most similar facilities. Most of the equipment is functioning well but chemical storage tanks will be replaced, one in 2024 and one in 2025. The treatment system includes reverse osmosis and possibly a demineralizer system. A second electric boiler feedwater pump will likely be installed within the next five years. The Facility currently has an electric and a steam driven feedwater pump but the Facility has struggled keeping the steam driven pump in service. No other pump issues were noted.

Fire protection systems were reported by Covanta to be in good shape. A break in the site fire loop occurred and will need repairs, but all areas of the plant were reported to be protected. The Plant Manager indicated that the addition of more infrared (IR) fire detection and other advanced warning, detection, and protection systems would be nice to have. Currently the Facility has two mobile IR systems used to monitor the tipping floor and pit. They are equipped with foam carts to fight any fires detected. If the Facility continues to operate into the future, it is expected additional upgrades will be added.

The condition of other BOP equipment and systems were not mentioned by Covanta as needing attention during the Facility status discussion. It is likely that some equipment and systems will require attention if the contract is extended, however in most cases the work can probably be completed during existing outages and preventive maintenance plans.

3.2.12 Other Structures and Equipment

Other systems include but are not limited to water treatment systems, cooling systems, other BOP equipment, and maintenance and administration and mobile equipment. The aging Facility will likely have some other needs that will require repairs or replacements during a contract extension. In addition, allowances should be made to perform future repair on systems or components that cannot be inspected (i.e., underground infrastructure) and also to perform aesthetic improvements to the facility.

An example is that due to a recent lightning strike, the administration area was flooded and has since been repaired. Another system that Covanta indicated will likely need replacement or major repairs is the circulating water system. The piping to and from the cooling tower was reported to be in poor condition and is necessary for Facility operation. Covanta is evaluating work need for the piping system to and from the condenser and cooling tower and whether it needs to be relined or replaced at least in part due to the age of the system. Some funds have been set aside for the project, but it will be difficult to complete due to the location and the outage requirements. The cooling tower is a wood frame structure. Covanta indicated it could use some attention but is still serviceable. No issues were noted with the condenser.

3.2.13 Outage and Major Maintenance History

Covanta is responsible for maintaining the Facility and completing all required repairs. No historical records were provided for review.

3.2.13.1 Scheduled Outages

Normal facility outages include both major and minor outages for each processing train every year. The outages are intended to keep the Facility in proper operating condition. As the Facility ages, maintenance becomes more complicated and forced outages can become an issue. Details were not provided by Covanta, but the implication was that the Facility has had difficulty keeping up with issues. The Facility was without a plant manager for a while, but recently hired a new Plant Manager. Based on discussions with Covanta, the Plant Manager has addressed the status of various Facility systems and provided an update on condition, repairs, and plans for repairs across the plant. Some refinement of needs may occur after the Plant Manager has a chance to work through the next round of outages, but it was reported that most major work appears to have been completed or is scheduled to be addressed in the next couple years. The Facility is old and will have continued and increased age-related issues, particularly for electrical systems. If the contract is extended, it is likely that availability and throughput will continue to have some impacts but the major repairs should improve performance when compared to the last couple of years.

A recent turbine generator major outage was completed. Major and minor overhauls are imperative to ensure reliable operation of this system and can often also provide minor efficiency improvements as well. The outage was reported to take a few extra days, but with this work completed, the turbine generator system should be in good condition other than a noncritical oil leak until the next minor overhaul (anticipated to occur in two to three years) and the next major overhaul (anticipated to occur seven to eight years after this recent major overhaul).

3.2.13.2 Facility Operations

In recent operating cycles, the performance has not been as strong as desired. Annual waste processing capacity has declined as the Facility has had increased forced outages and has had to complete additional maintenance. If a contract extension is completed, it is likely that reduced availability from historical values will occur but now having a plant manager with WTE experience should improve availability. Random events such as the heavy rains earlier this year that resulted in wet waste, requiring heavy usage of diesel and increased operating costs will still need to be addressed and will continue to impact operations.

3.3 Areas of Concern & Facility Improvement Needs

Limited information was available from Covanta regarding the Facility condition and areas that require attention. All required work is the responsibility of Covanta, and thus only impacts the Contracting Communities indirectly with reduced waste diversion. For instance, work on the circulating water piping systems that is anticipated to replace or complete major repairs soon is Covanta’s responsibility and will impact their ability to

process waste until the work is completed. The cooling systems are critical for Facility operation.

Another area of concern noted by Covanta is the status of the electrical and control systems. Replacing obsolete instruments and controls or major transformers is necessary to manage and avoid Facility shutdowns. Some of that work related to major components is scheduled for completion and for some electrical component replacement will occur as failures happen.

Covanta noted that the Facility had been operating for some time without a plant manager. A new plant manager experienced with waste to energy is now in place. Maintaining key staff is a critical issue for all facilities and avoiding loss of additional key staff is especially important to maintain institutional knowledge. For the WTE Facility to bring a new manager on board who has not had operating experience with the Facility will require time but based on discussions, progress is well underway. The new plant manager needs to understand the issues surrounding the operating equipment and develop a working relationship with the Facility staff and processes. Proper attention to both the plant systems and the personnel is needed to maintain performance.

As noted above, Covanta is currently addressing an issue regarding residual ash remaining on metal sent for recycling and anticipates they are nearing final resolution a continued variance in final review stages with the agency. It is anticipated that ash going directly to the monofil will not need to be characterized due to a long-held understanding. However, a question is still open regarding any residual ash transferred to the recycling company that requires disposal.

Covanta indicated one of the biggest factors for their stable operation is the elimination of bulky materials that if not caught can jam in the feed chute and result in upsets. Objects can be large metal, plastic, wood, baled, or other materials. The feed chute has a clearance in depth of only about two feet and thus can be plugged by something like a washing machine, large plastic tote, plexiglass, metal sheeting, baled waste, or a water tank. Unjamming the feed chute can cause significant issues.

3.4 Economic and Regulatory Considerations

Covanta is responsible for all costs to maintain and refurbish the Facility. This responsibility extends to change in law requirements that are necessary to remain in compliance with revised state and federal regulations. Covanta is currently addressing the NOx emission regulations. On December 20, 2023, EPA signed a proposed update to the Standards of Performance for New Stationary Sources (NSPS) and Emission Guidelines (EG) for Existing Sources for Large Municipal Waste Combustors (MWCs). These rules are commonly referred to as the Maximum Achievable Control Technology (MACT) Rules for Large MWCs. The proposed update and revised EGs in the MACT include more stringent emission limits for most of the criteria pollutant and new operating requirements that could have a direct impact on the operation of the Facility. If there is a contract extension, it is anticipated the MACT regulations will be enforceable before or during the term of the extended contract. There is some time for the individual states to adopt the rules and EPA to approve. There is then an additional period for the impacted facilities to come into compliance (currently the proposed MACT rules would most likely require implementation by 2029 for the Covanta Stanislaus Facility). From the time EPA

issues the final emission guidelines to when the facilities impacted must come into compliance is usually between two and five years but could be less or more time.

Cap and trade costs for carbon emissions have become a significant cost for the Facility. The rates for the cost of carbon emissions jumped again during the last quarter. The cost per ton was in the range of $20 to $30 per ton but most recently the price went to approximately $50 per ton. Rates have been generally climbing, and that trend is expected to continue during a contract extension term. It is anticipated that rates will continue to rise, potentially to $100 per ton or more. At current pricing, the fee is approximately three to four million dollars per year. Covanta is responsible for paying these costs.

Covanta's power purchase agreement expired years ago, and since then, Covanta has been selling power without that guaranteed rate. Recently, the Facility has been getting capacity money and has fared reasonably well with power sales. The plant has been relying on the spot market with a hedge. Power sales, however, cannot fully make up for the added operating and regulatory costs and lost revenue from landfill diversion fees.

To provide the revenue needed to continue operating the Facility, Covanta has been working on identifying additional special or profile waste that might be processed by the Facility. When the current contract expires in 2027, Covanta plans to operate the Facility as a merchant plant processing the best value waste available. Profile waste has a higher tipping fee sometimes substantially higher than MSW. Several types of profile waste are under consideration including but not limited to:

1. Waste from companies and facilities that are striving for zero landfilling claims. The tipping fee for this type of waste is usually approximately $70 per ton.
2. Special wastes from industrial and commercial sources may have a price of $150 to $200 per ton. These materials may be items such as assured destruction service for legal or financial documents, off-spec medications, or other materials firms do not want to send to a landfill.
3. Animal and Plant Health Inspection Service (APHIS) waste including materials such as agricultural food scraps, plants, and seeds obtained from airports, border crossing stations, harbors, and other points of inspection may have a value of approximately $300 to $400 per ton.
4. Regulated medical waste may have a value of approximately $400 per ton. A limit of ten percent of the facility capacity or approximately 20,000 tons is imposed on the Facility without needing to comply with additional medical waste incinerator regulatory requirements. A ten percent limit of the facility capacity or about 20,000 tons is imposed on the Facility without complying with additional medical waste incinerator regulatory requirements.

The higher revenues from these types of materials help to close the revenue gap. Covanta has not identified enough profile wastes that might be necessary or available but has been working on this issue. Covanta is projecting that as materials are brought to the Facility, a substantial portion of the Contracting Communities waste would be displaced by the profile waste to bring the Facility to a sustainable operating position. Depending on the materials identified and permitted to be processed, Covanta estimates between 7,000 and 30,000 TPY would need to be processed by the Facility. Obtaining

the required permit changes to allow processing is something Covanta has been working on with limited progress.

While at one point the Facility was able to process approximately 300,000 TPY, in recent years the processing rate has been approximately 235,000 to 240,000 TPY. The reduction in throughput has been largely attributed to the increasing heating value of the MSW. More recently due to the turbine outage and low Facility availability, the annual throughput has been even lower. Some of this reduction should be possible to recover but in order to close the revenue gap, the Contracting Communities waste quantity would likely need to drop from 240,000 TPY to somewhere between 150,000 and 200,000 TPY.

The implication of these comments from Covanta are that the tipping fee revenue for the Facility to continue operation needs to increase by a factor of 2 to 2.5.

For the Contracting Communities there are several impacts:

- If Covanta were to decrease the MSW accepted by the WTE Facility, this would mean increasing the landfill disposal needs. The anticipated additional MSW sent to the landfill ranges from approximately 40,000 TPY to 90,000 TPY. The current tip fee for the WTE Facility ($42 plus $7 for admin fees per ton) is roughly equivalent to the current tip fee for the Fink Road Landfill ($45 per ton for non-franchised cities, $29 per ton for franchised cities), therefore sending this material to Fink Road Landfill would be nearly equivalent in disposal cost. However, it could significantly reduce the life of the landfill.
- For the Contracting Communities waste sent to the Facility ash and residue returned to the landfill would decrease somewhere between approximately 10,000 TPY and 22,500 TPY assuming 25% ash and residue content. This could potentially result in a loss of revenue of approximately $450,000 to $1,012,500 per year.

