EXHIBIT C

Phoebe Award Summary: 058909-002

PIs and Campus RAs always are responsible for reading and understanding all of the award terms and conditions found in the award document. The Phoebe Award Summary is provided as a courtesy to summarize certain elements of the award. Errors found on the PAS should be reported to Froylan Fernandes at ffernandes@berkeley.edu.

PI Summary

Funding Change	**$2,644,806**
Project Title	**Community Alliance for Direct Air Capture (CALDAC)**
Principal Investigator	Louise Wells Bedsworth
Lead Unit	CLLAW Law
SPO/IAO Contact	Joyce Yin Ho So
Sponsor	005099 DOE Department of Energy
Prime Sponsor	n/a
Award Transaction Comment	**DOE Award Administrator confirmed that DOE legal has approved an IHE carve-out on the Transparency of Foreign Connections requirement. It is anticipated that an amendment would be issued to reflect that once DOE has confirmed the exact language for the IHE carve-out.**
Award Type	Cooperative agreement
Transaction Type	New
Sponsor Award Number	DE-FE0032382

Pending Subagreements: PI Action Required

Pending subagreements under this award are listed below. Although each has been given a subagreement number, SPO cannot start the process of setting up these subagreements until the Principal Investigator submits a Subaward Request and any required supplementary materials. A guide for submitting the request from the Phoebe subaward record is at https://spo.berkeley.edu/procedures/subawards.html.

If the PI wishes to set up any additional subagreements not listed here, the PI should contact his/her SPO Contract and Grant Officer for additional assistance.

Subagreement No.	Subrecipient
12023	AECOM Technology Corporation
12024	California State University, Bakersfield
12025	California State University, Fresno Foundation
12026	Electric Power Research Institute
12027	Lawrence Berkeley National Laboratory LBNL
12028	PSE Healthy Energy
12029	Blue Planet Systems
12030	Carbon180
12031	Clean Energy Systems
12032	CarbonBuilt
12033	Origen Carbon Solutions Inc.
12034	Rondo Energy Inc.
12035	Valley Onward - Sol Rivas

Financial Information

BFS Chart of Accounts

Fund	Dept. ID	Function	CF1	CF2
	11959	44		CLLWB

Budget Periods

Phoebe Award Number	Begin Date	End Date	Anticipated	Obligated	Funding Change
058909-002	8/1/24	4/30/25	$2,644,806	$2,644,806	$2,644,806

Anticipated Total **$3,651,424** for the project period **8/1/24** – **7/31/26**

Indirect Cost Information

Rate	Base Type	On/Off Campus	Waiver/Reduction
60.5%	MTDC	On	

Comments and Special Terms

General Comments

Please review award document carefully for intellectual property, procurement, financial, and other terms and conditions.

Reduction of Effort Commitments and Absences from the Project: During the life of this award, the PI must notify the Sponsored Projects Office (SPO) when the PI is going to be temporarily absent from the project (three months or less.) For PI absences longer than three months, the University must obtain prior sponsor approval and notify the sponsor at least 30 days before the PI's departure. In both cases SPO is required notify the grantee agency of arrangements that have been made for the conduct of the project during the PI's absence, so the PI must provide this information to SPO. Prior sponsor approval is also required for significant reductions (generally 25 percent or more) of the PI's effort on the project (including periods under a no cost extension.)

It is the PI's responsibility to be aware of each key person's effort commitments to communicate any inability to meet those commitments to SPO to ensure that any necessary sponsor approvals of their reduced efforts are obtained.

Final grant reports are due within 120 days from the period of performance end date.

Referenced Document

This award is subject to the Uniform Guidance 2 CFR 200. Additional information can be accessed here: https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title02/2cfr200_main_02.tpl

Principal Investigators are responsible for informing all members of the project team that procuring, obtaining, providing, or using any telecommunications equipment produced by Huawei Technologies Company, ZTE Corporation (or any subsidiary or affiliate of such entities), Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, Dahua Technology Company (or any subsidiary or affiliate of such entities), or any other entity reasonably believed to be owned or controlled by, or otherwise connected to, the government of a covered foreign country is strictly prohibited. Note that personal device use, including cell phone use, except for personal use, is included in the prohibition. In addition, PIs are advised to work closely with Supply Chain Management on procurement of any third-party services. Any known breach of the ban must be reported to SPO as soon as reasonably possible.

Informed Participation: please review document type "Informed Participation" in Phoebe Search under this award record for further information.

DOE Foreign Government Talent Recruitment Programs (FGTRP) certification required.

This award is subject to the Research Terms and Conditions. Additional information can be accessed here: https://www.nsf.gov/awards/managing/rtc.jsp

Compliance Review

Type	Protocol Number	Approval Status	Approval Date	Expiration Date
Financial disclosure		Negative		
Principal investigator exception - continuing		Approved	3/1/22	
VCR late exception		Approved		
See VCR approval email provided in the attachments section of Phoebe.				
Risk addendum		Pending review		
Subaward risks - some answers are not answered in the subrecipient forms, see review email for more details				

Cost Sharing/Matching

The PI/Department is responsible for providing the cost sharing listed in accordance with the terms of the award. All of the cost sharing listed below must be reported to the sponsor through Contracts and Grants Accounting (CGA). Cost shared effort must be reported via Effort Reporting System. Contact SPO/IAO if the value, source, or type of cost sharing changes. Contact CGA for additional guidance.

Type	Amount
3rd Party	$1,006,618

Reporting Requirements

Reports listed here are final reports only. Please see your award terms for required interim reports and schedules.

Final technical report due:	As required
Final intellectual property (patents and inventions) report due:	As required

Approved Subawardee

PIs must request issuance of pending subagreements listed below under this award.

Subrecipient	Amount
TBD	$0

Other Details

CFDA	81.086
Activity Type	Basic research
Project Type	Regular
FDP/RTC	Yes
Equipment Title	UCB
Phoebe Proposal ID(s)	20232721, 36048

ASSISTANCE AGREEMENT

1. Award No.	2. Modification No.	3. Effective Date	4. CFDA No.
DE-FE0032382		08/01/2024	81.086

5. Awarded To
Regents of the University of California, The
Attn: NOAM PINES
1608 4th St Ste 220
SPONSORED PROJECTS OFFICE
Berkeley CA 947101749

6. Sponsoring Office
Fossil Energy and Carbon Management
FECM-1
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington DC 20585

7. Period of Performance
08/01/2024
through
04/30/2025

8. Type of Agreement
- [ ] Grant
- [X] Cooperative Agreement
- [ ] Other

9. Authority
See Page 2

10. Purchase Request or Funding Document No.
24FE001564

11. Remittance Address
Regents of the University of California, The
Attn: NOAM PINES
CONTRACT AND GRANT ACCOUNTING
1608 4TH ST SUITE 201 MC 1103
BERKELEY CA 947201103

12. Total Amount
Govt. Share: $2,644,806.00
Cost Share : $1,006,618.00
Total : $3,651,424.00

13. Funds Obligated
This action: $2,644,806.00
Total : $2,644,806.00

14. Principal Investigator

15. Program Manager
Richard M. Bergen
Phone: 304-285-1316

16. Administrator
U.S. DOE/NETL
NATIONAL ENERGY TECH LAB
3610 Collins Ferry Road
PO Box 880
Morgantown WV 26507-0880

17. Submit Payment Requests To
Payment - Direct Payment
from U.S. Dept of Treasury

18. Paying Office
Payment - Direct Payment
from U.S. Dept of Treasury

19. Submit Reports To
See Attachment 3

20. Accounting and Appropriation Data
00174-2022-31-232428-25500-1611468-1001030-0000000-0000000

21. Research Title and/or Description of Project
Bipartisan Infrastructure Law (BIL) Community Alliance for Direct Air Capture

For the Recipient		For the United States of America	
22. Signature of Person Authorized to Sign		25. Signature of Grants/Agreements Officer	
23. Name and Title	24. Date Signed	26. Name of Officer	27. Date Signed
		Jodi L. Collins	08/02/2024

CONTINUATION SHEET	REFERENCE NO. OF DOCUMENT BEING CONTINUED	PAGE	OF
	DE-FE0032382	2	37

NAME OF OFFEROR OR CONTRACTOR
Regents of the University of California, The

ITEM NO. (A)	SUPPLIES/SERVICES (B)	QUANTITY (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)
	UEI: GS3YEVSS12N6 Project Period of Performance - 08/01/2024-07/31/2026 Budget Period 1- 08/01/2024-04/30/2025 Budget Period 2- 05/01/2025-07/31/2026 Block 9. Authority: Public Law (PL) 95-91, DOE Organization Act, as amended; and PL 109-58, Energy Policy Act of 2005, Section 969D, as amended, including by PL 117-58, Infrastructure Investment and Jobs Act (IIJA), Section 40308, codified at 42 U.S.C. 16298d. Block 14 Principal Investigator: Louise Bedsworth, louise.bedsworth@berkeley.edu, 510-910-4445 Recipient Business Point of Contact: Joy Ayson-Yu, laysonyu@berkeley.edu, 510-664-4458 Block 15- DOE Program Manager: Richard Bergen - richard.bergen@netl.doe.gov, 304-285-1316 DOE Award Administrator: Jena Barrientos-Armas, jena.barrientos-armas@netl.doe.gov, 412-386-5885 ASAP: YES Extent Competed: COMPETED Davis-Bacon Act: NO PI: Louise Bedsworth Fund: 00174 Appr Year: 2022 Allottee: 31 Report Entity: 232428 Object Class: 25500 Program: 1611468 Project: 1001030 WFO: 0000000 Local Use: 0000000				

SPECIAL TERMS AND CONDITIONS FOR USE IN MOST GRANTS AND COOPERATIVE AGREEMENTS

LEGAL AUTHORITY AND EFFECT (JUNE 2015)

(a) A DOE financial assistance award is valid only if it is in writing and is signed, either in writing or electronically, by a DOE Contracting Officer.

(b) Recipients are free to accept or reject the award. A request to draw down DOE funds constitutes the Recipient's acceptance of the terms and conditions of this Award.

RESOLUTION OF CONFLICTING CONDITIONS

Any apparent inconsistency between Federal statutes and regulations and the terms and conditions contained in this award must be referred to the DOE Award Administrator for guidance.

AWARD AGREEMENT TERMS AND CONDITIONS – BIPARTISAN INFRASTRUCTURE LAW / INFLATION REDUCTION ACT (DECMBER 2014) (NETL – APRIL 2024)

This agreement consists of the Assistance Agreement Cover Page and Award Terms and Conditions of this Assistance Agreement, plus the following:

Attachment 1	Intellectual Property Provisions
Attachment 2	Statement of Project Objectives
Attachment 3	Federal Assistance Reporting Checklist and Instructions
Attachment 4	Budget Information
Attachment 5	Community Benefits Outcomes and Objectives

The following are incorporated into this Award by reference:

- DOE Assistance Regulations, 2 CFR part 200 as supplemented by 2 CFR part 910 at https://www.eCFR.gov.
- Research Terms & Conditions (November 12, 2020) and the DOE Agency Specific Requirements (November 2020) at https://www.nsf.gov/awards/managing/rtc.jsp.
- National Policy Requirements (November 12, 2020) at https://www.nsf.gov/awards/managing/rtc.jsp.
- As applicable, Public Law 117-58, also known as the Bipartisan Infrastructure Law (BIL).
- The Recipient's application/proposal as approved by DOE.
- Applicable program regulations at *https://www.eCFR.gov*

AWARD PROJECT PERIOD AND BUDGET PERIODS

The Project Period for this award is 08/01/2024 through 07/31/2026 consisting of the following Budget Periods.

Budget Period	Start Date	End Date
1	08/01/2024	04/30/2025
2	05/01/2025	07/31/2026

CONFERENCE SPENDING (FEBRUARY 2015)

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the grant or cooperative agreement was awarded that would defray the cost to the United States Government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the United States Government would otherwise exceed $20,000, thereby circumventing the required notification by the head of any such Executive Branch department, agency, board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the date, location, and number of employees attending such conference.

PAYMENT PROCEDURES - REIMBURSEMENT THROUGH THE AUTOMATED CLEARING HOUSE (ACH) VENDOR INQUIRY PAYMENT ELECTRONIC REPORTING SYSTEM (VIPERS)

a. Method of Payment. Payment will be made by reimbursement through ACH.

b. Requesting Reimbursement. Requests for reimbursements must be made electronically through Department of Energy's Oak Ridge Financial Service Center (ORFSC) VIPERS. To access and use VIPERS, you must enroll at https://vipers.doe.gov. Detailed instructions on how to enroll are provided on the web site.

For non-construction awards, you must submit a Standard Form (SF) 270, "Request for Advance or Reimbursement" at https://vipers.doe.gov and attach a file containing appropriate supporting documentation. The file attachment must show the total federal share claimed on the SF 270, the non-federal share claimed for the billing period if cost sharing is required, and cumulative expenditures to date (both Federal and non-Federal) for each of the following categories: salaries/wages and fringe benefits; equipment; travel; participant/training support costs, if any; other direct costs, including subawards/contracts; and indirect costs. For construction awards, you must submit a SF 271, "Outlay Report and Request for Reimbursement for Construction Programs," through VIPERS.

c. Timing of submittals. Submittal of the SF 270 or SF 271 should coincide with your normal billing pattern, but not more frequently than every two weeks. Requests for reimbursement must be limited to the amount of disbursements made during the billing period for the federal share of direct project costs and the proportionate share of any allowable indirect costs incurred during that billing period.

d. Adjusting payment requests for available cash. You must disburse any funds that are available from repayments to and interest earned on a revolving fund, program income, rebates, refunds, contract settlements, audit recoveries, credits, discounts, and interest earned on any of those funds before requesting additional cash payments from DOE/NNSA.

e. Payments. The DOE approving official will approve the invoice as soon as practicable but not later than 30 days after your request is received, unless the billing is improper. Upon receipt of an invoice payment authorization from the DOE approving official, the ORFSC will disburse payment to you. You may check the status of your payments at the VIPER web site. All payments are made by electronic funds transfer to the bank account identified on the ACH Vendor/Miscellaneous Payment Enrollment Form (SF 3881) that you filed.

COST SHARING FFRDC'S NOT INVOLVED

a. Total Estimated Project Cost is the sum of the Government share and Recipient share of the estimated project costs. The Recipient's cost share must come from non-Federal sources unless otherwise allowed by law. By accepting federal funds under this award, you agree that you are liable for your percentage share of total allowable project costs, on a budget period basis, even if the project is terminated early or is not funded to its completion. This cost is shared as follows:

Budget Period No.	Budget Period Start	Government Share $/%	Recipient Share $/%	Total Estimated Cost
1	08/01/2024	$1,105,878(69%)	$502,964 (31%)	$1,608,842 (100%)
2	05/01/2025	$1,538,928(75%)	$503,654 (25%)	$2,042,582 (100%)
Total Project		$2,644,806(72%)	$1,006,618 (28%)	$3,651,424 (100%)

b. If you discover that you may be unable to provide cost sharing of at least the amount identified in paragraph a of this term, you should immediately provide written notification to the DOE Award Administrator indicating whether you will continue or phase out the project. If you plan to continue the project, the notification must describe how replacement cost sharing will be secured.

c. You must maintain records of all project costs that you claim as cost sharing, including in-kind costs, as well as records of costs to be paid by DOE/NNSA. Such records are subject to audit.

d. Failure to provide the cost sharing required by this term may result in the subsequent recovery by DOE/NNSA of some or all the funds provided under the award.

REBUDGETING AND RECOVERY OF INDIRECT COSTS - REIMBURSABLE INDIRECT COSTS

a. If actual allowable indirect costs are less than those budgeted and funded under the award, you may use the difference to pay additional allowable direct costs during the project period. If at the completion of the award the Government's share of total allowable costs (i.e., direct and indirect), is less than the total costs reimbursed, you must refund the difference.

b. Recipients are expected to manage their indirect costs. DOE will not amend an award solely to provide additional funds for changes in indirect cost rates. DOE recognizes that the inability to obtain full reimbursement for indirect costs means the recipient must absorb the underrecovery. Such underrecovery may be allocated as part of the organization's required cost sharing.

c. The budget for this award includes indirect costs, but does not include fringe benefits. Therefore, fringe benefit costs shall not be charged to nor shall reimbursement be requested for this project nor shall the fringe benefit costs for this project be allocated to any other federally sponsored project. In addition, fringe benefit costs shall not be counted as cost share unless approved by the Contracting Officer.

USE OF PROGRAM INCOME - ADDITION

If you earn program income during the project period as a result of this award, you may add the program income to the funds committed to the award and use it to further eligible project objectives.

STATEMENT OF FEDERAL STEWARDSHIP

DOE/NNSA will exercise normal Federal stewardship in overseeing the project activities performed under this award. Stewardship activities include, but are not limited to, conducting site visits; reviewing performance and financial reports; providing technical assistance and/or temporary intervention in unusual circumstances to correct deficiencies which

develop during the project; assuring compliance with terms and conditions; and reviewing technical performance after project completion to ensure that the award objectives have been accomplished.

STATEMENT OF SUBSTANTIAL INVOLVEMENT

DOE has substantial involvement in work performed under awards made as a result of this FOA. DOE does not limit its involvement to the administrative requirements of the award. Instead, DOE has substantial involvement in the direction and redirection of the technical aspects of the project as a whole. Substantial involvement includes, but is not limited to, the following:

Recipient's Responsibilities. The Recipient is responsible for:

- Performing the activities supported by this award in accordance with the Project Management Plan, including providing the required personnel, facilities, equipment, supplies and services;
- Managing and controlling project activities in accordance with established processes and procedures to ensure tasks and subtasks are completed within schedule and budget constraints defined by the current Project Management Plan;
- Implementing an approach to identify, analyze, and respond to project risks that is commensurate with the complexity of the project;
- Defining and revising approaches and plans, submitting the plans to DOE for review, and incorporating DOE comments;
- Coordinating related project activities with subrecipients and external suppliers, including contractors, to ensure effective integration of all work elements;
- Attending annual project review meetings and reporting project status;
- Participating in peer review evaluations of the project, or peer review evaluations of the program that their project supports;
- Submitting technical reports and publicly releasable documents that incorporate DOE comments;
- Presenting the project results at appropriate technical conferences or meetings as directed by the DOE Project Officer; and
- Submitting data generated as a result of this project to NETL for inclusion in the NETL Energy Data eXchange (EDX), https://edx.netl.doe.gov/.

DOE Responsibilities. DOE has the right to intervene in the conduct or performance of project activities for programmatic reasons. Intervention includes the interruption or modification of the conduct or performance of project activities. Suspension or termination of the cooperative agreement under 2 CFR part 200, as amended by 2 CFR part 910 (DOE Financial Assistance Regulations) does not constitute intervention in the conduct or performance of project activities. DOE is responsible for:

- Reviewing in a timely manner project plans, including project management, testing and technology transfer plans, and recommending alternate approaches, if the plans do not address critical programmatic issues;
- Participating in project management planning activities, including risk analysis, to ensure DOE's program requirements or limitations are considered in performance of the work elements;
- Conducting annual project review meetings to ensure adequate progress and that the work accomplishes the program and project objectives. Recommending alternate approaches or shifting work emphasis, if needed;
- Providing substantial involvement to ensure that project results address critical system and programmatic goals established by the DOE's Offices of Fossil Energy and Carbon Management and Clean Energy Demonstrations, and in coordination with DOE's Carbon Dioxide Removal, Carbon Conversion, and Carbon Storage Programs;
- Promoting and facilitating technology transfer activities, including disseminating program results through presentations and publications;

• Serving as scientific/technical liaison between awardees and other program or industry staff; and
• Reviewing and concurring with ongoing technical performance to ensure that adequate progress has been obtained within the current Budget Period authorized by DOE before work can commence on subsequent Budget Periods.

SITE VISITS

DOE/NNSA's authorized representatives have the right to make site visits at reasonable times to review project accomplishments and management control systems and to provide technical assistance, if required. You must provide, and must require your subrecipients to provide, reasonable access to facilities, office space, resources, and assistance for the safety and convenience of the government representatives in the performance of their duties. All site visits and evaluations must be performed in a manner that does not unduly interfere with or delay the work.

REPORTING REQUIREMENTS (APRIL 2023)

a. Requirements. The reporting requirements for this award are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to this award. Failure to comply with these reporting requirements is considered a material noncompliance with the terms of the award. Noncompliance may result in withholding of future payments, suspension, or termination of the current award, and withholding of future awards. A willful failure to perform, a history of failure to perform, or unsatisfactory performance of this and/or other financial assistance awards, may also result in a debarment action to preclude future awards by Federal agencies.

b. Dissemination of scientific/technical reporting products. Reporting project results in scientific and technical information (STI) publications/products to the DOE Office of Scientific and Technical Information (OSTI) ensures dissemination of research results to the public as well as preservation of the results. The DOE form F 4600.2, B. Scientific/Technical Reporting, has instructions for the DOE Energy Link (E-Link) system managed by OSTI. Scientific/technical reports and other STI products submitted under this award will be disseminated publicly on the Web via OSTI.GOV (https://www.osti.gov), unless the STI contains patentable material, protected data, or SBIR/STTR data, which must be indicated per instructions in DOE 4600.2.

c. Restrictions. Restrictions. STI products submitted to the DOE via E-link must not contain any Protected Personally Identifiable Information (PII), limited rights data, classified information, information subject to export control classification, or other information not subject to public release. The Contracting Officer or Technical Project Officer should be contacted with any questions. Limited rights data means data (other than computer software) developed at private expense that embody trade secrets or are commercial or financial and confidential or privileged. SBIR/STTR Protected Data, and other data subject to statutory data protection authorized by the award may be submitted, provided such data is properly marked and identified during submission. Submissions must not contain any “Proprietary”, “Confidential” or “Business Sensitive” markings or similar restrictive markings not authorized by the applicable government agreement.; it is acknowledged that DOE has the right to cancel or ignore such markings.

PUBLICATIONS

a. You are encouraged to publish or otherwise make publicly available the results of the work conducted under the award.

b. An acknowledgment of Federal support and a disclaimer must appear in the publication of any material, whether copyrighted or not, based on or developed under this project, as follows:

Acknowledgment: "This material is based upon work supported by the Department of Energy under Award Number DE-FE0032382."

Disclaimer: "This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof."

FEDERAL, STATE, AND MUNICIPAL REQUIREMENTS

You must obtain any required permits and comply with applicable federal, state, and municipal laws, codes, and regulations for work performed under this award.

INTELLECTUAL PROPERTY PROVISIONS AND CONTACT INFORMATION

a. The intellectual property provisions applicable to this award are provided as an attachment to this award or are referenced on the Assistance Agreement Face Page. A list of all intellectual property provisions may be found at http://energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards.

b. Questions regarding intellectual property matters should be referred to the DOE Award Administrator and the Patent Counsel designated as the service provider for the DOE office that issued the award. The IP Service Providers List is found at http://energy.gov/gc/downloads/intellectual-property-ip-service-providers-acquisition-and-assistance-transactions.

NATIONAL SECURITY: CLASSIFIABLE RESULTS ORIGINATING UNDER AN AWARD (DECEMBER 2014)

This award is intended for unclassified, publicly releasable research. You will not be granted access to classified information. DOE/NNSA does not expect that the results of the research project will involve classified information. Under certain circumstances, however, a classification review of information originated under the award may be required. The Department may review research work generated under this award at any time to determine if it requires classification.

b. Executive Order 12958 (60 Fed. Reg. 19,825 (1995)) states that basic scientific research information not clearly related to the national security shall not be classified. Nevertheless, some information concerning (among other things) scientific, technological, or economic matters relating to national security or cryptology may require classification. If you originate information during the course of this award that you believe requires classification, you must promptly:

1. Notify the DOE Project Officer and the DOE Award Administrator;

2. Submit the information by registered mail directly to the Director, Office of Classification and Information Control, SO-10.2; U.S. Department of Energy; P.O. Box A; Germantown, MD 20875-0963, for classification review.

3. Restrict access to the information to the maximum extent possible until you are informed that the information is not classified, but no longer than 30 days after receipt by the Director, Office of Classification and Information Control.

c. If you originate information concerning the production or utilization of special nuclear material (i.e., plutonium, uranium enriched in the isotope 233 or 235, and any other material so determined under section 51 of the Atomic Energy Act) or nuclear energy, you must:

1. Notify the DOE Project Officer and the DOE Award Administrator;

2. Submit the information by registered mail directly to the Director, Office of Classification and Information Control, SO-10.2; U.S. Department of Energy; P. O. Box A; Germantown, MD 20875-0963 for classification review within 180 days of the date the recipient first discovers or first has reason to believe that the information is useful in such production or utilization; and

3. Restrict access to the information to the maximum extent possible until you are informed that the information is not classified, but no longer than 90 days after receipt by the Director, Office of Classification and Information Control.

d. If DOE determines any of the information requires classification, you agree that the Government may terminate the award with consent of the recipient in accordance with 2 CFR part 200.339(a)(3). All material deemed to be classified must be forwarded to the DOE, in a manner specified by DOE.

e. If DOE does not respond within the specified time periods, you are under no further obligation to restrict access to the information.

CONTINUATION APPLICATION AND FUNDING (APRIL 2024)

A. Continuation Application

A continuation application is a non-competitive application for an additional budget period within a previously approved project period of performance. At least **45** calendar days before the end of each budget period, the Recipient must submit its continuation application in writing to the DOE Program Manager and the DOE Award Administrator. The continuation application must include the following information:

i. A report on the Recipient's progress towards meeting the objectives of the project set forth in the Statement of Project Objectives (SOPO) and Community Benefits Outcomes and Objectives, including any significant findings, conclusions, or developments, and an estimate of any unobligated balances remaining at the end of the budget period. If the remaining unobligated balance is estimated to exceed 20 percent of the funds available for the budget period, explain why the excess funds have not been obligated and how they will be used in the next budget period. The report must also address the Recipient's progress towards meeting the objectives and milestones set forth in the cybersecurity plan.

ii. A detailed budget and supporting justification if there are changes to the negotiated budget, or a budget for the upcoming budget period was not approved at the time of award.

iii. A description of any planned changes for the negotiated Statement of Project Objectives.

B. Continuation Funding

Continuation funding is contingent on (1) the availability of funds appropriated by Congress for the purpose of this program; (2) the availability of future-year budget authority; (3) Recipient's technical progress stated in the SOPO and in the Community Benefits Outcomes and Objectives; (4) Recipient's submittal of required reports; (5) Recipient's compliance with the terms and conditions of the Award; (6) the Recipient's submission of a continuation application; and (7) written approval of the continuation application by the DOE Contracting Officer.

NOTICE REGARDING THE PURCHASE OF AMERICAN-MADE EQUIPMENT AND PRODUCTS -- SENSE OF CONGRESS

It is the sense of the Congress that, to the greatest extent practicable, all equipment and products purchased with funds made available under this award should be American-made.

FUNDING OF BUDGET PERIODS

DOE has obligated $2,644,806 for completion of the Project authorized by this agreement, however, only $1,105,878 is available for work performed by the Recipient during Budget Period 1 of the Project. For Budget Period 2, the remainder or $1,538,928 will be available contingent upon (1) availability of funds appropriated by Congress for the purpose of this program; (2) the availability of future-year budget authority; (3) substantial progress towards meeting the objectives of your approved application; (4) submittal of required reports; (5) compliance with the terms and conditions of the award; (6).the submission by the Recipient of a continuation application; and (7) written approval of the continuation application by the DOE Contracting Officer.

In the event that the Recipient does not submit a continuation application for subsequent Budget Periods or DOE disapproves a continuation application for subsequent Budget Periods, the maximum DOE liability to the Recipient is the funds that are available for the current approved Budget Period(s). In such event, DOE reserves the right to deobligate any remaining funds.

