

Project Development Assistance Incentives

Renewable Energy Programs | Request for Funding | 930RF



Submission Instructions

A completed, signed **Form 910E: Project Enrollment** must precede or accompany this **Form 930RF: Request for Funding**. Only projects approved for enrollment are eligible for **Request for Funding** review. All terms and conditions of Project Proponent's enrollment agreement for this project apply and govern this **Request for Funding**.

To be considered for project development assistance incentives, a **Request for Funding** must be submitted to Energy Trust for review and consideration **before** Project Proponent begins any of the work on an activity that is the subject of the request. Proposed activities cannot already be underway. Energy Trust may request additional information or documentation. Approval or denial of a specific activity for incentive reservation rests solely with Energy Trust. Final determination of eligibility for Energy Trust incentives rests solely with Energy Trust.

Energy Trust considers certain activities and costs as **ineligible** for project development assistance incentives, including, but not limited to:

- Purchase of equipment or facilities (with the exception of anemometers) or investment in a physical asset
- Purchase or leasing of land or resources
- Permit fees
- Closing costs and other costs involved with finalizing a deal with an investor
- Project Proponent's or owner(s)' own time and materials towards the proposed project development work
- Activities already started or completed
- Proposed projects without any electric generation objectives

Types of Project Development Activities

Project Proponent may request project development assistance incentives for work to be performed by the Project Proponent's third party consultant(s), not work performed by the Project Proponent. Incentives for approved project development assistance activities are calculated and paid on a reimbursement basis following Energy Trust's review of submitted final completion documentation. Project Proponent is responsible for paying its consultant(s) in full. Typical project development activities include, but are not limited to:

Grant-writing Assistance: Engaging a consultant to complete grant applications for project funding opportunities, such as the United States Department of Agriculture and the State of Oregon.

Feasibility Study Assistance: Engaging a consultant to prepare a feasibility study for the project. Elements typically included in feasibility studies include, but are not limited to, resource characterization, a pro forma financial analysis, an assessment of technology options, and interconnection considerations and costs.

Expert Development Assistance: Engaging a consultant to provide expert assistance related to other project development needs such as design, permitting, utility interconnection, or construction management.

The maximum that Energy Trust may provide will not exceed 50%, or 75% for state, local or tribal governmental entities, of total documented, eligible project development activity cost. The maximum total amount of project development assistance incentives that Energy Trust will provide towards an enrolled project (for all approved project development activities combined) will not exceed \$200,000.

SECTION 1: Project Proponent Information

Project Proponent Legal Business Name City of Gresham, Oregon
(must match Project Proponent's enrollment agreement and submitted W-9)

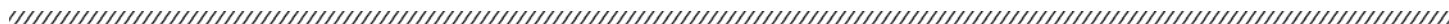
Title **Alan Johnston, Senior Engineer**

Telephone 503-318-3454

- ☒ office
☐ cellular

Email alan.johnston@greshamoregon.gov
(This email will be used by the program to notify you of its approval or denial for activities identified in connection with this **Request for Funding**)

Project Name WWTP Anaerobic Digestion and Cogeneration Expansion

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Provide a detailed description of the proposal/scope of work for development assistance including key milestones, key decision points, and expected deliverables. Describe the key information you expect to gain or the accomplishments expected to result from each activity. Describe how each proposed activity is important to the forward progress of the proposed project. You may attach additional pages, as necessary. **REQUIRED:** Project Proponent must include a table, consistent with the **Table 1** format below, specifically listing each activity included the proposal/scope associated with this ***Request for Funding***.

Provide a budget for the scope of work and an explanation of how costs were calculated. If the request includes multiple activities, please break out the cost of each activity individually. Include any bids for the proposed activities. Please disclose any other outside funding sources supporting your request. You may attach additional pages, as necessary.

Describe how the proposed scope of work fits into the overall project development process and how any other project development activities will be funded. Describe plans for how you will move forward into the design, financing, and construction phase of your project if project development activities prove to be successful.

The scope of work will provide a preliminary design to expand the WWTP anaerobic digestion and cogeneration capacity. Key project design decisions will be addressed that will shape the project such as method of biogas productions and applicable programs for renewable energy exchange. The predesign will also outline potential agreements with local organizations to provide a consistent source of food waste and other high strength waste.

Please provide the business name and qualifications of the third-party independent consultant(s) who will perform work, unless consultants' qualifications are already on file at Energy Trust. You may attach additional pages, as necessary.

Matt Noesen, P.E. | Project Manager

Matt has 31 years of experience leading a full range of municipal wastewater projects, including expertise in treatment plant upgrades and expansions, air permitting, and regulatory compliance issues. He has led and facilitated numerous master planning and facility planning projects with value engineering, benefit to cost and risk analyses, rate and system development charge impacts, and capital budget development and prioritization as key components in the decision-making process.

Kristen Jackson, P.E. | Project Engineer

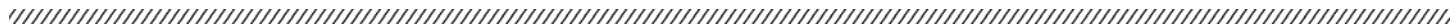
Kristen is experienced in the design and management of wastewater engineering projects, master planning, wastewater treatment processes, construction management, and services during construction

Dave Parry, P.E. | Senior Digestion Technologist

Dave is a principal investigator for research on anaerobic digestion, co-digestion, and cogeneration. He has 39 years of experience with biosolids and biogas technologies and international reputation for proven, innovative wastewater, biosolids, and energy solutions.