5. Covanta would import the displacement waste from other sources. Assuming 25% ash and residue content, these tons would approximately offset the ash and residue that would have been placed in the landfill from processing Contracting Communities' waste. In theory this increased ash tonnage for non-County waste would counter the lost ash and residue disposal of County waste.

3.5 Five Year Plan

Covanta was asked about their five-year plan for the Facility ongoing replacement and upkeep, but one was not provided. It is standard practice at Covanta operated facilities to have a short-term (i.e. 1-2 years) and a long-term 5-year plan that is updated after major schedule maintenance outages, so it is likely this plan exists for the Facility. HDR would anticipate that the plan identifies most, if not all of the items discussed with Covanta as part of HDR's evaluation. However, without access to Covanta's long-term maintenance and capital replacement plan, HDR can only speculate and rely on our recent experience at other similar WTE facilities. In addition, as noted above, the impact of the proposed MWC MACT rule on the capital improvements and upgrades would also need to be incorporated into the 5-year/long-term plan.

3.6 Other Replacement Plans

Covanta indicated the Facility is showing its age. Older facilities often need to go through certain measures to help maintain performance. Some possible measures might include:

1. Boiler waterwall replacement of high wear areas in the first and second passes. This may extend into the third pass and some tube bundles if these areas are in poor condition. Covanta indicated most of the major work will be completed within the coming year.
2. CEMS become obsolete after approximately ten years and may result in a complete overhaul of instruments, conditioning systems CEMS rooms and data acquisition systems. Covanta indicated that some analyzers are scheduled to be replaced.
3. Control systems also may no longer be supported by vendors and may require full system replacement. Major plant control room systems have been updated.
4. Ash and residue systems see tough duty and may require replacement from the ash dischargers through metals recovery. Several components are scheduled to be replaced and some other work and expansion is being contemplated but this area will continue to see needed work.
5. Site paving likely would be placed on the 5-year plan but major rebuilds of the tipping floor roadways and other areas may become a special project.
6. Water treatment systems such as demineralizers may be replaced with newer reverse osmosis systems or other changes may be made to help control makeup water costs. Some tanks are scheduled to be replaced and a plan is being developed to address the steam driven boiler infeed pump.
7. Cooling system rebuilds may be implemented. The circulating water lines are known to be in poor condition and may require total replacement. Cooling towers can be re-built to improve performance and pumps or other equipment replaced.
8. Power savings measures such as LED lights, variable frequency drives (VFDs), addition of solar panels, or other measures may be taken as a means of reducing inhouse power consumption and increasing electricity sales.
9. Air compressors, dryers and receivers may be old and need to be updated.

Any such replacement plans would be completed by Covanta. Costs would need to be covered by the various revenue streams for the Facility.

3.7 Expansion Capability

The current WTE Facility site arrangement was not developed to accommodate another processing train. A review of the site does not clearly show an area large enough for a third combustion train with the associated APC equipment. Adding a third unit would also require adding another turbine generator and ancillary equipment building, expanding the cooling systems, water treatment, ash and residue systems, and other support equipment meaning additional space requirements. Even more challenging would be expanding the tipping floor, refuse pit and crane systems to feed the expansion boiler.

The Facility does not appear to be laid out in a manner that would support expansion of these systems.

Permitting a third unit would be a very difficult process. If a permit could be obtained, it would most likely require selective catalytic reduction (SCR) technology for NOx control. This would be additional APC equipment requiring even more space for heat exchangers and catalyst beds. Emissions requirements would be even tougher for the new unit, possibly resulting in use of newer more capable APC equipment. These changes would add significant costs to the project.

These questions also need to consider the availability of MSW and whether the Contracting Communities would support the expansion project.

For these reasons, HDR's opinion is that expansion of the Facility is not a viable consideration.

3.8 Potential Facility Improvements

Discussions with Covanta and other investigations did not result in any clear improvements that would alter the economic conditions for the Facility. Potential Facility improvements may include some of the items listed in Section 3.6 that could increase electricity sales or reduce operating costs. To be viable, a very rapid payback period of less than three years would be necessary. While some ideas such as adding VFDs to the Facility ID fans or adding solar panels to rooftops, parking areas, and other spaces may reduce internal power consumption, payback likely would not be quick enough to justify the costs. Replacing lighting with LED fixtures if it has not already been completed may pay for themselves but not have enough savings to offer significant benefit. Other alternatives such as steam sales and microgrids that have improved revenue streams for some plants were quickly ruled out for this Facility. Other alternatives such as hydrogen generation instead of electricity generation are not yet commercially available.

3.8.1 Carbon Capture

3.8.1.1 High-Level Description

HDR has performed a high-level review of available carbon capture technologies that could be implemented at the Facility to reduce carbon dioxide equivalent (CO_2e or CO_2) emissions to ultimately reduce the amount spent on the cap-and-trade allowances. These technologies have varying levels of maturity, efficiency, and cost-effectiveness. The choice of technology depends on factors such as the specific application, the source of emissions, economic considerations, and policy/regulatory frameworks.

There are a wide range of carbon capture technologies that are currently being developed. These include absorption-based technologies, adsorption-based technologies, and membrane-based technologies. Other technologies that are being explored include cryogenic separation, oxy-fuel combustion, hydrate formation, ionic liquids, pressure swing adsorption, and chemical looping combustion. From HDR's high level review, the most commercially available technology for carbon capture in a post-combustion situation is the absorption-based technologies using an aqueous monoethanolamine (MEA) solution in a process referred to as "amine scrubbing". This is

a post-combustion CO_2 capture system that can be retrofitted onto an existing facility in a lower temperature region of the flue gas path.

Shell Catalysis & Technologies, a subsidiary of Shell, offers this technology registered as the Cansolv® CO_2 Capture System and has three sites in operation. This technology claims it can treat gas flow rates ranging from roughly 7,000 to 425,000 standard cubic feet per minute (SFCM) and CO_2 concentrations from nine (9) to 12.5-percent with a guaranteed CO_2 removal of over 90-percent. The recovered CO_2 can be sold for enhanced oil recovery (EOR) and commodity markets or for sequestration.

Honeywell International Inc. (Honeywell) through its subsidiary Universal Oil Products (UOP) also offers a wide variety of CO_2 separation technologies. They reported to have a commercially ready post-combustion carbon capture technology, referred to as their Advanced Solvent Carbon Capture (ASCC), though they are still seeking the first commercial application of this technology.

HDR also has spoken with Mantel Capture, a company focused on developing a system that captures CO_2 from the higher temperature regions of a boiler unit and is looking specifically at WTE applications as part of its target demographic. The technology could be installed as a retrofit to an existing facility or installed during a facility expansion and tied into the existing operating units. By Mantel's own timeline, commercially available systems will not be ready until 2028, and in addition HDR has concerns about the longevity of the tube bundles placed into the high temperature regions of the boiler.

That being said, there is currently limited commercially available technologies that can be implemented at the Stanislaus RRF.

There are many economic incentives supporting the development and implementation of CO_2 capture technologies. These exist in the forms of tax credits (with a period that allows direct pay), subsidies and grant funding options. Many existing incentives were improved upon as part of the Inflation Reduction Act (IRA) and signed into law in August, 2022. In addition, there are Voluntary Carbon Markets in which Stanislaus could theoretically sell their avoided carbon. It is difficult to estimate the value of these carbon credits, as these markets are not established by the government and the costs of the credits are influenced by the industry in which they are generated, and how the CO_2 was avoided. The presentation provided to HDR by Mantel Capture notes that Carbon Credits and Advance Market Commitments are currently in the range of $500 to $1,000 per ton of CO_2, however, they are expected to drop to a range of $100 to $250 per ton of CO_2 as supply catches up with demand.

The transportation cost also needs to be considered after the CO_2 is captured. Transportation can occur via pipeline, requiring higher pressures for longer distances, or via truck or ship. Ultimate use and destination and cost to transport would need to be considered to estimate transportation costs and tax credits for end use.

As a result of these factors, HDR is not recommending Carbon Capture as a viable solution at this time.

4 Alternative Technologies

4.1 Option 2: Gasification to Biofuels

4.1.1 Introduction to Gasification

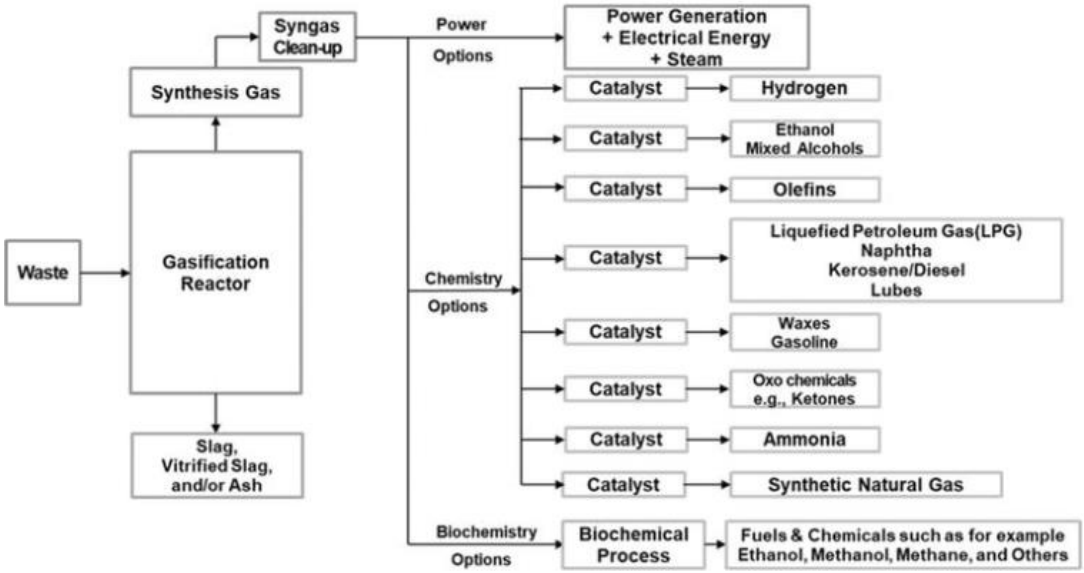
Gasification has been utilized for more than two centuries, starting with the use of "coal gas" as the feedstock in the 1790s for illuminating factories. During World War II, Germany employed wood gasification to synthesize fuels for vehicles and aircraft. Since the 1970s, commercially successful gasification facilities have relied on carbon-based feedstocks such as woody wastes generated from forestry and land-clearing activities, or clean wood recovered from construction and demolition activities to fuel the gasification process. The process typically yields a hydrogen rich syngas that can be directly used as a fuel for electricity generation in combustion turbines or internal combustion engines.