INSURANCE COVERAGE (DECEMBER 2014)

See 2 CFR 200.310 for insurance requirements for real property and equipment acquired or improved with Federal funds.

EQUIPMENT (DECEMBER 2014) (NETL - MAY 2024)

Subject to the conditions provided in 2 CFR 200.313 and 2 CFR 910.360 (as applicable), title to equipment (property) acquired under a Federal award will vest conditionally with the non-Federal entity.

The non-Federal entity cannot encumber this property or permit encumbrance without prior written approval by the DOE Contracting Officer and must follow the requirements of 2 CFR 200.313 before disposing of the property.

States must use equipment acquired under a Federal award by the state in accordance with state laws and procedures.

Equipment must be used by the non-Federal entity in the program or project for which it was acquired as long as it is needed, whether or not the project or program continues to be supported by the Federal award. When no longer needed for the originally authorized purpose, the equipment may be used by programs supported by the Federal awarding agency in the priority order specified in 2 CFR 200.313(c)(1)(i) and (ii).

Management requirements, including inventory and control systems, for equipment are provided in 2 CFR 200.313(d).

When equipment acquired under a Federal award is no longer needed, the non-Federal entity must obtain disposition instructions from the Federal awarding agency or pass-through entity. However, pursuant to the FY23 Consolidated Appropriations Act (Pub. L. No. 117-328), Division D, Title III, Section 309, the Secretary, or a designee of the Secretary may, at their discretion, vest unconditional title or other property interests acquired under this project regardless of the fair market value of the property at the end of the award period.

Subject to the vesting of any property pursuant to Section 309 of the FY23 Consolidated Appropriations Act (Pub. L. No. 117-328), Division D, Title III, disposition will be made as follows: (a) items of equipment with a current fair market value of $5,000 or less may be retained, sold, or otherwise disposed of with no further obligation to the Federal awarding agency; (b) non-Federal entity may retain title or sell the equipment after compensating the Federal awarding agency as described in 2 CFR 200.313(e)(2); or (c) transfer title to the Federal awarding agency or to an eligible third Party as specified in 2 CFR 200.313(e)(3).

See 2 CFR 200.313 for additional requirements pertaining to equipment acquired under a Federal award. Also see 2 CFR 200.439 Equipment and other capital expenditures.

See 2 CFR 910.360 for supplemental requirements for Equipment for for-profit Recipients.

INTANGIBLE PROPERTY (DECEMBER 2014)

Title to intangible property (as defined in 2 CFR Part 200.59) acquired under a Federal award vests upon acquisition in the non-Federal entity. Intangible property includes trademarks, copyrights, patents and patent applications.

See 2 CFR Part 200.315 for additional requirements pertaining to intangible property acquired under a Federal award.

Also see 2 CFR Part 910.362 for amended requirements for Intellectual Property for For-Profit recipients.

PROPERTY TRUST RELATIONSHIP (DECEMBER 2014)

Real property, equipment, and intangible property, that are acquired or improved with a Federal award must be held in trust by the non-Federal entity as trustee for the beneficiaries of the project or program under which the property was acquired or improved.

See 2 CFR Part 200.316 for additional requirements pertaining to real property, equipment, and intangible property acquired or improved under a Federal award.

INSOLVENCY, BANKRUPTCY OR RECEIVERSHIP

a. You shall immediately notify the DOE of the occurrence of any of the following events: (i) you or your parent's filing of a voluntary case seeking liquidation or reorganization under the Bankruptcy Act; (ii) your consent to the institution of an involuntary case under the Bankruptcy Act against you or your parent; (iii) the filing of any similar proceeding for or against you or your parent, or its consent to, the dissolution, winding-up or readjustment of your debts, appointment of a receiver, conservator, trustee, or other officer with similar powers over you, under any other applicable state or federal law; or (iv) your insolvency due to your inability to pay your debts generally as they become due.

b. Such notification shall be in writing and shall: (i) specifically set out the details of the occurrence of an event referenced in paragraph a; (ii) provide the facts surrounding that event; and (iii) provide the impact such event will have on the project being funded by this award.

c. Upon the occurrence of any of the four events described in the first paragraph, DOE reserves the right to conduct a review of your award to determine your compliance with the required elements of the award (including such items as cost share, progress towards technical project objectives, and submission of required reports). If the DOE review determines that there are significant deficiencies or concerns with your performance under the award, DOE reserves the

right to impose additional requirements, as needed, including (i) change your payment method; or (ii) institute payment controls.

d. Failure of the Recipient to comply with this term may be considered a material noncompliance of this financial assistance award by the Contracting Officer.

PERFORMANCE OF WORK IN UNITED STATES

The Recipient agrees that all work cost for the project (including subrecipient labor) shall be incurred in the United States, unless the Recipient can demonstrate to the satisfaction of the Department of Energy that the United States economic interest will be better served through a greater percentage of the work being performed outside the United States.

Based on DOE's review and approval of the submitted Performance of Work Waiver Request, the requirement for 100% performance in the United States is waived for only the following work:

Origen Carbon Solutions / England and Wales, UK / $50,360

This is specific to the entities and locations noted and does not relieve your organization from any future requirements for requesting additional relief of this requirement. Any future waiver request or changes to the approved waiver outlined above shall be submitted for review in writing to the DOE Contracting Officer.

CATEGORICAL EXCLUSION (CX)

DOE must comply with the National Environmental Policy Act (NEPA) prior to authorizing the use of federal funds. Based on all information provided by the Recipient, DOE has made a NEPA determination by issuing a CX, thereby authorizing use of funds for the defined project activities. If the Recipient later adds to or modifies the activities reviewed and approved under the original DOE NEPA determination, the Recipient must notify the DOE Contracting Officer before proceeding with the new and/or modified activities. Those additions or modifications may be subject to review by the DOE NEPA Compliance Officer and approval by the DOE Contracting Officer, and may require a new NEPA determination.

REPORTING SUBAWARDS AND EXECUTIVE COMPENSATION (SEPTEMBER 2023)

a. Reporting of first-tier subawards.

1. Applicability. Unless the Recipient is exempt as provided in paragraph d. of this award term, the Recipient must report each action that equals or exceeds $30,000 in Federal funds for a subaward to a non-Federal entity or Federal agency (see definitions in paragraph e. of this award term).

2. Where and when to report.

   i. The non-Federal entity or Federal agency must report each obligating action described in paragraph a.1. of this award term to http://www.fsrs.gov.
   ii. For subaward information, report no later than the end of the month following the month in which the obligation was made. (For example, if the obligation was made on November 7, 2010, the obligation must be reported by no later than December 31, 2010.)

3. What to report. The Recipient must report the information about each obligating action that the submission instructions posted at http://www.fsrs.gov specify.

b. Reporting total compensation of recipient executives for non-Federal entities.

1. Applicability and what to report. The Recipient must report total compensation for each of its five most highly compensated executives for the preceding completed fiscal year, if

i. The total Federal funding authorized to date under this Federal award is $30,000 or more as defined in 2 CFR 170.320;
ii. In the preceding fiscal year, the Recipient received:

a) 80 percent or more of the Recipient's annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and
b) $25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and

iii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at https://www.sec.gov/answers/execomp.htm.)

2. Where and when to report. The Recipient must report executive total compensation described in paragraph b.1. of this award term:

i. As part of the Recipients registration profile at https://www.sam.gov.
ii. By the end of the month following the month in which this award is made, and annually thereafter.

c. Reporting of total compensation of subrecipient executives.

1. Applicability and what to report. Unless the Recipient is exempt as provided in paragraph d. of this award term, for each first-tier non-Federal entity subrecipient under this award, the Recipient shall report the names and total compensation of each of the subrecipient's five most highly compensated executives for the subrecipient's preceding completed fiscal year, if:

i. In the subrecipient's preceding fiscal year, the subrecipient received;

a) 80 percent or more of its annual gross revenues from Federal procurement contracts (and subcontracts) and Federal financial assistance subject to the Transparency Act, as defined at 2 CFR 170.320 (and subawards); and
b) $25,000,000 or more in annual gross revenues from Federal procurement contracts (and subcontracts), and Federal financial assistance subject to the Transparency Act (and subawards); and

ii. The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at https://www.sec.gov/answers/execomp.htm.)

2. Where and when to report. The Recipient must report subrecipient executive total compensation described in paragraph c.1. of this award term:

i. To the recipient
ii. By the end of the month following the month during which the Recipient makes the subaward. For example, if a subaward is obligated on any date during the month of October of a given year (i.e., between October 1 and 31), the Recipient must report any required compensation information of the subrecipient by November 30 of that year.

d. Exemptions
If, in the previous tax year, the Recipient had gross income, from all sources, under $300,000, it is exempt from the requirements to report:

i. Subawards, and
ii. The total compensation of the five most highly compensated executives of any subrecipient.

e. Definitions. For purposes of this award term:

1. *Federal Agency* means a Federal agency as defined at 5 U.S.C. 551(1) and further clarified by 5 U.S.C. 552(f).
2. *Non-Federal entity* means all of the following, as defined in 2 CFR part 25:

i. A Governmental organization, which is a State, local government, or Indian tribe;
ii. A foreign public entity;
iii. A domestic or foreign nonprofit organization; and
iv. A domestic or foreign for-profit organization;

3. *Executive* means officers, managing partners, or any other employees in management positions.

4. *Subaward*:

i. This term means a legal instrument to provide support for the performance of any portion of the substantive project or program for which the Recipient received this award and that the recipient awards to an eligible subrecipient.
ii. The term does not include the Recipient's procurement of property and services needed to carry out the project or program (for further explanation, see 2 CFR 200.331).
iii. A subaward may be provided through any legal agreement, including an agreement that the Recipient or a subrecipient considers a contract.

5. *Subrecipient* means a non-Federal entity or Federal agency that:

i. Receives a subaward from the Recipient under this award; and
ii. Is accountable to the Recipient for the use of the Federal funds provided by the subaward.

6. *Total compensation* means the cash and noncash dollar value earned by the executive during the recipient's or subrecipient's preceding fiscal year and includes the following (for more information see 17 CFR 229.402(c)(2)).

SYSTEM FOR AWARD MANAGEMENT AND UNIVERSAL IDENTIFIER REQUIREMENTS

A. Requirement for System for Award Management (SAM) Unless exempted from this requirement under 2 CFR 25.110, the prime recipient must remain registered and maintain current information in SAM for the entire period of performance of the award. This includes providing information on the prime recipient's immediate and highest level owner and subsidiaries, as well as on all of its predecessors that have been awarded a Federal contract or Federal financial assistance agreements within the last three years, if applicable, until the prime recipient submits the final financial report required under this award or receives the final payment, whichever is later. This requires the prime recipient to review its information in SAM at least annually after the initial registration, and to update its information as soon as there are changes. Reviews and updates may be required more frequently due to changes in recipient information or as required by another award term.

B. Requirement for Unique Entity Identifier

If authorized to make subawards under this award, the prime recipient:

1. Must notify potential subrecipients that no entity (see definition in paragraph C of this award term) may receive a subaward until the entity has provided its unique entity identifier to the prime recipient.

2. Must not make a subaward to an entity unless the entity has provided its unique entity identifier to the prime recipient. Subrecipients are not required to obtain an active SAM registration, but must obtain a unique entity identifier.

C. Definitions

For purposes of this term:

1. System for Award Management (SAM) means the Federal repository into which a recipient must provide information required for the conduct of business as a recipient. Additional information about registration procedures may be found at the SAM internet site (currently at https://www.sam.gov).

2. Unique Entity Identifier means the identifier assigned by SAM to uniquely identify business entities.

3. Entity includes non-Federal entities as defined at 2 CFR 200.1 and also includes all of the following for purposes of this part:

a. A foreign organization;

b. A foreign public entity;

c. A domestic for-profit organization; and

d. A Federal agency.

4. Subaward has the meaning given in 2 CFR 200.1.

5. Subrecipient has the meaning given in 2 CFR 200.1.

LIABILITY

The Recipient and its contractors and sub-recipients agree not to seek to hold the U.S. Government liable, or to seek contribution from the U.S. Government, for any liabilities, including but not limited to environmental liabilities and third party liabilities resulting from the project, except to the extent that such liability results from the direct fault or negligence of the Government or to the extent such liability may be covered by applicable cost provisions and then, only to the extent of available funds obligated by the Government to the project.

LOBBYING RESTRICTIONS (MARCH 2012)

By accepting funds under this award, you agree that none of the funds obligated on the award shall be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

CORPORATE FELONY CONVICTION AND FEDERAL TAX LIABILITY ASSURANCES (MARCH 2014)

By entering into this agreement, the undersigned attests that The Regents of the University of California has not been convicted of a felony criminal violation under Federal law in the 24 months preceding the date of signature.

The undersigned further attests that The Regents of the University of California does not have any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

For purposes of these assurances, the following definitions apply:

A Corporation includes any entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States [but not foreign corporations]. It includes both for-profit and non-profit organizations.

NONDISCLOSURE AND CONFIDENTIALITY AGREEMENTS ASSURANCES (JUNE 2015)

(1) By entering into this agreement, the undersigned attests that The Regents of the University of California does not and will not require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contactors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.

(2) The undersigned further attests that The Regents of the University of California does not and will not use any Federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:

a.‘‘These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or

mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.''

b. The limitation above shall not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

c. Notwithstanding provision listed in paragraph (a), a nondisclosure or confidentiality policy form or agreement that is to be executed by a person connected with the conduct of an intelligence or intelligence-related activity, other than an employee or officer of the United States Government, may contain provisions appropriate to the particular activity for which such document is to be used. Such form or agreement shall, at a minimum, require that the person will not disclose any classified information received in the course of such activity unless specifically authorized to do so by the United States Government. Such nondisclosure or confidentiality forms shall also make it clear that they do not bar disclosures to Congress, or to an authorized official of an executive agency or the Department of Justice, that are essential to reporting a substantial violation of law.

REPORTING OF MATTERS RELATED TO RECIPIENT INTEGRITY AND PERFORMANCE (DECEMBER 2015)

a. General Reporting Requirement

If the total value of your currently active grants, cooperative agreements, and procurement contracts from all Federal awarding agencies exceeds $10,000,000 for any period of time during the period of performance of this Federal award, then you as the recipient during that period of time must maintain the currency of information reported to the System for Award Management (SAM) that is made available in the designated integrity and performance system (currently the Federal Awardee Performance and Integrity Information System (FAPIIS)) about civil, criminal, or administrative proceedings described in paragraph 2 of this award term and condition. This is a statutory requirement under section 872 of Public Law 110-417, as amended (41 U.S.C. 2313). As required by section 3010 of Public Law 111-212, all information posted in the designated integrity and performance system on or after April 15, 2011, except past performance reviews required for Federal procurement contracts, will be publicly available.

b. Proceedings About Which You Must Report

Submit the information required about each proceeding that:

1. Is in connection with the award or performance of a grant, cooperative agreement, or procurement contract from the Federal Government;

2. Reached its final disposition during the most recent five year period; and

3. Is one of the following:

(A) A criminal proceeding that resulted in a conviction, as defined in paragraph 5 of this award term and condition;

(B) A civil proceeding that resulted in a finding of fault and liability and payment of a monetary fine, penalty, reimbursement, restitution, or damages of $5,000 or more;

(C) An administrative proceeding, as defined in paragraph 5. of this award term and condition, that resulted in a finding of fault and liability and your payment of either a monetary fine or penalty of $5,000 or more or reimbursement, restitution, or damages in excess of $100,000; or

(D) Any other criminal, civil, or administrative proceeding if:

(i) It could have led to an outcome described in paragraph 2.c.(1), (2), or (3) of this award term and condition;

(ii) It had a different disposition arrived at by consent or compromise with an acknowledgment of fault on your part; and

(iii) The requirement in this award term and condition to disclose information about the proceeding does not conflict with applicable laws and regulations.

c. Reporting Procedures

Enter in the SAM Entity Management area the information that SAM requires about each proceeding described in paragraph 2 of this award term and condition. You do not need to submit the information a second time under assistance awards that you received if you already provided the information through SAM because you were required to do so under Federal procurement contracts that you were awarded.

d. Reporting Frequency

During any period of time when you are subject to the requirement in paragraph 1 of this award term and condition, you must report proceedings information through SAM for the most recent five year period, either to report new information about any proceeding(s) that you have not reported previously or affirm that there is no new information to report. Recipients that have Federal contract, grant, and cooperative agreement awards with a cumulative total value greater than $10,000,000 must disclose semiannually any information about the criminal, civil, and administrative proceedings.

e. Definitions

For purposes of this award term and condition:

1. Administrative proceeding means a non-judicial process that is adjudicatory in nature in order to make a determination of fault or liability (e.g., Securities and Exchange Commission Administrative proceedings, Civilian Board of Contract Appeals proceedings, and Armed Services Board of Contract Appeals proceedings). This includes proceedings at the Federal and State level but only in connection with performance of a Federal contract or grant. It does not include audits, site visits, corrective plans, or A. Reporting of Matters Related to Recipient Integrity and Performance.

2. Conviction, for purposes of this award term and condition, means a judgment or conviction of a criminal offense by any court of competent jurisdiction, whether entered upon a verdict or a plea, and includes a conviction entered upon a plea of nolo contendere.

3. Total value of currently active grants, cooperative agreements, and procurement contracts includes—

(A) Only the Federal share of the funding under any Federal award with a recipient cost share or match; and

(B) The value of all expected funding increments under a Federal award and options, even if not yet exercised.

SUBAWARD/SUBCONTRACT CHANGE NOTIFICATION

Except for subawards and/or subcontracts specifically proposed as part of the Recipient's Application for award, the Recipient must notify the DOE Contracting Officer and Project Officer in writing 30 days prior to the execution of new or modified subawards/subcontracts. This notification does not constitute a waiver of the prior approval requirements outlined in 2 CFR 200, nor does it relieve the Recipient from its obligation to comply with applicable Federal statutes, regulations, and executive orders.

In order to satisfy this notification requirement, Recipient documentation must, as a minimum, include the following:

1. A description of the research to be performed, the service to be provided, or the equipment to be purchased;
2. Cost share commitment letter if the subawardee is providing cost share to the award;
3. Updated budget justification, budget pages;
4. An assurance that the process undertaken by the Recipient to solicit the subaward/subcontract complies with their written procurement procedures as outlined in 2 CFR 200.317 through 200.327.
5. An assurance that no planned, actual or apparent conflict of interest exists between the Recipient and the selected subawardee/subcontractor and that the Recipient's written standards of conduct were followed[1];
6. A completed Environmental Questionnaire, if applicable;
7. An assurance that the subawardee/subcontractor is not a debarred or suspended entity; and
8. An assurance that all required award provisions will be flowed down in the resulting subaward/subcontract.

The Recipient is responsible for making a final determination to award or modify subawards/subcontracts under this agreement, but the Recipient may not proceed with the subaward/subcontract until the Contracting Officer determines, and provides the Recipient written notification, that the information provided is adequate.

Should the Recipient not receive a written notification of adequacy from the Contracting Officer within 30 days of the submission of the subaward/subcontract documentation stipulated above, Recipient may proceed to award or modify the proposed subaward/subcontract.

IMPLEMENTATION OF EXECUTIVE ORDER 13798, PROMOTING FREE SPEECH AND RELIGIOUS LIBERTY (NOVEMBER 2020)

States, local governments, or other public entities may not condition sub-awards in a manner that would discriminate, or disadvantage sub-recipients based on their religious character.

ENERGY DATA EXCHANGE (EDX) REQUIREMENTS (DECEMBER 2022)

Any data products generated under this award shall be submitted to the Energy Data eXchange (EDX) at https://edx.netl.doe.gov/. Data products include but are not limited to software code, tools, applications, webpages, portfolios, images, videos, and datasets.

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[1] It is DOE's position that the existence of a "covered relationship" as defined in 5 C.F.R. § 2635.502(a)&(b) between a member of the Recipient's owners or senior management and a member of a subawardee's/subcontractor's owners or senior management creates at a minimum an apparent conflict of interest that would require the Recipient to notify the Contracting Officer and provide detailed information and justification (including, for example, mitigation measures) as to why the subaward or subcontract does not create an actual conflict of interest. Recipients must also notify the Contracting Officer of any new subcontract or subaward to: (1) an entity that is owned or otherwise controlled by the Recipient; or (2) an entity that is owned or otherwise controlled by another entity that also owns or otherwise controls the Recipient, as it is DOE's position that these situations also create at a minimum an apparent conflict of interest.

EDX supports a wide variety of file types and formats including: 1) data, 2) metadata, 3) software/tools, and 4) articles, provided that there is an accompanying Government use license. A partial list of file formats accepted by EDX is provided below, however, EDX accepts all types of file formats.

**Common Data Product Submission Formats: ASC, AmiraMesh, AVI, CAD, CSV, DAT, DBF, DOC, DSV, DWG, GIF, HDF, HTML, JPEG2000, JPG, MOV, MPEG4, MSH/CAS/DAT, NetCDF, PDF, PNG, PostScript, PPT, RTF, Surface, TAB, TIFF, TIFF Stacks, TXT, XLS, XML, ,Xradio, ZIP, and others.

**Geographic Formats: APR, DBF, DEM, DLG, DRG, DXF, E00, ECW, GDB, GeoPDF, GeoTIFF, GML, GPX, GRID, IMG, KML, KMZ, MDB, MrSID, SHP, and others.

Information provided to EDX will be made publicly available, unless otherwise prohibited under the award. Additional information on EDX is available at https://edx.netl.doe.gov/about.

When data products are submitted to EDX, the data product will need to be registered with a digital object identifier (DOI) through OSTI to ensure more visibility in other search repositories (i.e., osti.gov, data.gov, Google Scholar, etc.). The OSTI DOI can be established through an application programming interface (API) by completing just a few additional fields.

The Recipient shall submit annually to EDX any data products generated under the award using any of the file formats listed above. All final data products shall be submitted to EDX prior to the completion of the project.

The Recipient must include this term in any subaward and in any applicable contractual agreement(s) associated with this Award.

CONTINUED USE OF REAL PROPERTY AND EQUIPMENT (OCTOBER 2022)

Real property and equipment purchased with project funds (federal share and recipient cost share) under this Award are subject to the requirements at 2 CFR 200.311, 200.313, and 200.316 (non-Federal entities, except for-profit entities) and 2 CFR 910.360 (for-profit entities). The Recipient may continue to use the real property and equipment after the conclusion of the award period of performance so long as the Recipient:

a. Continues to use the property for the authorized project purposes;
b. Complies with the applicable reporting requirements and regulatory property standards;
c. As applicable to for-profit entities, UCC filing statements are maintained; and
d. Submits a written Request for Continued Use for DOE authorization, which is approved by the DOE Contracting Officer.

The Recipient must request authorization from the Contracting Officer to continue to use the property for the authorized project purposes beyond the award period of performance ("Request for Continued Use"). The Recipient's written Request for Continued Use must identify the property and include: a summary of how the property will be used (must align with the authorized project purposes); a proposed use period (e.g., perpetuity, until fully depreciated, or a calendar date where the Recipient expects to submit disposition instructions); acknowledgement that the recipient shall not sell or encumber the property or permit any encumbrance without prior written DOE approval; current fair market value of the property; and an Estimated Useful Life or depreciation schedule for equipment.

When the property is no longer needed for authorized project purposes, the Recipient must request disposition instructions from DOE. For-profit entity disposition requirements are set forth at 2 CFR 910.360. Property disposition requirements for other non-federal entities are set forth in 2 CFR 200.310 through 200.316.

FOREIGN NATIONAL PARTICIPATION (APRIL 2024)

If the Recipient (including any of its subrecipients and contractors) anticipates involving foreign nationals in the performance of this award, the Recipient must provide DOE with specific information about each foreign national to ensure compliance with the requirements for foreign national participation and access approvals. The volume and type of information required may depend on various factors associated with the award.

Approval for foreign nationals from countries identified on the U.S. Department of State's list of State Sponsors of Terrorism (https://www.state.gov/state-sponsors-of-terrorism/) must be obtained from DOE before they can participate in the performance of any work under this award.

A "foreign national" is defined as a person without United States citizenship or nationality (may include a stateless person. DOE may elect to deny a foreign national's participation in the award. Likewise, DOE may elect to deny a foreign national's access to a DOE sites, information, technologies, equipment, programs or personnel. DOE's determination to deny participation or access is not appealable.

The Recipient must include this term in any subaward and in any applicable contractual agreement(s) associated with this award.

POST AWARD DUE DILIGENCE REVIEWS (APRIL 2024)

During the period of performance of the Award, DOE may conduct ongoing due diligence reviews, through Government resources, to identify potential risks of undue foreign influence. In the event a risk is identified, DOE may require risk mitigation measures, including but not limited to, requiring an individual or entity not participate in the Award. As part of the research, technology, and economic security risk review, DOE may contact the Recipient project team members for additional information to inform the review.

EXPORT CONTROL (JUNE 2024)

The United States government regulates the transfer of information, commodities, technology, and software considered to be strategically important to the U.S. to protect national security, foreign policy, and economic interests without imposing undue regulatory burdens on legitimate international trade. There is a network of Federal agencies and regulations that govern exports that are collectively referred to as "Export Controls." The Recipient is responsible for ensuring compliance with all applicable United States Export Control laws and regulations relating to any work performed under the award.

The Recipient must immediately report to DOE any export control investigations, charges, convictions and violations upon occurrence, at the recipient or subrecipient level, and for convictions/violations, provide the corrective action(s) to prevent future convictions/violations.

CURRENT AND PENDING SUPPORT (APRIL 2024)

A. Definitions

For purposes of this term, the following definitions are applicable:

i. **Current and pending support** – (a) All resources made available, or expected to be made available, to an individual in support of the individual's RD&D efforts, regardless of (i) whether the source is foreign or

domestic; (ii) whether the resource is made available through the Recipient or directly to the individual; or (iii) whether the resource has monetary value; and (b) includes in-kind contributions requiring a commitment of time and directly supporting the individual's RD&D efforts, such as the provision of office or laboratory space, equipment, supplies, employees, or students. This term has the same meaning as the term Other Support as applied to researchers in the National Security Presidential Memorandum (NSPM) 33: For researchers, Other Support includes all resources made available to a researcher in support of and/or related to all of their professional RD&D efforts, including resources provided directly to the individual or through the organization, and regardless of whether or not they have monetary value (e.g., even if the support received is only in-kind, such as office/laboratory space, equipment, supplies, or employees). This includes resource and/or financial support from all foreign and domestic entities, including but not limited to, gifts provided with terms or conditions, financial support for laboratory personnel, and participation of student and visiting researchers supported by other sources of funding.

ii. **Foreign Government-Sponsored Talent Recruitment Program** – An effort directly or indirectly organized, managed, or funded by a foreign government, or a foreign government instrumentality or entity, to recruit science and technology professionals or students (regardless of citizenship or national origin, or whether having a full-time or part-time position). Some foreign government-sponsored talent recruitment programs operate with the intent to import or otherwise acquire from abroad, sometimes through illicit means, proprietary technology or software, unpublished data and methods, and intellectual property to further the military modernization goals and/or economic goals of a foreign government. Many, but not all, programs aim to incentivize the targeted individual to relocate physically to the foreign state for the above purpose. Some programs allow for or encourage continued employment at United States research facilities or receipt of federal research funds while concurrently working at and/or receiving compensation from a foreign institution, and some direct participants not to disclose their participation to United States entities. Compensation could take many forms including cash, research funding, complimentary foreign travel, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration, including in-kind compensation.

iii. **Senior/key personnel** – an individual who contributes in a substantive, meaningful way to the scientific development or execution of a research, development and demonstration (RD&D) project proposed to be carried out with DOE award.[2]

B. Disclosure Requirements

Prior to award, the Recipient was required to provide current and pending support disclosure statements and a Curriculum Vitae (CV) or Biosketch for each principal investigator (PI) and senior/key personnel, at the recipient and subrecipient level, regardless of funding source. In accordance with the Federal Assistance Reporting Checklist, throughout the life of the award, the Recipient must submit current and pending support disclosure statements and a CV or Biosketch for any new PI and senior/key personnel at the recipient and subrecipient level, added to the project funded under this Award within thirty (30) calendar days of the individual joining the project. In addition, if there are any changes to current and pending support disclosure statements previously submitted to DOE, the Recipient must submit updated current and pending disclosure statements within thirty (30) calendar days of the change. The Recipient must ensure all PIs and senior/key personnel at the recipient and subrecipient level, are aware of the requirement to submit updated current and pending support disclosure statements to DOE.

