California Energy Commission
August 09, 2023 Business Meeting
Backup Materials for Agenda Item No 12a:
Institute of Gas Technology dba GTI Energy

The following backup materials for the above-referenced agenda item are available in this PDF packet as listed below:

1. Proposed Resolution
2. Grant Request Form
3. Scope of Work

RESOLUTION NO: 23-0809-12a

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: Institute of Gas Technology dba GTI Energy

RESOLVED, that the State Energy Resources Conservation and Development Commission (CEC) adopts the staff CEQA findings contained in the Agreement or Amendment Request Form (as applicable); and

RESOLVED, that the CEC approves agreement PIR-23-005 with Institute of Gas Technology dba GTI Energy for a $999,319 grant to test a non-destructive evaluation tool to identify cracks in the wall of plastic pipes and defects in fusion joints. The project will combine historic and new inspection data to enhance decision support tools and improve cost-effectiveness of plastic pipeline integrity management; and

FURTHER BE IT RESOLVED, that the Executive Director or their designee shall execute the same on behalf of the CEC.

CERTIFICATION

The undersigned Secretariat to the CEC does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the CEC held on August 09, 2023.

AYE:
NAY:
ABSENT:
ABSTAIN:

Dated:

_____
Kristine Banaag
Secretariat

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

CEC-270 (Revised 9/2022)

GRANT REQUEST FORM (GRF)

A. New Agreement Number

IMPORTANT: New Agreement # to be completed by Contracts, Grants, and Loans Office.

New Agreement Number: PIR-23-005

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Sean Anayah
3. MS-:51
4. Phone Number: 916-931-5044

C. Recipient's Information

1. Recipient's Legal Name: Institute of Gas Technology dba GTI Energy
2. Federal ID Number: 36-2170137

D. Title of Project

Title of project: Plastic Pipeline Deficiency Inspection for Pipeline Integrity Management

E. Term and Amount

1. Start Date: 9/1/2023
2. End Date: 9/30/2026
3. Amount: $999,319.00

F. Business Meeting Information

1. Are the ARFVTP agreements $75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 8/9/2023 .
3. Consent or Discussion? Discussion
4. Business Meeting Presenter Name: Sean Anayah
5. Time Needed for Business Meeting: 5 minutes.
6. The email subscription topic is: NaturalGas (NG Research Program).

Agenda Item Subject and Description:

Institute of Gas Technology dba GTI Energy. Proposed resolution approving agreement PIR-23-005 with Institute of Gas Technology dba GTI Energy for a $999,319 grant to test a non-destructive evaluation tool to identify cracks in the wall of plastic pipes and defects in fusion joints, and adopting staff's determination that this action is exempt from CEQA. The project will combine historic and new inspection data to enhance decision support tools and improve cost-effectiveness of plastic pipeline integrity management. (PIER NG funding) Contact: Sean Anayah

G. California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?
Yes

If yes, skip to question 2.

If no, complete the following (PRC 21065 and 14 CCR 15378) and explain why Agreement is not considered a "Project":

Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because:

2. **If Agreement is considered a "Project" under CEQA answer the following questions.**

a) Agreement **IS** exempt?

Yes

Statutory Exemption?
No

If yes, list PRC and/or CCR section number(s) and separate each with a comma. If no, enter "None" and go to the next question.

PRC section number: None

CCR section number: None

Categorical Exemption?
Yes

If yes, list CCR section number(s) and separate each with a comma. If no, enter "None" and go to the next question.

CCR section number: Cal. Code Regs., tit. 14, § 15301 ; Cal. Code Regs., tit. 14, § 15306 ;

Common Sense Exemption? 14 CCR 15061 (b) (3)
No

If yes, explain reason why Agreement is exempt under the above section. If no, enter "Not applicable" and go to the next section.

California. Code Regs., tit 14, section 15301 provides that projects which consist of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, and which involve negligible or no expansion of existing or former use, are categorically exempt from the provisions of the California Environmental Quality Act. The project will assess a Phased Array Ultrasonic Testing (PAUT) tool to inspect both plastic pipe and fusion joints. During the initial laboratory testing period of the proposed project, pipe assemblies will be removed from the field within an investor-owned utility's (IOU) service territory during normal operations from an area associated with third-party damage hits on the plastic pipeline infrastructure. During the second portion of the proposed project, field demonstration sites will be selected from fully random sampling locations, also within an IOUs service territory, for field trials of the Non-Destructive Evaluation (NDE) equipment. These activities will result in negligible or no expansion of existing or former use of this existing infrastructure.