Alternatively, in commercial applications (particularly in Europe and Asia), the heat from the syngas is recovered in a boiler or heat recovery steam generator (HRSG) to produce steam, which then drives a steam condensing turbine to generate electricity, similar to the existing Facility and other waste-to-energy (WTE) technologies. The constituents of the syngas, specifically hydrogen (H_2) and carbon monoxide (CO), can also serve as chemical building blocks for the synthesis of chemicals and liquid fuels.

Gasification encompasses a wide range of technology designs. Gasification facilities that combust the syngas produced by the process will have air emissions similar to traditional WTE facilities, although, theoretically at lower volumes and concentrations. If the syngas is conditioned for use elsewhere (e.g., in a catalytic process for generating liquid fuel), or for combustion turbines, additional gas cleaning and conditioning equipment is required. These technologies also produce small amounts of char and ash, comparable to or less than traditional WTE technologies (less than 90% by volume and less than 20% by weight). Other metals and inert materials may remain with the char/ash and can be recovered after processing. Some technologies generate tars and waxes that may need to be removed from the gas to avoid operational issues.

Figure 4 provides a schematic of a gasification process showing the range of potential outputs.

Figure 4. Schematic of Typical Gasification Technologies



Source: Seo, Yong-Chil, et al. 'Gasification of Municipal Solid Waste'. Gasification for Low-Grade Feedstock.

4.1.2 Gasification in California and Beyond

There are currently no commercial-scale facilities operating continuously in the United States that meet the criteria for gasification as defined in Section2.3.4.1 of this report which summarized the California PRC requirements for gasification facilities. There are several commercial-scale gasification facilities in operation outside of North America, some of which have been operating for several decades, but historic operating data, economic data, and whether they are successfully processing mixed MSW as the incoming feedstock is not available. Furthermore, the scale of these gasification facilities on a per unit basis may not be sufficient compared to the existing WTE Facility (i.e. 400 tpd per unit). Thermal gasification of coal and biomass has a long commercial track record around the world, with majority of these facilities located in Asia, particularly in Japan, and in Europe. These facilities process feedstock materials using units sized from about 100 tons per day (TPD) to 275 TPD and are usually combined in multi-unit configurations to create an overall capacity of 500 TPD or greater. Some gasification facilities in Japan utilize feedstocks with high energy content, such as industrial wastes, tires, plastics, or a combination of these feedstocks and MSW. The drivers for the use of gasification technologies in Europe and Asia are largely related to the lack of available landfill capacity and very stringent emission standards, which favor the use of this technology. In addition, it is important to understand that waste tipping fees in Europe and parts of Asia, like Japan, are much higher compared to the U.S. (in excess of $250 per ton USD) and the cost of energy is also much higher, which makes these facilities more financially viable. In addition, one goal of the process is to generate an ash product that can be beneficially reused as an aggregate in the construction industry to limit the amount of material having to be diverted to scarce landfills. However, options for beneficial reuse of this material remains limited.

4.1.2.1 Gasification of Biomass-to-Electricity

Gasification in California follows the trend of gasification in Asia and Europe and began with biomass conversion into electricity. The challenges associated with gasification technologies include the types of wastes suitable for the technology may be limited to certain high energy content materials, such as plastics or tires. The feedstock also may need to be pre-processed including shredding, possibly drying and removal of unsuitable materials such as glass and metal. There are gasification technologies that require oxygen or enriched air for their process or steam inject for optimum performance, which can increase capital and operating costs. Consistent quality of syngas is crucial for further processing into chemicals or fuels, but the equipment needed for syngas cleanup can significantly increase costs.

The following are brief examples of biomass gasification plants operating in California.

Phoenix Energy

Since 2011, Phoenix Energy has been working in the gasification market in California and currently operates two pilot-scale facilities, one in Merced and one in Stockton. In 2014, Phoenix started work on two biomass-to-electricity facilities, one outside Truckee in Placer County (five megawatts) and the other in North Fork, Madera County (two megawatts). The five-megawatt capacity was strategically selected to qualify for California's BioMat program which allows facilities who generate up to five megawatts of gross electricity production to qualify for higher pricing for up to three megawatts. Phoenix Energy has a modular gasification system and can scale up capacity by adding additional gasifiers.

Envirepel Energy Inc.

Another modular biomass gasification technology to break into California is Envirepel Energy Inc., who constructed a three-megawatt facility in the high desert town of Phelan, CA. The process started in 2017 applying for the BioMat program to obtain a favorable Power Purchase Agreement (PPA) with Southern California Edison, who ultimately awarded a 20-year PPA in early 2018.

4.1.2.2 Gasification of biomass-to-fuel

Aemetis, Inc.

Aemetis currently owns a 60 million gallon per year ethanol and animal feed production facility in Keyes, California, and another facility in India. In 2019, they were awarded a five-million-dollar grant from the California Energy Commission (CEC) to construct a 12.54 million gallons per year renewable ethanol facility in Riverbank, CA in partnership with LanzaTec, Inc. and InEnTec, Inc. At full build, the facility would convert 138,000 tons of woody agricultural biomass into a cellulosic transportation fuel. InEnTec's gasification technology is known as the Plasma Enhanced Melter® (PEM) system. The syngas produced from the PEM would then be upgraded by LanzaTech's gas fermentation process to produce ethanol. Although larger than the biomass-to-electricity gasification systems, this technology is still considered modular and would consist of three 150 ton per day downdraft gasification systems.

4.1.2.3 Gasification of MSW-to-electricity

Sierra Energy

Sierra Energy developed their FastOx® gasification technology in 2004 and in 2017 commissioned a commercial demonstration facility in Monterey County, California. Their FastOx® technology uses heat, steam and oxygen to reach temperature as high as 1,000°F to break down materials and generate syngas. They call the resulting inert materials non-leaching stone free of toxic byproducts. The project in Monterey County converts ten tons of municipal solid waste and biomass per day into syngas which is then upgraded to electricity to power a portion of the military base. The project is situated on 0.25 acres. This project received funding from the U.S. Department of Defense, the California Energy Commission, and the U.S. Army.

4.1.2.4 Gasification of MSW-to-biofuel

Enerkem

As self-proclaimed on their website, Enerkem was the first company in the world to produce renewable methanol and ethanol from MSW at commercial scale. Born out of the Universite de Sherbrooke (Quebec, Canada), Enerkem spent over a decade refining their technology before scaling up from laboratory, then pilot, then demonstration scale as shown in Figure 5. Enerkem built its first commercial scale in Edmonton, Alberta capable of processing up to 100,000 dry tons of refuse derived fuel. The Alberta Biofuels facility was commissioned in 2016 but has reportedly not accepted waste from the City of Edmonton in over a year and its commercial viability is unknown. Enerkem also has projects in development around the world, including projects in California. One of their projects in California was awarded a five-million-dollar grant from the CEC, but due to project delays in permitting, had to return the grant. They have also attracted big partners with some of their facilities such as Shell, Suncor, and Suez.

Figure 5. Enerkem's Development Timeline

Source: https://enerkem.com/company/story/

Fulcrum BioEnergy

Fulcrum BioEnergy claims to have developed an operation that takes unprocessed MSW otherwise bound for a landfill and uses it to make transportation and aviation fuel. This operation occurs across two different campuses: their Feedstock Processing Facility (FPF) and their biorefinery facility.

Their Feedstock Processing Facility (FPF) is located in Sparks, NV adjacent to the Waste Management (WM) Lockwood Regional Landfill. Waste is supplied to this facility under long term waste supply agreements with WM and Waste Connections, Inc. Unprocessed MSW arrives at the FPF, then is fed through various separation, sorting, sizing, and drying equipment to produce a prepared feedstock that can meet the specification of the gasifier at the biorefinery facility. The entire FPF footprint is approximately seven acres and houses a roughly 60,000 square feet processing facility and an additional roughly 12,500 square feet tipping building to the south among other ancillary structures (i.e. admin building, scale, parking lot). An aerial of this facility is provided in **Figure 6**.

The prepared feedstock is trucked to the Fulcrum Sierra Biofuels facility located approximately 14 miles east of the FPF to be converted into a Sustainable Aviation Fuel (SAF). This site is approximately 17 acres. In this process, the incoming feedstock is fed into a bubbling bed gasifier to produce a syngas. The syngas is cleaned up in a wet scrubber to remove particulate, acid gas, and excess moisture to prepare the syngas for the Fischer-Tropsch (FT) process. The FT process occurs in a FT reactor and involves the use of a catalyst to convert elements of the syngas (CO and H) into a synthetic crude (syncrude). The syncrude is then broken down into smaller chain hydrocarbons and further to SAF. See **Figure 7** and **Figure 8** below for images of the biorefinery facility.

Figure 6. Fulcrum BioEnergy Feedstock Preparation Facility (FPF)

Source: Google Earth

Figure 7. Fulcrum Sierra Biofuels Facility (Aerial)

Source: Google Earth

Figure 8. Fulcrum Sierra Biofuels Facility

Source: Courtesy of energydigital.com

4.1.3 Assessment

Gasification of MSW is an extremely intricate process as a result of the heterogeneous requirement of the feedstock. There are many pilot/demonstration scale systems that appear to show success in smaller reactor type vessels, but this does not translate into a larger scale application like what would be required at Stanislaus.

Significant pre-processing of the incoming MSW is required to create a prepared feedstock (a.k.a. specified fuel) that is homogeneous in nature. In fact, the gasification technology itself (i.e. fixed or fluidized bed, plasma arc, etc.) is selected based on the specifications of the prepared feedstock. Many steps are involved in the pre-processing of MSW to create a feedstock that may be suitable for gasification. This includes pre-sorting of the feedstock to remove high value plastics, bulky materials, dirt, glass/grit, and metals that may cause operational issues, shredding to obtain the desired particle size, and drying to obtain the desired moisture content. This is a significant process and typically there is still a large percentage of the incoming waste stream that gets sorted out and requires disposal by traditional means.

Due to the high costs associated with the technology when compared to alternative disposal options available, a large percentage of material that still ends up being removed from the process, and the spatial requirements to site these facilities, these facilities experience difficulties with scaling-up to commercial operations.