Ben Herman, P.E. | Design Manager

Ben is a design manager and senior structural engineering technologist specializing in the design of water and wastewater infrastructure projects. He has extensive experience leading multidisciplinary engineering teams to successfully deliver complex and challenging infrastructure projects and a proven track record of meeting clients' schedules and budgets.

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There are no actual or potential financial or personal interest that any consultant may have in the proposed project or with project proponent.

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Table 1: Activity List (Required format — example)

Activity Description (must clearly identify the specific project development activity that is subject of the request)	Activity Start Date/End Date	Final Completion Documentation*	Cost Estimate (do not include ineligible activity costs)	Incentive Request (may not exceed 50% of estimated eligible costs, or 75% if governmental)
Feasibility study performed by XYZ consultant to examine resource potential.	6/1/2020-10/31/2020	Copy of final feasibility study prepared by consultant XYZ	\$10,000	\$5,000
TOTAL			\$10,000	\$5,000

* **Final Completion Documentation** should reference electronic copies of applicable items to be provided by Project Proponent as proof of activity completion, such as:

- Proof that a grant was submitted to the granting organization for the project listed within the required time period and passed its initial screening for completeness or a copy of the submitted grant application(s);
- A completed feasibility study, and unlocked versions of any underlying models, spreadsheets or other analysis created or prepared as part of or in support of such study along with a summary of next development steps Project Proponent intends to take or reasons for not proceeding at this time;
- Summary memo prepared by Project Proponent's expert consultant reporting on results of the specified activity (including, but not limited to final design, permitting, utility interconnection, construction management, etc. along with next steps, recommendations and lessons learned; and/or
- Completed permit(s) and/or power purchase agreement(s), interconnection agreements, or other such project application(s).

Project Proponent agrees to provide any additional final completion documentation as may be requested by Energy Trust for it to complete its review.

SECTION 3: Project Proponent Signature

Project Proponent understands and agrees that Energy Trust may or may not approve this **Request for Funding**, and the terms and conditions of this **Request for Funding** and the **Project Enrollment** agreement apply. By signing below, I represent to Energy Trust that (i) I have completed this **Request for Funding** completely, truthfully and accurately to the best of my knowledge, (ii) I have read, understand and agree that any terms and conditions contained herein are in addition to, and governed by, Project Proponent's **Project Enrollment Application** agreement with Energy Trust for the identified project; and (iii) I am authorized to enter into this agreement on behalf of the named Project Proponent. Project Proponent further agrees that all information provided to Energy Trust in its **Project Enrollment Application** agreement remains truthful and correct as of the date of this submission, including but not limited to Project Proponent's confirmation that the resulting project's energy will off-set or deliver energy for the benefit of Oregon customers of PGE or Pacific Power.

SIGNATURE: Alan Johnston	Digitally signed by Alan Johnston Date: 2022.03.28 13:23:51 -07'00'	DATE: March 28, 2022
PRINT NAME AND TITLE: Alan Johnston, Senior Engineer		

Next Steps: After review, Energy Trust will notify Project Proponent of its Approval or Denial by emailing a copy of this form to Project Proponent's email address listed with SECTION 4 below completed.

Unless a specified activity has been identified as approved by Energy Trust in SECTION 4 below, then such request is DENIED.

If DENIED, then Energy Trust has determined that we are NOT able to provide incentive support for the project development assistance as requested. Please contact us if you have questions.

SECTION 4: Notice of Denial or Approval *(This section to be completed by Energy Trust)*

Energy Trust has reviewed this **Request for Funding** and hereby approves the activities specifically listed below for an incentive reservation. If an activity is not listed then that request is DENIED. If you have any questions, please contact us at renewables@energytrust.org. Please note that the amount of incentives approved for reservation by Energy Trust may differ from the amount requested. If at any time during the approved project development activity work, the scope, schedule or cost changes from that presented to Energy Trust in the approved **Request for Funding**, you must notify Energy Trust and we may require you to submit a revised **Request for Funding** or other documentation.

Approved Activity #	Approved Activity	Incentive Reservation Amount (50% of estimated eligible cost, up to 75% if governmental)
ACTIVITY 1	AD and Cogen Expansion Predesign	\$107,548.50
ACTIVITY 2		
ACTIVITY 3		
ACTIVITY 4		
ACTIVITY 5		
ACTIVITY 6		
ACTIVITY 7		
ACTIVITY 8		
ACTIVITY 9		
ACTIVITY 10		
TOTAL INCENTIVE RESERVATION AMOUNT		\$107,548.50
INCENTIVE RESERVATION EXPIRATION DATE		6/30/2023

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Instructions to Request Incentive Payment:

Project Proponent must complete all approved project development activities and submit all of the following required completion documentation to Energy Trust to request payment by the Incentive Reservation Expiration Date indicated in SECTION 4. The incentive reservation will expire and be void as of this deadline. If you need an extension to complete an activity, you must contact Energy Trust in writing before the Incentive Reservation Expiration Date with your request. Unless an extension request is expressly approved by Energy Trust in writing and a revised Incentive reservation expiration date provided, then the reservation expires and reserved funds withdrawn and released. All documentation must be submitted electronically. Documentation may be submitted to the email address of the Energy Trust personnel working with the Project Proponent or to renewables@energytrust.org:

- A completed W-9 for Project Proponent, if not previously provided;
- A legible copy of Project Proponent's consultant's invoice for the activity work; and proof that such invoice was *paid in full* (examples include a cancelled check or a statement from consultant showing a balance of zero); and
- All required completion documentation for the specified activity, including Final Completion Documentation and any other required documentation as may have been additionally requested by Energy Trust for a specified activity, clearly identified by approved Activity #.