This project is also exempt under California Code Regs., tit 14, section 15306 which provides that projects which consist of basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource are categorically exempt from the

provisions of the California Environmental Quality Act. This project will collect data in a laboratory setting using samples from the field that have experienced third party hits, and by testing the NDE technology through field demonstrations at fully random sites, all located at sites within an IOU's service territory. The project will also address the interpretation of indications of defects identified by PAUT, incorporation of NDE inspection data into probabilistic risk assessment models, and development of probabilistic assessments of the impact of NDE inspection data on risk spend efficiency metrics in pipeline integrity management programs. The holistic approach adopted in the proposed project will provide a comprehensive view of the efficacy of PAUT in detecting defects in plastic piping systems, and the impact this new information has when viewed through the lens of benefits to stakeholders. These activities will not result in a serious or major disturbance to an environmental resource.

For these reasons, the proposed work will not have any significant effect on the environment and falls under sections 15301 and 15306.

This project does not involve impacts on any particularly sensitive environment; does not involve any cumulative impacts of successive projects of the same type in the same place that might be considered significant; does not involve unusual circumstances that might have a significant effect on the environment; will not result in damage to scenic resources within a highway officially designated as a state scenic highway; the project site is not included on any list compiled pursuant to Government Code section 65962.5; and the project will not cause a substantial adverse change in the significance of a historical resource. Therefore, none of the exceptions to categorical exemptions listed in CEQA Guidelines section 15300.2 apply to this project and this project will not have a significant effect on the environment.

b) Agreement **IS NOT** exempt.

IMPORTANT: consult with the legal office to determine next steps.

No

If yes, answer yes or no to all that applies. If no, list all as "no" and "None" as "yes".

Additional Documents	Applies
Initial Study	No
Negative Declaration	No
Mitigated Negative Declaration	No
Environmental Impact Report	No
Statement of Overriding Considerations	No
None	Yes

H. Subcontractors

List all Subcontractors listed in the Budget (s) (major and minor). Insert additional rows if needed. If no subcontractors to report, enter "No subcontractors to report" and "0" to funds. **Delete** any unused rows from the table.

Subcontractor Legal Company Name	CEC Funds	Match Funds
The Regents of the University of California on behalf of the Los Angeles Campus	$ 250,000	**$**0
Lumina Decision Systems, Inc.	$ 360,000	**$**0

I. Vendors and Sellers for Equipment and Materials/Miscellaneous

List all Vendors and Sellers listed in Budget(s) for Equipment and Materials/Miscellaneous. Insert additional rows if needed. If no vendors or sellers to report, enter "No vendors or sellers to report" and "0" to funds. **Delete** any unused rows from the table.

Vendor/Seller Legal Company Name	CEC Funds	Match Funds
TBD - Training Contractor	**$**0	**$**50,000
TBD1	**$**0	**$**200,000

J. Key Partners

List all key partner(s). Insert additional rows if needed. If no key partners to report, enter "No key partners to report." **Delete** any unused rows from the table.

Key Partner Legal Company Name
Southern California Gas Company

K. Budget Information

Include all budget information. Insert additional rows if needed. If no budget information to report, enter "N/A" for "Not Applicable" and "0" to Amount. **Delete** any unused rows from the table.

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
NG Subaccount, PIERDD	21-22	501.021	$ 999,319

TOTAL Amount: $ 999,319

R&D Program Area: ESRB: ETSI

Explanation for "Other" selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: 601 Program Continuous Appropriation

L. Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Kate Jauridez

Address: 1700 S Mount Prospect Rd

City, State, Zip: Des Plaines, IL 60018-1804

Phone: 847-768-0905

E-Mail: kate.jauridez@gastechnology.org

3. Recipient's Project Manager

Name: Ernest Lever

Address: 1700 S Mount Prospect Rd

City, State, Zip: Des Plaines, IL 60018-1804

Phone: (847) 544-3415

E-Mail: elever@gti.energy.com

M. Selection Process Used

There are three types of selection process. List the one used for this GRF.

Selection Process	Additional Information
Competitive Solicitation #	GFO-22-503
First Come First Served Solicitation #	Not applicable
Other	Not applicable

N. Attached Items

1. List all items that should be attached to this GRF by entering "Yes" or "No".

Item Number	Item Name	Attached
1	Exhibit A, Scope of Work/Schedule	Yes
2	Exhibit B, Budget Detail	Yes
3	CEC 105, Questionnaire for Identifying Conflicts	Yes
4	Recipient Resolution	No
5	Awardee CEQA Documentation	No

Approved By

Individuals who approve this form must enter their full name and approval date in the MS Word version.