There are many challenges associated with attempting to construct a FPF and biofuels refinery facility on the Stanislaus site. The existing WTE Facility is operated on a 15-acre parcel with approximately seven acres of available space to the east where the e-waste storage area is currently located. Assuming the existing facility can be completely demolished, and the e-waste storage area can be utilized, it may be possible to site both a FPF and biofuel refinery facility on the existing site. For comparison, the Fulcrum BioEnergy FPF is approximately 60,000 SF and can reportedly produce up to 175,000 tons per year (TPY) of a prepared feedstock for the biofuels refinery according to its website. This facility could be located in the e-waste storage area. **Figure 9** shows the potential available acreage from the existing WTE Facility and the e-waste storage area.

Option 2 assumes incoming deliveries of unsorted MSW in the amount of approximately 205,000 TPY, as this is the amount currently being sent to the existing WTE Facility in Table 1. Based on our knowledge of similar facilities, we can assume up to 30 to 40-percent of this material will be processed into a prepared feedstock. Thus, the biofuels refinery portion of the facility must be sized to process at least roughly 60,000 to 80,000 TPY of prepared feedstock. This is about less than 50-percent of the processing capacity of the Fulcrum Sierra Biofuels facility and may be able to be sited on the existing 15-acre site though nearly all the available acreage would be required.

It is important to note that everything from the feedstock preparation facility to the gasifier to the syngas clean up equipment is all predicated and designed to produce a specific end product (i.e. SAF, biodiesel). The Contracting Communities will need to identify a long-term partner or partners to purchase or take this end product under a long-term agreement to be able to adequately finance the project. This can be very challenging considering that there are no proven reference facilities operating at this scale in the United States other than the on-going progress of the Fulcrum Sierra Biofuel facility.

Figure 9. County Available Acreage

The specific design and function of the biofuels facility would need to be developed based on what the desired end product is. This will also drive the required specification of the prepared feedstock. This will require efforts to identify what type and form of biofuel is most marketable in the region. In California, this is most likely renewable compressed natural gas (RNG) for transportation fuel that is either injected into the pipeline or fed directly into a transportation fleet, or electricity if the facility can secure a favorable Power Purchase Agreement (PPA). Recently, projects have been favoring the generation of renewable fuel to qualify for monetary incentives such as the EPA Renewable Identification Number (RIN) program and California's Low Carbon Fuel Standard Program (LCFS). It is important to note that these incentives are highly variable and, in combination, can fluctuate resulting in a significant difference in projected revenue.

4.1.4 Costs

The capital and operational costs for implementing the gasification process is on the higher end of the options considered in this Report. The front-end processes, such as source separating into a homogenous product remains one of the most difficult tasks. Preparing MSW for most gasification technologies involves a large amount of mechanical processing, which greatly impact operating costs and may account for as much as 40-percent of the total plant capital costs.

Gasification, in all its forms, tends to be more modular in size and design and have comparable or higher capital costs than a similar size WTE Facility. This is especially true since mixed waste requires pre-processing to extract the appropriate materials as feedstock for the gasification unit. While they do have lower emissions and generate less ash, if Stanislaus County were to consider a thermal technology, these benefits will not likely offset the higher costs of constructing a suitably sized gasification plant.

4.1.4.1 Feedstock Processing Facility

While the estimated annual MSW throughput in 2022 is 205,000 TPY, assuming an annual population growth of 1.0% this could increase to 215,000 TPY in 2027 (Year 1) and 263,000 TPY in 2047 (Year 20). Although a significant portion of the organics could be recovered from the MSW stream by 2047, this option assumes this tonnage will be processed through a Feedstock Processing Facility (FPF). The estimated recovery from the FPF is roughly 40%, which includes 30% of the processed waste becoming feedstock sent to the biofuel refinery facility. Based on the requirements of Year 20, we estimate the pre-processing building requirements will be 89,400 square feet, require a total land area of approximately seven acres, and result in a capital cost, including design, engineering, and a 20% contingency, of roughly $92 million to $127 million. Table 3 and Table 4 summarize our findings and assumptions for the FPF.

The estimate in Table 4 does not include capital costs associated with mobile equipment nor operational costs. These costs are included in the summary table (Table 5) which shows the estimated cost per ton based on the capital and operational costs for the proposed FPF. This includes costs associated with the hauling of the feedstock and residue from the FPF. Ultimately, the FPF results in an estimated $91 per ton net cost. This is only the estimated cost of the FPF and does not include the biofuels refinery facility.

Table 3. Feedstock Processing Facility (FPF) Sizing

		Year 1 (2027)	Year 15 (2042)	Year 20 (2047)
Estimated Square Feet				
Tipping Floor		13,100	15,300	16,600
Processing System Area		47,600	47,600	47,600
Recovered Material Storage		3,300	3,800	4,000
Rejects/Remaining Waste Storage (CY)		6,300	7,400	7,800
MSW, Rejects/Remaining Waste Loadout Area		4,000	4,000	4,000
Feedstock Load-out		2,000	2,000	2,000
Recyclables Load-out		800	800	800
Office/Breakroom/Restrooms		3,900	4,000	4,100
Spare Parts/Shop Room		2,300	2,400	2,500
Building SF		**83,300**	**87,300**	**89,400**

Table 4. Feedstock Processing Facility (FPF) Capital Costs

Feedstock Processing Facility (FPF) Capital Costs		Total
Subtotal FPF Construction		$ 77,673,000
Subtotal FPF Engineering Costs		$ 8,544,000
Subtotal Contingency		$ 15,534,600
	TOTAL CONSTRUCTION	**$ 101,751,600**
	Low	**High**
High Tech FPF Cost Range (@ -10% Low to +25% High):	**$ 91,580,000**	**$ 127,190,000**

ASSUMPTIONS:

1. No sales tax is included. Assumed facility is tax exempt.
2. Costs rounded to nearest thousand.
3. Does not include financing costs or site acquisition.
4. Assumed project to be competitively bid under one general contract.
5. Assumed construction to be during normal working hours.
6. The construction costs are used for budgeting and planning purposes only and shall not be used as an actual bid as given by a contractor to build the project.

Table 5. Option 2: FPF Cost Summary

FPF Cost Summary	
Total Costs	
Annualized Capital Cost (5%, 20 yrs)	$8,277,000
Annual O&M Costs	$10,742,000
Pre-Process Facility Annual Cost	**$19,019,000**
Pre-Process Cost per Ton Processed ($/ton)	**$79**
Pre-Process Cost per Ton Diverted ($/ton)	**$272**
Other Costs:	
Annual Residue Disposal Cost	$3,521,000
Residue Disposal per Ton Processed ($/ton)	**$15**
Recovered Materials Revenues:	
Revenues Potential	$1,392,000
Revenue Potential per Ton Processed ($/ton)	**$6**
Estimate NET Pre-Process per Ton Processed ($/ton)	**$88**

4.1.4.2 Biofuels Refinery Facility

Construction and operating costs for a biofuels refinery processing a feedstock prepared from MSW is very difficult to estimate because there are limited representative facilities against which we can benchmark costs. The closest facility to this operating model is the Fulcrum Sierra Biofuels Facility (Fulcrum) which processes a feedstock prepared from MSW at another facility but owned by the same owner (Fulcrum BioEnergy). This facility has only recently reported successful production of the first tanker fuel of SAF, over 10 years after initial facility conception.

Limited information is available on the cost to build Fulcrum's FPF and biofuel refinery but based on publicly available information, the U.S. Department of Agriculture (USDA) provided a $105M loan guarantee through the Biorefinery Assistance Program in September 2014. The total construction cost reported at that time was $266M. HDR assumes this cost is inclusive of both the FPF and the biofuel refinery.

Using the reported Fulcrum facility construction costs as a benchmark, HDR estimates a biofuels refinery sited on the Stanislaus site would cost in the range of $120M to $165M not including the costs associated with the demolition of the existing WTE facility. Demolition of the WTE Facility will be paid by Covanta. This estimate is derived from escalating the reported capital cost of the Fulcrum operation ($266M) by 4% annually over a 10-year period to estimate a 2024 construction cost of approximately $395M, then reducing the cost using a scaling factor to account for the lower throughput requirements at a Stanislaus operation. This corresponds to an operating cost of $150/ton to $200/ton for the capital costs alone. Annual O&M costs (labor, utilities, process consumables, etc.) and other costs, i.e., disposal of process residuals are in addition to this cost. HDR does not have a good estimate on what the net O&M costs per ton would be for a facility such as this but expects it would be in the $40 to $100+/ton range less revenues generated from the sale of the produced biofuel product that is being manufactured. This cost also excludes up front processing costs to prepare the feedstock that would feed this facility; those estimated costs are covered in Section 4.1.4.1 All in all, Stanislaus may be looking at $250+ per ton of waste processed to construct and operate feedstock preparation facility and a gasification to bio-fuels facility.

4.2 Option 3: Mixed Waste Processing Facility

4.2.1 Description

There are various types of Material Recovery Facilities (MRFs) worldwide, including those that process source separated recyclables (referred to as "clean" MRFs) and those that handle mixed MSW streams (known as "Mixed Waste Processing Facilities" (MWPFs) or “dirty MRFs”). MWPFs aim to capture specific materials based on the feedstock and market demand, although their yields are typically lower compared to clean MRFs due to the nature of the mixed waste and low concentrations of target materials in the waste stream. In addition, often the materials recovered are lower value materials since higher value materials may already be collected separately and sent to a single stream or dual stream MRF facility.

The process in a MWPF involves receiving materials on a tipping floor, removing larger items manually or with equipment, and conveying the material to sort lines for separation.

Various types of mechanical, optical, and density screening equipment, as well as manual labor, are used to open bags, sort materials by size and weight, and separate fiber, plastic, metal, and glass containers and materials. The fines, consisting of small contaminants, can undergo further processing to recover metals, fiber, or a glass-rich stream. Fines can also be processed to recover an organics rich stream; however, the organic fines still have contaminants making it unlikely to be accepted at compost facilities.

The sorted materials are then baled (fiber, plastic, metal) or loaded (glass, wood, scrap metal) into bins for recycling, while the organic fraction may be isolated for composting or anaerobic digestion. Much of the waste available for processing is anticipated to be low in recoverable organics since significant programs are in place to capture organic materials. The remaining residue is either sent to the landfill or used for other waste reduction purposes. The main purpose of this type of MWPF is to remove recyclable materials from the mixed MSW in order to increase landfill diversion. MWPFs typically recover around 10 to 25 percent of materials, with some facilities achieving higher rates if there are suitable markets for certain products. The typical capacity for MWPFs ranges from 200 to 1,500 TPD, and their lifespan can be 20 to 30 years with proper maintenance.