Energy Trust reserves the right to request, and Project Proponent agrees to provide, any additional backup documentation requested by Energy Trust. By submitting the completion documentation to request payment, Project Proponent is certifying to Energy Trust that the project development assistance work has been completed consistent with the Energy Trust-approved ***Request for Funding*** and the information provided is true and correct.

Supplemental Information for REN_FM0930RF_20220328 submitted by the City of Gresham

Table 1: Activity List				
Activity Description	Activity Start Date/End Date	Final Completion Documentation	Cost Estimate	Incentive Request
Predesign for WWTP anaerobic digestion and cogeneration expansion	4/1/2022 2/21/2023	Preliminary design documents completed by consultant Jacobs, including technical memoranda, predesign report, and memoranda of understanding with both Metro and PGE	\$ 851,703	\$ 200,000
TOTAL				\$ 200,000

EXHIBIT A

WWTP Anaerobic Digestion and Cogeneration Expansion Project

CIP WW00024

Statement of Work, Compensation, and Payment Schedule

A. Project Description

The City of Gresham is interested in completing a Preliminary Design for the construction of the WWTP Anaerobic Digestion and Cogeneration Expansion, CIPWW00024. The preliminary design scope of work includes assisting the City with defining the scope and phasing of the project with which to proceed to Design and Construction. The project will further refine the conceptual design identified in the Feasibility Study of Expanding Liquid Organic Digestion Capacity, CIP 322100 (Jacobs, 2020).

Work anticipated consists of:

- Revise and update the previous Business Case Evaluation (BCE) to perform financial analysis that can be utilized for proceeding with funding the implementation phase of the project, including:
 - Capital Costs: Improve level of accuracy from Class 5 to Class 4 estimate based on preliminary design.
 - Feedstocks: Increase level of certainty associated with quantity, quality, likelihood of availability, and projected tipping fees – Memorandum of Understanding (MOU) or equivalent
 - Renewable Energy Revenues: Increase level of certainty associated with potential renewable energy revenues.
 - Prepare a preliminary design of improvements selected during development of the predesign.

Any additional scope beyond the Preliminary Design maybe be negotiated at the sole discretion of the City.

B. Schedule

The anticipated schedule duration of the WWTP Anaerobic Digestion and Cogeneration Expansion Project is projected to be approximately 12 months from notice to proceed.

C. Scope of Work

The Consultant will provide the work as defined herein. An outline of the project scope is presented below followed by a detailed narrative scope of work.

Preliminary Design

- **Task 1 – Project Management**
- **Task 2 – Predesign Evaluation Services**
 - Task 2.1 – Project Chartering
 - Task 2.2 – Review Existing WWTP Facilities and Background Information
 - Task 2.3 – Feedstock Market and Pre-processing Approach Update
 - Task 2.4 – Digestion Technology Update
 - Task 2.5 – Renewable Energy Update
 - Task 2.6 – Power Utility Coordination & Preliminary Economic Model Update
 - Task 2.7 – Workshop 1
 - *Optional Task 2.8 – Stakeholder Engagement Assistance*
 - *Optional Task 2.9 – Feedstock Preliminary Agreement Assistance*
 - *Optional Task 2.10 – PGE or Third Party Preliminary Renewable Electricity Agreement Assistance*
 - *Optional Task 2.11 – Capital funding assistance*
- **Task 3 – Dewatering Equipment Alternatives Analysis**
 - Task 3.1 Kickoff Meeting, Screening of Alternatives and Dewatering Equipment Tour
 - Task 3.2 Alternatives Analysis
 - Task 3.3 Technical Memorandum of Results
 - *Optional Task 3.4 Evaluation of Dewatering Process Improvements*
- **Task 4 – Preliminary Design Development**
 - Task 4.1 Liquid Organic Waste Receiving
 - Task 4.2 Digestion
 - *Optional 4.2.1 – Microbial Hydrolysis Integration*
 - Task 4.3 Gas System Analysis (Pretreatment, storage and backup flare)
 - Task 4.4 Cogeneration
 - Task 4.5 Hot Water Loop System (Heat exchangers, pumping, boilers, etc.)
 - Task 4.6 Dewatering & Biosolids Handling
 - Task 4.7 Wastewater Liquids Treatment System Impacts
 - Task 4.8 Electrical Power Plan (including Utility Connection)
 - Task 4.9 Building, Code Compliance, and Air Permitting Review
 - Task 4.10 Cost Estimate
 - Task 4.11 Workshop 2
- **Task 5 – Economic Model Update**
 - Task 5.1 Renewable Energy Revenue Analysis
 - Task 5.2 Economic Model Update
- **Task 6 – Predesign Report**
 - Task 6.1 Draft
 - Task 6.2 Workshop 3
 - Task 6.3 Final
- **Optional Task 7 – Out-of-Scope Work**

Preliminary Design

Task 1 Project Management

Jacobs will provide the resources necessary to manage the project, including:

- Scoping, task order review/execution, and project accounting setup.
- Monitor project progress, including work completed, work remaining, budget expended, schedule, estimated cost of work remaining, and estimated cost at completion.
- Monitor project activities for potential changes, anticipate changes when possible, and with City approval, modify project tasks, budgets, and approach.
- Manage quality of deliverables.

Deliverable:

- Monthly billing with narratives providing updates on work completed.