Agreement Manager: Sean Anayah

Approval Date: 6/30/2023

Branch Manager: Reynaldo Gonzalez

Approval Date: 6/30/2023

Director: Reynaldo Gonzalez for Jonah Steinbuck

Approval Date: 6/30/2023

Exhibit A
Scope of Work
GTI Energy

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2	X	Develop Project Framework
3		NDE Training
4		NDE Evaluation of Pipe and Joints
5	X	Verification, Inspection, and Accelerated Lifetime Testing of Detected Defects
6		Data Analytics and Information Fusion Framework
7		Integrity Management Framework, RSE and Stakeholder Benefits Analysis
8		Evaluation of Project Benefits
9		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
ANAGRAM	Analytica for Natural Gas Risk Analysis and Management
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CPR	Critical Project Review
CT	Computerized Tomography
DAC	Disadvantaged Communities
DEIA	Diversity, Equity, Inclusion, and Accessibility
MS	Microsoft
NDE	Non-Destructive Evaluation
PAUT	Phased Array Ultrasonic Testing
RSE	Risk Spend Efficiency
SQL	Structured Query Language
TAC	Technical Advisory Committee

II. PURPOSE OF AGREEMENT, PROBLEM/SOLUTION STATEMENT, AND GOALS AND OBJECTIVES

A. Purpose of Agreement

The purpose of this Agreement is to fund the demonstration of Phased Array Ultrasonic Testing (PAUT) technology for detecting potential defects in plastic pipe and fusion joints, and to demonstrate a comprehensive framework for integrating non-destructive evaluation (NDE) methods into the risk assessment, risk management, and mitigation programs associated with plastic piping infrastructure for gas distribution.

[1] Please see subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

B. Problem/ Solution Statement

Problem
There is currently no coherent framework for translating NDE indications of potential defects in plastic pipeline systems to actual predictions of the impact potential of these defects on the expected system lifetime.

Solution
The frameworks developed in this project will fuse information from NDE inspections, local system configuration, historic leak data, lifetime prediction models, expected consequences, mitigation costs, and other pertinent information into coherent, data-driven decision-support tools for risk management of plastic piping infrastructure associated with gas distribution systems.

C. Goals and Objectives of the Agreement

Agreement Goals
The goals of this Agreement are to:

- Demonstrate the efficacy of PAUT NDE tools in detecting potential defects in plastic pipe and fusion joints through field sampling, field testing, laboratory evaluation, and integration of the information gathered into the integrity management framework.
- Demonstrate a framework for enhancing decision-support for integrity-management of plastic pipeline infrastructure through proper use of NDE inspection, and other available system integrity data.

Ratepayer Benefits: This Agreement will result in the ratepayer benefit of increased safety by scanning a significant sample of pipe/joint assemblies using PAUT NDE tools. The pipe samples are to be removed from service according to a rigorous sampling plan. Pipes and joints where indications of anomalies are found will be verified using x-ray Computerized Tomography (CT) methods to determine the error matrix of the tools. The pipes and joints will then undergo accelerated lifetime testing to correlate indications of anomalies to expected residual lifetime. This severity of anomaly and lifetime expectancy information will be integrated into data analysis models. The information will also be fused with other available system integrity data to enhance decision support tools and the development of Risk Spend Efficiency (RSE) metrics for mitigation projects given the new NDE based data, and Diversity, Equity, Inclusion, and Accessibility (DEIA) objectives.

Technological Advancement and Breakthroughs: This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by developing tools to potentially provide earlier visibility to segments of the plastic piping infrastructure that are likely to develop leaks in the short-term. The tools will enable a more proactive approach to leak prevention and an associated fugitive emission reduction. The proposed project will contribute to reduced greenhouse gas emissions and contribute to enhanced inspection and maintenance of the plastic piping distribution infrastructure.

Exhibit A
Scope of Work
GTI Energy

Agreement Objectives

The objectives of this Agreement are to:

- Apply PAUT NDE tools to identify and measure potential defects in plastic pipe and joints;
- Obtain via a rigorous sampling plan; statistically valid baseline data on the distribution of potential defects in plastic pipe and joints identified by the PAUT NDE tools;
- Identify invisible damage in non-metallic pipeline structures using the PAUT NDE tools;
- Correlate indications of defects identified by the PAUT NDE tools to component lifetime expectancy; and
- Demonstrate a coherent framework for integrity information fusion and decision-support for mitigation measures that can be implemented to address integrity issues identified by the PAUT NDE inspections.
- All agreement objectives shall be accomplished through field sampling, field testing, laboratory evaluation, and integration of the information gathered into the integrity management framework.

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V).** All products submitted which will be viewed by the public, must comply with the accessibility requirements of Section 508 of the federal Rehabilitation Act of 1973, as amended (29 U.S.C. Sec. 794d), and regulations implementing that act as set forth in Part 1194 of Title 36 of the Federal Code of Regulations**.** All technical tasks should include product(s). Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, **"days"** means working days.

The Recipient shall:

For products that require a draft version, including the Final Report Outline and Final Report

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

For products that require a final version only

- Submit the product to the CAM for acceptance. The CAM may request minor revisions or explanations prior to acceptance.