The Sunnyvale Materials Recovery and Transfer (SMaRT) Station in the city of Sunnyvale California, shown in **Figure 10** is a mixed waste processing facility adjacent to regional landfill. Since 1994, the SMaRT Station has been processing MSW in addition to the facility receiving and processing dual stream recyclables, source separated food waste and source separated green/yard waste. The MSW is processed through a complex series of processing equipment including trommels and various screens, and multiple optical units to positively sort materials into further distinct sort lines with additional automated sorting units. Sunnyvale reports diverting 30% of the MSW materials processed through its mixed waste MRF. The current overall facility diversion rate is 44% and the City is intending to increase that rate to 55% when new equipment to extract food soiled paper is scheduled to be added. This diversion rate includes a significant portion consisting of source separated recyclables in addition to organic material that is either processed as food waste and sent to anerobic digesters for conversion to biogas or yard waste that is composted. At Stanislaus, it is anticipated that all the incoming material will be mixed MSW, and the appropriate automated processing system equipment would be incorporated into the facility. Anaerobic digesters are currently not included with the Stanislaus option.

MWPFs are fully developed and used throughout the United States and the world to process MSW (either mixed or commingled) to recover recyclable and divertible materials. This technology has the ability to process a wide range of MSW materials and yield potentially high recyclable and recovery rates. MWPFs are a well proven technology, and various mechanical, pneumatic, optical and automated processes are updated continually. This technology is being used more and more as a pre-processing step in preparing feedstock for thermal, biological, and chemical processes such as the gasification biofuels refinery facility discussed in Option 2. A local benefit is the creation of construction jobs over the one-to-two-year construction period and approximately 20 to 60 permanent jobs, depending on the size and complexity of the facility.

Figure 10. Sunnyvale Materials Recovery and Transfer (SMaRT) Station, California

Source: HDR

To help combat low public participation rates of traditional recycling programs and minimize collection costs, such as collection of curbside source-separated recyclables and source-separated organics, some communities are turning to MWPFs to either capture additional recyclables beyond single stream recycling or as a pre-sorting operation prior to more advanced conversion technologies.

Although MWPFs are well known and commercially available in the United States, their financial viability can be influenced by commodity prices and acceptance of the processing approach. Notably, the Montgomery County Facility in Alabama faced bankruptcy in 2016 but was later restarted after numerous upgrades and modifications were made to the facility and a new operator was retained.

Environmental impacts of MWPFs, similar to other waste management facilities, must be mitigated such as noise, dust, and odor. The most common issue is that the available equipment is not able to extract recyclables from the MSW waste stream and provide a clean enough product for the recycling industries end-users. MWPFs typically have higher capital and operating costs than landfilling in the United States; however, other benefits such as increased landfill diversion and reduced greenhouse gas impacts should be considered.

4.2.2 Assessment

Typical recovery rates from MWPF range in the five-percent to 30-percent. For the purposes of this study, the team used the 2014 Disposal-Facility-Based Characterization of Solid Waste in California (2014 Waste Characterization) published by CalRecycle to obtain a breakdown of the anticipated materials present in the MSW waste stream. **Table 6** is an abbreviated adaptation of **Table 7** from the 2014 Waste Characterization and **Table 7** is a reduced table focused on the percent of recoverable materials in the waste

stream. **Table 7** is based on HDR's experiences with similar projects, although unique to this study is the adoption of SB 1383 which mandates diversion of organic wastes from the landfill. As shown in **Table 7**, the waste stream has potential for up to 12.6-percent diversion of processed MSW if wood and organic wastes are not included, but this significantly increases to roughly 54-percent if these waste streams are included. Based on the 2014 Waste Characterization, roughly 18-percent of the MSW stream was food waste. If the Regional Agency achieves 75-percent diversion of organics from landfill disposal as required statewide in SB 1383, this would drop to roughly 4.5-percent food waste, lowering the overall available organics in the mixed waste stream from roughly 30-percent to 10-percent. In other words, if the Regional Agency is successful in meeting the requirements of SB 1383, a MWPF may see up to 35-percent of the waste stream potential for recovery. Actual recovery at a MWPF depends upon the materials targeted and capture rates of individual recyclables from the mixed waste which will be lower than the potential. For the County, wood waste and organics are significant percentage of the MSW composition, but are assumed to be diverted at an off-site organics facility and will most likely not contribute to the MWPF's potential future recovery.

Considering the low estimated diversion rate of the MWPF option, HDR considered an alternative on what to do with the remaining fraction of material that could not be recovered. It may be possible to enlarge the MWPF to include an area that could take the process residue and further sort, dry, and shred it to create a prepared feedstock or specified fuel that could be sold or provided to another entity to use in their process, such as a gasification-to-biofuels facility as discussed in Option 2. The cost of purchasing and operating additional equipment to create this prepared feedstock would need to be compared against the cost of simply disposing it at the landfill.

Table 6. Composition of California's Overall Disposed Waste Stream from 2014 Disposal-Facility-Based Characterization of Solid Waste in California (2014 Only)

Material	Estimated Percent[1]
Paper	17.4%
Glass	2.5%
Metal	3.1%
Electronics	0.9%
Plastic	10.4%
Other Organic	37.4%
Inerts and Other	19.9%
Household Hazardous Waste	0.4%
Special Waste	5.0%
Mixed Residue	3.0%
Totals	**100.0%**

[1] Estimated using 2014 sector percentages

Table 7. Percent Recyclables with Potential for Recovery in MSW Stream

Material	Composition in MSW
Ferrous Metals	1.5%
Non-Ferrous Metals	0.7%
Plastics #1	0.6%
Plastics #2	0.5%
Film Plastic	2.5%
Papers	2.5%
OCC	3.1%
Concrete	1.2%
Subtotal (without organics and wood)	**12.6%**
Wood	11.9%
Select Organics	29.3%
Total (with organics and wood)	**53.8%**

4.2.3 Costs

Similar to Option 2, key determining factors after the throughput capacity and diversion are size of the building (**Table 8**) and land requirements. Based on these, and other factors such as recycling system equipment and operational costs, HDR estimates the total capital costs of a MWPF to process this quantity of materials to be between roughly $83 million to $116 million. Factoring annual operational and maintenance costs, the estimated net cost per ton is $94 as shown in **Table 9**.

Table 8. Option 3: Mixed Waste Processing Facility (MWPF) Sizing (Estimated Square Feet)

Area	Year 1 (2027)	Year 15 (2042)	Year 20 (2047)
Tipping Floor	13,100	15,300	16,600
Processing System Area	47,600	47,600	47,600
Recovered Material Storage	6,200	7,100	7,500
Rejects/Remaining Waste Storage (CY)	8,400	9,800	10,300
MSW, Rejects/Fines Loadout Area	8,000	8,000	8,000
Recyclables Load-out	800	800	800
Office/Breakroom/Restrooms	4,200	4,400	4,500
Spare Parts/Shop Room	2,500	2,700	2,700
Building Square Feet (SF)	**90,800**	**95,700**	**98,000**

Table 9. Option 3: MWPF Cost Summary

MWPF Cost Summary	
Capital Costs	
Total Capital Costs	$94,154,000
Capital Cost per ton of annual throughput	$393
Annual O&M Costs	
Total Annual O&M Cost	$10,657,000
O&M Cost per ton of annual throughput	$44
Total Costs	
Annualized Capital Cost (5%, 20 yrs)	$7,555,000
Annual O&M Costs	$10,657,000
MWPF Annual Cost	**$18,212,000**
MWPF Cost per Ton Processed ($/ton)	**$76**
MWPF Cost per Ton Diverted ($/ton)	**$1,253**
Other Costs:	
Annual Residue Disposal Cost (Landfill Tip Fee @ $35/ton)	$5,902,000
Residue Disposal per Ton Processed ($/ton)	$25
Recovered Materials Revenues:	
Revenues Potential	$1,577,000
Revenue Potential per Ton Processed ($/ton)	$7
Estimate NET MWPF per Ton Processed ($/ton)	$94

HDR notes that the estimated net costs per ton for the MWPF ($94/ton) and for the FPF ($88/ton) are very close to other another. The MWPF has higher disposal costs for process residuals, while the FPF will capture and convert more incoming MSW into usable feedstock resulting in lower disposal costs but will have more sorting and drying equipment that add additional capital construction and O&M costs. A major unknown is the marketability of the prepared feedstock. HDR has assumed $0 for revenue/cost of the prepared feedstock in its model. All things being equal, the better option would be the MWPF option as there is less risk involved, However, if a purchaser can be identified that will pay for this material under a long term contract, an additional revenue stream can be added to the FPF model and lower operating costs, which could make it more appealing than a MWPF option.

4.3 Option 4: Landfill-Centric Model without WTE

4.3.1 Landfill-Centric Options

Although Options 1, 2, and 3 all have a portion of the MSW stream disposed of at a landfill, Option 4 is the only one that sends 100-percent of the MSW waste stream to landfill for disposal. With this focused approach, there are three options to consider:

Option 4A: Continued use of Fink Road Landfill;

Option 4B: Use of transfer station to transfer MSW from current WTE Facility site to another landfill for disposal; or

Option 4C: Development of a new landfill cell to accommodate increased tonnage to the landfill.

It is important to note that while the County and cities reported over 650,000 tons per year to disposal and transformation combined as shown in **Table 1**, the County and cities only have control of roughly 400,000 tons per year through their franchised tonnages as shown in **Table 2**. This includes the tonnage currently going to Fink Road Landfill and the existing WTE Facility.

4.3.2 Existing Landfill Description

The Fink Road Landfill (Landfill) is a 203-acre, Class II and Class III landfill split into three disposal areas: Landfill Unit 1 (LF-1) which is inactive, Landfill Unit 2 (LF-2), and Landfill Unit 3 (LF-3). LF-2 accepts inert and nonhazardous wastes consisting primarily of MSW, commercial wastes and community construction and demolition debris. It also accepts commercial, industrial, and agricultural wastes. All cells in LF-3 are operated as boiler ash monofils supplied by the current WTE Facility. The Landfill is owned and operated by Stanislaus County and has been active since 1973.

LF-2 was constructed in 1993 and consists of six cells with plans to build a seventh compositely lined cell. In August of 2019, the Landfill submitted a revised Joint Technical Document including an expansion plan set to begin in 2027 that is projected to extend the life of the landfill by 27 years. Including the proposed expansion, the total airspace available is 22.57 million cubic yards, an increase from the currently available 12.7 million cubic yards.