[2] Typically, these individuals have doctoral or other professional degrees, although individuals at the masters or baccalaureate level may be considered senior/key personnel if their involvement meets this definition. Consultants, graduate students, and those with a postdoctoral role also may be considered senior/key personnel if they meet this definition.

Current and pending support is intended to allow the identification of potential duplication, overcommitment, potential conflicts of interest or commitment, and all other sources of support. All PIs and senior/key personnel at the recipient and subrecipient level must provide a list of all sponsored activities, awards, and appointments, whether paid or unpaid; provided as a gift with terms or conditions or provided as a gift without terms or conditions; full-time, part-time, or voluntary; faculty, visiting, adjunct, or honorary; cash or in-kind; foreign or domestic; governmental or private-sector; directly supporting the individual's research or indirectly supporting the individual by supporting students, research staff, space, equipment, or other research expenses. All involvement with foreign government-sponsored talent recruitment programs must be identified in current and pending support.

For every activity, list the following items:

- The sponsor of the activity or the source of funding.
- The award or other identifying number.
- The title of the award or activity. If the title of the award or activity is not descriptive, add a brief description of the research being performed that would identify any overlaps or synergies with the proposed research.
- The total cost or value of the award or activity, including direct and indirect costs and cost share. For pending proposals, provide the total amount of requested funding.
- The award period (start date – end date).
- The person-months of effort per year being dedicated to the award or activity.

To identify overlap, duplication of effort, or synergistic efforts, append a description of the other award or activity to the current and pending support.

Details of any obligations, contractual or otherwise, to any program, entity, or organization sponsored by a foreign government must be provided to DOE upon request to either the applicant institution or DOE. Supporting documents of any identified source of support must be provided to DOE on request, including certified translations of any document.

All PIs and senior/key personnel must provide a separate disclosure statement listing the required information above regarding current and pending support. The individual must sign and date their respective disclosure statement and include the following certification statement:

> I, [Full Name and Title], certify to the best of my knowledge and belief that the information contained in this Current and Pending Support Disclosure Statement is true, complete and accurate. I understand that any false, fictitious, or fraudulent information, misrepresentations, half-truths, or omissions of any material fact, may subject me to criminal, civil or administrative penalties for fraud, false statements, false claims or otherwise. (18 U.S.C. §§ 1001 and 287, and 31 U.S.C. 3729-3733 and 3801-3812). I further understand and agree that (1) the statements and representations made herein are material to DOE's funding decision, and (2) I have a responsibility to update the disclosures during the period of performance of the award should circumstances change which impact the responses provided above.

The information may be provided in the approved common disclosure format available at Common Form for Current and Pending (Other) Support (nsf.gov) to be implemented by DOE.

Regardless of the format used, the individual must still include a signature, date, and a certification statement using the language included in the paragraph above.

INTERIM CONFLICT OF INTEREST POLICY FOR FINANCIAL ASSISTANCE (MARCH 2023)

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy) can be found at https://www.energy.gov/management/department-energy-interim-conflict-interest-policy-requirements-financial-assistance. This policy is applicable to all non-Federal entities applying for, or that receive, DOE funding by means of a financial assistance award (e.g., a grant, cooperative agreement, or technology investment agreement) and, through the implementation of this policy by the entity, to each Investigator who is planning to participate in, or is participating in, the project funded wholly or in part under this Award. The term "Investigator" means the PI and any other person, regardless of title or position, who is responsible for the purpose, design, conduct, or reporting of a project funded by DOE or proposed for funding by DOE. The Recipient must flow down the requirements of the interim COI Policy to any subrecipient non-Federal entities, with the exception of DOE National Laboratories. Further, the Recipient must identify all financial conflicts of interests (FCOI), i.e., managed and unmanaged/ unmanageable, in its initial and ongoing FCOI reports.

Prior to award, the Recipient was required to: 1) ensure all Investigators on this Award completed their significant financial disclosures; 2) review the disclosures; 3) determine whether a FCOI exists; 4) develop and implement a management plan for FCOIs; and 5) provide DOE with an initial FCOI report that includes all FCOIs (i.e., managed and unmanaged/unmanageable). Within 180 days of the date of the Award, the Recipient must be in full compliance with the other requirements set forth in DOE's interim COI Policy.

ORGANIZATIONAL CONFLICT OF INTEREST (APRIL 2024)

Organizational conflicts of interest are those where, because of relationships with a parent company, affiliate, or subsidiary organization, the Recipient is unable or appears to be unable to be impartial in conducting procurement action involving a related organization (2 CFR 200.318(c)(2)).

The Recipient must disclose in writing any potential or actual organizational conflict of interest to the DOE Contracting Officer. The Recipient must provide the disclosure prior to engaging in a procurement or transaction using project funds with a parent, affiliate, or subsidiary organization that is not a state, local government, or Indian Tribe. For a list of the information that must be included the disclosure, see Section VI. of the DOE interim Conflict of Interest Policy for Financial Assistance at https://www.energy.gov/management/department-energy-interim-conflict-interest-policy-requirements-financial-assistance.

If the effects of the potential or actual organizational conflict of interest cannot be avoided, neutralized, or mitigated, the Recipient must procure goods and services from other sources when using project funds.

The Recipient must flow down the requirements of the interim COI Policy to any subrecipient non-Federal entities, with the exception of DOE National Laboratories. The Recipient is responsible for ensuring subrecipient compliance with this term.

If the Recipient has a parent, affiliate, or subsidiary organization that is not a state, local government, or Indian Tribe, the Recipient must maintain written standards of conduct covering organizational conflicts of interest.

PROHIBITION ON CERTAIN TELECOMMUNICATIONS AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT (APRIL 2024)

As set forth in 2 CFR 200.216, recipients and subrecipients are prohibited from obligating or expending project funds (Federal and non-Federal funds) to:

(1) Procure or obtain;

(2) Extend or renew a contract to procure or obtain;

(3) Exercise an option to procure; or

(4) Enter into a contract (or extend or renew a contract) to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system. As described in Public Law 115-232, section 889, covered telecommunications equipment is telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities).

(i) For the purpose of public safety, security of government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

(ii) Telecommunications or video surveillance services provided by such entities or using such equipment.

(iii) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

See Public Law 115-232, section 889 for additional information.

PROHIBITION RELATED TO FOREIGN GOVERNMENT-SPONSORED TALENT RECRUITMENT PROGRAMS (MARCH 2023)

A. Prohibition

Persons participating in a *Foreign Government-Sponsored Talent Recruitment Program of a Foreign Country of Risk* are prohibited from participating in this Award. The Recipient must exercise ongoing due diligence to reasonably ensure that no individuals participating on the DOE-funded project are participating in a *Foreign Government-Sponsored Talent Recruitment Program of a Foreign Country of Risk*. Consequences for violations of this prohibition will be determined according to applicable law, regulations, and policy. Further, the Recipient must notify DOE within five (5) business days upon learning that an owner of the Recipient or subrecipient or individual on the project team is or is believed to be participating in a *Foreign Government-Sponsored Talent Recruitment Program of a Foreign Country of Risk*. DOE may modify and add requirements related to this prohibition to the extent required by law.

B. Definitions

1. **Foreign Government-Sponsored Talent Recruitment Program**. An effort directly or indirectly organized, managed, or funded by a foreign government, or a foreign government instrumentality or entity, to recruit science and technology professionals or students (regardless of citizenship or national origin, or whether having a full-time or part-time position). Some foreign government-sponsored talent recruitment programs operate with the intent to import or otherwise acquire from abroad, sometimes through illicit means, proprietary technology or software, unpublished data and methods, and

intellectual property to further the military modernization goals and/or economic goals of a foreign government. Many, but not all, programs aim to incentivize the targeted individual to relocate physically to the foreign state for the above purpose. Some programs allow for or encourage continued employment at United States research facilities or receipt of federal research funds while concurrently working at and/or receiving compensation from a foreign institution, and some direct participants not to disclose their participation to U.S. entities. Compensation could take many forms including cash, research funding, complimentary foreign travel, honorific titles, career advancement opportunities, promised future compensation, or other types of remuneration or consideration, including in-kind compensation.

2. **Foreign Country of Risk**. DOE has designated the following countries as foreign countries of risk: Iran, North Korea, Russia, and China. This list is subject to change.

PARTICIPANTS AND OTHER COLLABORATING ORGANIZATIONS (APRIL 2024)

Prior to award, the Recipient was required to provide the following information on participants and other collaborating organizations. If there are any changes to Participants and Collaborating Organizations information previously submitted to DOE, the Recipient must submit updated information within thirty (30) calendar days after the end of the quarterly reporting period in which the change occurred:

A. What individuals have worked on the project

Provide the following information for individuals at the prime recipient and subrecipient level: (1) all senior and key personnel; (2) authorized representative of applicant with primary responsibility for business support (e.g., financial management, fiscal oversight, providing resources, award administration, etc.), if other than listed senior/key personnel, e.g., the Administrative Officer listed on the SF-424 Application; and (3) each person who has worked or is expected to work at least one person month per year on the project regardless of the source of compensation (a person month equals approximately 160 hours of effort).

i. Name
ii. Organization
iii. Job Title
iv. Role in the project
v. Start and end date (month and year) working on the project
vi. State, U.S. territory, and/or country of residence
vii. Whether this person collaborated with an individual or entity located in a foreign country in connection with the scope of this Award, and
viii. If yes to vii, whether the person traveled to the foreign country as part of that collaboration, and, if so, where and what the duration of stay was.

B. Organizations

Identify all subrecipients, contractors, U.S. National Laboratories, partners, and collaborating organizations. Recipients must also include all foreign collaborators as outlined in the Foreign Collaboration Considerations term of the award Terms and Conditions. For each, provide name, UEI, zip code or latitude/longitude, role in the project, contribution to the project and start and end date.

HUMAN SUBJECTS RESEARCH (MARCH 2023)

Research involving human subjects, biospecimens, or identifiable private information conducted with Department of Energy (DOE) funding is subject to the requirements of DOE Order 443.1C, *Protection of Human Research Subjects*, 45 CFR Part 46, *Protection of Human Subjects* (*subpart A which is referred to as the "Common Rule"),* and 10 CFR Part 745, *Protection of Human Subjects*.

Federal regulation and the DOE Order require review by an Institutional Review Board (IRB) of all proposed human subjects research projects. The IRB is an interdisciplinary ethics board responsible for ensuring that the proposed research is sound and justifies the use of human subjects or their data; the potential risks to human subjects have been minimized; participation is voluntary; and clear and accurate information about the study, the benefits and risks of participating, and how individuals' data/specimens will be protected/used, is provided to potential participants for their use in determining whether or not to participate.

The Recipient shall provide the Federal Wide Assurance number identified in item 1 below and the certification identified in item 2 below to DOE prior to initiation of any project that will involve interactions with humans in some way (e.g., through surveys); analysis of their identifiable data (e.g., demographic data and energy use over time); asking individuals to test devices, products, or materials developed through research; and/or testing of commercially available devices in buildings/homes in which humans will be present. *Note:* This list of examples is illustrative and not all inclusive.

No DOE funded research activity involving human subjects, biospecimens, or identifiable private information shall be conducted without:

1) A registration and a Federal Wide Assurance of compliance accepted by the Office of Human Research Protection (OHRP) in the Department of Health and Human Services; and
2) Certification that the research has been reviewed and approved by an Institutional Review Board (IRB) provided for in the assurance. IRB review may be accomplished by the awardee's institutional IRB; by the Central DOE IRB; or if collaborating with one of the DOE national laboratories, by the DOE national laboratory IRB.

The Recipient is responsible for ensuring all subrecipients comply and for reporting information on the project annually to the DOE Human Subjects Research Database (HSRD) at https://science.osti.gov/HumanSubjects/Human-Subjects-Database/home. *Note:* If a DOE IRB is used, no end of year reporting will be needed.

Additional information on the DOE Human Subjects Research Program can be found at: https://science.osti.gov/ber/human-subjects.

FRAUD, WASTE AND ABUSE (MARCH 2023)

The mission of the DOE Office of Inspector General (OIG) is to strengthen the integrity, economy and efficiency of DOE's programs and operations including deterring and detecting fraud, waste, abuse and mismanagement. The OIG accomplishes this mission primarily through investigations, audits, and inspections of Department of Energy activities to include grants, cooperative agreements, loans, and contracts. The OIG maintains a Hotline for reporting allegations of fraud, waste, abuse, or mismanagement. To report such allegations, please visit https://www.energy.gov/ig/ig-hotline.

Additionally, the Recipient must be cognizant of the requirements of 2 CFR 200.113 Mandatory disclosures, which states:

> The non-Federal entity or applicant for a Federal award must disclose, in a timely manner, in writing to the Federal awarding agency or pass-through entity all violations of Federal criminal law involving fraud, bribery, or gratuity violations potentially affecting the Federal award. Non-Federal entities that have received a Federal award including the term and condition outlined in appendix XII of 2 CFR Part 200 are required to report certain civil, criminal, or administrative proceedings to SAM (currently FAPIIS). Failure to make required disclosures can result in any of the remedies described in § 200.339. (See also 2 CFR part 180, 31 U.S.C. 3321, and 41 U.S.C. 2313.)

FOREIGN COLLABORATION CONSIDERATIONS (MARCH 2023)

A. Consideration of new collaborations with foreign entities, organizations, and governments. The Recipient must provide DOE with advanced written notification of any potential collaboration with foreign entities, organizations or governments in connection with its DOE-funded award scope. The Recipient must await further guidance from DOE prior to contacting the proposed foreign entity, organization or government regarding the potential collaboration or negotiating the terms of any potential agreement.

B. Existing collaborations with foreign entities, organizations and governments. The Recipient must provide DOE with a written list of all existing foreign collaborations, organizations, and governments in which has entered in connection with its DOE-funded award scope.

C. In general, a collaboration will involve some provision of a thing of value to, or from, the Recipient. A thing of value includes but may not be limited to all resources made available to, or from, the recipient in support of and/or related to the Award, regardless of whether or not they have monetary value. Things of value also may include in-kind contributions (such as office/laboratory space, data, equipment, supplies, employees, students). In-kind contributions not intended for direct use on the Award but resulting in provision of a thing of value from or to the Award must also be reported. Collaborations do not include routine workshops, conferences, use of the Recipient's services and facilities by foreign investigators resulting from its standard published process for evaluating requests for access, or the routine use of foreign facilities by awardee staff in accordance with the Recipient's standard policies and procedures.

REPORTING, TRACKING AND SEGREGATION OF INCURRED COSTS (MARCH 2023)

BIL funds can be used in conjunction with other funding, as necessary to complete projects, but tracking and reporting must be separate to meet the reporting requirements of the BIL and related Office of Management and Budget (OMB) Guidance. The Recipient must keep separate records for BIL funds and must ensure those records comply with the requirements of the BIL.

POTENTIALLY DUPLICATIVE FUNDING NOTICE (MARCH 2023)

If the Recipient or subrecipients have or receive any other award of federal funds for activities that potentially overlap with the activities funded under this Award, the Recipient must promptly notify DOE in writing of the potential overlap and state whether project funds (i.e., recipient cost share and federal funds) from any of those other federal awards have been, are being, or are to be used (in whole or in part) for one or more of the identical cost items under this

Award. If there are identical cost items, the Recipient must promptly notify the DOE Contracting Officer in writing of the potential duplication and eliminate any inappropriate duplication of funding.

AFFIRMATIVE ACTION AND PAY TRANSPARENCY REQUIREMENTS (SEPTEMBER 2023)

All federally assisted construction contracts exceeding $10,000 annually will be subject to the requirements of Executive Order 11246:

(1) Recipients, subrecipients, and contractors are prohibited from discriminating in employment decisions on the basis of race, color, religion, sex, sexual orientation, gender identity or national origin.

(2) Recipients and Contractors are required to take affirmative action to ensure that equal opportunity is provided in all aspects of their employment. This includes flowing down the appropriate language to all subrecipients, contractors and subcontractors.

(3) Recipients, subrecipients, contractors and subcontractors are prohibited from taking adverse employment actions against applicants and employees for asking about, discussing, or sharing information about their pay or, under certain circumstances, the pay of their co-workers.

The Department of Labor's (DOL) Office of Federal Contractor Compliance Programs (OFCCP) uses a neutral process to schedule contractors for compliance evaluations. OFCCP's Technical Assistance Guide should be consulted to gain an understanding of the requirements and possible actions the recipients, subrecipients, contractors and subcontractors must take. See OFCCP's Technical Assistance Guide at: https://www.dol.gov/sites/dolgov/files/ofccp/Construction/files/ConstructionTAG.pdf?msclkid=9e397d68c4b111ec9d8e6fecb6c710ec.

Additionally, for construction projects valued at $35 million or more and lasting more than one year, Recipients, subrecipients, contractors, or subcontractors may be selected by OFCCP to participate in the Mega Construction Project Program. DOE, under relevant legal authorities including Sections 205 and 303(a) of Executive Order 11246, will require participation as a condition of the award. This program offers extensive compliance assistance with EO 11246. For more information regarding this program, see https://www.dol.gov/agencies/ofccp/construction/mega-program.

CONSTRUCTION SIGNAGE

The Recipient is encouraged to display DOE Investing in America signage during and after construction. Guidance can be found at: (https://www.energy.gov/branding). Proposed signage costs that meet these specifications are an allowable cost and may be included in the proposed project budget.

FOREIGN TRAVEL

International travel to attend/present at a scientific/technical conference and/or consortium is permitted under this project only after obtaining prior approval from the Contracting Officer. Please note that your organization must tie the travel to project objectives and comply with the International Air Transportation Fair Competitive Practices Act of 1974 (49 USC 40118), commonly referred to as the "Fly America Act," and implementing regulations at 41 CFR 301-10.131 through 301-10.143. The law and regulations require air transport of people or property to, from, between, or within a

country other than the United States, the cost of which is supported under this award, to be performed by or under a cost-sharing arrangement with a U.S. flag carrier, if service is available.

REPORTING, TRACKING AND SEGREGATION OF INCURRED COSTS (MARCH 2023)

BIL funds can be used in conjunction with other funding, as necessary to complete projects, but tracking and reporting must be separate to meet the reporting requirements of the BIL and related Office of Management and Budget (OMB) Guidance. The Recipient must keep separate records for BIL funds and must ensure those records comply with the requirements of the BIL.

CYBERSECURITY PLAN (APRIL 2024)

The Secretary of Energy, per BIL Section 40126, designated the DOE's Office of Cybersecurity, Energy Security, and Emergency Response (CESER) as responsible for coordinating cybersecurity project plans for IIJA provisions the Secretary deemed to have a cyber risk. CESER coordinates with DOE National Laboratory Subject Matter Experts (SMEs) to provide project lifecycle support activities that maintain or improve the project cybersecurity over its lifecycle.

The Recipient is responsible for maintaining and improving project cybersecurity throughout the project period, including responding to DOE feedback on the plans and the associated milestones, deliverables, and attending associated cybersecurity plan lifecycle support meeting dates with CESER and DOE SMEs. Any revisions to the cybersecurity plans and all related deliverables shall be emailed securely to CR-IIJACybersecurityplans@hq.doe.gov.

Any DOE and/or National Laboratory review comments or feedback provided to Recipients does not constitute an endorsement or approval of any specific elements within the cybersecurity plan or the proposed security approach. Therefore, such feedback should not be referenced or used in marketing or promotional materials.

All cybersecurity plans and deliverables are exempt from disclosure under the Freedom of Information Act (5 U.S.C. § 552) pursuant to Section 40126(e). This exemption is limited to information provided to or collected by the federal government described in Pub. L. 117-58 § 41026, 42 U.S.C. § 18725.

COMMUNITY BENEFITS OUTCOMES AND OBJECTIVES (APRIL 2024)

The Recipient must meet the stated objectives and milestones set forth in its Community Benefits Outcomes and Objectives, which is incorporated into the Award as an attachment. Reporting on the Recipient's progress towards meeting the objectives and milestones set forth in the Community Benefits Outcomes and Objectives must be submitted in accordance with the Federal Assistance Reporting Checklist, attached to this award.

TRANSPARENCY OF FOREIGN CONNECTIONS (APRIL 2024)

The Recipient must notify the DOE Contracting Officer within fifteen (15) business days of learning of the following circumstances in relation to the Recipient and subrecipients:

1. Any current or pending subsidiary, foreign business entity, or offshore entity that is based in or funded by any foreign country of risk or foreign entity based in a country of risk;
2. Any current or pending contractual or financial obligation or other agreement specific to a business arrangement, or joint venture-like arrangement with an entity owned by a country of risk or foreign entity based in a country of risk;
3. Any current or pending change in ownership structure of the Recipient or subrecipients that increases foreign ownership related to a country of risk. Each notification shall be accompanied by a complete and up-to-date capitalization table showing all equity interests held including limited liability company (LLC) and partnership interests, as well as derivative securities. Include both the number of shares issued to each equity holder, as well as the percentage of that series and of all equity on fully diluted basis. For each equity holder, provide the place of incorporation and the principal place of business, as applicable. If the equity holder is a natural person, identify the citizenship(s);
4. Any current or pending venture capital or institutional investment by an entity that has a general partner or individual holding a leadership role in such entity who has a foreign affiliation with any foreign country of risk;
5. Any current or pending technology licensing or intellectual property sales to a foreign country of risk; and
6. Any changes to the Recipient or the subrecipients' board of directors, including additions to the number of directors, the identity of new directors, as well as each new director's citizenship, shareholder affiliation (if applicable); each notification shall include a complete up-to-date list of all directors (and board observers), including their full name, citizenship and shareholder affiliation, date of appointment, duration of term, as well as a description of observer rights as applicable.
7. Any proposed changes to the equipment used on the project that would result in:
   a. Equipment originally made or manufactured in a foreign country of risk (including relabeled or rebranded equipment).
   b. Coded equipment where the source code is written in a foreign country of risk.
   c. Equipment from a foreign country of risk that will be connected to the internet or other remote communication system.
   d. Any companies from a foreign country of risk that will have physical or remote access to any part of the equipment used on the project after delivery.

Should DOE determine the connection poses a risk to economic or national security, DOE will require measures to mitigate or eliminate the risk.

DOE has designated the following countries as foreign countries of risk: Iran, North Korea, Russia, and China. This list is subject to change.

Recognizing the disclosures may contain business confidential information, subrecipients may submit their disclosures directly to DOE.

Buy America Requirement

None of the funds provided under this award (federal share or recipient cost-share) may be used for a project for infrastructure unless:

1. All iron and steel used in the project is produced in the United States—this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;

2. All manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation. See 2 CFR 184.5 for determining the cost of components for manufactured products; and

3. All construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States. See 2 CFR 184.6 for construction material standards.

The Buy America Requirement only applies to those articles, materials, and supplies that are consumed in, incorporated into, or permanently affixed to the infrastructure in the project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought into the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America Requirement apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.

The Buy America Requirement only applies to an article, material, or supply classified into one of the following categories* based on its status at the time it is brought to the work site for incorporation into an infrastructure project:

i. Iron or steel products;
ii. Manufactured products; or
iii. Construction materials

The Buy America Requirement only applies to the iron or steel products, manufactured products, and construction materials used for the construction, alteration, maintenance, or repair of public infrastructure in the United States when those items are consumed in, incorporated into, or permanently affixed to the infrastructure. An article, material, or supply incorporated into an infrastructure project should not be considered to fall into multiple categories, but rather must meet the Buy America Preference Requirement for only the single category in which it is classified.

All iron and steel, manufactured products, and construction materials used in the infrastructure project must be produced in the United States.

*Section 70917(c) of the BABA states that “construction materials” do not include cement and cementitious materials, aggregates such as stone, sand, or gravel; or aggregate binding agents or additives. Section 70917(c) materials are excluded from Construction materials. Asphalt concrete pavement mixes are typically composed of asphalt cement (a binding agent) and aggregates such as stone, sand, and gravel. Accordingly asphalt is also excluded from the definition of Construction materials.

Section 70917(c) materials, on their own, are not manufactured products. Further, Section 70917(c) materials should not be considered manufactured products when they are used at or combined proximate to the work site-such as in the case with wet concrete or hot mix asphalt brought to the work site for incorporation. However, certain Section 70917(c) materials (such as stone, sand, and gravel) are used to produce a manufactured product, such as is precast concrete processed into a specific shape or form, and is in such state when brought to the work site, then that product is subject to the BABA requirements.

Further, clarification is provided in 2 CFR 184 on the circumstances under which a determination is made that Section 70917(c) materials should be treated as components of a manufactured product. That determination is based on consideration of: (i) the revised definition of the "manufactured products" at 2 CFR 184.3; (ii) a new definition of "Section 70917(c) materials" at 2 CFR 184.3; (iii) new instructions at 2 CFR 184.4(e) on how and when to categorize articles, materials, and supplies; and (iv) new instructions at 2 CFR 184.4(f) on how to apply the Buy America preference by category.

Recipients are responsible for administering their award in accordance with the terms and conditions, including the Buy America Requirement. The recipient must ensure that the Buy America Requirement flows down to all subawards and that the subawardees and subrecipients comply with the Buy America Requirement. The Buy America Requirement term and condition must be included all sub-awards, contracts, subcontracts, and purchase orders for work performed under the infrastructure project.

C. Certification of Compliance

Recipients must certify or provide equivalent documentation for proof of compliance that a good faith effort was made to solicit bids for domestic products used in the infrastructure project under this Award.

Recipients must also maintain certifications or equivalent documentation for proof of compliance that those articles, materials, and supplies that are consumed in, incorporated into, affixed to, or otherwise used in the infrastructure project, not covered by a waiver or exemption, are produced in the United States. The certification or proof of compliance must be provided by the suppliers or manufacturers of the iron, steel, manufactured products and construction materials and flow up from all subawardees, contractors and vendors to the Recipient. Recipients must keep these certifications with the award/project files and be able to produce them upon request from DOE, auditors or Office of Inspector General.

D. Waivers

When necessary, Recipients may apply for, and DOE may grant, a waiver from the Buy America Requirement. Requests to waive the application of the Buy America Requirement must be in writing to the DOE Contracting Officer. Waiver requests are subject to review by DOE and the Office of Management and Budget, as well as a public comment period of no less than 15 calendar days.

Waivers must be based on one of the following justifications:

1. Public Interest- Applying the Buy America Requirement would be inconsistent with the public interest;
2. Non-Availability- The types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality; or

3. Unreasonable Cost- The inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent.

Requests to waive the Buy America Requirement must include the following:

- Waiver type (Public Interest, Non-Availability, or Unreasonable Cost);
- Recipient name and Unique Entity Identifier (UEI);
- Award information (Federal Award Identification Number, Assistance Listing number);
- A brief description of the project, its location, and the specific infrastructure involved;
- Total estimated project cost, with estimated federal share and recipient cost share breakdowns;
- Total estimated infrastructure costs, with estimated federal share and recipient cost share breakdowns;
- List and description of iron or steel item(s), manufactured goods, and/or construction material(s) the Recipient seeks to waive from the Buy America Preference, including name, cost, quantity(ies), country(ies) of origin, and relevant Product Service Codes (PSC) and North American Industry Classification System (NAICS) codes for each;
- A detailed justification as to how the non-domestic item(s) is/are essential the project;
- A certification that the Recipient made a good faith effort to solicit bids for domestic products supported by terms included in requests for proposals, contracts, and non-proprietary communications with potential suppliers;
- A justification statement—based on one of the applicable justifications outlined above—as to why the listed items cannot be procured domestically, including the due diligence performed (e.g., market research, industry outreach, cost analysis, cost-benefit analysis) by the Recipient to attempt to avoid the need for a waiver. This justification may cite, if applicable, the absence of any Buy America-compliant bids received for domestic products in response to a solicitation;
- A description of the market research conducted that includes who conducted the market research, when it was conducted, sources that were used, and the methods used to conduct the research; and
- Anticipated impact to the project if no waiver is issued.