Assumptions:

- Assume 4 hours per month of effort for the Project Manager to coordinate project activities during the 9-month project period.
- 1 invoice per month
- Assume 4 status meeting calls during the project, each attended by Project Manager, not to exceed 1-hour each (included in 4-hours per month of project management).

Task 2 Predesign Evaluation Services

The overall purpose of this task is to build on the conceptual design from the Feasibility Study of Expanding Liquid Organic Digestion Capacity, CIP 322100 (Jacobs, 2020) to further refine the project scope definition so that the Preliminary Design Development under Task 4 can proceed.

In general, any additional data gathering, data analysis, and alternatives evaluations will be conducted as part of Task 2 so that key project decisions in term of design criteria and technologies that will be utilized to meet those criteria will be selected upon the culmination of this task.

Task 2.1 – Project Chartering

This subtask involves conducting a meeting to review the scope, schedule, budget with the City's project team and the City's contract operator. Also at this meeting the communication protocol for the project will be defined as well as goals and critical success factors that the City wants to achieve at the conclusion of the project.

Deliverable:

- Agenda for chartering session
- Notes from chartering meeting.

Assumptions:

- Chartering meeting to include up to 6 members of Jacobs team attending in person, one additional member attending virtually, and the session shall not to exceed 2-hours in duration.

Task 2.2 – Review Existing WWTP Facilities and Background Information

This subtask involves new members of the team reviewing existing information pertaining to this project so that they can become familiar with past work and the current status of facilities and operation of those facilities at the WWTP.

Deliverable:

- Data/information request email submitted to the Gresham project manager

Task 2.3 – Feedstock market and pre-processing approach update

This subtask involves working with Gresham's solid waste manager and Metro staff to further refine as necessary the quantities and quality previously assumed for the food slurry feedstock. Additional Fats, Oils & Grease (FOG) quantities will also be confirmed. Jacobs will further evaluate industrial sources of liquid organic waste as a potentially viable future source for co-digestion.

Jacobs will also finalize the conceptual approach for receiving the food slurry including the assumed location of the food scraps processing facility (i.e., whether it will be remote or co-located at or adjacent to the Gresham WWTP site, who will own and operate this food scraps processing facility. Also, to the extent possible it will be identified which entity or entities will be responsible for truck hauling the food slurry to the Gresham WWTP's receiving station.

Deliverable:

- Agenda for meeting with Metro
- Notes from meeting with Metro.
- Memorandum that documents the mutual understanding between the City and Metro in terms of food slurry quantities and quality that the City can anticipate receiving and the most probable range of tipping fees that the City will receive for accepting the food slurry.

Assumptions:

- One in person meeting will be conducted with Metro which will be attended by two Jacobs staff; meeting duration will not exceed 2 hours.
- Up to two, 1-hour phone conferences will be conducted with Metro which will be attend by two Jacobs staff.

Task 2.4 – Digestion Technology Update

This subtask involves conducting and documenting an assessment of the existing digestion tanks ability to operate over the long-term at thermophilic temperatures. The assessment will outline upgrades and/or improvements to insulation or other mitigation measures that are needed to mitigate long-term impacts to the structures such as cracking that may result from operating at higher temperatures.

This subtask involves qualitatively evaluating different digestion technologies and configurations and selecting the general approach that will be carried forward to Task 4. For example, will the digestion capacity expansion be attained by one single, continuous flow stirred tank reactor (CFSTR), a series of CFSTRs that will approach plug flow, or a plug flow reactor configuration. Part of this analysis will be to determine if one of the design criterion will be to attain Class A biosolids through digestion.

Jacobs will conduct an evaluation of microbial hydrolysis based on lab-scale pilot results in the Gresham laboratory. Jacobs will conduct an economic evaluation considering costs to construct and operate the microbial hydrolysis system, changes to the heat balance, and if appropriate, increase/decrease in

dewatering costs, decrease in cake storage costs (initial capital costs), reduction in biosolids land application costs.

Finally, as part of this subtask Jacobs will conduct a desktop evaluation of microaeration in the digesters for reduction of hydrogen sulfide in the biogas prior to the biogas treatment systems. This evaluation will be based on information from other facilities and will not involve conducting a site specific pilot of microaeration, although a potential recommendation of this evaluation may be to conduct a pilot at the Gresham WWTP which could entail a lab scale testing utilizing the digestion pilot system or a full-scale pilot as part of the next phase of this project.

Deliverable:

- Memorandum that documents the structural assessment, the digester process configuration evaluation, and microaeration evaluation including conclusion/recommendations for each of these three topics.

Task 2.5 – Renewable Energy Update

Subconsultant EcoEngineers will provide an update for the renewable energy credit markets incorporating developments since the 2020 Study was completed. Efforts will focus on the Oregon Clean Fuels Program rules development being conducted by DEQ.

Deliverable:

- Memorandum that documents an update to renewable energy markets.

Task 2.6 – Power Utility Coordination & Preliminary Economic Model Update

Jacobs will communicate with Portland General Electric to assess how the power utility will approach and price renewable electricity generated by Gresham. Generally, two renewable electricity scenarios will be explored 1) PGE purchases the power from the City, or 2) a third party purchases the power from the City.

Jacobs will utilize the information from the previous subtasks as well as the information gathered from the power utility to conduct a preliminary update of the economic model that was developed as part of the 2020 Study.