LF-3 is a non-Subtitle D, Class II landfill that has been in operation since 1988 and consists of four cells. There are plans to construct a fifth double compositely lined cell.

Fink Road Landfill accepts 700 to 1,200 tons per day of MSW, roughly 200 to 320 tons of which are ash from the WTE Facility. Based on these tonnages, both LF-2 and LF-3 are expected to reach capacity in 2050 and close by 2053 if no expansions were to occur. LF-2 and LF-3 are limited to a combined maximum of 2,400 tons of refuse per day.

According to data from the Landfill Gas Emissions Model the Fink Road Landfill accepts on average 115,141 short tons per year since 1997 when LF-1 was closed. For the past three years the landfill accepted 117,159 short tons.

4.3.3 Assessment

4.3.3.1 Option 4A: Continued Use of Fink Road Landfill

As reported in the 2019 Joint Technical Document (JTD) for Fink Road Landfill, it is estimated at its current disposal rate with a three-percent annual growth factor the Landfill will reach capacity by 2050.

If the WTE Facility were to cease operations June 30, 2027, then an additional roughly 666 tons per day or 205,000 tons per year would need to be redirected from the WTE Facility to the Landfill for disposal. Depending on the annual growth factor used (one to three-percent) then the Landfill would reach its disposal capacity between 2039 and 2041. This is based on the net remaining disposal volume of approximately 11.7 million cubic yards as provided by the County as of the end of 2023.

4.3.3.2 Option 4B: Use of Transfer Facility

The Contracting Communities currently utilize several landfills in the region, for a variety of reasons including economic and environmental benefits due to favorable tip fees and hauling distances. These include but are not limited to:

1. American Avenue Disposal Site
2. Avenal Landfill
3. Chiquita Canyon, Inc.
4. Cold Canyon Landfill
5. Mid-Valley Sanitary Landfill
6. San Timoteo Sanitary Landfill
7. Victorville Sanitary Landfill
8. County of Yolo
9. El Sobrante Landfill
10. Fairmead Landfill
11. Foothill Sanitary Landfill
12. Forward Landfill
13. Billy Wright Landfill
14. Highway 59 Landfill
15. North County Recycling Center and Sanitary Landfill
16. Potrero Hills Landfill, Inc.
17. Vasco Road Landfill

Since the Contracting Communities only have control of roughly 400,000 tons per year of MSW, this option assumes only these tons would need to be sent through a transfer station to another permitted landfill.

4.3.3.3 Option 4C: Development of New Landfill Cell

Similar to Option 4B, the development of a new landfill cell only takes into consideration the roughly 400,000 tons per year of MSW within the County and cities control. The difference between this option and Option 4A is Option 4A does not assume Fink Road Landfill will implement an expansion or development of a new landfill cell. This option assumes a one-percent annual growth rate.

4.3.4 Costs

4.3.4.1 Option 4A: Continued Use of Fink Road Landfill

It assumed that continued use of Fink Road Landfill will not result in a cost differential and most likely will result in a reduction in operating cost due to the slightly lower tip fee at the Landfill ($45 per ton for non-franchised cities, $29 per ton for franchised cities) compared to the existing WTE Facility ($42.90 per ton plus $7.00 fee for admin). However, the increase in tonnage may require additional labor thus making this option closer to equivalent to the current use. It should also be noted that the reduction in operations cost is dependent on the current franchised tip fee, which is up for renewal June 30, 2025.

The biggest drawback with redirecting the transformation waste to Fink Road Landfill is decreasing the Landfill's life. Option 4C discuss the alternative of expanding the Landfill to include a new cell or another local site.

4.3.4.2 Option 4B: Use of Transfer Facility

The estimated size of the Transfer Facility to accommodate the roughly 400,000 tons of MSW is approximately 60,000 square feet. Including design, engineering, and a 20-percent planning contingency, the total construction cost of the Transfer Facility is estimated to be between $33 million and $46 million and require roughly 10 acres. Assuming a third-party landfill tip fee of $50 per ton, this option results in a new cost per ton through the Transfer Facility of $81 to $84 per ton. **Table 10** shows the Transfer Facility cost summary.

The Transfer Facility is assumed to be constructed on available land adjacent to the Fink Road Landfill. If this option is utilized at a different location, a property purchase price may need to be included in the capital costs.

Table 10. Option 4B: Transfer Facility Cost Summary

Transfer Facility Cost Summary	Low Range	High Range
Capital Costs		
Total Capital Costs	$33,200,000	$45,600,000
Capital Cost per Ton of Annual Throughput	$78	$108
Annual O&M Costs		
Total Annual O&M Cost	$2,968,000	$3,265,000
O&M Cost per Ton of Annual Throughput	$7	$8
Total Costs		
Annualized Capital Cost (5%, 20 yrs)	$2,664,000	$3,659,000
Annual O&M Costs	$2,968,000	$3,265,000
TS Facility Annual Cost	**$5,632,000**	**$6,924,000**

TS Cost per Ton Received ($/ton)	**$13**	**$16**
Other Costs:		
Annual Hauling Costs	$7,466,000	
Other Landfill Costs @ Contracted Tip Fee	$21,170,000	
Disposal per Ton Transferred ($/ton)	$68	
Total Cost per Ton Transferred ($/ton)	$81	$84

4.3.4.3 Option 4C: Development of New Landfill

If the County were to develop a new landfill to handle the roughly 400,000 tons of MSW per year, HDR estimates approximately 70 acres would be required to accommodate this tonnage for 20 years, with an annual population growth of one percent. The net disposal cost per ton sent to this new landfill cell would be $44 to $55. The 70-acre landfill cells has an estimated capacity for 20 years whereas the full 129-acre Canyon Landfill has estimated landfill life of 35 years. **Table 11** summarizes the cost associated with the construction of a new landfill cell.

Note that the new landfill cost excludes property purchase price which will likely be significant if required. Based on the 100 Year Life Study for Fink Road Landfill prepared by SCS Engineers Revised June 15, 2017 (2017 Landfill Study), HDR assumed the expanded landfill cells would be part of the 129-acre Canyon Landfill identified in the 2017 Landfill Study is located south and west of Fink Road Landfill.

Table 11. Option 4C: New Landfill Cell Cost Summary

New Landfill Cell Cost Summary	Low Range	High Range
Capital Costs		
Total Capital Costs	$99,840,000	$138,670,000
Capital Cost per Ton of Annual Throughput	$248	$344
Annual O&M Costs		
Total Annual O&M Cost	$9,621,500	$10,949,000
O&M Cost per Ton of Annual Throughput	$24	$27
Total Costs		
Annualized Capital Cost (5%, 20 yrs)	$8,011,000	$11,127,000
Annual O&M Costs	$9,621,500	$10,494,000
LF Facility Annual Cost	**$17,632,500**	**$22,076,000**
LF Cost per Ton Received ($/ton)	**$44**	**$55**

5 Option 5: Landfill-Centric Model with WTE

5.1 Description

Based on discussions with Covanta, there is a potential that the current WTE capacity of roughly 200,000 tons per year of waste from the Contracting Communities may be reduced to 150,000 tons per year. In addition, due to the various regulatory and operational factors impacting the facility's future, Covanta recommended doubling the current tip fee of $42 per ton to $84 per ton for post-2027 operations, plus the addition of $7 per ton for administrative fees which brings the post-2027 tip fee to $91 per ton.

The varying tonnage presents two options, Option 5A with 150,000 TPY going to WTE and Option 5B with 200,000 TPY going to WTE. Since the County and cities control roughly 400,000 tons per year of waste, the remaining waste not sent to WTE will be sent to landfill disposal. For this option, it is assumed that the Fink Road Landfill will need an expansion to meet their disposal needs.

5.2 Costs

Looking at these two options of combining the use of WTE with a landfill expansion, it is estimated that the cost to develop the landfill expansion required for Option 5A is $57 to $70 per ton and Option 5B is $70 to $82 per ton. This does not include potential revenue from the tip fee collected by the Regional Agency for the WTE ash disposal. The following two tables summarize key costs associated with these options.

Table 12. Option 5A: Landfill Expansion Costs

	Low Range	High Range
Sizing Considerations		
Waste Flow		
Total Received Waste at LF, TPY	253,000	
Opinion of Probable Cost		
Total Capital Costs	$71,270,000	$98,980,000
Capital Cost per ton of annual throughput	**$282**	**$391**
Total Annual O&M Cost	$8,732,500	$9,738,500
O&M Cost per ton of annual throughput	**$35**	**$38**
Total Costs		
Annualized Capital Cost (5%, 20 yrs)	$5,719,000	$7,942,000
Annual O&M Costs	$8,732,500	$9,738,500
LF Facility Annual Cost	**$14,451,500**	**$17,680,500**
LF Cost per Ton Received ($/ton)	**$57**	**$70**

Table 13. Option 5B: Landfill Expansion Costs

	Landfill Options 5A	Landfill Options 5B
Sizing Considerations		
Waste Flow		
Total Received Waste at LF, TPY	203,000	
Opinion of Probable Cost		
Total Capital Costs	$63,800,000	$88,610,000
Capital Cost per ton of annual throughput	**$314**	**$437**
Total Annual O&M Cost	$9,162,500	$9,552,500
O&M Cost per ton of annual throughput	**$45**	**$47**
Total Costs		
Annualized Capital Cost (5%, 20 yrs)	$5,119,000	$7,110,000
Annual O&M Costs	$9,162,500	$9,552,500
LF Facility Annual Cost	**$14,281,500**	**$16,662,500**
LF Cost per Ton Received ($/ton)	**$70**	**$82**

6 Conclusions and Recommendations

6.1 Conclusions

As stated at the beginning of this report, the purpose of this study is to assess the technical feasibility and economic costs associated with potential alternatives, and at this time does not include any human or environmental health impact analyses. The later will be conducted for separately for the preferred option or options during the next steps of planning, permitting, and development. Based on the findings of this report, the County and cities may consider several disposal options:

Option 1: Continued use of the WTE Facility under existing contract; Status Quo

Option 2: Gasification-to-Biofuels

Option 3: Mixed Waste Processing Facility (MWPF)

Option 4: Landfill-Centric Model

Option 4A: Continued use of Fink Road Landfill with no expansion

Option 4B: Development and use of a Transfer Facility at Fink Road Landfill to transfer to a third-party landfill

Option 4C: Development of a New Landfill Cell adjacent to Fink Road Landfill

Option 5: WTE with Landfill Disposal

Option 5A: WTE at 150,000 TPY with rest to expanded landfill

Option 5B: WTE at 200,000 TPY with rest to expanded landfill

Table 14 summarizes the estimated cost per ton to pursue the above options, as well as the expected California-qualifying diversion from landfill disposal. All data, assumptions, and analysis in this report are based on the Landfill status (i.e., current landfill life and tipping fees) and current solid waste management system and practices (i.e., current franchised waste flow) at the time of the project (December 2022).