DOE may request, and the Recipient must provide, additional information for consideration of this wavier. DOE may reject or grant waivers in whole or in part depending on its review, analysis, and/or feedback from OMB or the public. DOEs final determination regarding approval or rejection of the waiver request may not be appealed. Waiver requests may take up to 90 calendar days to process.

IMPACTED INDIAN TRIBES (MAY 2024)

If any activities anticipated to take place under this agreement could potentially impact the resources or reserved rights of Indian Tribe(s), as defined in 25 U.S.C. § 5304 (e), then the recipient/awardee agrees to develop and maintain active and open communications with the potentially impacted Indian Tribe(s), during the period of performance of the agreement, and, if necessary, after the end of the agreement. Approval by DOE must be obtained before any activities take place that could impact Tribal resources or reserved rights, including but not limited to lands, cultural sites, sacred sites, water rights, mineral rights, fishing rights, and hunting rights. The recipient/awardee must coordinate with DOE on all Tribal interactions. DOE will determine if formal government-to-government consultation is needed, and DOE will conduct that consultation accordingly.

- Tribal lands is as defined in 25 U.S.C. §§ 3501(2), (3), (4)(A) and (13).
- Indian Tribe is as defined in 25 U.S.C. § 5304 (e).

Department of Energy

Standard Intellectual Property (IP) Provisions for Financial Assistance Awards issued ON OR AFTER October 1, 2021

Recipient Name	The Regents of the University of California
Award Number	DE-FE0032382
Type of Award	Cooperative Agreement
Type of Project	Research Development or Demonstration (RD&D)
Type of Recipient	Domestic Nonprofit Organization (e.g. Educational Institutions)
US Manufacture/DEC	US Comp. (S&E DEC)
Special Data Statute	EPACT
Name of Program	Fossil Energy and Carbon Management
Unprotected Data Categories (g(4))	See Appendix 1
Protection Period	5
Delivery of Limited Rights Data	No
Delivery of Restricted Computer Software	No
Data Management Plan	N/A or Included Elsewhere
Supplemental Instructions	None
DOE IP Clause Number	GDNP-821-US
Data Rights	Special Data (EPAct)
Patent Rights	Bayh-Dole
USM Requirements	U.S. Comp. – S&E DEC
Provisions	2 CFR 910, Appendix A of Subpart D, Rights in Data - Programs Covered Under Special Data Statutes 37 CFR 401.14 DOE Modified Patent Rights Clause* Data Management Plan

The recipient and any subrecipients are subject to the U.S. Competitiveness Provision set forth herein that requires products embodying or made through a Subject Invention be substantially manufactured in the U.S. Implementation of the U.S. Competitiveness Provision for domestic small businesses and nonprofits is through the Determination of Exceptional Circumstances (DEC) under the Bayh-Dole Act to Further Promote Domestic Manufacture of DOE Science and Energy Technologies executed by DOE on June 7, 2021. A copy of the DEC is available at https://www.energy.gov/gc/determination-exceptional-circumstances-decs. For all other types of entities, the implementation of the U.S. Competitiveness Provision is through DOE patent waivers and policy.

Department of Energy

In reading these provisions, any reference to "contractor" or "subcontractor" shall mean "recipient" or "subrecipient," and any reference to "contract" or "subcontract" shall mean "award" or "subaward." Likewise, any reference to "recipient" or "subrecipient" shall mean "contractor" or "subcontractor," and any reference to "award" or "subaward" shall mean "contract" or "subcontract."

Failure to comply with the terms of the agreement may result in a loss of rights in Subject Inventions, including, but not limited to, forfeiture of retained rights. All Subject Inventions (conceived or first actually reduced to practice in the performance of the above identified agreement) must be timely reported at https://www.nist.gov/iedison. Invention reporting is required regardless of any patent protection sought or the subject matter (e.g. software invention). Any manuscript describing the invention for publication or of any on sale or public use planned for an invention must be promptly reported through iEdison. For assistance with iEdison, please contact iedison@nist.gov. For assistance regarding DOE's administration of Subject Inventions or patents, please contact Intellectual Property Law (IPL) at (630) 283-7117 or Chicago-IP@science.doe.gov.

Department of Energy

2 CFR 910, Appendix A of Subpart D, Rights in Data - Programs Covered Under Special Data Statutes

(a) Definitions

Computer Data Bases, as used in this clause, means a collection of data in a form capable of, and for the purpose of, being stored in, processed, and operated on by a computer. The term does not include computer software.

Computer software, as used in this clause, means

(i) computer programs which are data comprising a series of instructions, rules, routines, or statements, regardless of the media in which recorded, that allow or cause a computer to perform a specific operation or series of operations and

(ii) data comprising source code listings, design details, algorithms, processes, flow charts, formulae and related material that would enable the computer program to be produced, created or compiled. The term does not include computer data bases.

Data, as used in this clause, means recorded information, regardless of form or the media on which it may be recorded. The term includes technical data and computer software. The term does not include information incidental to administration, such as financial, administrative, cost or pricing or management information.

Form, fit, and function data, as used in this clause, means data relating to items, components, or processes that are sufficient to enable physical and functional interchangeability as well as data identifying source, size, configuration, mating and attachment characteristics, functional characteristics, and performance requirements except that for computer software it means data identifying source, functional characteristics, and performance requirements but specifically excludes the source code, algorithm, process, formulae, and flow charts of the software.

Limited rights data, as used in this clause, means data (other than computer software) developed at private expense that embody trade secrets or are commercial or financial and confidential or privileged.

Restricted computer software, as used in this clause, means computer software developed at private expense and that is a trade secret; is commercial or financial and confidential or privileged; or is published copyrighted computer software; including modifications of such computer software.

Protected data, as used in this clause, means technical data or commercial or financial data first produced in the performance of the award which, if it had been obtained from and first produced by a non-federal party, would be a trade secret or commercial or financial information that is privileged or confidential under the meaning of 5 U.S.C. 552(b)(4) and which data is marked as being protected data by a party to the award.

Protected rights, as used in this clause, mean the rights in protected data set forth in the Protected Rights Notice of paragraph (g) of this clause.

Technical data, as used in this clause, means that data which are of a scientific or technical nature. Technical data does not include computer software, but does include manuals and instructional materials and technical data formatted as a computer data base.

Department of Energy

Unlimited rights, as used in this clause, means the right of the Government to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose whatsoever, and to have or permit others to do so.

(b) Allocation of Rights

(1) Except as provided in paragraph (c) of this clause regarding copyright, the Government shall have unlimited rights in --

(i) Data specifically identified in this agreement as data to be delivered without restriction;

(ii) Form, fit, and function data delivered under this agreement;

(iii) Data delivered under this agreement (except for restricted computer software) that constitute manuals or instructional and training material for installation, operation, or routine maintenance and repair of items, components, or processes delivered or furnished for use under this agreement; and

(iv) All other data delivered under this agreement unless provided otherwise for protected data in accordance with paragraph (g) of this clause or for limited rights data or restricted computer software in accordance with paragraph (h) of this clause.

(2) The Recipient shall have the right to --

(i) Protect rights in protected data delivered under this agreement in the manner and to the extent provided in paragraph (g) of this clause;

(ii) Withhold from delivery those data which are limited rights data or restricted computer software to the extent provided in paragraph (h) of this clause;

(iii) Substantiate use of, add, or correct protected rights or copyrights notices and to take other appropriate action, in accordance with paragraph (e) of this clause; and

(iv) Establish claim to copyright subsisting in data first produced in the performance of this agreement to the extent provided in paragraph (c)(1) of this clause.

(c) Copyright

(1) Data first produced in the performance of this agreement. Except as otherwise specifically provided in this agreement, the Recipient may establish, without the prior approval of the Contracting Officer, claim to copyright subsisting in any data first produced in the performance of this agreement. If claim to copyright is made, the Recipient shall affix the applicable copyright notice of 17 U.S.C. 401 or 402 and acknowledgment of Government sponsorship (including agreement number) to the data when such data are delivered to the Government, as well as when the data are published or deposited for registration as a published work in the U. S. Copyright Office. For such copyrighted data, including computer software, the Recipient grants to the Government, and others acting on its behalf, a paid-up nonexclusive, irrevocable, worldwide license to

reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government, for all such data.

(2) Data not first produced in the performance of this agreement. The Recipient shall not, without prior written permission of the Contracting Officer, incorporate in data delivered under this agreement any data that are not first produced in the performance of this agreement and that contain the copyright notice of 17 U.S.C. 401 or 402, unless the Recipient identifies such data and grants to the Government, or acquires on its behalf, a license of the same scope as set forth in paragraph (c)(1) of this clause; provided, however, that if such data are computer software, the Government shall acquire a copyright license as set forth in paragraph (h)(3) of this clause if included in this agreement or as otherwise may be provided in a collateral agreement incorporated or made a part of this agreement.

(3) Removal of copyright notices. The Government agrees not to remove any copyright notices placed on data pursuant to this paragraph (c), and to include such notices on all reproductions of the data.

(d) Release, Publication and Use of Data

(1) The Receipt shall have the right to use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Recipient in the performance of this contract, except to the extent such data may be subject to the Federal export control or national security laws or regulations, or unless otherwise provided in this paragraph of this clause or expressly set forth in this contract.

(2) The Recipient agrees that to the extent it receives or is given access to data necessary for the performance of this agreement which contain restrictive markings, the Recipient shall treat the data in accordance with such markings unless otherwise specifically authorized in writing by the Contracting Officer.

(e) Unauthorized Marking of Data

(1) Notwithstanding any other provisions of this agreement concerning inspection or acceptance, if any data delivered under this agreement are marked with notices or any other restrictive or limiting markings not authorized by this agreement, the Contracting Officer may at any time either return the data to the Recipient or cancel or ignore the markings. However, the following procedures shall apply prior to canceling or ignoring the markings.

(i) The Contracting Officer shall make written inquiry to the Recipient affording the Recipient 30 days from receipt of the inquiry to provide written justification to substantiate the propriety of the markings;

(ii) If the Recipient fails to respond or fails to provide written justification to substantiate the propriety of the markings within the 30-day period (or a longer time not exceeding 90 days approved in writing by the Contracting Officer for good cause shown), the Government shall have the right to cancel or ignore the markings at any time after said period and the data will no longer be made subject to any disclosure prohibitions.

(iii) If the Recipient provides written justification to substantiate the propriety of the markings within the period set in subdivision (e)(1)(i) of this clause, the Contracting Officer shall consider such written justification and determine whether or not the markings are to be cancelled or ignored. If the Contracting Officer

determines that the markings are authorized, the Recipient shall be so notified in writing. If the Contracting Officer determines, with concurrence of the head of the contracting activity, that the markings are not authorized, the Contracting Officer shall furnish the Recipient a written determination, which determination shall become the final agency decision regarding the appropriateness of the markings unless the Recipient files suit in a court of competent jurisdiction within 90 days of receipt of the Contracting Officer's decision. The Government shall continue to abide by the markings under this subdivision (e)(1)(iii) until final resolution of the matter either by the Contracting Officer's determination become final (in which instance the Government shall thereafter have the right to cancel or ignore the markings at any time and the data will no longer be made subject to any disclosure prohibitions), or by final disposition of the matter by court decision if suit is filed.

(2) The time limits in the procedures set forth in paragraph (e)(1) of this clause may be modified in accordance with agency regulations implementing the Freedom of Information Act (5 U.S.C. 552) if necessary to respond to a request thereunder.

(f) Omitted or Incorrect Markings

(1) Data delivered to the Government without either a notice authorized by paragraph (g) of this clause, or the copyright notice required by paragraph (c) of this clause, shall be deemed to have been furnished with unlimited rights, and the Government assumes no liability for the disclosure, use, or reproduction of such data. However, to the extent the data has not been disclosed without restriction outside the Government, the Recipient may request, within 6 months (or a longer time approved by the Contracting Officer for good cause shown) after delivery of such data, permission to have notices placed on qualifying data at the Recipient's expense, and the Contracting Officer may agree to do so if the Recipient --

(i) Identifies the data to which the omitted notice is to be applied;

(ii) Demonstrates that the omission of the notice was inadvertent;

(iii) Establishes that the use of the proposed notice is authorized; and

(iv) Acknowledges that the Government has no liability with respect to the disclosure, use, or reproduction of any such data made prior to the addition of the notice or resulting from the omission of the notice.

(2) The Contracting Officer may also:

(i) Permit correction at the Recipient's expense of incorrect notices if the Recipient identifies the data on which correction of the notice is to be made, and demonstrates that the correct notice is authorized; or

(ii) Correct any incorrect notices.

(g) Rights to Protected Data

(1) The Recipient may, with the concurrence of DOE, claim and mark as protected data, any data first produced in the performance of this award that would have been treated as a trade secret if developed at private expense. Any such claimed “protected data” will be clearly marked with the following Protected Rights Notice,

and will be treated in accordance with such Notice, subject to the provisions of paragraphs (e) and (f) of this clause.

Protected Rights Notice
These protected data were produced under agreement no. DE-FE0032382 with the U.S. Department of Energy and may not be published, disseminated, or disclosed to others outside the Government until 5 years after the date the data were first produced, unless express written authorization is obtained from the recipient. Upon expiration of the period of protection set forth in this Notice, the Government shall have unlimited rights in this data. This Notice shall be marked on any reproduction of this data, in whole or in part.

(End of notice)

(2) Any such marked Protected Data may be disclosed under obligations of confidentiality for the following purposes:

(a) For evaluation purposes under the restriction that the "Protected Data" be retained in confidence and not be further disclosed; or

(b) To subcontractors or other team members performing work under the Government's Fossil Energy and Carbon Management program of which this award is a part, for information or use in connection with the work performed under their activity, and under the restriction that the Protected Data be retained in confidence and not be further disclosed.

(3) The obligations of confidentiality and restrictions on publication and dissemination shall end for any Protected Data:

(a) At the end of the protected period;

(b) If the data becomes publicly known or available from other sources without a breach of the obligation of confidentiality with respect to the Protected Data;

(c) If the same data is independently developed by someone who did not have access to the Protected Data and such data is made available without obligations of confidentiality; or

(d) If the Recipient disseminates or authorizes another to disseminate such data without obligations of confidentiality.

(4) However, the Recipient agrees that the following types of data are not considered to be protected and shall be provided to the Government when required by this award without any claim that the data are Protected Data. The parties agree that notwithstanding the following lists of types of data, nothing precludes the Government from seeking delivery of additional data in accordance with this award, or from making publicly available additional non-protected data, nor does the following list constitute any admission by the Government that technical data not on the list is Protected Data.

See Appendix 1

(5) The Government's sole obligation with respect to any protected data shall be as set forth in this paragraph (g).

(h) Protection of Limited Rights Data

When data other than that listed in paragraphs (b)(1)(i), (ii), and (iii) of this clause are specified to be delivered under this agreement and such data qualify as either limited rights data or restricted computer software, the Recipient, if the Recipient desires to continue protection of such data, shall withhold such data and not furnish them to the Government under this agreement. As a condition to this withholding the Recipient shall identify the data being withheld and furnish form, fit, and function data in lieu thereof.

(i) Subaward/Contract

The Recipient has the responsibility to obtain from its subrecipients/contractors all data and rights therein necessary to fulfill the Recipient's obligations to the Government under this agreement. If a subrecipient/ contractor refuses to accept terms affording the Government such rights, the Recipient shall promptly bring such refusal to the attention of the Contracting Officer and not proceed with subaward/contract award without further authorization.

(j) Additional Data Requirements

In addition to the data specified elsewhere in this agreement to be delivered, the Contracting Officer may, at any time during agreement performance or within a period of 3 years after acceptance of all items to be delivered under this agreement, order any data first produced or specifically used in the performance of this agreement. This clause is applicable to all data ordered under this subparagraph. Nothing contained in this subparagraph shall require the Recipient to deliver any data the withholding of which is authorized by this clause or data which are specifically identified in this agreement as not subject to this clause. When data are to be delivered under this subparagraph, the Recipient will be compensated for converting the data into the prescribed form, for reproduction, and for delivery.

(k) The Recipient agrees, except as may be otherwise specified in this agreement for specific data items listed as not subject to this paragraph, that the Contracting Officer or an authorized representative may, up to three years after acceptance of all items to be delivered under this contract, inspect at the Recipient's facility any data withheld pursuant to paragraph (h) of this clause, for purposes of verifying the Recipient's assertion pertaining to the limited rights or restricted rights status of the data or for evaluating work performance. Where the Recipient whose data are to be inspected demonstrates to the Contracting Officer that there would be a possible conflict of interest if the inspection were made by a particular representative, the Contracting Officer shall designate an alternate inspector.

Department of Energy

37 CFR 401.14 DOE Modified Patent Rights Clause*

**the standard patent rights clause at 37 CFR 401.14 has been modified to (1) reflect DOE required subcontracting instructions pursuant to 37 CFR 401.5(a) as well as the deletion of the definition of contractor that does not apply based on the subcontracting instructions; (2) change acquisition terms of contractor, contract and subcontract to financial assistance terms of recipient, award, subaward or agreement pursuant to 37 CFR 401.5(c); and (3) include paragraph (n) U.S. competitiveness provision pursuant to the Determination of Exceptional Circumstances under the Bayh-Dole Act to Further Promote Domestic Manufacture of DOE Science and Energy Technologies executed by DOE on June 7,2021.*

(a) Definitions

(1) Invention means any invention or discovery which is or may be patentable or otherwise protectable under Title 35 of the United States Code, or any novel variety of plant which is or may be protected under the Plant Variety Protection Act (7 U.S.C. 2321 et seq.).

(2) Subject invention means any invention of the Recipient conceived or first actually reduced to practice in the performance of work under this agreement, provided that in the case of a variety of plant, the date of determination (as defined in section 41(d) of the Plant Variety Protection Act, 7 U.S.C. 2401(d)) must also occur during the period of agreement performance.

(3) Practical Application means to manufacture in the case of a composition or product, to practice in the case of a process or method, or to operate in the case of a machine or system; and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are, to the extent permitted by law or government regulations, available to the public on reasonable terms.

(4) Made when used in relation to any invention means the conception or first actual reduction to practice of such invention.

(5) Small Business Firm means a small business concern as defined at section 2 of Pub. L. 85-536 (15 U.S.C. 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of this clause, the size standards for small business concerns involved in government procurement and subcontracting at 13 CFR 121.3-8 and 13 CFR 121.3-12, respectively, will be used.

(6) Nonprofit Organization means a university or other institution of higher education or an organization of the type described in section 501(c)(3) of the Internal Revenue Code of 1954 (26 U.S.C. 501(c) and exempt from taxation under section 501(a) of the Internal Revenue Code (25 U.S.C. 501(a)) or any nonprofit scientific or educational organization qualified under a state nonprofit organization statute.

(7) Statutory period means the one-year period before the effective filing date of a claimed invention in a patent application during which exceptions to prior art exist per 35 U.S.C. 102(b) as amended by the Leahy-Smith America Invents Act, Public Law 112-29.

(b) Allocation of Principal Rights

The Recipient may retain the entire right, title, and interest throughout the world to each subject invention subject to the provisions of this clause and 35 U.S.C. 203. With respect to any subject invention in which the Recipient retains title, the Federal government shall have a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the subject invention throughout the

world.

(c) Invention Disclosure, Election of Title and Filing of Patent Application by Recipient

(1) The Recipient will disclose each subject invention to the Federal agency within two months after the inventor discloses it in writing to Recipient personnel responsible for patent matters. The disclosure to the agency shall be in the form of a written report and shall identify the agreement under which the invention was made and the inventor(s). It shall be sufficiently complete in technical detail to convey a clear understanding to the extent known at the time of the disclosure, of the nature, purpose, operation, and the physical, chemical, biological or electrical characteristics of the invention. The disclosure shall also identify any publication, on sale or public use of the invention, and whether a manuscript describing the invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after disclosure to the agency, the Recipient will promptly notify the agency of the acceptance of any manuscript describing the invention for publication or of any on sale or public use planned by the Recipient. If required by the Federal agency, the Recipient will provide periodic (but no more frequently than annual) listings of all subject inventions which were disclosed to the agency during the period covered by the report, and will provide a report prior to the close-out of a funding agreement listing all subject inventions or stating that there were none.

(2) The Recipient will elect in writing whether or not to retain title to any such invention by notifying the Federal agency within two years of disclosure to the Federal agency. However, in any case where a patent, a printed publication, public use, sale, or other availability to the public has initiated the one year statutory period wherein valid patent protection can still be obtained in the United States, the period for election of title may be shortened by the agency to a date that is no more than 60 days prior to the end of the statutory period.

(3)(i) The Recipient will file its initial patent application on a subject invention to which it elects to retain title within one year after election of title or, if earlier, prior to the end of any statutory period wherein valid patent protection can be obtained in the United States after a publication, on sale, or public use.

(ii) If the Recipient files a provisional application as its initial patent application, it shall file a non-provisional application within 10 months of the filing of the provisional application. So long as there is a pending patent application for the subject invention and the statutory period wherein valid patent protection can be obtained in the United States has not expired, additional provisional applications may be filed within the initial 10 months or any extension period granted under paragraph (c)(5) of this clause. If an extension(s) is granted under paragraph (c)(5) of this clause, the Recipient shall file a nonprovisional patent application prior to the expiration of the extension(s) or notify the agency of any decision not to file a nonprovisional application prior to the expiration of the extension(s), or if earlier, 60 days prior to the end of any statutory period wherein valid patent protection can be obtained in the United States.

(iii) The Recipient will file patent applications in additional countries or international patent offices within either ten months of the first filed patent application or six months from the date permission is granted by the Commissioner of Patents to file foreign patent applications where such filing has been prohibited by a Secrecy Order.

(iv) If required by the Federal agency, the Recipient will provide the filing date, patent application number and title; a copy of the patent application; and patent number and issue date for any subject invention in any country in which the Recipient has applied for a patent.

(4) For any subject invention with Federal agency and Recipient co-inventors, where the Federal agency employing such co-inventor determines that it would be in the interest of the government, pursuant to 35 U.S. C. 207(a)(3), to file an initial patent application on the subject invention, the Federal agency employing such co-inventor, at its discretion and in consultation with the Recipient, may file such application at its own expense, provided that the Recipient retains the ability to elect title pursuant to 35 U.S.C. 202(a).

(5) Requests for extension of the time for disclosure, election, and filing under paragraphs (1), (2), and (3) of this clause may, at the discretion of the Federal agency, be granted. When a Recipient has requested an extension for filing a non-provisional application after filing a provisional application, a one-year extension will be granted unless the Federal agency notifies the Recipient within 60 days of receiving the request.

(6) In the event a subject invention is made under funding agreements of more than one agency, at the request of the Recipient or on their own initiative the agencies shall designate one agency as responsible for administration of the rights of the government in the invention.

(d) Conditions When the Government May Obtain Title

(1) A Federal agency may require the Recipient to convey title to the Federal agency, of any subject invention -

(i) If the Recipient fails to disclose or elect title to the subject invention within the times specified in paragraph (c) of this clause, or elects not to retain title.

(ii) In those countries in which the Recipient fails to file patent applications within the times specified in paragraph (c) of this clause; provided, however, that if the Recipient has filed a patent application in a country after the times specified in paragraph (c) of this clause, but prior to its receipt of the written request of the Federal agency, the Recipient shall continue to retain title in that country.

(iii) In any country in which the Recipient decides not to continue the prosecution of any non-provisional patent application for, to pay a maintenance, annuity or renewal fee on, or to defend in a reexamination or opposition proceeding on, a patent on a subject invention.

(iv) Upon breach of paragraph (n) U.S. Competitiveness of this Patent Rights clause.

(2) A Federal agency at its discretion, may waive the requirement for the Recipient to convey title to any subject invention.

(e) Minimum Rights to Recipient and Protection of the Recipient Right to File

(1) The Recipient will retain a nonexclusive royalty-free license throughout the world in each subject invention to which the Government obtains title, except if the Recipient fails to disclose the invention within the times specified in (c), above. The Recipient's license extends to its domestic subsidiary and affiliates, if any, within the corporate structure of which the Recipient is a party and includes the right to grant sublicenses of the same scope to the extent the Recipient was legally obligated to do so at the time the agreement was awarded. The license is transferable only with the approval of the Federal agency except when transferred to the successor of that party of the Recipient's business to which the invention pertains.

(2) The Recipient's domestic license may be revoked or modified by the funding Federal agency to the extent necessary to achieve expeditious practical application of the subject invention pursuant to an application for an exclusive license submitted in accordance with applicable provisions at 37 CFR part 404 and agency licensing

regulations (if any). This license will not be revoked in that field of use or the geographical areas in which the Recipient has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of the funding Federal agency to the extent the Recipient, its licensees, or the domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country.

(3) Before revocation or modification of the license, the funding Federal agency will furnish the Recipient a written notice of its intention to revoke or modify the license, and the Recipient will be allowed thirty days (or such other time as may be authorized by the funding Federal agency for good cause shown by the Recipient) after the notice to show cause why the license should not be revoked or modified. The Recipient has the right to appeal, in accordance with applicable regulations in 37 CFR part 404 and agency regulations (if any) concerning the licensing of Government-owned inventions, any decision concerning the revocation or modification of the license.

(f) Recipient Action to Protect the Government's Interest

(1) The Recipient agrees to execute or to have executed and promptly deliver to the Federal agency all instruments necessary to (i) establish or confirm the rights the Government has throughout the world in those subject inventions to which the Recipient elects to retain title, and (ii) convey title to the Federal agency when requested under paragraph (d) above and to enable the government to obtain patent protection throughout the world in that subject invention.

(2) The Recipient agrees to require, by written agreement, its employees, other than clerical and nontechnical employees, to disclose promptly in writing to personnel identified as responsible for the administration of patent matters and in a format suggested by the Recipient each subject invention made under agreement in order that the Recipient can comply with the disclosure provisions of paragraph (c) of this clause, to assign to the Recipient the entire right, title and interest in and to each subject invention made under agreement, and to execute all papers necessary to file patent applications on subject inventions and to establish the government's rights in the subject inventions. This disclosure format should require, as a minimum, the information required by paragraph (c)(1) of this clause. The Recipient shall instruct such employees through employee agreements or other suitable educational programs on the importance of reporting inventions in sufficient time to permit the filing of patent applications prior to U.S. or foreign statutory bars.

(3) For each subject invention, the Recipient will, no less than 60 days prior to the expiration of the statutory deadline, notify the Federal agency of any decision: Not to continue the prosecution of a non-provisional patent application; not to pay a maintenance, annuity or renewal fee; not to defend in a reexamination or opposition proceeding on a patent, in any country; to request, be a party to, or take action in a trial proceeding before the Patent Trial and Appeals Board of the U.S. Patent and Trademark Office, including but not limited to post-grant review, review of a business method patent, inter partes review, and derivation proceeding; or to request, be a party to, or take action in a non-trial submission of art or information at the U.S. Patent and Trademark Office, including but not limited to a pre-issuance submission, a post-issuance submission, and supplemental examination.