For all products

- Submit all data and documents required as products in accordance with the following.

  Instructions for Submitting Electronic Files and Developing Software:

  - **Electronic File Format**
    - Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the California Energy Commission's (CEC) software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick

    The following describes the accepted formats for electronic data and documents provided to the CEC as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:
    - Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
    - Text documents will be in MS Word file format, version 2007 or later.
    - Project management documents will be in MS Project file format, version 2007 or later.

  - **Software Application Development**
    Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:
    - MS ASP.NET framework (version 3.5 and up). Recommend 4.0.
    - MS Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
    - Visual Studio.NET (version 2008 and up). Recommend 2010.
    - C# Programming Language with Presentation (UI), Business Object and Data Layers.
    - Structured Query Language (SQL).
    - MS SQL Server 2008, Stored Procedures. Recommend 2008 R2.
    - MS SQL Reporting Services. Recommend 2008 R2.
    - XML (external interfaces).

    Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the CEC's Information Technology Services Branch to determine whether the exceptions are allowable.

MEETINGS

Subtask 1.2 Kick-off Meeting

The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

Exhibit A
Scope of Work
GTI Energy

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other CEC staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.
  The administrative portion of the meeting will include discussion of the following:
  - Terms and conditions of the Agreement;
  - Invoicing and auditing procedures;
  - Administrative products (subtask 1.1);
  - Critical Project Review (CPR) meetings (subtask 1.3);
  - Match fund documentation (subtask 1.7);
  - Permit documentation (subtask 1.8);
  - Subcontracts (subtask 1.9); and
  - Any other relevant topics.

  The technical portion of the meeting will include discussion of the following:
  - The CAM's expectations for accomplishing tasks described in the Scope of Work;
  - An updated Project Schedule;
  - Technical products (subtask 1.1);
  - Progress reports (subtask 1.5);
  - Final Report (subtask 1.6);
  - Technical Advisory Committee (TAC) meetings (subtasks 1.10 and 1.11); and
  - Any other relevant topics.

- Provide *Kick-off Meeting Presentation* to include but not limited to:
  - Project overview (i.e. project description, goals and objectives, technical tasks, expected benefits, etc.)
  - Project schedule that identifies milestones
  - List of potential risk factors and hurdles, and mitigation strategy

- Provide an *Updated Project Schedule, Match Funds Status Letter,* and *Permit Status Letter*, as needed to reflect any changes in the documents.

The CAM shall:

- Designate the date and location of the meeting.
- Send the Recipient a *Kick-off Meeting Agenda*.

Recipient Products:

- Kick-off Meeting Presentation
- Updated Project Schedule *(if applicable)*
- Match Funds Status Letter (subtask 1.7) *(if applicable)*
- Permit Status Letter (subtask 1.8) *(if applicable)*

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings
The goal of this subtask is to determine if the project should continue to receive CEC funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the CEC and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient and may include the CAO and any other individuals selected by the CAM to provide support to the CEC.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the CEC, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:
- Prepare and submit a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:
- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* with a list of expected CPR participants in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a schedule for providing a Progress Determination on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:
- CPR Report(s)

CAM Products:
- CPR Agenda
- Progress Determination

Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

- Meet with CEC staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.
  The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.
  - The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
  - The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
    - Disposition of any procured equipment.
    - The CEC's request for specific "generated" data (not already provided in Agreement products).
    - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
    - "Surviving" Agreement provisions such as repayment provisions and confidential products.
    - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and CEC staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide copies of *All Final Products* on a USB memory stick, organized by the tasks in the Agreement.

Products:

- Final Meeting Agreement Summary *(if applicable)*
- Schedule for Completing Agreement Closeout Activities
- All Final Products

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
  - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions, including a financial report on Match Funds and in-state expenditures.

Products:
- Progress Reports
- Invoices

Subtask 1.6 Final Report
The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. When creating the Final Report Outline and the Final Report, the Recipient must use the CEC Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:
- Prepare a *Final Report Outline* in accordance with the *CEC Style Manual* provided by the CAM.

Recipient Products:
- Final Report Outline (draft and final)

CAM Product:
- CEC Style Manual
- Comments on Draft Final Report Outline
- Acceptance of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:
- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, CEC Style Manual, and Final Report Template provided by the CAM with the following considerations:
  - Ensure that the report includes the following items, in the following order:
    - Cover page (**required**)
    - Credits page on the reverse side of cover with legal disclaimer (**required**)
    - Acknowledgements page (optional)
    - Preface (**required**)
    - Abstract, keywords, and citation page (**required**)
    - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
    - Executive summary (**required**)
    - Body of the report (**required**)
    - References (if applicable)
    - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
    - Bibliography (if applicable)
    - Appendices (if applicable) (Create a separate volume if very large.)
    - Attachments (if applicable)
- Submit a draft of the Executive Summary to the TAC for review and comment.