Table 14. Cost per Ton Summary by Alternative Option

	Estimated Cost per Ton (Year 2027) (A)	Estimated Lifespan per Option	Estimated Diversion
Option 1: Status Quo	$42.90 through June 30, 2024	End June 30, 2027	0%
Option 2: Gasification-to-Biofuels	$250	20+ years	0%
Option 3: Mixed Waste Processing Facility	$94	20+ years	5% to 15%
Option 4: Landfill-Centric Model without Waste-to-Energy (WTE)	-		-
Option 4A: Fink Road Landfill	$29 through June 30, 2025 (B)	End 2039 to 2041	0%
Option 4B: Transfer Facility at Fink Road Landfill	$81 to $84 (C)	20+ years	0%
Option 4C: New Landfill Cell at Fink Road Landfill	$44 to $55	35 years	0%
Option 5: Landfill-Centric Model with WTE			-
Option 5A: WTE @ 150,000 Tons per Year (TPY)	WTE: $85.80 Landfill: $57 to $70	50 years	0%
Option 5B: WTE @ 200,000 TPY	WTE: $85.80 Landfill: $70 to $82	58 years	0%

A) In 2023 Dollars. These options do not include current or potential program fees. Existing program fees are an additional $7.00 per ton to waste-to-energy.

B) In 2023 for Franchised Cities per disposal Memorandum of Understandings (MOUs).

C) Assumes a $50 per ton landfill disposal fee.

D) All options with new or expanded landfill assumes a 20-year capacity and financing model.

6.2 Recommendations

Although Option 3 results in additional diversion, the range of likely diversion is relatively low diversion based on limited operating facilities at a significantly higher cost per ton than the current status quo. Option 2 results in up to 30 to 40-percent diversion, but similar to WTE does not count as qualifying diversion under California statues. Alternatively, Options 1 and 4 do not offer any California-qualifying diversion from disposal but are favorable from an economical and commercially-viable perspective.

There are a few critical aspects to consider amongst the options presented in this study:

1. While Option 4A appears to result in a reduction in cost compared to the other options, it is important to note this price reflects the current franchise fee which is up for renewal June 30, 2025. An increase in waste going to Fink Road Landfill may require additional labor, equipment, and administrative support which may result in an increase in the franchised fee. The potential reduction in cost between each option is a snapshot in time for the year 2027 and assumes that the WTE will continue operations based on its current contract, among other factors. Should any of the assumptions on the County's current Landfill status and solid waste management system change, this could impact these cost estimates.
2. It is important to note that Options 1 and 4 both technically count as offering no diversion, rather they are defined as disposal under recently revised California regulations. There may be significantly varying environmental impacts from the continued use of the existing WTE Facility compared with expanding the Fink Road Landfill.
3. Gasification technologies, such as those presented in Option 2 have evolved, particularly when treating high carbon feedstocks but lack a proven track record of continuous and reliable commercial operation for treating mixed municipal waste on a larger scale. Depending on the type of feedstock and scale, Option 2 could offer an economically attractive remedy. If implemented, Option 2 is classified the same as waste to energy, namely, is defined as disposal and would not provide diversion as defined by California.
4. Mixed waste processing facilities have commercial applications in North America and are continually improving their recovery rates. This option may prove to achieve increased diversion in the future but there would still be a significant residual stream that would need to be further processed or landfilled. The benefit of the somewhat marginal increased diversion may not be justified by the elevated capital and operating costs associated with these facilities.

While this report thoroughly assessed four alternative options for managing the County's MSW stream, no singular option proves to be superior either from a combined approach considering technology, economics, and regulations. This is mainly due to the relatively low diversion rates and high capital and operations costs for mixed waste processing facilities, the high capital and operating costs of gasification and feedstock processing facilities, and the relatively low cost of traditional landfill disposal.

As noted previously in Table 6 of this report, repeated here as Table 15, the County theoretically has waste streams within its MSW stream that could be targeted for additional diversion. Specifically, organic waste per SB 1383 which requires 75-percent

diversion of organics (food, yard, and food soiled paper) by 2025, and construction and demolition (C&D) debris (i.e., inert materials and others) per SB 1374, also known as the California Green Building Standards Code which requires most C&D projects to meet 65-perscent waste diversion. In addition, other recycling laws such as AB 341 (focusing on mandatory commercial recycling) and AB 1826 (focusing on mandatory commercial organics diversion) were passed to support meeting California's recycling goal of 75-percent by the year 2020.

Table 15. Composition of California's Overall Disposed Waste Stream from 2014 Disposal-Facility-Based Characterization of Solid Waste in California (2014 Only)

Material	Estimated Percent[2]
Paper	17.4%
Glass	2.5%
Metal	3.1%
Electronics	0.9%
Plastic	10.4%
Other Organic	37.4%
Inerts and Other	19.9%
Household Hazardous Waste	0.4%
Special Waste	5.0%
Mixed Residue	3.0%
Totals	**100.0%**

Based on the findings of this report and the estimated costs presented to achieve additional diversion from the MSW stream, it may be more economical from a technical and operational position to utilize the County's existing diversion programs to achieve a similar increase in diversion while minimizing risk and cost.

HDR offers the following recommendations:

1. Compare the potential human and environmental health impacts from Option 1 versus traditional landfill disposal, such as greenhouse gas emissions to understand the varying environmental impacts of the status quo vs landfill disposal.
2. Perform a diversion assessment based on AB 341, AB 1826, and SB 1383 to understand the estimated annual tons that need to be diverted to achieve 75-percent diversion of the solid waste generated.
3. Perform a County-specific waste characterization study at Fink Road Landfill and at the WTE Facility. This waste characterization study should be conducted to evaluate the composition by generator type so as to inform the County of the remaining recyclables and organics in the MSW stream.

[2] Estimate using 2014 sector percentages

4. Target the three highest categories that make up the County's MSW stream:
    a. Assess County and member cities' potential to pre-process mixed and source-separated organic waste for beneficial use.
    b. Assess County and member cities' potential to recover additional C&D debris from the MSW stream.
    c. Assess County and member cities' potential to reduce, recover, or pre-process recyclables, particularly paper for diversion/marketable products.

A

List of Alternatives
Technical Memorandum

Memo

Date:	Wednesday, February 22, 2023
Project:	Long-Term Disposal Alternatives Analysis for Stanislaus County Solid Waste
To:	Will Richards, Stanislaus County, Solid Waste Manager
From:	Cindy Liles, HDR, Project Manager Tim Raibley, HDR, Principal in Charge Greg Gesell, HDR, Lead Engineer
Subject:	List of Alternatives Technical Memorandum

The County of Stanislaus (County) and the City of Modesto, California (City) currently utilize the Stanislaus County Resource Recovery Facility (Facility) in Crow's Landing, CA, for disposal of much of their post-recycling municipal solid waste (MSW). Covanta Stanislaus Inc. (Covanta) is the facility owner and operator. The County and City have an operating contract with Covanta that will expire in approximately five years. The State of California has begun implementing the recent Senate Bill 1383 which requires separate collection and management of organic waste diverting much of this material from the Facility. Excess waste and ash are managed at the Fink Road Landfill (Landfill). While the Landfill is projected to have available capacity until 2058 under the current operation, if the Facility were to close, the life expectancy would be severely impacted.

This technical memorandum is intended to offer for consideration viable alternatives to the status quo operation of the Facility utilizing alternative technologies either in conjunction with the existing Facility operation, retrofit of the existing Facility with an alternative technology, or replacement of the existing facility with new technology. There are numerous technologies that are in development, but the vast majority do not have commercial operating experience with full scale complete facilities. A key directive of this analysis is that all technology alternatives need to be proven in commercial operation for post-recycled municipal solid waste assuming that much of the available food and other organic wastes are managed separately and no longer are in the waste stream. For the purposes of this study, proven technologies will be those that are currently in use, with an operating record preferably of at least several continuous years, and where the daily quantity of solid waste processed is approximately equal to the projected County and City MSW waste flow rates.

HDR generally groups alternative waste processing technologies into one of four different types:

- Thermal
- Biological
- Mechanical
- Chemical

These are broad groupings of technologies with subcategories and there is a spectrum of technologies with components that may overlap or have features that could be characterized under more than one major grouping.

Thermal Technologies

Thermal technologies include the existing plant and some alternatives. The existing plant could be refurbished to continue operations past the current useful life. This option basically maintains the current operation (conventional mass-burn waste-to-energy) without any major technology changes. HDR has requested information from Covanta on potential refurbishment options for the Facility. Preliminary discussions with Covanta indicate primary issues for continued operation for the next five or ten years revolve largely around regulatory requirements (specifically reduction in NOx limits), cap-and-trade program revised provisions (estimated $2M per year additional cost to the facility), and equipment and staffing operations (as the plant nears end of life).

Alternative thermal technologies are potentially an option. The main alternative thermal processing technology sub-classifications are:

- Gasification
- Plasma Arc Gasification
- Pyrolysis
- Autoclave/Steam Classification

HDR is not aware of any plasma arc gasification facilities that could be considered commercial for MSW. Several projects have been advanced but for this size and application, no commercial plants have been identified. As far as gasification and pyrolysis is concerned, there are a few plants overseas, mainly in Japan, and a few of those might be viable (JFE for instance). Fulcrum BioEnergy, Inc. at their Sierra facility is getting close, but HDR does not believe they have achieved a year's operation yet. We have been reaching out to them to confirm their current status and interests. For Fulcrum a possible approach could be to add a fuel production facility (i.e., MSW mixed-waste processing to an engineered fuel) but not have the gasification plant itself at Stanislaus. A second approach would be to develop both a fuel production facility and a gasification plant at Stanislaus. Fulcrum, or another developer, may or may not be interested in such an arrangement. Similar to Fulcrum, there are reports of a new autoclave-based plant in the U.S. that could be evaluated but may not have enough operating experience yet to know if it can be considered commercial.

Biological Technologies

Biological technologies such as anaerobic digestion are not considered since the majority of the available food waste and other organics are anticipated to be diverted and managed under other programs.