The renewable energy landscape continues to evolve since the completion of the Feasibility Study of Expanding Liquid Organic Digestion Capacity, CIP 322100 (Jacobs, 2020). Changes have included:

- The Oregon legislature passed Senate Bill 98, which established RNG targets and rules around RNG procurement for all gas utilities in Oregon. Senate Bill 98 sets the policy framework for gas utilities to buy RNG and deliver it to all their customers for residential, commercial, and industrial needs, such as space and process heating. No need to put the RNG into a vehicle. This bill is completely separate from the Oregon Clean Fuels Program and the federal Renewable Fuel Standard (RINs).
- Senate Bill 98 allows natural gas utilities to both procure RNG under long-term contracts and invest in RNG production. Gas utilities can invest in the equipment to process, clean, condition, compress, and interconnect RNG to the local gas distribution network. These investments can be rate-based and can be made both in Oregon and outside of Oregon.

- The Climate Protection Program, which is the outcome of the governor's [Executive Order on Climate](#) will also dramatically increase the incentive for gas utilities throughout Oregon to procure RNG.

These policies have led NW Natural to get more involved in RNG development and procurement in recent years. NW Natural has been executing contracts to purchase RNG under long-term fixed-price contracts, is investing in RNG production, and has several projects where they are providing the capital to pay for the RNG cleaning, conditioning, and compression equipment, as well as the pipeline interconnection.

Jacobs will re-evaluate renewable natural gas (RNG) vis-à-vis renewable electricity to confirm the City still wants to remain on the current path. The 2020 economic model will be updated utilizing RNG incorporating the pertinent incentive programs to enable the City to assess whether they would like to change direction or remain with a renewable electricity approach.

Deliverable:

- Agenda for meeting with PGE in email format
- Notes from meeting with PGE in WORD and PDF formats.
- Memorandum that documents the mutual understanding between the City and PGE in terms of renewable power pricing and credit sharing as well as applicable transmission fees. Memorandum will also document the output from the economic model utilizing RNG and comparing those results to the results based on the renewable electricity approach.

Assumptions:

- One in-person meeting will be conducted with PGE which will be attended by two Jacobs staff; meeting duration will not exceed 2 hours.
- Up to two, 1-hour phone conferences will be conducted with PGE which will be attended by up to three Jacobs staff. It is intended that one of these phone meetings will be utilized to introduce the topic to PGE prior to the in-person session and the second phone meeting will be utilized after the in person session to further clarify any outstanding questions or issues.

Task 2.7 – Workshop 1

Jacobs will facilitate a workshop with the City to present the findings from subtasks 2.3 through 2.6 and subtask 3.2.

Deliverable:

- Agenda for workshop in Word format
- Notes from workshop in WORD and PDF formats.

Assumptions:

- Two-hour workshop to be held at Gresham WWTP to include up to 5 Jacobs team members in person, and up to 5 Jacobs team members attending virtually for half of the workshop.

Optional Task 2.8 – Stakeholder Engagement Assistance

Provide stakeholder engagement assistance to the City staff as requested. Activities might include preparing for and/or attending briefings to City management, City Council or other third party stakeholders.

Deliverable:

- Presentation materials, as requested by City staff

Assumption:

- Provide up to 46 hours of assistance, as requested

Optional Task 2.9 – Feedstock Preliminary Agreement Assistance

Provide assistance to the City staff for developing a preliminary agreement between the City and Metro for food slurry feedstock.

Deliverable:

- Written comments of preliminary agreement

Assumption:

- Provide up to 44 hours of assistance

Optional Task 2.10 – PGE or Third Party Preliminary Renewable Electricity Agreement Assistance

Provide assistance to the City staff for developing a preliminary agreement between the City and PGE for renewable electricity.

Deliverable:

- Written comments of preliminary agreement

Assumption:

- Provide up to 44 hours of assistance

Optional Task 2.11 – Capital Funding Assistance

Provide assistance to the City staff for identifying capital funding for the project.

Deliverable:

- Memorandum that documents potential funding sources including a general description of the range of possible funding available from various sources.

Assumption:

- Provide up to 46 hours of assistance

Task 3 – Dewatering Equipment Alternatives Analysis

This task will include qualitative and quantitative evaluation of dewatering equipment alternatives, to determine the preferred technology so that the subsequent preliminary design of the selected alternative can be performed in Task 4. The results of the Task 3 activities will be documented in a technical memorandum to define the scope of the dewatering equipment replacement.

Evaluation includes conceptual costs (budgetary pricing) and non-monetary criteria. The preferred option to be selected by the City.

In providing opinions of construction cost, Consultant has no control over cost or price of labor and materials; therefore, Consultant makes no warranty that actual project costs, financial aspects, economic feasibility, or schedules will not vary from Consultant's analyses, projections, and/or estimates.

Task 3.1 – Dewatering Equipment Kickoff Meeting

Conduct kickoff meeting and high level screening of available alternatives to reduce the number of viable thickening technology alternatives to a short-list of practical alternatives considered for detailed comparison. A preliminary outline of the technical memorandum described in Task 3.3 will be presented and discussed at the Kickoff Meeting.

Example alternatives to be screened at the meeting include :

- Base Case: Retain existing Belt Filter Presses (BFPs)
- Replace with new 3-belt BFPs
- Replace with screw presses
- Replace with high-solids centrifuges

Deliverable:

- Kickoff meeting agenda
- Kickoff meeting notes
- TM outline.