- Develop and submit a *Summary of TAC Comments on Draft Final Report* received on the Executive Summary. For each comment received, the Recipient will identify in the summary the following:
  - Comments the Recipient proposes to incorporate.
  - Comments the Recipient does propose to incorporate and an explanation for why.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt.
- Incorporate all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a *Written Responses to Comments* explaining why the comments were not incorporated into the final product.
- Submit the revised Final Report electronically with any Written Responses to Comments within 10 days of receipt of CAM's Written Comments on the Draft Final Report, unless the CAM specifies a longer time period or approves a request for additional time.

Products:
- Summary of TAC Comments on Draft Final Report
- Draft Final Report
- Written Responses to Comments *(if applicable)*
- Final Report

CAM Product:
- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of CEC funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:
- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the proposal that led to the CEC awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

  If match funds were a part of the proposal that led to the CEC awarding this Agreement, then provide in the letter:
  - A list of the match funds that identifies:
    - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
    - The amount of each in-kind contribution, a description of the contribution type

(e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
    - If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:
- Match Funds Status Letter
- Supplemental Match Funds Notification Letter *(if applicable)*
- Match Funds Reduction Notification Letter *(if applicable)*

Subtask 1.8 Permits
The goal of this subtask is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:
- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If <u>no permits</u> are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:
    - A list of the permits that identifies: (1) the type of permit; and (2) the name, address, and telephone number of the permitting jurisdictions or lead agencies.
    - The schedule the Recipient will follow in applying for and obtaining the permits.

  The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.

- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:
- Permit Status Letter
- Updated List of Permits *(if applicable)*
- Updated Schedule for Acquiring Permits *(if applicable)*
- Copy of Each Approved Permit *(if applicable)*

Subtask 1.9 Subcontracts
The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:
- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required CEC flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of each executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:
- Subcontracts *(draft, if required by the CAM, and final)*

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)
The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:
- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
  - Technical area expertise;
  - Knowledge of market applications; or
  - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.

- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.
- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate, to the extent the TAC members feel is appropriate, on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.

The TAC may be composed of qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

Products:

- List of Potential TAC Members
- List of TAC Members
- Documentation of TAC Member Commitment

Subtask 1.11 TAC Meetings

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

The TAC shall:

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.
- Review and provide comments to proposed project performance metrics.
- Review and provide comments to proposed project Draft Technology Transfer Plan.

Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)
- TAC Meeting Back-up Materials
- TAC Meeting Summaries

Subtask 1.12 Project Performance Metrics

The goal of this subtask is to finalize key performance targets for the project based on feedback from the TAC and report on final results in achieving those targets. The performance targets should be a combination of scientific, engineering, techno-economic, and/or programmatic metrics that provide the most significant indicator of the research or technology's potential success.

The Recipient shall:

- Complete and submit the project performance metrics section of the *Initial Project Benefits Questionnaire,* developed in the Evaluation of Project Benefits task, to the CAM.
- Present the draft project performance metrics at the first TAC meeting to solicit input and comments from the TAC members.

- Develop and submit a *TAC Performance Metrics Summary* that summarizes comments received from the TAC members on the proposed project performance metrics. The *TAC Performance Metrics Summary* will identify:
  - TAC comments the Recipient proposes to incorporate into the *Initial Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task.
  - TAC comments the Recipient does not propose to incorporate with and explanation why.
- Develop and submit a *Project Performance Metrics Results* document describing the extent to which the Recipient met each of the performance metrics in the *Final Project Benefits Questionnaire,* developed in the Evaluation of Project Benefits task.
- Discuss the *Project Performance Metrics Results* at the Final Meeting.

Products:
- TAC Performance Metrics Summary
- Project Performance Metrics Results

IV. TECHNICAL TASKS

TASK 2: DEVELOP PROJECT FRAMEWORK

The goal of this task is to refine the project framework to ensure the project tasks are properly aligned with stakeholder goals, objectives, and expectations. This task will focus on utility operations and how best to integrate project outputs into useful deliverables. This task will also focus on additional stakeholders, particularly disadvantaged communities (DAC), to ensure the project outputs and deliverables will deliver the expected benefits.