Mechanical Technologies

The main mechanical processing technology sub-classifications are:

- Mixed Waste Processing
- Refuse Derived Fuel (RDF) Production

Mechanical technologies generally rely on other thermal or chemical technologies to maximize diversion. Mixed waste processing, like the mixed waste processing facility in Sunnyvale, CA could be considered. It could complement the existing plant to increase diversion while maximizing recyclables. Several smaller WTE plants have a mixed waste processing arrangement and potentially this concept could be used to presort some or all the MSW received at the facility. The increase in recyclables would not be expected to be high with an established base community recycling program. The fuel produced would save wear and tear for Covanta, but the cost of production would be high compared to simple mass burn combustion. Similarly, RDF production would be expensive and unnecessary if the RDF is processed at the existing facility exclusively for its use. Building a dedicated RDF boiler expansion would also not make economic sense even though the technology is viable. Potentially as noted above, a fuel product could be produced from the MSW for another facility if a cement kiln or other user can be identified.

Chemical Technologies

The main chemical or waste-to-fuel processing technology sub-classifications are:

- Hydrolysis
- Depolymerization (Thermal, Enzymatic/Catalytic, Microwave)
- Waste-to-Fuel Technologies

Most of these technologies are not commercial although Enerkem may be an example of an exception. HDR has opened discussions with Enerkem regarding their status as the Edmonton facility has been around for a number of years, but little performance data is available and the full chemical process may not have been in place for the full operating history. Some waste-to-fuel technologies only utilize select waste components such as only plastics and possibly only certain types of plastics. There is a push to develop and increase production of transportation fuels but at this time the regulatory directive is not in place. However, a waste-to-fuels technology, similar to a mixed waste or RDF production facility could potentially be added at Stanislaus as a preprocessing fuel production facility. Potentially such a facility could provide fuel for a gasification, pyrolysis, or chemical technology and use the existing facility as a backup outlet. The alternative technology plant that uses the fuel could also be built on site.

In addition to alternative technologies, the County and City may want to consider shifting to a landfill centric waste system whereby all or a portion of the County and City waste that currently is disposed at the Facility goes to the Landfill in 2027 after the end of term of the existing agreement with the Facility operator.

In summary, technologies that may have demonstrated commercial viability for the County and City to consider include:

1. Refurbished Facility (existing mass-burn technology)
2. Gasification to Biofuels (such as the Fulcrum model)
3. Mixed waste MRF or similar facility designed to recover recyclables and produce a feedstock used on site or offsite
4. Hydrolysis to Chemicals (Enerkem model)
5. Landfill

These technologies may be developed on-site or in conjunction with off-site facilities.

The goal of this memo is to introduce the various alternatives available to manage the County's MSW, then for the County to select three alternatives to be further analyzed as part of this study.

Update on Reworld (Covanta) Agreement

Department of Environmental Resources

November 12, 2024

Update on Reworld Agreement

- Historical Background - Planning, Financing, Facility Design, Agreements, and Regulatory Challenges
- Alternative Waste Management Planning Strategies
- Reworld's Financial Challenges
- Impact of Facility Closure and County's Response
- Breakdown of Settlement Funds and WTE Fund Distribution

Background – Planning

- In 1983, Stanislaus County began exploring the feasibility of resource recovery as a waste disposal alternative which included composting and Waste-to-Energy transformation.
- In 1985, Stanislaus County and the City of Modesto (Contracting Communities) formally agreed to partner with Stanislaus Waste Energy Company (Company) to build and develop a Waste-to-Energy facility (Facility).
- Stanislaus Waste to Energy Company
  - Subsidiary of Ogden Martin Systems (later changed to Covanta, presently Reworld)

Background – Financing

- The Facility was funded with equity capital from the Company and the sale of bonds by the Contracting Communities.
- Stanislaus County would act as treasurer for the established Resource Recovery Account (RRA) to fund operations and maintenance of the Facility.
- The Facility was owned by the Contracting Communities and operated by the Company.
- The Facility was sited on the existing Fink Road Landfill (Landfill) through a land-lease agreement from the County.


5
5
Covanta Stanislaus

Background – Facility Design

- The Facility was designed and built to process 800 tons of municipal solid waste (MSW), annual guarantee of 243,300 tons.
- Steam produced from the incineration of MSW generates 22 megawatts of electricity enough to power 13,000 homes.
- MSW processed by the Facility is reduced in weight by 60% and reduced in volume by 90% which adds significant life to the Landfill.
- The transformation process produces ash which is deposited at a monofil at the Landfill and metals which are shipped to a recycling facility.
- The Facility recovers nearly 6,000 tons of metals annually.

Background – Original Agreement

- The Facility was owned by the Contracting Communities and operated by the Company.
- The Contracting Communities were responsible for all operational costs and liabilities.
- The Company could procure up to 7,300 tons of Special Waste with approval from the Contracting Communities.
- The Facility pledged to process 243,300 tons of MSW annually, but averaged ~260,000 tons through the original agreement.

Background – 2012 Agreement

- Transferred ownership of Facility to Company.
- The risk exposure from unforeseen circumstances to the Contracting Communities was reduced from 100% to 25%.
- The changes in contract structure established more predictable tip fees and prevented further operating loss to RRA.
- The annual guarantee remained at 243,300 tons, but the Contracting Communities ceded capacity of up to 12,000 tons of Special Waste annually above the guarantee.
- The agreement extended disposal at Facility through June 2027.

Background – Regulatory Challenges

- 2015 - SB 350 removed renewable energy designation the Facility had received since 2002, causing a significant drop in the electricity revenue received.
- June 2017 - the service agreement was amended to eliminate the unforeseen circumstance risk to the Contracting Communities in exchange for increasing the allowed procurement of Special Waste to 30,000 tons per year.
- The California Air Resource Board (CARB) removed the exemption of the Facility from the Cap-and-Trade program.
- Transitional assistance into the program would be provided to the Facility through 2024.

Background – Regulatory Challenges

- 2021 - CARB increased regulations through Rule 4352, which significantly lowered the permitted limit of NOx emissions.
- The Facility installed Covanta's LN system to comply with regulations by January 1, 2024.
- 2022 - AB 1857 removed the10% diversion credit for jurisdictions using transformation.
- These diversion credits assisted Stanislaus County and its cities to meet waste diversion mandates of AB 939 since its inception in 1989.
- The loss of diversion credits negatively impacted the beneficial use of the Facility for the Contracting Communities.

Waste Management Planning

- In January 2023, Contracting Communities contracted with HDR, Inc. to explore potential options for MSW stream destined for the landfill and the facility based on the following criteria:
  - The ability to process MSW excluding composting and anaerobic digestion
  - Presence of one or more vendors operating one or more existing full scale commercial facility with current operations in North America for a minimum of 3 years
  - Processing throughput capacity equal to, or greater than, the solid waste flow for the Contracting Communities

Waste Management Planning

- HDR presented the Contracting Communities with 5 potential options:
  - Chemical transformation
  - Gasification-to-biofuels
  - Mixed waste processing facility
  - Landfill-centric disposal with continued use of the Facility
  - Landfill-centric disposal discontinuing use of the Facility

Waste Management Planning Study – Results

- HDR's report showed that anticipated costs to utilize the facility were expected to double if a new agreement was reached in 2027.
- Other technological options did not provide significant diversion benefit and were determined to not be economically viable for the waste management stream.
- The workgroup recommended to continue use of the Facility through the life of the current service agreement, then transition towards a landfill-centric disposal model without further use of the Facility.

Reworld's Financial Challenges

- In October 2023, the Company expressed serious concern about the ongoing financial losses sustained at the Facility.
- In December 2023, the Company sent correspondence to the Contracting Communities proposing three options to mitigate its financial hardship:
  - Mutually agreed upon early termination of the service agreement, ceasing operations on June 30, 2024.
  - Significantly increase the tip fee at the Facility and/or increase the amount of Special Waste to be delivered to the Facility.
  - The Company could determine it had met its contractual obligations to effectively terminate the agreement early.

Reworld's Financial Challenges

- Due to the severity of the financial challenges facing the Company, the Contracting Communities determined that the best path forward for the partnership would be to allow the company to exit the agreement early.
- After a series of negotiations, the parties agreed to conclude deliveries to the Facility on December 2, 2024.
- The Company is responsible for the decommissioning and demolition of the Facility.
- The demolition is expected to take approximately 24 months and should conclude in 2027.

Impact of Facility Closure and County Response

- The closure of the Facility is anticipated to reduce the Landfill's life expectancy by approximately 9-11 years due to the increase of tonnage delivered to the Landfill.
- The Landfill is actively working to increase staffing, equipment, and operating hours to handle additional tonnage.
- The DER staff remain dedicated to exploring new opportunities for reducing landfill waste through cost-effective, efficient, and environmentally sustainable waste management solutions.

Regional Solid Waste Disposal Plan

- All cities within Stanislaus County currently operate under MOUs to direct most of their franchised waste to the Facility or the Landfill until June 30, 2025.
- In exchange for the waste stream, the cities are afforded:
  - Discounted tip fee at both facilities
  - Access to the permanent Household Hazardous Waste (HHW) facility
  - Two mobile HHW events annually, except for the cities of Ceres and Modesto
  - The County also performs grant administration, education and outreach, and annual waste reporting requirements to CalRecycle, except for the city of Modesto

Regional Solid Waste Disposal Plan

- The MOUs also dictate that tonnages delivered to the Facility be charged $7/ton for administrative and program fees:
  - $3/ton to HHW program
  - $3/ton to AB939 program
  - $.50/ton for Landfill scale house operations
  - $.25/ton for City of Modesto's administrative costs
  - $.25/ton for County's administrative costs

Regional Solid Waste Disposal Plan

- The closure of the Facility will mean program revenue sources will eventually need to transition to the Landfill tip fees.
- Staff are currently working with HDR to determine the appropriate tip fee necessary to cover increased costs of the Landfill and funding for the AB939 and HHW programs.
- The calculated revenue requirements will be utilized to negotiate a new tip fee and MOUs with partner cities.
- The new MOUs are anticipated to be presented to the Board in June 2025 for final approval.

Distribution of Settlement and RRA Fund

- The Contracting Communities will receive a settlement of $4 million.
- The Joint Powers Agreement dictates a distribution of 58% to the City of Modesto and 42% to the County.
- The RRA balance is anticipated to be ~$8 million after all financial obligations are met.
  - The RRA will be dissolved and distributed in the same proportions of 58% and 42%.
- The County's proceeds will be utilized to fund additional equipment and staffing needs at the Landfill to aid in stabilizing garbage rates for the residents and businesses of Stanislaus County.

Recommendation

- Accept the update on the operations and service agreement between the Contracting Communities and Reworld, Inc. regarding the waste-to-energy facility located in Crows Landing, CA.

Questions?