(4) The Recipient agrees to include, within the specification of any United States patent applications and any patent issuing thereon covering a subject invention, the following statement, “This invention was made with government support under DE-FE0032382 awarded by U.S. Department of Energy. The government has certain rights in the invention.”

(g) Subaward/Contract

(1) The Recipient will include this clause, suitably modified to identify the parties, in all subawards/contracts, regardless of tier, for experimental, developmental, or research work to be performed by a domestic small business firm or nonprofit organization. The subrecipient/contractor will retain all rights provided for the Recipient in this clause, and the Recipient will not, as part of the consideration for awarding the subaward/ contract, obtain rights in the subrecipient's/contractor's subject inventions.

(2) The above requirement in (g)(1) does not apply for any agreement with a DOE laboratory. The Recipient and the DOE laboratory shall use a technology transfer agreement (e.g., Strategic Partnership Project (SPP), Cooperative Research and Development Agreement (CRADA)) that is executed by the Recipient and the DOE laboratory and approved by DOE. The technology transfer agreement will provide the applicable patent rights clause for the work to be performed by the DOE laboratory.

(3) The Recipient will include in all other subawards/contracts, regardless of tier, for experimental, developmental, or research work the patent rights clause directed by the DOE Contracting Officer.

(h) Reporting on Utilization of Subject Inventions

The Recipient agrees to submit on request periodic reports no more frequently than annually on the utilization of a subject invention or on efforts at obtaining such utilization that are being made by the Recipient or its licensees or assignees. Such reports shall include information regarding the status of development, date of first commercial sale or use, gross royalties received by the Recipient, and such other data and information as the agency may reasonably specify. The Recipient also agrees to provide additional reports as may be requested by the agency in connection with any march-in proceeding undertaken by the agency in accordance with paragraph (j) of this clause. As required by 35 U.S.C. 202(c)(5), the agency agrees it will not disclose such information to persons outside the government without permission of the Recipient.

(i) Preference for United States Industry

Notwithstanding any other provision of this clause, the Recipient agrees that neither it nor any assignee will grant to any person the exclusive right to use or sell any subject inventions in the United States unless such person agrees that any products embodying the subject invention or produced through the use of the subject invention will be manufactured substantially in the United States. However, in individual cases, the requirement for such an agreement may be waived by the Federal agency upon a showing by the Recipient or its assignee that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the United States or that under the circumstances domestic manufacture is not commercially feasible.

(j) March-in Rights

The Recipient agrees that with respect to any subject invention in which it has acquired title, the Federal agency has the right in accordance with the procedures in 37 CFR 401.6 and any supplemental regulations of the agency to require the Recipient, an assignee or exclusive licensee of a subject invention to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to a responsible applicant or applicants, upon terms that are reasonable under the circumstances, and if the Recipient, assignee, or exclusive licensee refuses such a request the Federal agency has the right to grant such a license itself if the Federal agency determines that:

(1) Such action is necessary because the Recipient or assignee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of the subject invention in such field of use.

(2) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by the Recipient, assignee or their licensees;

(3) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by the Recipient, assignee or licensees; or

(4) Such action is necessary because the agreement required by paragraph (i) of this clause has not been obtained or waived or because a licensee of the exclusive right to use or sell any subject invention in the United States is in breach of such agreement.

(k) Special Provisions for Agreements with Nonprofit Organizations

If the Recipient is a nonprofit organization, it agrees that:

(1) Rights to a subject invention in the United States may not be assigned without the approval of the Federal agency, except where such assignment is made to an organization which has as one of its primary functions the management of inventions, provided that such assignee will be subject to the same provisions as the Recipient;

(2) The Recipient will share royalties collected on a subject invention with the inventor, including Federal employee co-inventors (when the agency deems it appropriate) when the subject invention is assigned in accordance with 35 U.S.C. 202(e) and 37 CFR 401.10;

(3) The balance of any royalties or income earned by the Recipient with respect to subject inventions, after payment of expenses (including payments to inventors) incidental to the administration of subject inventions, will be utilized for the support of scientific research or education; and

(4) It will make efforts that are reasonable under the circumstances to attract licensees of subject inventions that are small business firms and that, when appropriate, it will give a preference to a small business firm when licensing a subject invention;

(5) The Federal agency may review the Recipient's licensing program and decisions regarding small business applicants, and the Recipient will negotiate changes to its licensing policies, procedures, or practices with the Federal agency when the Federal agency's review discloses that the Recipient could take reasonable steps to more effectively implement the requirements of paragraph (k)(4) of this clause; and

(6) The Federal agency may take into consideration concerns presented by small businesses in making such determinations in paragraph (k)(5) of this clause.

(l) Communication

Unless otherwise directed by DOE Patent Counsel, all reports and notifications required by this clause shall be submitted in accordance with the instructions provided in the Federal Assistance Reporting Checklist (FARC) of this agreement.

(m) Electronic Filing.

(1) Unless otherwise requested or directed by the Federal agency --

(i) The written disclosure required in (c)(1) of this clause shall be electronically filed;

(ii) The written election required in (c)(2) of this clause shall be electronically filed; and

(iii) If required by the agency to be submitted, the close-out report in paragraph (c)(1) of this clause and the patent information and periodic reporting identified in paragraph (c)(3) of this clause shall be electronically filed.

(2) Other written notices required in this clause may be electronically delivered to the agency or the contractor through an electronic database used for reporting subject inventions, patents, and utilization reports to the funding agency.

(n) U.S. Competitiveness

The Recipient agrees that any products embodying any subject invention or produced through the use of any subject invention will be manufactured substantially in the United States unless the Recipient can show to the satisfaction of DOE that it is not commercially feasible. In the event DOE agrees to foreign manufacture, there will be a requirement that the Government's support of the technology be recognized in some appropriate manner, e.g., alternative binding commitments to provide an overall net benefit to the U.S. economy. The Recipient agrees that it will not license, assign or otherwise transfer any subject invention to any entity, at any tier, unless that entity agrees to these same requirements. In the event that the Recipient or other such entity receiving rights in the Subject Invention undergoes a change in ownership amounting to a controlling interest, the Recipient or other such entity receiving rights shall ensure continual compliance with the requirements of this paragraph (n) and shall inform DOE, in writing, of the change in ownership within six months of the change. The Recipient and any successor assignee will convey to DOE, upon written request from DOE, title to any subject invention, upon a breach of this paragraph (n). The Recipient will include this paragraph (n) in all subawards/contracts, regardless of tier, for experimental, developmental or research work.

(o) The requirements, rights and administration of paragraph (n) are further clarified as follows:

1. Waivers. The Recipient (or any entity subject to paragraph (n)) may request a waiver or modification of paragraph (n). Such waivers or modifications may be granted when DOE determines that (1) the Recipient (or any entity subject to paragraph (n)) has demonstrated, with quantifiable data, that manufacturing in the United States is not commercially feasible and (2) a waiver or modification would best serve the interests of the United States and the general public.

2. Final determination of breach of paragraph (n). If DOE determines the Recipient is in breach of paragraph (n), the Department may issue a final written determination of such breach. If such determination includes a demand for title to the subject inventions under the award, the demand for title will cause an immediate conveyance and assignment of all rights to all subject inventions under the award to the United States Government, including all pending U.S. and foreign patent applications and all U.S. and foreign patents that cover any subject invention, without compensation. Any such final determination shall be signed by the cognizant DOE Contracting Officer with the concurrence of the Assistant General Counsel for Technology Transfer & Intellectual Property. Advanced notice will be provided for comment to the Recipient before any final written determination by DOE is issued.

3. Pursuant to Recipient's agreement in paragraph (n) to not license, assign or otherwise transfer rights to

subject inventions at any tier unless the entity agrees to paragraph (n): any such license, assignment, or other transfer of right to any subject invention developed under the award shall contain paragraph (n) suitably modified to properly identify the parties. If a licensee, assignee, or other transferee of rights to any subject invention is finally determined by DOE in writing to be in breach of paragraph (n), the applicable license, assignment or other transfer shall be deemed null and void. Advanced notice will be provided for comment to the non-complying party before any final written determination by DOE is made.

4. For clarity, if the forfeiture of title to any subject invention is due to a breach of paragraph (n), the Recipient shall not be entitled to any compensation, or to a license to the subject invention including the reserved license in section (e)(1), unless DOE grants a license through a separately agreed upon licensing agreement.

5. Authority. The requirements and administration of paragraph (n) is in accordance with the Determination of Exceptional Circumstances (DEC) under the Bayh-Dole Act to Further Promote Domestic Manufacture of DOE Science and Energy Technologies executed by DOE on June 7, 2021. A copy of the DEC is available at https://www.energy.gov/gc/determination-exceptional-circumstances-decs. By accepting or acknowledging the award, the Recipient is also acknowledging that it has received a copy of the DEC through the foregoing link. As set forth in 37 CFR 401.4, any nonprofit organization or small business firm as defined by 35 U.S.C. 201 affected by any DEC has the right to appeal the imposition of the DEC within thirty (30) working days from the Recipient's acceptance or acknowledgment of this award.

Department of Energy

Data Management Plan

The data management plan is attached to this intellectual property clause set or is otherwise included in the award or application documentation. The Data Management Plan explains how data generated in the course of the work performed under this agreement will be shared or preserved or, when justified, explains why data sharing or preservation is not possible or scientifically appropriate. In the event of a conflict between this Data Rights clause and the Data Management Plan, the Data Rights clause takes precedence.

Department of Energy

Appendix 1

Unprotected Data Categories (g(4))

Sub-Recipient Mosaic

Data associated with the DAC Hub:

- High-level process assumptions
- Process descriptions
- High-level DAC hub process flow (Block Flow) and system diagrams
- System major inputs and outputs
- Non-confidential equipment, facility, or storage complex drawings or renderings
- Site description and summary, including general location, land ownership, description of CO_2 transport routes, and proximity to surrounding communities.
- Overall hub energy requirements
- Summary of energy supply evaluation, selected sources, and description of energy supply design
- DE-FOA-0002735, Appendix K DAC Hub data tables, Table 1
- LCA high-level carbon balance for the overall DAC Hub
- Major consumable materials descriptions
- Waste stream descriptions and high-level characterizations
- High-level operating considerations
- High-level description of sources of costs and revenue streams, without values
- HAZOP overview and high-level conclusions and recommendations
- Technology readiness level assessments and high-level technology maturation plans
- Summary of major project risks
- Business plan summary
- High-level project schedule of planned Phases 1-4
- Permitting requirements and workflow overview
- Community Benefits Plan and data, including commitment agreement summary data.
- Safety culture and EH&S development data
- 5-year construction and operations safety performance history (OSHA 300A) description of current and intended safety culture
- OSHA and local safety requirements
- EH&S Risk Analysis overview and high-level conclusions and recommendations
- Storage Field Development Plan

Sub-Recipient Rondo

Data associated with the DAC Hub:

- High-level process or model assumptions
- System major inputs and outputs
- High-level operating considerations
- High-level description of sources of costs and revenue streams, without values
- Non-confidential equipment, facility component, or thermal storage system drawings or renderings

Sub-Recipient Carbon Built

- Baseline CO_2 emissions from concrete plant(s) selected to undergo feasibility.
- Projected CO_2 emissions reductions from integrating selected concrete plant(s) with CarbonBuilt's technology and the CALDAC Hub
- Utility requirements

Sub-Recipient Blue Planet

- High-level CALDAC assumptions.
- High-level CALDAC plot plans and CALDAC integration and/or Conversion System Pre-FEED Study Initial DAC Hub Capacity.
- CALDAC-related capital cost and operating cost estimates related to the pre-FEED study.
- CALDAC-related techno-economic modeling assumptions, parameters and outputs generated using the BP Process.

ATTACHMENT 2 - STATEMENT OF PROJECT OBJECTIVES
BIPARTISAN INFRASTRUCTURE LAW(BIL) COMMUNITY ALLIANCE FOR DIRECT AIR CAPTURE

A. OBJECTIVES

This project will undertake a comprehensive assessment of the technical, social and governance feasibility of establishing a Community Alliance for Direct Air Capture (CALDAC) in California. This innovative effort invites the local community to be the center of Direct Air Capture (DAC) Hub development. The feasibility assessment will include two intersecting and interconnected elements:

- Development of the DAC Hub structure and assessment of the technical feasibility of the DAC Hub, including technology partners, location, business model, and CO_2 storage/utilization/conversion option(s), and
- Assessment of the social and governance feasibility of an innovative, community-led ownership model and community benefits plan that engages local stakeholders as core partners.

B. SCOPE OF WORK

The Recipient will address both project objectives through the course of the project. The diverse team that is assembled will co-produce research questions and scenarios related to the social, environmental, and technological implications of a DAC Hub. During Phase 0a, the Recipient will assess candidate DAC and CO_2-to-products technologies both individually and as an integrated hub system to ensure that the DAC Hub is anchored in strong technical and technological capacity. This assessment will provide inputs to the finalized DAC Hub concept and conceptual design, Technology Maturation Plan (TMP), Life Cycle Assessment (LCA), Technoeconomic Analysis (TEA), and preliminary front end engineering design (pre-FEED) study. The Recipient will work with community partners to conduct outreach, engagement, and education on DAC; establish a compensated Community Oversight Council; and develop a set of community-vetted criteria and goals for DAC Hub design, development, and operation. These activities will inform preliminary hub design, integration, location, and ownership decisions. Completion of a feasibility assessment that meets both technical and social criteria tasks is a continuation decision point to advance to Phase 0b.

During Phase 0b, the Recipient will continue to support co-creation of the hub design and development with technology partners and a Community Oversight Council. Based on the DAC Hub design developed in Phase 0a, the Recipient will complete a pre-FEED for the initial DAC Hub capacity (at least 50 Kilo Tonnes per Annum (KTA)) and conceptual design for the final DAC Hub capacity (at least 1 Mega Tonnes per Annum (MTA)). This scaling will be completed and evaluated alongside community-developed performance criteria. Additional efforts will include completing a business plan; a financial plan; the final TMP; a community benefits plan (CBP); a

description of the DAC Hub Concept and the DAC and CO_2 conversion technologies to be implemented; DAC Hub data tables; a balance of plant (BOP) conceptual design for the final DAC Hub capacity; an updated LCA; a storage field development plan; an Environmental Health & Safety (EH&S) Risk Analysis; safety, security, and regulatory requirements; and an integrated project schedule (IPS). In Phase 0b, the Recipient will work with a Community Oversight Council to co-produce the CBP. The CBP will be developed through robust engagement with labor, local government, environmental justice, and other stakeholders. The community vision, goals, and values for the DAC Hub developed in Phase 0a will be the foundation of the CBP. The Recipient will work with the DAC Hub owner(s) to develop a business and financial plan that delivers community benefits in alignment with the community vision, goals, and criteria for a regional DAC Hub.

C. TASKS TO BE PERFORMED

Task 1.0 – Project Management and Planning

Subtask 1.1 – Project Management Plan

The Recipient will manage and direct the project in accordance with a Project Management Plan to meet all technical, schedule and budget objectives and requirements. The Recipient will coordinate activities in order to effectively accomplish the work. The Recipient will ensure that project plans, results, and decisions are appropriately documented, and project reporting and briefing requirements are satisfied.

The Recipient will update the Project Management Plan 30 days after award and as necessary throughout the project to accurately reflect the current status of the project. Examples of when it may be appropriate to update the Project Management Plan include: (a) project management policy and procedural changes; (b) changes to the technical, cost, and/or schedule baseline for the project; (c) significant changes in scope, methods, or approaches; or (d) as otherwise required to ensure that the plan is the appropriate governing document for the work required to accomplish the project objectives.

Management of project risks will occur in accordance with the risk management methodology delineated in the Project Management Plan in order to identify, assess, monitor and mitigate technical uncertainties as well as schedule, budgetary and environmental risks associated with all aspects of the project. The results and status of the risk management process will be presented during project reviews and in quarterly progress reports with emphasis placed on the medium- and high-risk items.

The Recipient is also required to implement the project by tracking key CBP milestones which will be incorporated into the milestone log as part of the overall Project Management Plan. The quarterly progress reports and the final technical report shall include updates on the progress and challenges throughout the course of the award.

Subtask 1.2 – Business Plan

The Recipient will develop a Business Plan for the project. The Business Plan shall encompass Commercial Feasibility and Business Case Analysis; Key Contracts, Permits, and Agreements; Preliminary Site Selection; Market Analysis; Feedstock, Supplies, and Offtake Arrangements, and the DAC Hub Capacity Build-Out Plan. The Business Plan shall be completed in accordance with Appendix A.

Subtask 1.3 – Financial Plan

The Recipient will develop a Financial Plan that presents a viable plan to obtain funding for the entire non-DOE share of the total project cost and identifies all sources of project funds. The Financial Plan shall be completed in accordance with Appendix B.

Subtask 1.4 – Technology Maturation Plan

The Recipient will develop a Technology Maturation Plan (TMP) that describes the current technology readiness level (TRL) of the proposed technology/technologies, relates the proposed project work to maturation of the proposed technology, describes the expected TRL at the end of the project, and describes any known post-project research and development necessary to further mature the technology. For TA-1, the initial TMP is due with the Phase 0a "Continuation Application" and should be updated as needed throughout the project period of performance. The TMP will be completed in accordance with Appendix C.

Subtask 1.5 – Community Benefits Plan

The Recipient will develop a CBP Development Proposal during Phase 0a. The Recipient shall develop a CBP during Phase 0b. The CBP Development Proposal and CBP will be completed in accordance with Appendices D and E, respectively.

Subtask 1.6 – Integrated Project Schedule

The Recipient will develop an Integrated Project Schedule during Phase 0b, due 90 days prior to project completion. The Integrated Project Schedule shall be completed in accordance with Appendix K.

Subtask 1.7 – DAC Hub Data Tables

The Recipient will submit DAC Hub Data Tables during Phase 0a. The Recipient will update and submit DAC Hub Data Tables at the conclusion of Phase 0b. The Data Tables will be completed in accordance with Appendix N.

Subtask 1.8 – Storage Field Development Plan

The Recipient will develop a Storage Field Development Plan during Phase 0b, due 90 days prior to project completion. The Storage Field Development Plan will be completed in accordance with Appendix M.

Budget Period 1 (Phase 0a – Pre-Feasibility)

Task 2.0 – Hub Design and Development

The Recipient will select anchoring DAC technology(ies) (i.e., minimum capacity of at least 50,000 tonnes CO_2 captured from the atmosphere (50 KTA)) for the pre-FEED study to be completed in Phase 0b**.** The Recipient will provide the current DAC technology readiness level (TRL) and scale. The Recipient must discuss resource requirements (i.e., energy, land, water, etc.) and justify the energy source(s) for the selected DAC technology(ies). The Recipient will complete the conceptual design for the initial DAC Hub capacity (minimum 50 KTA CO_2) integrated with required CO_2 storage and/or CO_2 conversion (if applicable).

Subtask 2.1 – Assessment of DAC Technologies

The Recipient will work with each DAC technology to collect or estimate inputs for the TMP, LCA, and TEA. The Recipient will request that companies provide state-point data, details, updates on technology developments, and any available process flow diagrams or schematics. The Recipient will start the assessment with four partner companies. The assessment will include descriptions of technology state of development and scale, which is essential for understanding design flexibility, scaling uncertainty when extrapolating data, and for determining appropriate technology performance milestones. The Recipient will also work with other DAC technology providers during the pre-feasibility study to see whether participation in the Hub might be considered. Once an inventory is developed for the DAC technologies, the Recipient will verify the inventory to ensure it provides detail at relevant operating conditions to conduct subsequent process modeling, and environmental and economic assessments.

Subtask 2.2 – Assessment of CO_2 to Products Technologies

As in Subtask 2.1, the Recipient will gather or estimate inputs for the TMP, LCA, and TEA from each CO_2 to products technology. The Recipient will compile information in an inventory and conduct analyses to ensure each technology has a complete energy and mass balance for relevant deployment scales, with an eye towards integrated operations that maximize heat, hydrogen, power and mass transport efficiency, and cost within the DAC Hub physical infrastructure. Additional technologies will be assessed as they become available thanks to the modular testbed approach used by the DAC Hub. Such an approach can quickly adapt to screening new technologies that are ready for testing and evaluation in a skid-like workflow at scale with integrated data collection and analysis. The Recipient will also work with other CO_2 to products technology providers during the pre-feasibility study to see whether participation in the hub might be considered. Once an inventory is developed for the CO_2 to products technologies, the Recipient will verify the inventory to ensure it provides detail at relevant operating conditions to conduct subsequent process modeling and environmental and economic assessments.

Subtask 2.3 – Community Guided Project Design

The Recipient will work with a Community Oversight Council (see Task 5.3) and technology providers to prepare scenarios for the DAC Hub design. The Recipient will evaluate these scenarios against the performance objectives of the solicitation (i.e., minimum capacity of at least 50,000 tonnes CO_2 annually captured from the atmosphere (50,000 Tonnes Per Year (TPY)) for the pre-FEED study to be completed in Phase 0b) and community vision, goals, and criteria of hub design. The Recipient will produce data tables with preliminary estimates for the operations of the hub. The Recipient will prioritize scenarios according to synergy between hub performance goals, technology readiness levels (TRLs), and community priorities. Based on this process, the Recipient will select anchoring technologies going forward that will serve as the initial baseline for the development of the TMP.

Inputs to guide hub designs which will be evaluated in Task 3 will be derived from the community engagement process. Inputs may include targets for financial performance, water consumption, or annual volumes of stored CO_2. Many possible hub configurations may emerge from the anchor and alternative technologies evaluated in Tasks 2.3 and 2.4, and only hub designs that can meet the Project Design Basis, which reflect the needs of the hub owner and community, will be explored in the feasibility study.

Task 3.0 – Hub Resources and Analysis

The Recipient must describe the selected DAC Hub owner and , site location, CO_2 transport routes, CO_2 storage sites, and CO_2 conversion technologies (if applicable) for the pre- FEED study to be completed in Phase 0b. The Recipient must indicate the geographic region of the United States, including any specific cities, metropolitan areas, states, and/or groups of states, including economically distressed communities (if applicable), that may be involved in the DAC Hub. The site location should include a discussion of the carbon intensity of the local industry, fossil energy production history (if applicable), availability of renewable and low carbon energy production, land and water resources, existing infrastructure, CO_2 storage and/or conversion potential, and include information on economically distressed communities impacted (if applicable).

Subtask 3.1 – Preliminary DAC Hub Design

The Recipient will develop a preliminary hub design that conforms to community developed vision, goals, and criteria (developed in Task 5.0 and associated subtasks). Selected DAC Hub technologies and CO_2 to products technologies identified in Task 2.0 will provide the starting point for assessment of resource requirements (i.e., energy, land, water, etc.). These preliminary DAC Hub designs will be shaped at first based on individual technology data tables and the overall project design basis, and advanced as process modeling and simulation efforts offer more robust data on equipment requirements, operation cycles, and material and energy storage and consumption.

Subtask 3.2 – Energy: Sources of Electricity and Thermal Energy

Based upon the energy usage of selected technologies, the Recipient will calculate the amount of clean electricity sources needed to support an initial buildout of 50,000 TPY. Evaluation of electricity sources will be informed by a Community Oversight Council (developed in Subtask 5.4). The evaluation will include consideration of Biomass Carbon Removal and Storage (BiCRS), renewable electricity generation, and energy storage. The Recipient will prepare a detailed planning and optimization study of renewable power and heat sources for initial capacity. The BiCRS plants that are co-hosting the DAC Hub will provide roughly enough power and heat to satisfy the initial removal capacity of at least 50,000 TPY. The Recipient will also consider the delivery of power, heat, syngas, water to the CO_2 to products facilities to maximize energy and carbon capture/conversion efficiency. This task will be directly informed by the process modeling and simulation efforts that may start with individual technologies but will ultimately evolve to capture synergistic effects of colocation that could influence energy needs.

Subtask 3.3 – Water Management: Requirements and Availability

The Recipient will develop information regarding unconventional water sources located in the southern San Joaquin Valley that may be available for use with the three sites and related processes requiring water. Given drought considerations, the Recipient will prioritize a modular optimized approach to circular water management that relies on unconventional water sources. Potential sources of water include, but are not limited to, surface waters available for agricultural and domestic uses; agricultural drainage waters; dairy wash waters; food processing facilities, such as wineries, tomato paste, cheese, and juice plants; fresh produce processing plants; municipal wastewater treatment plants; groundwater having domestic and agricultural users; petroleum industry-produced water; and brackish water in groundwater aquifers. Based upon information received regarding technology water usage and quality needs, the Recipient will evaluate the available candidate water sources according to: (1) source type, (2) volume, (3) quality and treatability, (4) location, (5) estimated cost at the source and transport costs, and (6) other special considerations including treatment pertaining to each source type. Importantly, the cost delivered to a DAC process is a function of the amount of water required and the distance between the water source and the DAC facility. The Recipient will also explore secondary usage or disposal of wastewater from DAC facilities.

Subtask 3.4 – CO_2 Purification

The Recipient will assess CO_2 purification options for an initial buildout of 50,000 TPY. In an ideal situation, CO_2 produced by different DAC technology providers will be combined into a single stream to minimize redundant equipment and cost. The choice of purification technologies will be dictated by produced CO_2 purity as well as the purity needed for downstream operations (e.g., geologic sequestration). Options include simple dehydration and compression to cryogenic distillation. For the 50,000 TPY feasibility study, priority will be placed on pre-engineered, turnkey systems rather than greenfield design, but system optimization with other balance-of-plant (BOP) equipment will be explored.

Subtask 3.5 – Hub Layout and Land Use

Preliminary design for the 50,000 TPY Hub layout will consider optimal locations for centralized equipment (e.g., CO_2 purification), air flow, CO_2 depletion, CO_2 conversion, energy and water/wastewater flow, and interdependencies between DAC providers. Hub activities that require transportation of material into or out of the Hub will be located to minimize localized impacts. The Hub's footprint will also be minimized while retaining maneuverability throughout the site for operation and maintenance activities and to adhere to engineering best practices and regional codes and requirements.

Subtask 3.6 – Host Site Modifications

Several opportunities exist for hub cost reduction by leveraging existing infrastructure and equipment at the host sites. The objective of this task is to identify such opportunities, as well as characterize the cost and timeline for necessary modifications. Modifications may range from changes to the CO_2 pipelines and injection site, to relocation of biomass onsite to accommodate DAC air contactor distribution, to adjustments to existing and new safety and utility requirements.

Subtask 3.7 – Integration and Hub Design: Connections and Synergies

The Recipient will identify opportunities for shared equipment, synergistic thermal and material flows, and overall hub optimization following the initial development of a hub design, and as new DAC and CO_2 to products technologies are identified. The Recipient will develop process flow diagrams for each technology according to the company informed guidance and state tables for a feasible capture scale, and then scaled based on the individual technology's potential contribution to meeting the Hub CO_2 capture capacity requirements as well as the project design basis. Following this first assessment, opportunities for technology integration will be carefully evaluated. Each opportunity may come with an advantage at either the technology or Hub level, and tradeoffs must be weighed accordingly. In some cases, decisions may be simple and rational engineering choices that lower risk of unexpected shutdowns. In other cases, there may be a tradeoff among profitability, energy, land, and water efficiency, sharing transportation equipment and CO_2 processing equipment, minimizing socio-environmental impacts, flexibility, and redundancy.

Subtask 3.8 – Preliminary Life Cycle Analysis

The Recipient will conduct a preliminary life cycle analysis (LCA) of the DAC Hub at the initial capacity (at least 50,000 TPY CO_2) in accordance with Appendix H of this Statement of Project Objectives (SOPO). Analyses of the energy and material inputs and outputs from each process will be integrated, resulting in a high-level carbon balance of all components, processes, and co-products derived from CO_2 not stored underground.