The Recipient shall:
- Identify operator defined performance metrics and objectives:
  - Develop and submit a *Current Integrity Management Practices Report* pertaining to defects in plastic pipes and fusion joints;
    - The Report shall include a comprehensive review of current integrity management practices used by gas asset owners and users.
  - Develop and submit an *Historic Data Analysis Report* on loss of containment due to defects in plastic pipes and fusion joints;
    - The Report shall include a comprehensive review of historic data analysis from gas asset owners and users.
  - Develop and submit an *Integration of NDE Inspections into Integrity Management Practices Report*;
    - The Report shall determine how the proposed NDE methods can be integrated into and enhance current integrity management activities; and
  - Develop and submit draft and final versions of a *Sampling Plan Report*
    - The Report shall include a plan for evaluating the efficacy of NDE methods in detecting defects in plastic pipe and fusion joints through samples collected from the field and through field testing on site.
- Identify stakeholder defined performance metrics and objectives:
  - Facilitate community engagement to develop and submit a *Report on Issues and Concerns Raised by The Community*;
    - The Report shall be informed by at least one community engagement workshop.

  - Develop and submit a *Report on The Levels of Risk Tolerance of The Project Stakeholders*;
    - The Report shall be guided through meetings with project stakeholders.
  - Develop and submit a *Decision Support Framework*
    - The Framework shall identify and map DAC's and low-income communities in the project area and create and implement a community-informed risk mitigation framework to identify mitigation programs that address defects in plastic pipe and fusion joints; and
  - Develop and submit a *Methodology for Measuring Benefit to DAC*.
    - The Methodology shall describe the use of the Analytica for Natural Gas Risk Analysis and Management (ANAGRAM) tools and framework that will be used to measure the benefit to DAC.
- Prepare a *CPR Report #1* and participate in CPR Meeting, per subtask 1.3.

Products:

- Current Integrity Management Practices Report
- Historic Data Analysis Report
- Integration of NDE Inspections into Integrity Management Practices Report
- Sampling Plan Report (Draft and Final)
- Report on Issues and Concerns Raised by The Community
- Decision Support Framework
- Report on The Levels of Risk Tolerance of The Project Stakeholders
- Methodology for Measuring Benefit to DAC
- CPR Report #1

TASK 3: NDE TRAINING

The goal of this task is to train laboratory and field technicians on the proper use of the PAUT NDE tools for the relevant pipe and joint configurations that will be evaluated.

The Recipient shall:

- Develop and submit a *User Manual and Protocols for Laboratory Evaluations*.
  - The manual shall include specific guidance and instructions on how to inspect pipe, including, but not limited to:
    - Detecting internal pipe flaws.
    - Measuring the location within the pipe wall and the dimensions of internal pipe flaws.
  - The manual shall include specific guidance and instructions on how to inspect fusion joints, including, but not limited to:
    - Measuring the location within the joint and measure the dimensions of the joint defects.
- Develop and submit a *User Manual and Protocols for Field Evaluations.*
  - The user manual and protocols shall provide guidance and instructions on how to identify internal defects in pipe and joints based on best practices developed in the laboratory evaluations and field testing.
- Develop and Submit *Training Workshop Slides and Materials for Laboratory Technicians.*
  - Laboratory technicians shall be trained on how to utilize the PAUT equipment to identify and measure internal defects in pipe and joints.

- Develop and Submit *Training Workshop Slides and Materials for Field Technicians*.
  - Field technicians shall be trained on how to utilize the PAUT equipment to identify and measure internal defects in pipe and joints.

Products:

- User Manual and Protocols for Laboratory Evaluations
- User Manual and Protocols for Field Evaluations
- Training Workshop Slides and Materials for Laboratory Technicians
- Training Workshop Slides and Materials for Field Technicians

TASK 4: NDE EVALUATION OF PIPE AND JOINTS

The goals of this task are to extract pipe and joint assemblies from the field, perform PAUT NDE inspections on the assemblies, verify the NDE indications via x-ray CT scanning, categorize the defects discovered, develop an error matrix for the various categories of defects found in the assemblies, perform accelerated lifetime analysis on the assemblies, and correlate NDE indications to the expected residual lifetime of the assembly given the defect indications for each category of defect.

The Recipient shall:

- Develop and submit a *Field Sampling Plan.*
  - The Plan shall describe the methodology utilized to demonstrate The Plan shall identify the location(s) in collaboration with a gas utility or asset owner, as well as DAC and low-income communities, to demonstrate and test the use of the PAUT NDE.
  - the PAUT NDE on-site and the anticipated data that will be collected.
- Develop and submit an *In-Field Demonstration of PAUT NDE Report.*
  - The Report shall include the techniques needed to identify potential defects in the pipe wall, butt-fusion joints, heat-fusion joints, and electrofusion joints.
  - The fieldwork shall be guided by a quasi-random sampling approach based on third-party hits to the infrastructure or a fully random sampling approach.
- Develop and submit a *Samples Removed from Field Report.*
  - The Report shall include pipe sizes and joint configurations to be evaluated from the field.
- Develop and submit a *PAUT NDE Inspection Report*.
  - The Report shall include the probabilities of detection of the various categories of defects found in pipes and joints through PAUT NDE inspections and verified via x-ray CT scanning.
  - The Report shall categorize the defects discovered, develop an error matrix for the various categories of defects found in the assemblies, perform accelerated lifetime analysis on the assemblies, and correlate NDE indications to expected residual lifetime of the assembly given the defect indications for each category of defect.
  - The Report shall include a discussion on the gaps and potential limitations between demonstrating the PAUT NDE in the lab compared to the field.