Assumptions:

- One hour kickoff meeting at the Gresham WWTP to include 2 members of Jacobs in person, 3 members of Jacobs on the phone.
- Two thickening technology options will be selected by the City for further evaluation.
- Includes travel from out of town for 1 Jacobs employee.

Task 3.2 – Alternatives Analysis

It is assumed that the following two dewatering technology options from Task 3.1 will be carried forward for a more detailed evaluation that includes qualitative and quantitative factors:

- New 3-belt Belt Filter Presses (BFPs)
- High-solids centrifuges

Evaluation includes qualitative and quantitative factors, preferred option to be selected by the City.

- Qualitative – Non-monetary evaluation criteria comparison. An example of possible non-monetary evaluation criteria includes:

- Performance
 - Equipment reliability
 - Level of operational complexity
 - Level of maintenance complexity
 - Sustainability (energy consumption)
 - Odor generation
 - Noise/safety
 - NFPA considerations required by upgrade versus replace-in-kind (HVAC, electrical, process mechanical)
- Quantitative Comparison – Life cycle costs will be developed for the two alternatives. Class 5 cost estimate will be developed and utilized for the cost comparisons.

Deliverable:

- PowerPoint slides or fact sheets that can be utilized to review findings as part of Workshop 1 (see subtask 2.7)

Assumptions:

- A maximum of two dewatering technology alternatives from Task 3.1 will be evaluated

Task 3.3 – Technical Memorandum of Results

A description of the alternatives and the alternative analysis will be summarized in a draft TM which will include one preferred technology selected from Task 3.2.

- Draft TM
- Final Report that incorporates City comments from the Draft Report.

Deliverable:

- Draft and Final TM electronically in PDF format.

Assumptions:

- City comments to be received within 2 weeks of delivery of draft TM.

Optional Task 3.4 – Evaluation of Dewatering Process Improvement Options

Dewatering performance of digested sludge at the Gresham WWTP has historically been well below industry average when utilizing belt filter press technology. Bench pilot scale testing of centrifuge or screw press technologies has in some cases have slightly increased cake solids performance but to the detriment of polymer demand.

Cake solids of digested sludge that was treated with microbial hydrolysis in the pilot unit in the Gresham laboratory significantly increased; however, the polymer demand of this sample also significantly increased. Testing at a scale closer to full-scale might be needed to assess the polymer demand more accurately.

Previous testing of salt addition to the digested sludge did slightly improve cake solids but not sufficiently to clearly offset the costs of the salt addition (both direct chemical addition costs and the resulting additional biosolids disposal costs).

A primary theory for the poor dewatering characteristics of digested sludge at Gresham is the high ratio of biological sludge/waste activated sludge (WAS) relative to primary sludge, which is much easier to digest and dewater. A potential promising idea is to utilize an approach known as chemically enhanced primary treatment (CEPT) whereby a metal salt (with or without a trim polymer) is added to the primary influent thereby generating more primary sludge (relative to WAS). This process also serves to send less organic load to secondary treatment thereby reducing air demand and therefore electricity usage.

The purpose of work conducted under this task would be to assess CEPT holistically by first conducting jar tests to pinpoint the optimal metal salt/polymer dosage combination and then utilize the and could be coupled with microbial hydrolysis utilized the pilot unit in the laboratory at the WWTP. The results would then be utilized to develop an economic analysis which would account for labor impacts, chemical costs, electricity usage and impact of net zero, cake storage needs, and biosolids land application costs.

An allowance of \$32,904 has been established to support such efforts. The City may opt to direct the consultant to develop a scope for laboratory scale CEPT and subsequent engineering economic evaluation. If the CEPT approach is deemed successful based on the laboratory scale testing, one potential recommendation might be to conduct full-scale CEPT testing at the upper or lower plant (scope of work to be developed separately).

Task 4 – Preliminary Design Development

This task will include designing the project to approximately the 20% of this assumed project scope:

- Expansion of liquid organics receiving
- Convert the existing mesophilic digesters to thermophilic
- Construct a third, thermophilic anaerobic digester to provide redundancy
- Convert Digester 2 from floating cover to fixed cover and install low pressure storage for biogas pressure control
- Construct a third biogas flare and demolish one existing flare
- Roughly doubling the solids processing capacity in terms of:
 - o Liquid organics processing (volatile solids per day)
 - o Biogas production (standard cubic feet per day)
 - o Power generation (kilowatt-hours)
- Install microgrid power controls for use during utility power outages so that WWTP system can be isolated from the PGE utility grid
- Replace two existing belt filter presses with new dewatering equipment (assumed to be centrifuges that can be located in the existing Solids Building)

This scope may need to be modified depending on the outcomes from work conducted under Tasks 2 and 3.

Task 4 Deliverables:

- Updated Overall Process Flow Diagram
- Update Mass/Energy Balance
- Preliminary Overall Civil Site Plan
- Preliminary Equipment List
- Draft Network control diagram (defining number of new PLCs and how PLCs will be linked together)

- List of Special System Requirements (e.g., CCTV and fire suppression system)
 - Site survey – Assess existing information and identify information/data gap
 - Identify early-out underground gaps (so that potholing could commence at the beginning of the design phase)
 - Initial Geotechnical Needs Assessment
 - Initial architectural concepts/space planning for buildings (e.g., cogen building, and digestion building space); General type of building architecture, draft airflow diagrams
- For each major unit process (subtasks 4.1 through 4.6):
- Preliminary P&ID
 - Preliminary Mechanical Plan and Section

Task 4.1 – Liquid Organic Waste Receiving

Key decisions and/or aspects of the design approach will include:

- Level of redundancy required to handle multiple feedstocks and multiple, concurrent truck deliveries
- Determine if rock traps are needed and if so whether to include specialized polymer concrete tanks against typical manufactured rock traps, based on increased lifespan and larger potential sizes
- Type of screening and whether the screening system will also accommodate primary and waste activated sludge which would significantly reduce contaminant buildup in the digesters, reduce the frequency of digester cleanings and increase digestion performance.
- Materials of construction for major equipment and components with the intent to be compatible with current FOG receiving station if possible to facilitate operation and maintenance of the two receiving facilities

Task 4.2 – Digestion

Key decisions and/or aspects of the work to be conducted include:

- Sludge heating and heat recovery: integrating the heating system for the higher temperature, thermophilic digestion with heat recovery from the cogeneration system cost-effectively optimizes heat recovery from digested biosolids while reducing the overall heat demand. Coordinate with subtask 4.5.
- Sludge feeding and withdrawal that will provide flexibility in feeding the existing and new digesters with attention to even distribution; sludge withdrawal removes foam and floatables from the surface and grit from the bottom of the digesters.
- Conduct qualitative digester mixing evaluation comparing linear motion mixers to a pump mixing approach, with the goal to provide adequate mixing, avoid grit deposition, prevent short-circuiting between the feed and withdrawal, and minimize energy use.
- Select digester cover for new thermophilic digester and for retrofitting the existing floating cover digester.
- Identify inside digester coating or linings for the new digester and for original digesters compatible with thermophilic operating temperatures.

Optional Task 4.2.1 – Microbial Hydrolysis Integration

If *Microbial Hydrolysis* is selected to be included in the project under subtask 2.4, then integrate that sub-unit process into the project.

Task 4.3 – Gas System (Pretreatment, storage and backup flare)

Add second train of equipment for gas conditioning expansion including additional cooling capability prior to H₂S removal, given the higher gas temperatures from thermophilic digestion. As the new fixed cover for Digester 2 will eliminate the gas storage function provided through the floating cover, add low-pressure gas storage in the form of a dual membrane gas holder (bubble-type gas control system) providing a means to:

- Automatically adjust the operating load of the cogeneration engines.
- Alert operations staff when an additional engine could be started (high amount of gas stored) or an engine needs to be stopped (low amount of gas stored).

Incorporate microaeration if selected in subtask 2.4. Select flare/waste gas burner type and identify location for unit.

Task 4.4 – Cogeneration

Determine optimum approach for engine size and number; options consist of:

- Retain current 400 kW units and installing two more, similar engines.
- Retain one of the current 400 kW units (unit installed in 2015), decommission original unit installed in the 2005 and install two, new larger 600 KW engines.

Factors to be considered include phasing in maximize renewable energy credit generation, working environment noise reduction, minimize NFPA 820 compliance while improving ventilation and safety.

Task 4.5 – Hot Water Loop System

Update heat balance model based on findings and decisions made in Task 2. Develop hot water loop system upgrade approach that builds on current system to recover heat from the new and original cogeneration engines, circulating hot water through the new and original digesters. Loop and heat recovery configuration must provide higher temperatures than current system to achieve thermophilic digestion, while still returning water cool enough to provide reliable engine cooling.

Consider cast-iron section boilers, which are more accepting of raw/partially treated gas, decreasing full biogas treatment costs when using the boiler

Task 4.6 – Dewatering & Biosolids Handling

Apply findings from Task 3 to develop the preliminary design for solids dewatering and cake conveyor modifications.

Task 4.7 – Wastewater Liquids Treatment System Impacts

Based on the updated design criteria for the project, revise and re-run the liquids treatment process model to determine if there are significant resulting changes to ammonia recycles to the Upper Plant and to the effluent ammonia concentration relative to the new effluent ammonia permit limit as of November 1, 2021.

Deliverable:

- Document findings in a memorandum; submit to City in electronic PDF format.

Assumptions:

- Utilize existing Pro2D2 process model; additional calibration of the model will not be conducted.

Task 4.8 – Electrical Power Plan (including Utility Connection)

Generate preliminary electrical power plan for the project. Determine extent of power system upgrades that will need to be addressed in the next phase of the project (detailed design).

Deliverable:

- Preliminary Overall electrical One-line and Site Power Plan including MicroGrid design approach

Task 4.9 – Building, Code Compliance, and Air Permitting Review

Outline approach for complying with building code, NFPA 820 for retrofitted areas and new areas associated with the project. Identify which air permits need to be modified and/or if new air permits will be required.

Deliverable:

- Memorandum documenting the findings and recommended approach associated with complying with the Building code, fire code, and applicable air permitting requirements.

Assumptions:

- One half-day site visit at the Gresham WWTP to review existing facilities to include 3 members of Jacobs in person.

Task 4.10 – Cost Estimate

Generate engineer's opinion of construction cost for the project.

Deliverable:

- Basis of Cost document, Detailed Report and Summary Report associated with cost estimate.

Assumptions:

- Class 4 Estimate. In providing opinions of construction cost under subtask 4.10, Consultant has no control over cost or price of labor and materials; therefore, Consultant makes no warranty that actual project costs, financial aspects, economic feasibility, or schedules will not vary from Consultant's analyses, projections, and/or estimates.

Task 4.11 – Workshop 2

Jacobs will facilitate a workshop with the City to present the work conducted under subtasks 4.1 through 4.10.