The Recipient will follow NETL CO_2U LCA guidance for developing an LCA for each component technology and will construct an attributional LCA inventory based on energy and material inputs from anchor DAC technologies and CO_2 disposal pathways, including components such

as pipelines and underground storage. The Recipient will estimate direct and indirect greenhouse gas emissions and criteria air pollutants based on the operation of systems, and the source of plausible local energy and feedstocks, using emission factors reported in the CA-GREET model and literature. The CA-GREET model is a California-specific version of Argonne National Laboratory's Greenhouse gases, Regulated Emissions, and Energy use in Technologies (GREET) life cycle model which is used to calculate GHG emissions under the California Low Carbon Fuel Standard (LCFS). Sensitivity analysis based on factors such as carbon intensities of electricity and heat sources will be considered to understand the range of expected outcomes and will be refined as the sources of energy and feedstocks are known. All results will be normalized to a functional unit of 1 kg of CO_2 removed from the atmosphere and permanently stored. Major uncertainties stemming from the DAC technologies, the manufacturing of novel materials, and their hub-level integration will be discussed in a summary report.

Subtask 3.9 – Geologic Storage Options and Available Capacity

Historic oil and gas exploration and production have identified widespread contingent storage resources near each potential Recipient site. The three BiCRS sites have credible plans for development of subsurface storage that will offer additional capacity for the >1 M TPY CO_2 removed from air. Detailed subsurface site characterization is underway for the Delano site, with plans to develop and submit a Class VI UIC permit application in mid-2023. The Recipient is considering joint storage development for the Mendota and Madera sites, using a 2020 Class VI permit application as the starting point. Working with potential storage providers, the Recipient will assess the planned storage locations and will monitor progress towards development, characterization, and permitting activities, relative to the capacity needed for a minimum of 12 years of DAC Hub operation at final capacity.

The Recipient will also review potential obstacles to storage development and provide mitigation plans. For example, pore space ownership in the vicinity of each site is fragmented relative to the size of prospective CO_2 footprints resulting from storage. One of the three sites is also in the vicinity of residences. Due to these factors, the Recipient will identify a suite of potential locations for storing the CO_2 from each site that provide options meeting community preferences expressed in the Project Design Basis developed in Subtask 2.3 and gaining pore space access. The Recipient will generate and elicit community perspective on each location, including transportation of CO_2. The Recipient will open pore space access discussions with the owners of each location. Based on the results, the Recipient will work with the site hosts to select storage locations. The Recipient will consider existence of legacy wells as a secondary factor in down selection.

Task 4.0 – Environment, Health, and Safety

The Recipient will complete an EH&S analysis of the anchoring integrated DAC system in accordance with the format provided in Appendix L. EH&S analysis should include discussion regarding air and water emissions, water utilization, solid waste streams, noise, and potential environmental impacts of the technology including toxicological effects and hazards of emissions and waste streams.

Subtask 4.1 – Environmental Health and Safety Risk Analysis

Air

The Recipient will assess risks from air emissions based on data on all potential or incidental air emissions provided by DAC, CO_2 to products, energy supply and storage providers, and the host site operator. The Recipient may also request methods used to develop underlying emissions rates, estimate magnitude of emissions, and/or model ambient air concentrations. A subset of the Recipient will independently review all data gathered to ensure that the information can be trusted. Independent review will include examination of the available data from the peer-reviewed literature on air emissions associated with DAC technologies; evaluation of analytical approaches for developing underlying data (e.g., gas analyses, modeling approaches); and a detailed summary of potential air quality and public health impacts, limitations, and remaining data gaps. The Recipient will assess potential hazards to human health and the environment for the air pollutants identified by technology providers and the host site operator, including associated transformation and degradation byproducts. The Recipient will compile chemical-specific physical, chemical, and toxicological properties (e.g., volatility, flammability, explosivity, corrosivity, biodegradation and bioaccumulation potential, acute and chronic toxicity) and associated environmental and/or health-based guidance values from publicly available state, federal, and international screening and authoritative databases and the peer-reviewed literature. The Recipient will examine similar substances or class of substances for any air pollutants lacking information on potential health effects or ecotoxicity shall be evaluated. Depending on data availability, emissions rates may be used to model ambient air pollutant concentrations and evaluate potential health risks and impacts. Findings from the independent review of potential air quality risks and impacts can be used to inform exploration of community-focused air monitoring approaches for the build phase and to co-develop a community air monitoring plan with a Community Oversight Council.

Water

The availability of water resources for the proposed technologies will be evaluated in Subtask 3.3. This task will work closely with that effort but will focus on any potential changes, deleterious or positive, impacts on water quality resulting from DAC Hub activities. The rerouting and repurposing of water resources could potentially have positive benefits for water quality by providing a use for lower quality waste waters. However, any change in water resource utilization needs to be examined at a system level. In addition, the Recipient will evaluate potential water quality impacts of all DAC Hub activities, e.g. potential impacts to groundwater from geologic carbon storage activities, any effluent or waste waters that need disposal, changing utilization of groundwater (fresh and brackish). The impacts will be assessed in the context of regional water quality but will also focus specifically on domestic and municipal wells and water sources in the vicinity of the DAC Hub site(s).

Other Risks

Air and water impacts are expected to be the most likely concerns associated with the DAC Hub development. However, in conjunction with our community partners, the Recipient will also assess other potential negative or positive environmental impacts of the proposed project including impacts on traffic, noise, light pollution, or local wildlife.

Subtask 4.2 – Safety, Security, and Regulatory Requirements

The larger and more established participants on the Recipient have an established safety culture and history which can be readily communicated and adapted to the unique requirements of the DAC Hub. These larger entities can help guide the newer organizations, leading by example to assist the development of a safety culture and security standards for the technology providers. The site, as is typical of any industrial facility, will have controlled access. There is experience with both physical protection and cybersecurity of sensitive sites, construction sites, and operating facilities that will be adapted for the host site facility. Permit applications will not be sought during the feasibility study, but the Recipient will complete a permitting workflow overview that identifies the relevant and applicable federal, state, and local codes, regulations, and permitting requirements anticipated to site, construct, implement, and operate the DAC Hub. Contact with the relevant regulatory agencies will be initiated where feasible. Priority will be given to requirements that have lengthy review and approval processes and those that require input from aligned community groups.

Task 5.0 – Community Partnership and Benefits

The Recipient will develop a Community Benefits Plan Development Proposal (CBPDP). The CBPDP must set forth the applicant's proposal to generate a plan to ensure that Federal investments advance the following four goals: 1) community and labor engagement; 2) investing in the American workforce 3) advancing diversity, equity, inclusion, and accessibility (DEIA); and 4) contributing to the Justice40 Initiative. The requirements for the CBPDP are outlined in Appendix D.

Subtask 5.1 – Community Outreach and Engagement

The Recipient aims to have community groups as thought partners in this feasibility effort. The Recipient will administer grants to community-based organizations to support staffing, capacity building, and other resources to ensure that they have the staff resources and technical capacity to engage. The Recipient will support community outreach and engagement with labor and workforce agencies throughout the project. The Recipient will conduct a series of roundtables and convenings to engage residents, stakeholders, and community organizations in DAC Hub design. The Recipient will conduct roundtables at locations and times that are conducive to broad participation and will provide compensation for participants and other services (e.g., food, childcare) to increase accessibility.

Subtask 5.2 – Carbon Removal Curriculum

To increase accessibility for community members and community-based organizations to engage in the DAC process, the Recipient will host sessions to deliver their carbon dioxide removal curriculum. The curriculum is designed to support informed community decision making around DAC engagement. The curriculum empowers citizens and communities to make decisions about whether and how they engage with DAC technology, including DAC Hub development.

Subtask 5.3 – Establish Community Oversight Council

The Recipient will establish a Community Oversight Council that includes representatives of community-based organizations, environmental justice organizations, labor and workforce representatives, and residents. The Recipient will work with local organizations to develop a facilitation and convening strategy for the Council. The Recipient will facilitate meetings between the Community Oversight Council, technology providers, and site owner(s) to develop a shared set of criteria for hub design, development, and performance.

Subtask 5.4 – Develop Community Vision and Goals for Hub

The Community Oversight Council will work with technology providers, and the Recipient to develop a community vision and goals for a DAC Hub. These criteria will be used to guide the feasibility assessment and design principles. The Recipient will identify and collect community-relevant data to inform the design process and to monitor, track and verify social and environmental goals. This could include various climate and resource needs data related to water, energy, and air, as well as data in line with the federal government's Justice40 initiative. The Recipient will establish baseline data and data transparency processes to ensure timely sharing of project performance data in an easily understandable and regionally-relevant manner with the public. The Recipient will also test and verify the effectiveness and possible environmental and social footprint of technologies that could be included as part of the DAC technology portfolio (included in Task 2 and associated subtasks).

Task 6.0 – Hub Ownership

The Recipient must describe the selected DAC Hub owner and , site location, CO_2 transport routes, CO_2 storage sites, and CO_2 conversion technologies (if applicable) for the pre- FEED study to be completed in Phase 0b. Recipients must indicate the geographic region of the United States, including any specific cities, metropolitan areas, states, and/or groups of states, including economically distressed communities (if applicable), that may be involved in the DAC Hub.

Subtask 6.1 – Review of Possible Ownership Structures

The Recipient will prepare a literature review of public, community, and cooperative hub ownership models that include a comparison of the characteristics of different ownership models, including enabling legal and regulatory actions. The Recipient will explore the

feasibility and legal and regulatory steps needed to establish a Public Authority to oversee the business model, operations, and financing of a DAC Hub. A Public Authority would operate the DAC Hub as a public good – one that maximizes safety and the strongest environmental standards while minimizing costs.

Subtask 6.2 – Identify Hub Owner(s)

Based on the review of ownership models, engagement with technology providers, site owner(s), and the Community Oversight Council, the Recipient will select an ownership model and identify a DAC Hub owner or owners. The Recipient will also identify needed steps to establish an ownership structure in Phase 0b, including any transitional or intermediate steps. The Recipient will evaluate ownership models for alignment with community vision, goals, and criteria.

CONTINUATION/DECISION POINT 1 – Phase 0a – Pre-Feasibility

In accordance with the "CONTINUATION APPLICATION" provision in this Cooperative Agreement, the Recipient is not authorized to proceed beyond Phase 0a – Pre-Feasibility without written approval by the Contracting Officer for continuation into Phase 0b – Feasibility. The Recipient shall prepare and submit a "Continuation Application" directly to the DOE Project Officer and the DOE Contract Specialist no later than forty-five (45) days prior to the end of Phase 0a – Pre-Feasibility. In addition to the requirements of the CONTINUATION APPLICATION provision in this Cooperative Agreement, the continuation application at a minimum, must document the following activities and deliverables:

- ✓ Description of the selected DAC Hub owner and , site location, CO_2 transport routes, CO_2 storage sites, and CO_2 conversion technologies (if applicable) for the pre- FEED study to be completed in Phase 0b.
- ✓ Discuss the current status of the CO_2 storage site(s), including development, characterization, and permitting activities conducted to date.
- ✓ Discuss the current status of, and plans for submitting, the UIC Class VI permit to construct application. Recipients must provide an initial design for the DAC Hub BOP.
- ✓ Selection of the anchoring DAC technology(ies) (i.e., minimum capacity of at least 50,000 tonnes CO_2 captured from the atmosphere (50 KTA)) for the pre-FEED study to be completed in Phase 0b**.**
- ✓ Conceptual design for the initial DAC Hub capacity (minimum 50 KTA CO_2) integrated with required CO_2 storage and/or CO_2 conversion (if applicable).
- ✓ If applicable, selection of the CO_2 conversion technology(ies) for the pre-FEED study to be completed in Phase 0b.
- ✓ Data tables with preliminary estimates for the DAC Hub, and the selected DAC and CO_2 conversion (if applicable) technologies.
- ✓ Description of safety culture, discussion of security considerations, a permitting workflow overview.
- ✓ DAC and CO_2 conversion (if applicable) Technology Maturation Plan(s)

- ✓ Preliminary Life Cycle Analysis
- ✓ CBP Development Proposal (CBPDP)

Budget Period 2 (Phase 0b – Feasibility)

Task 7.0 – Technology Description and Scale-Up Potential

This task will be a continuation and further maturation of the efforts conducted in Task 2, but with a shift in emphasis on conducting scale-up feasibility and design scenarios to at least 1 M TPY for the DAC Hub for all selected DAC and CO_2 to products technologies that pass through the Continuation/Decision Point process in Phase 0a. This will include evaluating the community-based priorities and perspectives around the deployment of these technologies at the scale of the hub to be built and operated. The assessment will also include descriptions of technology state of development and scale, which is essential for understanding design flexibility, scaling uncertainty when extrapolating data, and for determining appropriate technology performance milestones. Once an inventory is developed for the DAC and CO_2 to products technologies, the Recipient will conduct additional analysis to verify inputs and ensure the inventory and technologies are described with enough detail at relevant operating conditions to conduct subsequent process modeling, and environmental and economic assessments. The Recipient will produce data tables with the next round of estimates for the operations of the Hub. Prioritization of those designs and related technologies that maximize the synergy between hub performance goals, TRLs, and community priorities will be used to rank the different scenarios evaluated. Based on this process, the Recipient will select the final anchoring technologies going forward that will serve as the foundational engineering design basis for the DAC Hub and the finalization of the Technology Maturation Plan.

Task 8.0 - Finalize DAC Hub Concept

The Recipient must describe the selected geographic region in the United States and discuss the carbon intensity of the local industry, fossil energy production history (if applicable), availability of renewable and low carbon energy production, land and water resources, existing infrastructure, and CO_2 storage and/or conversion potential, and include information on economically distressed communities impacted (if applicable). The Recipient must discuss the fit of the site(s) from a social and environmental justice standpoint (including social characterization of nearby communities, community support for the project, and workforce availability), with reference to the CBP, as appropriate. The Recipient must define their DAC Hub concept, including selection and siting of DAC and CO_2 conversion (if applicable) technology(ies) with a discussion of ongoing National Environmental Policy Act (NEPA) and permitting activities. The Recipient must discuss plans for the development of a DAC Hub with larger initial capacity, greater potential for expansion, and lower levelized cost per net tonne of CO_2e removed from the atmosphere.

Subtask 8.1 – Final DAC Hub Design

The Recipient will develop a final DAC Hub design for a capture capacity of at least 1 M TPY. The design will be informed by the knowledge gained through the development and technical and community vetting of hub designs at the 50,000 TPY scale, the life cycle assessment, technology maturity plans for each technology, and technoeconomic analysis. This will include qualitative information, such as the effects of scale up on the host site and local communities. The Recipient will evaluate additional effects of scale identified in the BOP conceptual design. This could include the potential change in technology contribution to capture and opportunities for system integration or improved ancillary equipment performance that are possible at a larger scale. The Recipient will work with a Community Oversight Council to assess final DAC Hub design and evaluate options relative to community goals, vision, and criteria, with emphasis on concerns resulting from operation at a larger scale. The DAC Hub design will include guidance on the implication of scale that is specific to the region of study, that may extend beyond a 1 M TPY capacity. This will provide the basis for analysis of resource requirements (i.e., energy, land, water, etc.) and energy source(s) for the selected DAC technology(ies), as well as CO_2 to product technologies.

Subtask 8.2 – Resource Planning: Energy, Water, Layout and Land Use

The Recipient will complete resource planning for initial buildout (50,000 TPY) and final buildout (1 M TPY) to feed into BOP for final capacity as described in Task 3.0 and associated Subtasks. In Phase 0b, the Recipient will focus attention on the increased electricity and thermal energy demand with a buildout to 1 M TPY. Reliance on intermittent sources will depend on smart grid integration and optimization of supply and demand as well as build-out of energy storage solutions. The Recipient will evaluate potential power supply by hydrogen via fuel cell technology and storage via Rondo Heat Battery. The Recipient will also continue to evaluate unconventional water sources located in the southern San Joaquin Valley that may be available for use with the three identified CO_2 capture sites and related processes requiring water.

Subtask 8.3 – Updated Preliminary Life Cycle Analysis

The Recipient will continue activities on Life Cycle Analysis begun in Phase 0a. The LCA inventory will be updated for the 1 M TPY scale, and any new life cycle phases associated with the final DAC Hub design will be evaluated following Appendix H of this SOPO.

Subtask 8.4 – Integrated DAC System Pre-FEED Study

The Recipient will complete a pre-FEED study (i.e., Class 4 estimate with expected cost accuracy of +/- 30% and project definition maturity of at least 5%) for the anchoring integrated DAC system (i.e., DAC, CO_2 pipeline, CO_2 conversion (if applicable)) and required BOP sited in the selected DAC Hub and designed for a minimum capacity of 50 KTA CO_2. Recipients will prepare the DAC pre-FEED Study in the format provided in Appendix I and Appendix J. The pre-FEED for the initial capacity DAC Hub will include key capital equipment for each DAC technology and shared supporting infrastructures such as heating and cooling, water, CO_2

purification, compression, and transportation. The general design and size of the equipment will be based on heat and material balances, heating and cooling duties, and power requirements provided by anchor DAC partners and key vendors. If partner companies do not have complete process flow diagrams, the analysis will derive these data from theoretical heat and mass transfer calculations. The Recipient will conduct process modeling using software such as Aspen. The Recipient will normalize key metrics, including capture rates and efficiencies, land use, feedstock consumption, and waste production relative to captured tonnes of CO_2, both for each subcomponent and the entire DAC Hub.

This task will result in: (1) The pre-FEED final report for the initial DAC Hub following the guidance in Appendix I; (2) the completed relevant DAC Hub Data Tables in accordance with Appendix N, which are expected to be for sorbent, solvent- and mineralization-based capture, the synthesis of value-added organics, and the production of inorganic materials; and (3) the Integrated Project Schedule developed in accordance with Appendix K. The Recipient will combine the results from the pre-FEED with the pre-LCA for a range of electricity and thermal production carbon intensities to calculate the cost of CO_2 abated, and the levelized cost of electricity.

Subtask 8.5 – Hub Balance-of-Plant (BOP) Conceptual Design

The Recipient will identify the conceptual design for the mature DAC Hub at its final design capacity based on requirements of the project design basis. This will include identifying and evaluating options for all common systems and utilities including electricity, thermal energy, cooling, water, waste treatment, and CO_2 transportation. To develop a process flow diagram, the Recipient will consider plausible scenarios for collocation siting and integration of anchor technologies with each other, with pipelines, water, and CO_2 injection infrastructure. The Recipient will consider heat and mass balances for each process at scale and for the integrated hub at the final capacity DAC Hub. Details on the pipeline and the geologic carbon storage system will be informed by previous and ongoing work conducted by the site host and their partners.

Subtask 8.6 – Geologic Storage Options and Available Capacity

The Recipient will continue engagement with the pore space owners for each of the storage locations selected in Phase 0a (Subtask 3.9). The Recipient will work with the site host and potentially other hosts of storage locations associated with each site to provide sufficient storage capacity for 12 years of Hub operation at final capacity. All work will be conducted with full consideration of parameters and preferences developed by community stakeholders in Subtask 3.9, and the feasibility and magnitude of legacy well corrective actions. The Recipient will develop preliminary plans for CO_2 monitoring, reporting, and verification. A Storage Field Development Plan will be developed in accordance with Appendix M and submitted 90 days prior to project completion.

Subtask 8.7 – Business Development and Financial Plan

An initial market assessment will estimate the required selling price (RSP) for each CO_2 conversion product derived from anchor DAC technologies. Key material and energy inputs as well as overhead estimations will be based on the developed BOP conceptual design. A plausible range of RSP will be derived from identified uncertainties. Commercial viability for each product will be conducted by assessing its market price and gross market volume at present and in the near future when the proposed DAC Hub can be scaled to 1 M TPY CO_2. The Recipient will also assess potential for credits for carbon removal as a revenue generation mechanism.

Task 9.0 – Environment, Health, and Safety

To meet the requirements for Environmental Health and Safety (EH&S) Risk Analysis the Recipient will complete an EH&S analysis of the anchoring integrated DAC system in accordance with the format provided in Appendix L. EH&S analysis will include discussion regarding air and water emissions, water utilization, solid waste streams, noise, and potential environmental impacts of the technology including toxicological effects and hazards of emissions and waste streams.

Subtask 9.1 – Environmental Health and Safety Risk Analysis

EH&S risk analysis activities under Subtask 10.1 will include continuation of activities outlined in Subtask 4.1 and will lead to a final completed EH&S risk analysis in accordance with Appendix L.

Air

EH&S risk analysis activities focused on air emissions under Subtask 10.1 will include continuation of activities outlined in Subtask 4.1 and will lead to a completed EH&S risk analysis component focused on air emissions.

Water

Activity on water quality impact assessment will continue in the second budget period along the same lines as described in Task 4.1. The effort in this budget period will be to develop more detailed analysis of the most likely potential improvements or negative impacts identified in the first budget period and develop preliminary recommendations for steps that should be considered in a mature design that could maximize (for positive impacts) or minimize these impacts.

Other Risks

This activity will continue in the second budget period developing the finalized list of additional impacts that are worth additional risk assessment and mitigation efforts.

Subtask 9.2 – Safety, Security, and Regulatory Requirements

All aspects of Task 4.2 EH&S activities will be progressed as part of Task 10.2. Organization-specific practices will be adapted to activities and plans appropriate for the hub. The Recipient

will continue development of a permitting roadmap, building upon the list generated in Task 4.2. The roadmap will help the DAC Hub understand not only the technical permitting requirements but also the timeline of submittals, review periods, and ultimately approvals for all of the necessary regulatory documentation.

Task 10.0 – Community Partnership and Benefits

The Recipient will continue working with a Community Oversight Council and other stakeholders to develop a Community Benefits Plan that reflects the community vision, goals, and objectives for a DAC Hub. This will include metrics to monitor DAC Hub progress and performance, transparency, and accountability systems.

Subtask 10.1 – Community and Labor Engagement

The Recipient will continue activities started under Task 5 to support ongoing community engagement through the second phase of the project and to implement the plan to develop a Community Benefits Plan in Phase 0b. The Recipient will continue to provide education and capacity building opportunities to ensure accessibility for all interested stakeholders. The Recipient will partner with local labor organizations and leverage ongoing regional economic development efforts, including the recently-funded Community Economic Resilience Fund collaboratives in the region.

Subtask 10.2 – Energy and Environmental Justice and Justice40 Initiative

The information from a Community Oversight Council, the community vision, goals, and criteria for a DAC Hub, and the EH&S Risk analysis will inform community monitoring, data transparency, and accountability systems to ensure the DAC Hub does not result in increased environmental burden in the community. These criteria will shape the development of an assessment of community impacts of the hub. The Recipient will develop a DAC Hub design informed and guided by community-developed criteria. The ownership model, coupled with the Community Benefits Plan, will provide a pathway for implementation.

Subtask 10.3 – Workforce Development

In partnership with project partners, a Community Oversight Council, and local labor and workforce partners, the Recipient will work with technology providers to understand workforce needs for various DAC Hub designs. The Recipient will develop a business plan for the DAC Hub that includes innovative ownership models, revenue streams and sharing models, and governance structures that deliver meaningful community benefits, while identifying a risk and profit-sharing process. The Recipient will work with the technical providers to develop a DAC Hub integration plan that describes how public and private entities participate in hub design, development, and operation.

D. DELIVERABLES

The periodic and final reports shall be submitted in accordance with the “Federal Assistance Reporting Checklist” and the instructions accompanying the checklist. In addition to the reports specified in the “Federal Assistance Reporting Checklist”, the Recipient must provide the

following to the NETL Project Manager (identified in Block 15 of the Assistance Agreement as the Program Manager).

Task / Subtask Number	Deliverable Title	Due Date
1.1	Project Management Plan	Update due 30 days after award. Revisions to the PMP shall be submitted as requested by the NETL Project Manager.
1.2	Business Plan	Due 90 days prior to project completion
1.3	Financial Plan	Due 90 days prior to project completion
1.4	Technology Maturation Plan(s) (TMP)	Initial TMP(s) is due 45 day prior to Phase 0a completion and should be updated as needed throughout the project period of performance. Final TMP(s) should be submitted within 90 days of completion of the project.
1.5	CBP Development Proposal	Due 45 day prior to Phase 0a completion. Will be incorporated into the Final Scientific/ Technical Report as an appendix.
1.5	CBP	Due 90 days prior to project completion. Will be incorporated into the Final Scientific/Technical Report as an appendix.
3.8	Preliminary LCA	Due 45 day prior to Phase 0a completion.
8.3	Updated Preliminary LCA	Due 90 days prior to project completion. Will be incorporated into the Final Scientific/Technical Report as an appendix.
8.4	Integrated DAC System pre-FEED Study	Due 90 days prior to project completion.
8.5	DAC Hub BOP Conceptual Design	Due 90 days prior to project completion.
9.1	Environmental Health and Safety (EH&S) Risk Analysis	Due 90 days prior to project completion. Will be incorporated into the Final Scientific/Technical Report as an appendix.
1.6	Integrated Project Schedule	Due 90 days prior to project completion.
1.7	DAC Hub Data Tables	Due at project completion
1.8	Storage Field Development Plan	Due 90 days prior to project completion

E. BRIEFINGS/TECHNICAL PRESENTATIONS

The Recipient will prepare detailed briefings for presentation to the NETL Project Manager at their facility located in Pittsburgh, PA, Morgantown, WV, Albany, OR, or virtually. The Recipient will make a presentation to the NETL Project Manager at a project kick-off meeting held within ninety (90) days of the project start date. At a minimum, the Recipient will provide one annual

public briefing at an NETL sponsored meeting to explain the plan, progress, and results of the technical effort. A final project briefing at the close of the project will also be given.

APPENDIX A – BUSINESS PLAN

The business plan should address the items listed below and any other pertinent information to understand the DAC Hub business plans.

Commercial Feasibility and Business Case Analysis: The plan should describe the commercial feasibility of the proposed technologies and related infrastructure and how the Recipient intends to employ such technologies and related infrastructure in the DAC Hubs. See **Appendix F** for guidance on the Business Case Analysis.

Key Contracts, Permits, and Agreements: The plan should provide a top-level description, schedule, and status, of all critical path contracts and agreements relevant to the DAC Hubs, encompassing permits, NEPA, design, engineering, technology licensing, financing, construction, startup, commissioning, shakedown, operation, and maintenance of the DAC Hub. **TA-2 Recipients** must secure a DAC Hub owner letter of commitment with plans for executing the landowner and/or host site agreement(s) needed for the initial DAC Hub capacity (minimum 50 KTA CO_2), including the DAC, storage and/or conversion sites by the end of Phase 1.

Preliminary Site Selection: The plan should describe the rationale for selection of the DAC Hub site(s) and contain evidence of control over the DAC Hub site(s) or the plan to establish control over the DAC Hub site(s).

Market Analysis: Recipients must submit a market analysis for the CO_2 conversion product(s) produced as part of the Regional DAC Hub, if applicable. Recipients should include an initial assessment of the product market potential, including current and projected market volume and value, as well as the estimated quantity of CO_2 converted to durable products that have a lower GHG life cycle compared to incumbent products. At a minimum, the Recipient should provide an initial estimate of the required selling price (RSP) of their primary product relative to existing markets (co-products should be valued at no more than their current market value). The current value and RSP should be reported on a USD/unit product basis. The Recipient should use assumptions for the required rate of return on investment, capital and operating costs, other co-feeds (if applicable), etc., consistent with the products and markets that they are targeting. The assumed purchase price of CO_2 and possibly other waste streams processed should be clearly stated, along with any potential tipping fees assumed. A thorough description of how the RSP estimate was derived should be clearly and completely described, with all key assumptions stated.