Products:

- Field Sampling Plan (Draft and Final)
- In-Field Demonstration of PAUT NDE Report
- Samples Removed from Field Report

- PAUT NDE Inspection Report

TASK 5: VERIFICATION, INSPECTION, AND ACCELERATED LIFETIME TESTING OF DETECTED DEFECTS

The goal of this task is to send the pipes and joints, removed from the field in accordance with the sampling plan, to the laboratory where they will undergo carefully documented visual inspection, PAUT NDE inspection, and x-ray CT scans to provide an absolute measurement of detectable defects. The pipes and joints with indications of defects and reference specimens with no indication of defects will be destructively evaluated using accelerated lifetime testing. Other mechanical tests will be used to develop a correlation of categories of defect indications to expected system performance outcomes.

The Recipient shall:

- Develop an *X-Ray CT Scan Report*.
  - The Report shall describe the x-ray CT scan technology and provide the absolute measurement of detectable defects.
- Develop a *Defect Category Error Matrix Report*.
  - The Report shall describe the statistical classification of defects found.
- Develop an *Accelerated Lifetime Testing Report*.
  - The report shall describe the accelerated lifetime testing evaluation process and the results of testing on pipes and joints with indications of defects and reference specimens with no indication of defects. These pipes will be destructively evaluated using accelerated lifetime testing.
- Develop a *Correlation of Indications to Expected Lifetime Report*.
  - The report shall describe all other mechanical tests and the results of those tests used to develop a correlation of categories of defect indications to expected system performance outcomes.
- Prepare a *CPR Report #2* and participate in CPR Meeting, per subtask 1.3.

Products:

- X-Ray CT Scan Report
- Defect Category Error Matrix Report
- Accelerated Lifetime Testing Report
- Correlation of Indications to Expected Lifetime Report
- CPR Report #2

TASK 6: DATA ANALYTICS AND INFORMATION FUSION FRAMEWORK

The goal of this task is to analyze the data collected and develop appropriate information-fusion strategies through proper use of machine learning, Bayesian networks, causal modeling, and additional modeling techniques. The focus will be to feed the pertinent historic system performance data, NDE and other inspection data, lifetime expectancy models, consequence of loss of containment information, and any other relevant information into holistic and coherent risk models.

The Recipient shall:

- Develop an *Information Utilized Report*.

  - The Report shall include the methodology for information fusion and data analysis, as well as the sources of the information used.
- Develop a *Data Analysis Report*.
  - The Report shall analyze the collected data through the proper use of machine learning, Bayesian networks, causal modeling, and additional modeling techniques.
- Develop an *Information Fusion Framework*.
  - The Framework shall describe the development of appropriate information-fusion strategies that may assist operators in assessing the benefits of the operational applications of the NDE tools.
- Develop a *Risk Modeling Report*.
  - The Report shall describe the pertinent historic system performance data, NDE and other inspection data, lifetime expectancy models, consequence of loss of containment information, and any other relevant information that are used for holistic and coherent risk models.

Products:

- Information Utilized Report
- Data Analysis Report
- Information Fusion Framework
- Risk Modeling Report

TASK 7: INTEGRITY MANAGEMENT FRAMEWORK, RSE AND STAKEHOLDER BENEFITS ANALYSIS

The goals of this task are to: 1) import the participating utilities data into the commercially available ANAGRAM software application, 2) incorporate information from the Data Analytics and Information Fusion Framework, in collaboration with the participating utility to generate enough potential mitigation efforts with the given NDE data developed to support a RSE analysis to quantify the benefit of the new NDE tools, and 3) incorporate the draft benefits DAC methodology as a modifier to the RSE analysis in ANAGRAM.

To establish criteria for quantifying benefits to DAC, the team will identify DAC in the areas impacted by the project work, establish an engagement team to facilitate two-way communication and feedback, and develop a methodology to quantify benefits to DAC and low-income communities.

The Recipient shall:

- Develop and submit a *Working ANAGRAM Implementation*.
  - The ANAGRAM tools and framework shall include information on the magnitude of potential failures due to defects in plastic pipes and fusion joints. Information shall be informed by:
    - Publicly available data sources;
    - Coordination (facilitated by CAM) with Recipients of related CEC-funded grants (e.g. PIR-22-002, PIR-20-009);
    - Outreach to IOUs;
    - CPUC's Long-Term Gas Planning Rulemaking (R.20-01-007).
  - The Recipient shall import the above-described data into the commercially available ANAGRAM software application.