Deliverable:

- Agenda for workshop in Word format
- Notes from workshop in WORD and PDF formats.

Assumptions:

- Two-hour workshop to be held at Gresham WWTP to include up to 4 Jacobs team members in person, and up to 4 Jacobs team members attending virtually for half of the workshop.

Task 5 – Economic Model Update

Task 5.1 – Renewable Energy Revenue Analysis

Subconsultant EcoEngineers will provide an update to the carbon intensity (CI) score that was developed under the 2020 study based on the findings and results of the work conducted under Tasks 2 and 4.

Deliverable:

- Memorandum from EcoEngineers documenting the results.

Assumptions:

- Renewable electricity credits from the Oregon Clean Fuels Program will be utilized under the assumption that a third party will purchase the power from the City.

Task 5.2 – Economic Model Update

Based on the results from subtasks 4.10 and 5.1, the economic model from subtask 2.6 will be revised to reflect the current project scope assumptions.

Deliverable:

- Tabular and graphical summary output from the revised model.

Assumptions:

- Two scenarios will be run:
- Renewable electricity credits from the Oregon Clean Fuels Program only.
- Renewable electricity credits from the Oregon Clean Fuels Program and eRINs from the EPA's Renewable Fuel Standard (RFS).

Task 6 – Predesign Report

The purpose of this task is to document the findings in a report that can be submitted by the City to DEQ for approval.

Task 6.1 – Draft Report

Report will include sections and/or discussions on the project delivery approaches, preliminary list of specifications of major mechanical equipment identifying which pieces of equipment may need to be pre-purchase/preselection due to anticipated long lead time or other reasons, general project implementation schedule and projects phasing approach

Deliverable:

- Draft Report electronically in Word and PDF format.

Assumptions:

- Pre-Design Draft Report Review meeting at the Gresham WWTP to include 2 members of Jacobs in person, 2 members of Jacobs on the phone, and not to exceed 1-hour in duration.
- Includes travel from out of town for 1 Jacobs employee.
- City comments to be received within 2 weeks of delivery of draft report.

Task 6.2 – Workshop 3

Meet with City staff to review the Draft Report

Deliverable:

- Agenda for workshop
- Meeting notes with comment log attached resulting from workshop in Word and PDF format.

Assumptions:

- Draft Report will be submitted to the City's project manager one week prior to the date of the Workshop
- Workshop to be held at Gresham WWTP to include 3 members of Jacobs in person, and not to exceed 2-hours in duration.
- Any additional City comments not documented at the Workshop to be received by Jacobs within 2 weeks of Workshop.

Task 6.3 – Final Report

City comments will be adjudicated and accepted comments will be incorporated into a DEQ Review Draft Report. This Report will be submitted to the City staff who will in turn submit it to DEQ for their review. Approximately 2 weeks after submitted to DEQ a review phone conference call will be conducted with Jacobs, City and DEQ staff to review DEQ's comments. Comments will be adjudicated between the City/Jacobs staff and DEQ during this call and accepted comments will be incorporated into the Final Report.

Deliverable:

- DEQ Review Draft Report in electronic PDF format and two hard copies
- Final Report electronically in PDF format and five hard copies.

Assumptions:

- Review phone conference with DEQ staff will be a video conference call and will include up to 3 members of Jacobs team, and conversation will not exceed 2-hours in duration.
- DEQ's comments will be made available prior to or during the review phone conference.

Task 7 – Out-of-Scope Work (Optional Task)

This task is to allow for Consultant support as directed and authorized by the City in writing for out-of-scope work. A \$20,000 allowance has been established for this optional task.

D. Compensation

Work, not including optional tasks, will be performed on a lump sum basis for an estimated amount of \$721,975 per Table 1. Optional tasks are also shown in Table 1 and total \$129,729; consultant shall proceed with work under optional tasks only if directed to do so by the City in writing. The total fee for the Work including all optional tasks (if all are authorized) is \$851,703.

The method used to charge for any additional services will be billed at raw salary cost multiplied by a factor of 3.15 and direct expenses billed at cost. Additional subcontracted work, if any becomes necessary, will be billed at cost plus 5 percent. Sales and other applicable taxes will be applied as appropriate.

	Task Description	Labor Cost	Expenses	Total
Task 1	Project Management	\$46,244	\$697	46,941
Task 2	Predesign Evaluation Services	\$150,267	\$19,266	169,533
Task 3	Dewatering Equipment Alternatives Analysis	\$46,287	\$1,210	47,497
Task 4	Preliminary Design Development	\$378,774	\$821	379,595
Task 5	Economic Model Update	\$6,182	15,000	21,182
Task 6	Predesign Report	\$56,288	\$939	57,227
Total		\$684,042	\$37,932	\$721,975
Optional Tasks				
Task 2.8	Stakeholder engagement assistance	\$10,030		10,030
Task 2.9	Feedstock Preliminary Agreement Assistance	\$9,570		9,570
Task 2.10	PGE or Third Party Preliminary Renewable Electricity Agreement Assistance	\$11,960		11,960
Task 2.11	Capital funding assistance	\$9,746		9,746
Task 3.4	Evaluation of dewatering process improvements	\$17,904	\$15,000	32,904
Task 4.2.1	Microbial Hydrolysis Integration	\$35,519	-	\$35,519
Task 7	Out-of-Scope Work	\$20,000		\$20,000
	Total of Optional Tasks	\$114,729	\$15,000	\$129,729
	Total (including Optional Tasks)	\$798,770	\$52,932	851,703