Feedstock, Supplies, and Offtake Arrangements: The plan should provide a detailed description of plans for ensuring an adequate supply of feedstock and other major raw materials or supplies, as needed for successful operation of the DAC Hub. If available, the Recipient should provide letters of commitment or term sheets (including power purchase agreements) for prospective

feedstocks and other suppliers. The Recipient should also provide letters of commitment or term sheets from prospective customers and/or offtakers, if available.

DAC Hub Capacity Build-Out Plan: The plan should describe the potential for expanding the proposed DAC Hub both during and beyond the award performance period. The plan should also discuss how the proposed DAC Hub will achieve market liftoff and contribute to building out a DAC Hub and CDR industry, including the ability to attract follow-on private sector investments beyond the award performance period. Recipients must provide their plan for the DAC Hub to have capacity to capture and geologically store, utilize, or store and utilize at least 1,000,000 metric tons (tonnes) of CO_2 from the atmosphere annually (1 MTA) from a single unit or multiple interconnected units with each unit capable of capturing a minimum of 50,000 tonnes CO_2 from the atmosphere annually (50 KTA). An initial assessment on how the DAC Hub is scalable to 1 MTA CO_2. Anticipated benefits, as well as challenges for the DAC Hub should also be discussed in detail. The plan should include how the DAC Hub will be connected regionally or inter-regionally to secure geologic storage sites and/or carbon conversion systems. If applicable, an initial schedule, cost estimate, and plans to integrate new team members and technologies is required.

APPENDIX B – FINANCIAL PLAN

The Financial Plan must present a viable plan to obtain funding for the entire non-DOE share of the total project cost that identifies all sources of project funds. The plan should provide a description of the following elements for the proposed DAC Hub:

- Plan and schedule to achieving long-term financial viability, beyond DOE and other funding;
- Plan and schedule to achieving long-term financial viability, beyond DOE and other funding;
- The amount of expected traditional equity investments (identify participants and level of participation, if applicable);
- The timing of expected equity contributions and/or debt funding;
- The timing of repayment of expected debt funding;
- If debt is contemplated, provide a plan for managing potential interest rate risk and default risk;
- If tax equity or other non-traditional equity investments are contemplated, highlight any structural requirements that might arise from such investments; and
- Contingency funding including the source should also be detailed in the **Phase 1 through 4 Financial Plan**.

Recipients must provide a plan for financing Phases 1-4. The **Financial Plan** shall address the Recipient's financial commitment to the project by including existing and planned commitments for the required non-federal cost share. A commitment letter should state the amount and timing of the funds to be made available for the project; and should provide information on the source(s) of the funds along with the authority of the signor of the letter to commit such funds to the project. Any existing approvals, such as minutes from a board of directors meeting, should be included in the application materials. Limitations, restrictions, contingencies, or the like on the commitment must be disclosed in the letter.

If other parties are to provide non-federal cost share, such parties must also provide commitment letters including the same information as above. In addition, other parties must disclose their relationship to the Recipient, or other interests in the project.

For non-federal cost share commitments that are in the form of cash, each provider must present audited financial statements for the prior year and all unaudited interim financial statements for the current year. If audited financial statements are not available, the financial statements presented must be certified by the Chief Financial Officer of the organization that the statements were prepared on the basis of U.S. Generally Accepted Accounting Principles (US GAAP). Each provider must describe how the financial statements evidence the capacity of the provider to supply their committed cost share.

For existing and planned non-federal cost share commitments that are not in cash, provide a full description of the commitment and justification for the qualification of such commitment as non-federal cost share. Provide supporting evidence regarding the value of the non-cash commitment.

Recipient must certify in writing that all planned non-federal cost share will come from qualified sources.

Project Parties. A description of the main parties (developers, owners, investors) to the project, including background, ownership and experience, proposed financial contribution to project, and expected financial benefit to each party of the project. In line with the Organization Structure in the PMP, the application should describe the financial relationship of the Recipient to major project partners, including any Foreign Owned Entities,[1] who are contributing cost share and/or performing work. It should include a table that identifies the name of the organization or entity that are expected to contribute debt or equity financing and any person, organization, or entity who owns or will own five percent (5%) or more of the DAC Hub. The plan should indicate the Recipient, project partners, and other debt or equity contributors by listing the organization or entity name, website address, mailing address, city and state, and postal code.

Financial Strength: The plan should describe the Recipient's and major project partner's financial strengths, as well as the DAC Hub's strategic significance to the Recipient and major project partner involved.

Project Assumptions. A description and explanation for each of the financial, economic, and operating assumptions for the project. The assumptions should be consistent with and supported by other documents in the application materials.

Contracts and Agreements. A description of all contracts, agreements, permits, licenses, etc., that will need to be established or obtained to finance the project. Also describe agreements to be entered into regarding the operation of the project and any related responsibilities of the Project Parties.

Financial Projections. Financial projections should be presented on an annual basis, commence with the initial project Phase, and extend to the end of the life of the facility. Projections should include a statement of revenues and expenses (income statement), balance sheet, and cash flow statement (sources and uses of funds). In addition, a cashflow waterfall schedule should be included as well as projections of annual net cash flows (for purposes of calculating net present value (NPV) and internal rate of return (IRR)). The projections should be adequately supported. The statements and schedules should be prepared using software and the model

[1] Foreign investment in projects may be subject to Committee on Foreign Investment in the United States (CFIUS) review: https://home.treasury.gov/policy-issues/international/the-committee-on-foreign-investment-in-the-united-states-cfius

should be provided in electronic format including cell formulas so that review and exercising of the model assumptions and calculations may be facilitated. The financial model should be included as an attachment named "FPmodel.xlsx".

Financial Commitments. The Recipient must discuss the priority placed by their teams' respective management on financing Phases 1-4 of the project. This should include a discussion of management's decision to: (1) allocate internal resources, (2) obtain recourse financing, or (3) obtain limited or non-recourse project financing. The degree of commitment to the project will be measured in part by the level of financial commitment assumed by project team members. The project team can also demonstrate its commitment by: (A) proposing to share in project costs above the Government's minimum requirements and (B) agreeing to cover potential project cost increases.

Limited Recourse Project Financing. For projects employing non-recourse or limited recourse debt financing, provide a description of the Recipient's approach to, and the status of, such financing. Include copies of available funding commitments, draft Term Sheets, or expressions of interest from funding sources.

Equity. If tax credit equity is part of the financial plan, provide a description of the structure of the legal arrangements either in place or contemplated. Project when tax equity contributions to pay project costs will be made. List prospects for other equity investors and include progress to date in gaining interest in the project by such investors.

Other Federal Funding. Identify any other federal funding sources such as DOE Loan Program Office, CO_2 Infrastructure Finance and Innovation Act (CIFIA) program credit subsidy, etc. Federal financing, such as grants or loan guarantees from federal agencies, cannot be leveraged by Recipients to provide the required DAC Hub cost share or to otherwise support the same scope of the DAC Hub. However, other federal support may be used for activities that fall outside of the DAC Hub scope/budget. The financial plan should identify whether the DAC Hub will benefit directly or indirectly from other forms of federal support, such as grants, loan guarantees, tax credits, having federal agencies or entities as a customer or offtaker of the DAC Hub's products or services, or other federal contracts, including acquisitions, leases, and other arrangements, that may indirectly support the DAC Hub.

Non-Federal Support. The plan should identify other non-federal governmental (including state or local) incentives or other assistance on which the proposed DAC Hub relies, including grants, tax credits and loan guarantees to support the financing, construction, and operation of the DAC Hub. It should indicate the terms of such support which could result in termination or reduction of anticipated/actual non-Federal support, and whether any such incentives or assistance are subject to clawback and the circumstances under which a clawback could occur.

45Q. If project finances are expected to include benefits from IRC Section 45Q federal income tax credits, describe the way value from the credits will be derived. In particular state whether the credits will be used by the Recipient or an affiliate or if tax equity will be engaged to monetize

the tax benefits for the benefit of the project. State whether any 45Q tax credits are planned to be allocated to the CO_2 storage site operator. Ensure the financial model appropriately shows the projected financial impacts of 45Q tax credits and other tax benefits through at least the end of the 45Q tax credit earning period, or the life of the project, whichever is longer.

Contract Bonding Practices. For proposed construction contracts or subcontracts, the Recipient must explain its contract bonding and/or surety/guarantor practices and how they will be applied if their application is accepted for Federal funding.

Financing Schedule. A tentative schedule of dates and events that comprise the financing efforts must be provided. The schedule shall include, to the extent possible, key project dates such as signing of the EPC contract, negotiating Purchase and Sale agreements, finalizing the Operations and Maintenance Agreement, and the target date for financial closing for construction.

APPENDIX C – TECHNOLOGY MATURATION PLAN

TECHNOLOGY MATURATION PLAN
for *{insert project title}*
{Date Prepared}

SUBMITTED UNDER FUNDING OPPORTUNITY ANNOUNCEMENT

DE-FOA-#######

SUBMITTED BY

{Organization Name}
{Organization Address}
{City, State, Zip Code}

PRINCIPAL INVESTIGATOR

{Name}
{Phone Number}
{E-mail}

SUBMITTED TO

U.S. Department of Energy
National Energy Technology Laboratory

This plan should be formatted to include the following sections with each section to include the information as described below:

A. TECHNOLOGY READINESS LEVEL

- Using the Technology Readiness Levels (TRL) **Appendix G**, specify the current TRL of the proposed technology. Note, to be at a certain TRL, all of the description must be met. The application must provide a clear technical write-up describing the state of the proposed technology and use TRL description-based activities to justify the TRL score assigned.
- Provide a one-paragraph description of the target commercial application(s).

B. PROPOSED WORK

- Relate the proposed project work to the maturation of the proposed technology.

- List known performance attributes and their performance requirements to the extent possible. Explain how the performance requirements were determined (i.e., from FOAs; program plans; technology roadmaps; need to surpass the current state of the art). Be as specific as practical on any supporting technical/economic assessments.
- Define the TRL that is anticipated at the end of the project and describe how the project objectives will meet the TRL description if the project is successful.

C. POST-PROJECT PLANS

- Describe known post-project work needed to attain the next TRL. Explain why that work is not part of the proposed project, and why the project end point sets the best foundation practical for the next phase of work. To the extent practical, include market assessments and deployment strategies.

APPENDIX D – COMMUNITY BENEFITS PLAN DEVELOPMENT PROPOSAL (CBPDP)

The CBPDP is the Recipient's proposal to develop a Community Benefits Plan (CBP). Guidance and templates for the community benefits plan can be found at the following website: https://www.energy.gov/infrastructure/about-community-benefits-plans.

APPENDIX E – COMMUNITY BENEFITS PLAN

Guidance and templates for the Community Benefits Plan (CBP) can be found at the following website: https://www.energy.gov/infrastructure/about-community-benefits-plans.

APPENDIX F – BUSINESS CASE ANALYSIS

The Business Case Analysis, included in the Business Plan, demonstrates an understanding of the current and projected landscapes of the proposed DAC Hub and the potential utilization of tax credits including their projected revenue and duration.

The first section of the business case analysis should identify the potential market size of a technology option proposed by the Recipient. The analysis will contain a Business Case Analysis, Technical overview; Market analysis; Future deployment projection; and Quantification of potential benefits of the technology.

An outline of each of the five major pieces of the analysis are as follows:

Business Case Analysis

a. A *pro forma* which quantifies the projected financial parameters such as operating costs, operating revenues, financing cash flows, EBITDA, tax credits/liabilities, and ROI over the project lifespan. The Business Case Analysis should also include a list of key economic/financial assumptions.

Technical Overview

a. Description of the technology and potential applicability across the DAC Hub

Market Analysis

a. Survey of energy, water and land resources
b. Applicability of technology to these sources
c. Financial analysis of application of the technology to these sources
d. Discussion of potential financing structures and partnerships for deployment of the technology
e. Discussion of the potential utilization of tax credits and other incentives, including projected revenue and duration

Future Deployment Projection

a. Provide the potential deployment scale of the technology
b. Identify and compare competing technology options
c. Discussion of potential barriers to large scale deployment

Quantify Potential Benefits of the Technology

a. Provide estimates of the potential benefits of large-scale deployment in terms of metrics such as manufacturing jobs, revenue, emissions reductions, etc.

APPENDIX G – DEFINITION OF TECHNOLOGY READINESS LEVELS

The following is a description of the DOE Technology Readiness Levels.

Relative Level of Technology Development	TRL	TRL Definition	Description
System Operations	**9**	Actual system operated over the full range of expected mission conditions.	The technology is in its final form and operated under the full range of operating mission conditions. Examples include using the actual system with the full range of wastes in hot operations.
System Commissioning	**8**	Actual system completed and qualified through test and demonstration.	The technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development. Examples include developmental testing and evaluation of the system with actual waste in hot commissioning. Supporting information includes operational procedures that are virtually complete. An Operational Readiness Review (ORR) has been successfully completed prior to the start of hottesting.
	7	Full-scale, similar (prototypical) system demonstrated in relevant environment	This represents a major step up from TRL 6, requiring demonstration of an actual system prototype in a relevant environment. Examples include testing full-scale prototype in the field with a range of simulants in cold commissioning (1). Supporting information includes results from the full-scale testing and analysis of the differences between the test environment, and analysis of what the experimental results mean for the eventual operating system/environment. Final design is virtually complete.
Technology Demonstration	**6**	Engineering/pilot-scale, similar (prototypical) system validation in relevant environment	Engineering-scale models or prototypes are tested in a relevant environment. This represents a major step up in a technology's demonstrated readiness. Examples include testing an engineering scale prototypical system with a range of simulants. (1) Supporting information includes results from the engineering scale testing and analysis of the differences between the engineering scale, prototypical system/environment, and analysis of what the experimental results mean for the eventual operating system/environment. TRL 6 begins true engineering development of the technology as an operational system. The major difference between TRL 5 and 6 is the step up from laboratory scale to engineering scale and the determination of scaling factors that will enable design of the operating system. The prototype should be capable of performing all the functions that will be required of the operational system. The operating environment for the testing should closely represent the actual operating environment.

Relative Level of Technology Development	TRL	TRL Definition	Description
Technology Development	**5**	Laboratory scale, similar system validation in relevant environment	The basic technological components are integrated so that the system configuration is similar to (matches) the final application in almost all respects. Examples include testing a high-fidelity, laboratory scale system in a simulated environment with a range of simulants (1) and actual waste (2). Supporting information includes results from the laboratory scale testing, analysis of the differences between the laboratory and eventual operating system/environment, and analysis of what the experimental results mean for the eventual operating system/environment. The major difference between TRL 4 and 5 is the increase in the fidelity of the system and environment to theactual application. The system tested is almost prototypical.
Technology Development	**4**	Component and/or system validation in laboratory environment	The basic technological components are integrated to establish that the pieces will work together. This is relatively "low fidelity" compared with the eventual system. Examples include integration of ad hoc hardware in a laboratory and testing with a range of simulants and small-scale tests on actual waste (2). Supporting information includes the results of the integrated experiments and estimates of how the experimental components and experimental test results differ from the expected system performance goals. TRL 4-6 represent the bridge from scientific research to engineering. TRL 4 is the first step in determining whether the individual components will work together as a system. The laboratory system will probably be a mix of on hand equipment and a few special purpose components that may require special handling, calibration, or alignment to get them to function.
Research to Prove Feasibility	**3**	Analytical and experimental critical function and/or characteristic proof of concept	Active research and development (R&D) is initiated. This includes analytical studies and laboratory-scale studies to physically validate the analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative tested with simulants. (1) Supporting information includes results of laboratory tests performed to measure parameters of interest and comparison to analytical predictions for critical subsystems. At TRL 3 the work has moved beyond the paper phase to experimental work that verifies that the concept works as expected on simulants. Components of the technology are validated, but there is no attempt to integrate the components into a complete system. Modeling and simulation may be used to complement physical experiments.
	2	Technology concept and/or application formulated	Once basic principles are observed, practical applications can be invented. Applications are speculative, and there may be no proof or detailed analysis to support the assumptions. Examples are still limited to analytic studies. Supporting information includes publications or other references that outline the application being considered and that provide analysis to support the concept. The

Relative Level of Technology Development	TRL	TRL Definition	Description
Basic Technology Research			step up from TRL 1 to TRL 2 moves the ideas from pure to applied research. Most of the work is analytical or paper studies with the emphasis on understanding the science better. Experimental work is designed to corroborate the basic scientific observations made during TRL 1 work.
	1	Basic principles observed and reported	This is the lowest level of technology readiness. Scientific research begins to be translated into applied R&D. Examples might include paper studies of a technology's basic properties or experimental work that consists mainly of observations of the physical world. Supporting Information includes published research or other references that identify the principles that underlie the technology.

[1]Simulants should match relevant chemical and physical properties.
[2]Testing with as wide a range of actual waste as practicable and consistent with waste availability, safety, ALARA, cost and project risk is highly desirable.

Source: U.S. Department of Energy, "Technology Readiness Assessment Guide". Office of Management. 2011.

APPENDIX H – LIFE CYCLE ANALYSIS

Life Cycle Analysis/Assessment (LCA) is an existing framework that is well suited to evaluate CDR. By design, LCA provides a holistic perspective of the potential environmental impacts of a product or process throughout the entire lifetime. This includes the extraction of raw materials through the end-of-life. Emissions to the environment (air, water, and land) are translated to a variety of potential impacts ranging from climate change to human health. Two International Organization for Standardization (ISO) standards provide the principles and framework (14040) and requirements and guidelines (14044) for conducting LCA. LCA requirements for each TA are shown in the table below:

TA	Application	Phase 0 completion	Phase 1 completion	Phase 2 completion	Phase 3 completion
1	N/A	Pre-LCA	N/A	N/A	N/A
2	Pre-LCA	N/A	LCA	N/A	N/A
3	LCA	N/A	N/A	Refined LCA	Refined LCA

Preliminary LCA (Pre-LCA) Discussion:

The Pre-LCA is intended to define high-level description of life cycle considerations for the initial DAC Hub capacity (i.e., capacity of at least 50 KTA CO_2) and final DAC Hub capacity. If quantitative data are not available, the Recipient should provide a qualitative discussion and highlight any major uncertainties and missing information.

LCA:

This effort should result in an LCA that is in conformance with the ISO 14040/14044 standards for the initial DAC Hub capacity (i.e., capacity of at least 50 KTA CO_2) and final DAC Hub capacity. Given the stage of the project, it is expected that there will be significant uncertainty in some portions of the LCA. These should be addressed through the evaluation of multiple scenarios and sensitivities analyses as provided in the technology-specific guidance below.

Refined LCA:

The Refined LCA is intended to be a revision of the LCA to reflect any changes as the project design progresses towards completion. At this stage, the Recipient should be prepared to assess specific regionalized inputs and scale-up considerations.

Life Cycle Analysis Requirements for DAC Hub Technologies

Pre-LCA

The following information should be provided or discussed in a qualitative nature for the pre-LCA:

- Process
  - High-level carbon balance of the proposed approach
  - Disposition of the captured CO_2 – will it be stored underground or utilized in a long-lasting product
  - Define any co-products that might be produced as part of the DAC operation
- Energy and Material Inputs
  - Planned sources of energy (electricity and heat)
  - Ranges of energy and material requirements per kg CO_2 captured
- Impacts
  - Discuss potential co-benefits, including the reduction in criteria air pollutants (CAPs)

LCA

The approach and boundaries for the LCA depend on the ultimate fate of the captured CO_2 based on one of the two following options.

Option 1. In this option, the captured CO_2 from the DAC facility is sent to saline storage for permanent geologic storage. The majority of the necessary inputs for the LCA should be leveraged from the Techno-Economic Analysis (TEA) (e.g., materials and energy balances, block flow diagrams, etc.). The LCA shall be conducted in accordance with the "FECM Best Practices for LCA of Direct Air Capture with Storage (DACS)." Table 5 of the Best Practices document summarizes the requirements.

The following provides additional clarity and specificity for some items in the Best Practices.

- Required data:

  i. Separately report and account for any captured fossil CO_2 (e.g., from on-site fossil fuel combustion) from the captured atmospheric CO_2 for consistency with the functional unit
  ii. Include technical/physical flow amounts (e.g., kWh of electricity, MJ of heat) as key outputs in addition to the LCA impacts
  iii. Energy inputs to the facility including fuels and electricity
    1. For electricity inputs, a minimum of six scenarios should be modeled corresponding to different grid mix carbon intensities, available in the NETL CO2U openLCA LCI Database and the NETL CO2U LCA Documentation Spreadsheet as:

a. Regional grid consumption mix (modeled as the Balancing Authority) based on proposed location of hub
b. Current U.S. grid mix
c. 100% renewables
d. 100% grid average coal
e. 100% Natural Gas Combined Cycle (NGCC) with CCS
f. 2050 U.S. grid mix

2. For heat inputs, the following scenarios shall be assessed using the data provided by NETL:
   a. Regional source of natural gas
   b. National average natural gas
   c. If external low-grade/waste heat is utilized for the DAC process, describe the source and availability

iv. Carbon dioxide transport and saline aquifer storage life cycle inventory values (gate-to-grave emissions data to be used for all projects using saline storage) are available in the NETL CO2U openLCA LCI Database and the NETL CO2U LCA Documentation Spreadsheet as "Saline aquifer transport and storage."

- LCA results:
  i. Shall be normalized to 1 kg of CO_2 removed from the atmosphere and permanently stored
  ii. A contribution analysis shall be provided so that impacts can be differentiated by major operation/input

- Emissions scope:
  i. The scope of environmental impacts shall include all the impact categories listed in Section 4 of the Best Practices for LCA of DAC. To accomplish this, the environmental inventory will need to include data beyond greenhouse gas emissions.
  ii. For GHG emissions, the global warming potential shall be reported using the 100-year global warming potential (GWP) characterization factors as the default values from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) and the Sixth Assessment Report (AR6), sensitivity cases using the 20-year GWP values is required:

GHG	AR5 (IPCC 2013)[8]		AR6 (IPCC 2021)[9]	
	100-year (Default)	20-year	100-year (Default)	20-year
CO_2	1	1	1	1
CH_4	36	85	29.8	82.5
N_2O	298	264	273	273
SF_6	23,500	17,500	25,200	18,300

Note: These GWP characterization factors may be updated by NETL to reflect the latest science.

- Additional Resources – NETL has tools that may be helpful in completing the LCA requirement. These tools are not exhaustive but can be used to provide some life cycle inventory data for some energy and material inputs. The version of tools used for the life cycle analysis should be clearly specified in the report. The following resources are recommended:
  i. Additional General LCA guidance - CO2U LCA Guidance Document
  ii. NETL Life Cycle Inventory Data – NETL CO2U openLCA LCI Database
  iii. Electricity Consumption LCI Data – NETL Grid Mix Explorer

- LCA Submission Requirements for Phase Deliverables
  i. LCA Report – see CO2U LCA Guidance Document, Chapter 6 "Completing the NETL CO2U LCA Report Template"
  ii. LCA Model with Life Cycle Inventory Data – see CO2U LCA Guidance Document, for modeling guidance (no specific LCA software type is required)
  iii. List of all licensed LCA data used within the model (DOE will confirm or obtain license to access licensed data within the LCA model)

Option 2. If the CO_2 captured from the modeled DAC technology will be utilized to make a product, the LCA shall follow the guidelines set forth in the NETL report - "*Carbon Dioxide Utilization Life Cycle Analysis Guidance for the U.S. DOE Office of Fossil Energy*," known as the CO2U LCA Guidance Document, or simply, the guidance document. The guidance document is part of the NETL LCA CO2U Guidance Toolkit, which provides additional support for the creation of the required LCA. The

[8] IPCC. (2013). *Climate Change 2013 The Physical Science Basis*. New York: Cambridge University Press: Intergovernmental Panel on Climate Change Retrieved December 12, 2013, from https://www.ipcc.ch/report/ar5/wg1/

[9] IPCC. (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* New York: Cambridge University Press: Intergovernmental Panel on Climate Change Retrieved May 18, 2022, from https://www.ipcc.ch/report/ar6/wg1/

guidance document outlines the analysis requirements and how to use the supporting data and tools. As outlined in the guidance document, the LCA must compare a proposed product system, the supply chain of the proposed CO_2 utilization project, to an appropriate comparison product system using a multiproduct functional unit and system expansion. All materials, including the guidance document can be accessed at www.netl.doe.gov/LCA/CO2U In addition to the LCA requirements outlined for Option 1, the following shall also be accounted for:

- Development of a Comparison Product System LCA – greenhouse gas benefits of capture and utilization technologies requires a comparison to the current commercial process for developing the same product or service as derived from the carbon utilization product proposed in the project. Guidance on how to develop the Comparison Product System are contained within the CO2U LCA Guidance Document.

Refined LCA

The Refined LCA is intended to reflect any changes in design since the original LCA. All of the steps for modeling and reporting should be consistent with the LCA description above. A qualitative discussion should also be provided to describe a summary of the changes from the LCA. The Refined LCA should include:

- Scale-up considerations (≥ 50 KTA CO_2 to up to final DAC Hub capacity) – economies of scale impacts
- Representation of regionalized sources of energy inputs, including contractual procurements for dedicated sources (e.g., Power Purchase Agreement [PPA])
- Representation of regionalized storage or utilization site

APPENDIX I – PRE-FEED STUDY GUIDANCE

The integrated DAC system and DAC Hub balance-of-plant (BOP) pre-FEED studies shall result in equipment sizing fully substantiated with kinetic, heat and mass transfer data, as well as justification for choice of materials of construction. TA-1 Recipients must complete a pre-FEED study (i.e., Class 4 estimate with expected cost accuracy of +/- 30% and project definition maturity of at least 5%) for the anchoring integrated DAC system (i.e., DAC, CO_2 pipeline, CO_2 conversion (if applicable)) and required balance-of-plant (BOP) sited in the selected DAC Hub and designed for a minimum unit capacity of 50,000 tonnes CO_2 from the atmosphere annually (50 KTA), or up to the final DAC Hub capacity, depending on DAC Hub concept maturity. TA-2 and TA- 3 Recipients must complete a pre-FEED study for the DAC Hub BOP, including utilities (e.g., sources for electricity, steam, water) and CO_2 transport, for the final DAC Hub capacity.

The pre-FEED shall cover both the DAC system and required BOP. BOP includes, but is not limited to, utilities such as compression, cooling water, water treatment, waste treatment, and the sources of energy, electricity, and/or steam that are necessary to power the DAC system. The BOP also includes CO_2 transport (see **Appendix J**), CO_2 conversion (if applicable), and may include integration of an external energy source (e.g., grid electricity, solar, wind, and geothermal). If the DAC system is designed to purchase renewable electricity or to generate it on site, then the plant must include a method of energy storage or back-up power purchase or generation to supply electricity when renewable electricity is not available. Otherwise, the DAC system design and cost should be reflective of the expected capacity factor of the power generating source. The energy sources used should be clearly defined, and the impact of the energy sources on the net air capture rate should be clearly provided.

To the extent information is available, Recipients should include a detailed description of the DAC Hub infrastructure in terms of major subsystems and their interconnection(s) and a description of how the DAC Hub is intended to operate. If available, high-level schematic, technical specifications, equipment supplier and vendor information for all technologies, systems, and connective infrastructure should be included in the application. The Recipient should also describe the mass and energy balance of any major supply chain elements or unit operations, relevant system capacities, and projected availabilities.

If available, equipment descriptions should include consideration of how equipment would be used dynamically within the system. The Recipient should describe how the system design will address relevant needs for energy buffering, storage of or buffering for any intermediary, input, or waste products. Needs for and plans to balance variable supply and demand signals, as well as resiliency aspects necessary to handle maintenance outages and external system shocks should also be described.