  - The ANAGRAM shall incorporate information from the Data Analytics and Information Fusion Framework.
- Develop and submit a *RSE Analysis of NDE Tools Report*.
  - The Report shall quantify the economic and operational benefit of the new NDE tools.
  - The Report shall include a multi-attribute value function analysis to compare the cost-effectiveness of various mitigation measures.
  - The Report shall include a simplified cost-benefit analysis to convey whether the benefits of a proposed mitigation measure outweigh the costs.
- Develop and submit a *Benefits to DAC Report*.
  - The Report shall identify and map DAC's and low-income communities in the project area.
  - The Report shall include a methodology to measure benefits to DAC and low-income communities and assess benefits with a combination of indicators, including socioeconomic and Federal Justice40 indicators.
  - The Report shall quantify the benefits to DAC's to be realized through the project recommendations for risk-mitigation projects.
- Develop and submit a *Community Outreach Report*
  - The Report shall report findings from community and stakeholder engagement to develop a decision support framework.
- Develop and submit a *Methods for Quantifying Benefits to DAC Report*
  - The Report shall develop a methodology to measure benefits to DAC's that will be integrated into the ANAGRAM tools.
- Develop and submit an *Economic Impacts, DEIA, Clean Energy, and Sustainability Report*
  - The Report shall describe the full set of metrics developed and map them into an estimate of quantified economic impacts of the project technology.

Products:
- Working ANAGRAM Implementation
- RSE Analysis of NDE Tools Report
- Benefits to DAC Report
- Community Outreach Report
- Methods for Quantifying Benefits to DAC Report
- Economic Impacts, DEIA, Clean Energy, and Sustainability Report (Draft and Final)

TASK 8: EVALUATION OF PROJECT BENEFITS
The goal of this task is to report the benefits resulting from this project.

The Recipient shall:
- Complete *the Initial Project Benefits Questionnaire*. The Initial Project Benefits Questionnaire shall be initially completed by the Recipient with 'Kick-off' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Complete the *Annual Survey* by December 15th of each year. The Annual Survey includes but is not limited to the following information:
  - Technology commercialization progress
  - New media and publications

  - Company growth
  - Follow-on funding and awards received
- Complete the *Final Project Benefits Questionnaire*. The Final Project Benefits Questionnaire shall be completed by the Recipient with 'Final' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Respond to CAM questions regarding the questionnaire drafts.
- Complete and update the project profile on the CEC's public online project and recipient directory on the Energize Innovation website (www.energizeinnovation.fund), and provide *Documentation of Project Profile on EnergizeInnovation.fund*, including the profile link.
- If the Prime Recipient is an Innovation Partner on the project, complete and update the organizational profile on the CEC's public online project and recipient directory on the Energize Innovation website (www.energizeinnovation.fund), and provide *Documentation of Organization Profile on EnergizeInnovation.fund*, including the profile link.

Products:
- Initial Project Benefits Questionnaire
- Annual Survey(s)
- Final Project Benefits Questionnaire
- Documentation of Project Profile on EnergizeInnovation.fund
- Documentation of Organization Profile on EnergizeInnovation.fund (if applicable)

TASK 9: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to conduct activities that will accelerate the commercial adoption of the technology being supported under this agreement. Eligible activities include, but are not limited to, the following:

- Scale-up analysis including manufacturing analysis, independent design verification, and process improvement efforts.
- Technology verification testing, or application to a test bed program located in California.
- Legal services or licensing to secure necessary intellectual property to further develop the technology.
- Market research, business plan development, and cost-performance modeling.
- Entry into an incubator or accelerator program located in California.

The Recipient Shall:
- Develop and submit a *Technology Transfer Plan* that identifies the proposed activities the Recipient will conduct to accelerate the successful commercial adoption of the technology.
- Present the *Draft Technology Transfer Plan* to the TAC for feedback and comments.
- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the *Draft Technology Transfer Plan*. This document will identify:
  - TAC comments the Recipient proposes to incorporate into the *Final Technology Transfer Plan*.
  - TAC comments the Recipient does not propose to incorporate with and

explanation why.

- Submit the *Final Technology Transfer Plan* to the CAM for approval.
- Implement activities identified in *Final Technology Transfer Plan.*
- Develop and submit a *Technology Transfer Summary Report* that includes high level summaries of the activities, results, and lessons learned of tasks performed relating to implementing the *Final Technology Transfer Plan*. This report should not include any proprietary information.
- When directed by the CAM, develop presentation materials for an CEC- sponsored conference/workshop(s) on the project.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.

Products:

- Technology Transfer Plan (draft and final)
- Summary of TAC Comments
- Technology Transfer Summary Report (draft and final)
- High Quality Digital Photographs

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.