Recipients will be expected to develop detailed cost estimates that meet industry standards for the size and complexity of the proposed DAC Hub. DOE expects that DAC Hubs will employ

industry standard cost estimating methodologies and tools. Cost estimates should correspond to the DAC Hub design maturity and reflect appropriate uncertainties. While DOE is not requiring its use, Recipients are encouraged to review DOE's Cost Estimating Guide.[10] The Table below is included in that guide and highlights examples of industry standard cost estimating approaches and use cases.

Table 1: Cost Estimate Classification for Process Industries

	Primary Characteristic	*Secondary Characteristic*		
ESTIMATE CLASS	**MATURITY LEVEL OF PROJECT DEFINITION DELIVERABLES** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges
Class 5	0% to 2%	Concept screening	Capacity factored, parametric models, judgment, or analogy	L: -20% to -50% H: +30% to +100%
Class 4	1% to 15%	Study or feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
Class 3	10% to 40%	Budget authorization or control	Semi-detailed unit costs with assembly level line items	L: -10% to -20% H: +10% to +30%
Class 2	30% to 75%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
Class 1	65% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

The cost estimate shall include preparation of a total project cost (TPC) estimate, and capital and operating cost estimates, including the cost in $/net tonne CO_2e removed and cost of the CO_2 conversion product (if applicable). The pre-FEED shall include, at a minimum: preliminary process flow diagrams; heat and material balances prepared based on a DAC process model scaled up for a minimum capture capacity of 50 KTA CO_2 facility; preliminary utility flow diagrams; preliminary piping and instrumentation diagrams; rough plot plan; draft layout drawings; draft engineered process and utility equipment lists; draft single line diagrams for electrical; vendor quotations; draft project execution plans; draft resourcing and work force plans; and a hazard and operability study (HAZOP) review.

Any costs associated with CBP activities should also be included in the TPC estimate. Narratives accompanying cost estimates should include an explanation of the estimate class and/or maturity, a description of the methodology employed, and the uncertainty or accuracy range. While DOE is not requiring specific escalation assumptions be used for the TPC, cost estimate narratives should explain what assumptions were used and why they were deemed appropriate.

[10] DOE G 413.3-21A *Cost Estimating Guide*: https://www.directives.doe.gov/directives-documents/400-series/0413.3-EGuide-21A

DOE may require use of standard cost estimating assumptions, including escalation assumptions in future phases.

APPENDIX J – PIPELINE CONCEPT AND FEED GUIDANCE

DOE is working with our partners including the U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA) to ensure a safe and reliable CO_2 transport network that supports the deployment of CCUS and CDR. As part of these study deliverables, additional critical safety and risk requirements may support future regulatory development processes.

Pipeline Concept Study

If applicable, TA-1 (integrated DAC system pre-FEED study), and TA-2 and TA-3 (DAC Hub BOP pre-FEED study) projects will perform the scope of work needed to produce deliverables including, but not limited to, those listed below:

- Pipeline sizes, hydraulic study, compression/pumping needs, power requirements, facilities, and major pipeline appurtenances.
- Maps identifying the pipeline route or alternative routes, including whether project considers existing pipelines for potential service conversion and whether alternative routes take into consideration disadvantaged community designation.
- Basic technical design parameters and system schematic such as a process flow diagram (PFD).
- Desktop review of environmentally, ecologically, and culturally sensitive areas, geotechnical hazards, other significant areas of concern, and proposed mitigation methods.
- Identification of project's major impacts to critical resources including but not limited to water, air, minerals, forests, wildlife, farmland, navigable waterways, and vulnerable communities subject to social and environmental injustice including disadvantaged communities.
- Permits required and preliminary permitting procedures, list of agencies, and review timeline.
- Major crossings, field reconnaissance information, and preliminary constructability review.
- Basic pipeline safety risk assessment plans and procedures.
- Project management plan including a preliminary risk register.
- Identification of major land ownership parcels and market appraisal along the pipeline route.
- A preliminary AACE parametric or itemized Class 4 cost estimate, basis of estimate, and a benchmarking study.
- Integrated Project Schedule.
- Status of any existing project-specific studies to date.

APPENDIX K – INTEGRATED PROJECT SCHEDULE

The Integrated Project Schedule (IPS) encompasses all phases of the project, including all tasks necessary for successful completion of the project. The IPS should include all major project activities and milestones, including technology maturation, engineering, design, permitting, NEPA, procurement construction, and CBP activities. The IPS should incorporate and show inter-relationships among all technical, financial, NEPA, CBP, permitting, and other appropriate factors; including a critical path schedule with milestones and decision points; allocating sufficient and appropriate time to complete the project deliverables. The IPS should clearly identify and incorporate timelines for application and expected completion or receipt of all required federal, state or local permits, approvals, or reviews.

The IPS will be revised, expanded, and updated in future DAC Hub phases. By the end of Phase 2, it is expected that the IPS will be execution ready and reflect comprehensive schedule risk and uncertainty analyses. During each phase, DAC Hubs will report actual progress against their execution schedule or schedules as part of regular project management reporting requirements.

The IPS should include and clearly identify:

- Project Critical Path and key sub- or non-critical paths if relevant
- Anticipated project baseline schedule
- Major project milestones and deliverables associated with all project areas, including but not limited to, technology maturation, business development, engineering, procurement, construction, CBP implementation, permitting, safety, and regulatory
- Activities supporting completion of those milestones and deliverables
- Schedule dependencies, including predecessors and successors as well as parallel and sequential activities

For purposes of the Full Application, Table 1 may be used to guide schedule development. Please note that the below descriptions should be considered indicative of expectations and non-exhaustive.

Table 1. Integrated Project Schedule Level of Detail Examples

Level 1	Summary schedule including major project milestones, deliverables, and related activities.
Level 2	A more detailed version of the Level 1 schedule that should include a breakdown into major project categories such as engineering, design, construction, procurement, permitting and regulatory, CBP implementation, and others as appropriate.
Level 3	Integrated roll up of Level 4 schedules. Should reflect breakout of activities underlying elements of the Level 2 schedule including anticipated start and finish dates for each activity. Often developed by the executing contractor using detailed information from project and/or construction managers and is used for project progress reporting.

Level 4	Detailed working schedule used to manage day-to-day activities or other near term work plans. Should be resource loaded. Often called Execution or Working schedule or similar.

APPENDIX L – BASIS FOR TECHNOLOGY EH&S RISK ANALYSIS

Environmental Health and Safety is critical to enabling the successful commercialization of DAC Hub technologies. It is important to maintain a continued focus on a safety culture across all aspects of demonstration, deployment, and commercialization. Fostering a strong safety culture must be a priority for the entire scope of a DAC Hub – for every component, piece of equipment, integrated system, and all connective infrastructure. Each DAC Hub must develop a comprehensive Safety Program that encompasses all sites, technologies, and end-uses. The DAC Hub must identify a lead (individual or team) for their Safety Program through which all safety plans are coordinated and submitted.

TA-2 and TA-3 applications must include an initial technology EH&S risk analysis. Teams should include a detailed description of safety culture, including a five-year construction/operations safety performance history (such as an OSHA 300A form or Experience Modification Rating) of the entities and management involved in the DAC Hub. For those DAC Hub teams who may not have an extensive history, a detailed description of their intended safety culture for the DAC Hub should be provided. Teams must also discuss site and cybersecurity considerations for the DAC Hub.

The Safety Program Lead will coordinate the development of comprehensive safety plans for all relevant sites,[11] to be reviewed by DOE or third-party consultants representing DOE interests. These plans should address appropriate OSHA and local safety requirements for each relevant site and should be updated regularly through the life of the project.

DAC Hubs must perform a hazard and operability analysis (HAZOP) for each site and include the results in their safety plans that will be developed and refined during the project. DAC Hubs should document their operational safety procedures for each site and are encouraged to obtain an audit of those procedures by an appropriately credentialed body. This documentation should include plans for staff safety, maintenance, and operation training.

DAC Hubs are encouraged to provide or direct local first responders and authorities having jurisdiction (AHJs) to relevant training materials, including those for the safe handling of process chemicals and other industrial activities at each site in a DAC Hub. DAC Hubs are encouraged to provide relevant training to local first responders, which should take place prior to the end of Phase 3.

[11] For safety planning purposes, a "Site" may contain one or more different DAC, CO_2 storage, or conversion technologies that may be covered under a single safety plan. For example, all components of a DAC technology where on-site capture and conversion are co-located can be considered as part of a single site. Safety plans may be subdivided across several sites at the discretion of the DAC Hub, but all elements of the DAC Hub must be included in a safety plan.

DAC Hubs will be required to collect and submit safety related data (e.g., component failure) during the period of DOE project funding. In addition, recipients will be encouraged to voluntarily provide safety-related data for a period of five (5) years from the end date of the DOE award. This data requirement contributes to a future safety culture by encouraging open communication about safety and lessons learned. It will also enable advancements in risk assessment and codes and standards development. DAC Hubs will be required to notify DOE of any safety event (e.g., leak events, fires) within 14 days and submit a report which includes a root cause analysis and steps taken to prevent future events within 60 days of the event.

Teams must also complete a permitting workflow overview that identifies the relevant and applicable federal, state, and local codes, regulations, and permitting requirements anticipated to site, construct, implement, and operate the DAC Hub. As DAC Hubs will likely span multiple site locations, the overview should be organized by site location and should identify the Authority Having Jurisdiction (AHJ) and relevant regulatory bodies that may have approval authority during the course of the project (e.g., U.S. Nuclear Regulatory Commission for DAC Hubs involving commercial nuclear power plants). DOE recognizes that the material in this overview document will likely change during the award and, as such, will require that it be revised and updated during project execution. DOE encourages DAC Hubs to conduct outreach to AHJs and submit any written confirmation from AHJs regarding the project, if received. Frequent communication with AHJs through the life of the project is encouraged as a means of mitigating permitting delays.

The purpose of the EH&S activity is to assess the environmental friendliness and safety of any future process based on the materials and process being proposed under the subject DOE FOA. This is the major concern for solvents in use today. Exposure to nanoparticles is also coming under increasing scrutiny by the U.S. Environmental Protection Agency (EPA), National Institute for Occupational Safety and Health (NIOSH) and others. The EH&S risk assessments shall be conducted by qualified and experienced organizations and professionals (*e.g.,* environmental scientists, industrial hygienists, safety engineers). *Unanticipated or uncontrolled EH&S risks will impede commercialization of CO_2 capture technologies, and the EH&S assessment is a critical element of the development project.*

Required elements for the EH&S Analysis are:

1) All potential ancillary or incidental air and water emissions, and solid wastes produced from the proposed technology shall be identified and their magnitude estimated. In addition to solvents or sorbents used, researchers shall consider possible by-products of side reactions that might also occur in the system, accumulated waste products, and the fate of contaminants from the feed gas stream. Environmental degradation products shall be addressed. Bioaccumulation, soil mobility, and degradability shall be considered. Conditions at the point of discharge shall be examined.

2) If possible, a concise but complete and comprehensible description of the various toxicological effects of the substances identified in (1) above shall be provided. A thorough literature search

shall be conducted to examine potential human health effects and ecotoxicity. Where information is lacking for a particular material, it shall be compared to similar substances or classes of substances.

3) Properties related to volatility, flammability, explosivity, other chemical reactivity, and corrosivity shall also be collected from existing databases or if necessary, through direct measurement in cases where the substance is not in common use.

4) The compliance and regulatory implications of the proposed technology shall be addressed with reference to applicable U.S. EH&S laws and associated standards including the Comprehensive Environmental Response and Liability Act of 1980 (CERCLA), Toxic Substances Control Act (TSCA), Clean Water Act (CWA), Clean Air Act (CAA), Superfund Amendments and Reauthorization Act (SARA) Title III, and the Occupational Safety and Health Act (OSHA).

5) An engineering analysis shall be conducted for any potentially hazardous materials identified to look for ways their use can be eliminated or minimized. Less hazardous materials should be substituted where possible. For any new materials being proposed, synthetic options shall be examined that may lead to similar, less-hazardous compounds with the required functionality. Possible engineering controls and other mitigation strategies shall be described as appropriate.

Precautions for safe handling and conditions for safe storage shall be identified, including any incompatibilities with other materials that may be used in the process. Waste treatment and offsite disposal options shall be examined. Accidental release measures shall also be discussed.

APPENDIX M – STORAGE FIELD DEVELOPMENT PLAN

The Storage Field Development Plan should: (1) explain the strategy for developing the storage field to maximize its potential utility; (2) describe all elements of the proposed storage field facilities and establish a logical order and timing for the development of all anticipated facilities, accounting for changing needs for monitoring and use of pore space and changing CO_2 delivery rates over time; and (3) present a cost plan over the proposed life of the project. It is expected that the facilities description within the Storage Field Development Plan would be based on information associated with the relevant permits (e.g., UIC or OCS permit application and associated permit terms and conditions, NPDES permit, monitoring well permits, site access road permit), along with regulatory rules and guidance. The Plan should include, if relevant, the assessment and repurposing or plugging of legacy wells and other existing infrastructure. It is understood that this Plan will be only a draft or preliminary until after relevant permits are received, financing is arranged, and other considerations are settled.

There are several major cost categories related to the development of a CO_2 storage site, including wells, infrastructure, and monitoring deployment. Each of these will bring their own cost uncertainty due to outside influences such as oilfield contractor demand, steel price, supply chain disruptions, and inflation. To set the correct expectations, each Plan is required to include a project cost breakdown with a P-10, P-50 and P-90 project cost analysis. Project risks and their effect on cost should be clearly explained. In addition, each proposed well should have a full Authorization for Expenditures (AFEs) with cost uncertainty ranges defined for each line item.

The Storage Field Development Plan should additionally report the progression of the storage resource status through Prospective, Contingent, and Capacity based on the SRMS guidelines described at SPE CO_2 Storage Resource Management System (SRMS). Projects should follow the SRMS process to classify the status of the storage resource(s) from prospective through contingent to capacity. The estimated classification of the resource(s) and capacity(ies) will be used by DOE to demonstrate how BIL-funded projects are increasing secure geologic storage capabilities in the U.S.

Additionally, it is important to understand the plan for commercialization and how the storage field would be built and evolve over time (at least 30 years). A description and diagram of the fully developed field with clear delineation as to the immediate portion that makes up the current project, should be used in the Storage Field Development Plan and in business plan description.

Suggested contents of the Storage Field Development Plan are described below. Please note however that DOE will accept the Plan in whatever format is company standard for the

Recipient, assuming that the Plan has all needed information to understand the build-out, operations and costs for the planned storage of CO_2.

Suggested contents of the Field Development Plan:

1. Executive Summary
2. Storage Development Description and Rationale for Development Plan
    - Field Characterization Results
    - Seismic Interpretation and Structural Configuration
    - Geological Interpretation and Reservoir Description
    - Volumetrics
    - Reservoir Pressure and Reservoir Fluids
    - Reservoir Units and Modelling Approach
    - Injection Rate and Mass Over Time
    - Area of Review Calculation
    - Legacy Well Evaluation
3. Development and Management Plan
    - Development Plan
    - Well Construction and Legacy Well Mitigation Plans
    - Injection Facilities
    - Monitoring Plan
    - Injection Operations
    - Decommissioning & PISC Plan
    - Costs
        - Pre-Project Costs (Seismic, Exploration Drilling, Appraisal Drilling, Studies)
        - Drilling and completion of wells
        - Assessment and repurposing or plugging of legacy wells, pipelines and other existing infrastructure
        - Facilities
        - Field OpEx, excluding tariffs
        - Decommissioning & PISC costs
    - Project Risks & Mitigations
    - Storage Management Plan

APPENDIX N – DAC HUB DATA TABLES

***Instructions for completing data tables*:** Recipients shall complete the appropriate combinations of Table 1 and 2 and Tables 3-8 that relate to their proposed DAC Hub. If multiple DAC technologies are proposed in the DAC Hub, Table 2 must be completed for each DAC technology with a separated corresponding state point data table for the DAC material. *Merit scoring of application will correspond to the completeness of the data table and supporting information.*

Recipients are required to provide the demonstrated performance data for their DAC technology(ies).

Key data or estimates provided in the table(s) shall be supported with short narratives in bullet form. These bullets shall describe the sources for the individual data provided. This may be measurements made directly by the Recipient and shall identify the apparatus and methodology used in the measurement(s). Citations may be utilized to describe the sources for the individual data provided, or by example calculations for noncritical data. Other acceptable sources of data are the open literature (with citation and description), or estimated or extrapolated data (with description of method/model used for the estimate, or the procedure used for extrapolation). Arguments supported by theory/mechanisms shall be provided for projected performance for new, advanced DAC materials.

Table 1. Data Table for the DAC Hub

	Units	Initial Capacity	Final Capacity (if applicable)
Scalability and DAC Technologies			
DAC Hub Proposed Scale (Net CO_2 captured from the atmosphere)	Net tonne CO_2/yr.		
DAC Hub Proposed Scale (Gross CO_2 captured from the atmosphere)	Gross tonne CO_2/yr.		
DAC Technology(ies) in DAC Hub and TRL[1]	Technology and TRL		
Carbon Potential			
CO_2 Conversion Offtakers Available	-		
CO_2 Conversion Capacity for DAC Hub	tonne CO_2/yr.		
CO_2 Storage Options for DAC Hub	-		
CO_2 Storage Capacity Available	tonne CO_2		
Resources			
CO_2 Storage Infrastructure Available	-		
CO_2 Transport Infrastructure Available	-		
CO_2 Pipeline needed for DAC Hub	miles		
Total Land Requirements for DAC Hub	m^2		
Total Water Requirements for DAC Hub	Tonnes/yr.		
Energy Sources Available	type		
Renewable and Low Carbon Energy Available[2]	type		
Total Energy Requirements for DAC Hub	GJ/tonne CO_2 removed from atmosphere		
Total Thermal Energy Requirements for DAC Hub	GJ/tonne CO_2 removed from atmosphere		
Total Electrical Energy Requirements for DAC Hub	GJ/tonne CO_2 removed from atmosphere		
Emissions			

Type of Emission related to Energy Source	Type (e.g., natural gas leakage, CO_2, etc.)		
Total Emissions related to Energy Source	CO_2e tonne/yr.		
Geographic Diversity - DAC Hub Region			
DAC Hub Area	Square miles		
DAC Hub Region States	State(s)		
DAC Hub Region counties	counties		
DAC Hub Region cities	Cities		
DAC Hub Region zip codes	Zip codes		
Hubs in Fossil-Producing Regions			
Coal production (current) in DAC Hub Region	Tonnes/yr.		
Coal Production (Retired last 10 years) in DAC Hub Region	Tonnes/yr.		
Oil Production (current) in DAC Hub Region	Thousand Barrels per Day		
Oil Production (Retired last 10 years) in DAC Hub Region	Thousand Barrels per Day		
Gas Production (current) in DAC Hub Region	Cubic meters		
Gas Production (Retired last 10 years) in DAC Hub Region	Cubic meters		
Carbon Intensity of Local Industry			
Carbon Intensity of Local Industry	Kg CO_2/million BTU		
Retired Carbon-Intensive Industrial Capacity	-		
Economic Distressed Area			
Economic Distressed Area(s) in DAC Hub Region	Yes/No		
Employment			
Employment Potential	Jobs (operating-full time)		
Employment Potential	Jobs (construction)		

[1] List all the DAC technologies proposed in the DAC Hub and their current TRL.

[2] List the renewable and low carbon energy available in the proposed DAC Hub region, such as wind, solar, geothermal, nuclear, and fossil fuel or biomass equipped with CCUS

Table 2. Data Table for Individual DAC Technology(ies)

	Units	Measured Performance	Projected Performance
DAC Technology			
DAC Technology and TRL	-		
Scale (Net CO_2 captured from the atmosphere)	Net tonne CO_2/yr.		
Scale (Gross CO_2 captured from the atmosphere)	Gross tonne CO_2/yr.		
Total Energy Requirements[1]	GJ/tonne CO_2 removed from atmosphere		
Total Thermal Energy Requirements	GJ/tonne CO_2 removed from atmosphere		
Required Temperature of Thermal Energy	°C		
Total Electricity Energy Requirements	GJ/tonne CO_2 removed from atmosphere		
Volumetric Productivity	gmol CO_2 / m^3 capture media / time		
CO_2 Capture Percentage from air	%		
System Pressure Drop	Pa		
Energy Source	-		
Emissions related to energy source	CO_2e tonne/yr.		

[1] Total thermal and electricity requirements encompass the entire process, including pre-treatment, process operation, capture media conditioning/regeneration/drying, etc.

Table 3. State-Point Data for Solvent Based Systems

	Units	Measured/ Estimated Performance	Projected Performance
Pure Solvent			
Molecular Weight	mol-1		
Standard Boiling Point	°C		
Standard Freezing Point	°C		
Vapor Pressure @ 15°C	bar		
Working Solution			
Concentration	kg/kg		
Specific Gravity (15 °C/15 °C)	-		
Specific Heat Capacity @ STP	kJ/kg·K		
Viscosity @ STP	cP		
Surface Tension @ STP	dyn/cm		
CO_2 Mass Transfer Rate [KL]	m/s		
CO_2 Reaction Rate	-		
Thermal Conductivity	W/(m·K)		
Absorption			
Pressure	bar		
Temperature	°C		
Equilibrium CO_2 Loading	gmol CO_2/kg		
Heat of Absorption	kJ/kg CO_2		
Solution Viscosity	cP		
Desorption			
Pressure	bar		
Temperature	°C		
Equilibrium CO_2 Loading	gmol CO_2/kg		
Heat of Desorption	kJ/kg CO_2		
Pilot Scale Data			
Location			
The following information should be provided for the longest steady-state duration test performed			
Scale	tCO_2/year		
Duration of Long-Term Test (consecutive hours)	hr.		

CO_2 concentration in the feed stream (e.g., flue gas, process stream)	Mol %		
Carbon Capture Efficiency	%		
Solvent Make-up rate	%/yr.		
Reboiler Duty	KJ/Kg CO_2		
Details on solvent reclamation or refreshing			
CO_2 Product Purity	Mol % dry		
CO_2 Product Oxygen Concentration	Mol% (or ppm)		

Definitions for Table 3:
STP – Standard Temperature and Pressure (15 °C, 1 atm)
Pure Solvent – Agent(s), working alone or as a component of a working solution, responsible for enhanced CO_2 absorption. For example: the amine monoethanolamine (MEA) in an aqueous solution.
Working Solution – The solute-free (i.e., CO_2-free) liquid solution used as the working solvent in the absorption/desorption process. For example: the liquid mixture of MEA and water.
Absorption – The conditions of interest for absorption are those that prevail at maximum solvent loading, which typically occurs at the bottom of the absorption column. Measured data are preferable to estimated data.
Desorption – The conditions of interest for desorption are those that prevail at minimum solvent loading, which typically occurs at the bottom of the desorption column. Operating pressure and temperature for the desorber/stripper are process dependent. Measured data are preferable to estimated data.
Pressure – The pressure of CO_2 in equilibrium with the solution. If the vapor phase is pure CO_2, this is the total pressure, and if it is a mixture of gases, this is the partial pressure of CO_2.
Concentration – Mass fraction of pure solvent in working solution.
Loading – The basis for CO_2 loading is moles of pure solvent.
Mass Transfer Rate – Overall liquid phase mass transfer coefficient.
CO_2 Reaction Rate – A characterization of the CO_2 absorption trend with respect to time, as complete in the range of time as possible.
Details on solvent reclamation or refreshing – Include information about reclamation rates or solvent replacement/refreshing during the long-term test
CO_2 Product Purity – Average purity of the CO_2 product from the capture system during the long-term testing
CO_2 Product Oxygen Concentration – Oxygen content of the CO_2 produced during the long-term testing

Table 4. State-Point Data for Sorbent Based Systems

	Units	Measured Performance (Powder form)	Projected or Measured Performance (Structured material system)
Sorbent			
True Density @ STP	kg/m^3		
Bulk Density	kg/m^3		
Average Particle Diameter	mm		
Particle Void Fraction	m^3/m^3		
Packing Density	m^2/m^3		
Solid Heat Capacity @ STP	kJ/kg·K		
Crush Strength	kgf		
Attrition Index	-		
Thermal Conductivity	W/(m·K)		
Adsorption			
Pressure	bar		
Temperature	°C		
Equilibrium Loading	gmol CO_2/kg		
Heat of Adsorption	kJ/gmol CO_2		
CO_2 Adsorption Kinetics	gmol/time		
Desorption			
Pressure	bar		
Temperature	°C		
Equilibrium Loading	gmol CO_2/kg		
Heat of Desorption	kJ/gmol CO_2		
CO_2 Desorption Kinetics	gmol/time		
Pilot Scale Information			
Location			
The following information should be provided for the longest steady-state duration test performed			
Scale	tCO_2/year		
Duration of Long-Term Test (consecutive hours)	hrs.		
CO_2 concentration in feed stream (e.g., flue gas, process stream)	%		

Carbon Capture Efficiency	%		
Cycle Time	Hr.		
Sorbent Make-up rate	%/yr.		
Details on sorbent reactivation or refreshing			
Heat Duty	KJ/Kg CO_2		
CO_2 Product Purity	Mol % dry		
CO_2 Product Oxygen Concentration	Mol% (or ppm)		

Definitions for Table 4:
Attrition Index – For circulating sorbents, the attrition index includes the percentage and size of the fines generated
STP – Standard Temperature and Pressure (15 °C, 1 atm)
Sorbent – Adsorbate-free (i.e., CO_2-free) and dry material as used in adsorption/desorption cycle.
Adsorption – The conditions of interest for adsorption are those that prevail at maximum sorbent loading. Measured data are preferable to estimated data.
Desorption – The conditions of interest for desorption are those that prevail at minimum sorbent loading. Operating pressure and temperature for the desorber/stripper are process dependent. Measured data are preferable to estimated data.
Pressure – The pressure of CO_2 in equilibrium with the sorbent. If the vapor phase is pure CO_2, this is the total pressure, and if it is a mixture of gases, this is the partial pressure of CO_2.
Packing Density – Ratio of the active sorbent area to the bulk sorbent volume.
Loading – The basis for CO_2 loading is mass of dry sorbent.
Kinetics – A characterization of the CO_2 adsorption/desorption trend with respect to time, as complete in the range of time as possible.
Cycle Time – time for entire absorption and regeneration cycle utilized during long term testing
Details on sorbent reactivation or refreshing – Include information about reactivation process and rates or sorbent replacement during the long-term test
CO_2 Product Purity – Average purity of the CO_2 product from the capture system during the long-term testing
CO_2 Product Oxygen Concentration – Oxygen content of the CO_2 produced during the long-term testing

Table 5. State-Point Data for Membrane Based Systems

	Units	Measured/ Estimated Performance	Projected Performance
Materials Properties			
Materials of Fabrication for Selective Layer			
Materials of Fabrication for Support Layer (if applicable)			
Nominal Thickness of Selective Layer (mm)			
Membrane Geometry			
Max Trans-Membrane Pressure	bar		
Hours tested without significant degradation			
Membrane Performance			
Temperature	°C		
Pressure Standardized Flux for Permeate (CO_2)	GPU or equivalent		
CO_2/H_2O Selectivity	-		
CO_2/N_2 Selectivity	-		
Type of Measurement (Ideal or mixed gas)	-		
Proposed Module Design			
Flow Arrangement	-		
Packing Density	m^2/m^3		
Shell-Side Fluid	-		
Pilot Scale Information			
Location			
The following information should be provided for the longest steady-state duration test performed			
Scale	$tCO_2/yr.$		
CO_2 concentration in feed stream (e.g., flue gas, process stream)	%		
Duration of Long-Term Test (consecutive hours)	hrs.		
Average CO_2 capture Efficiency	%		
Starting CO_2 Capture Efficiency	%		

Ending CO_2 Capture Efficiency	%	
Membrane Performance Degradation	%/year	
CO_2 Product Purity	Mol % dry	
CO_2 Product Oxygen Concentration	Mol% (or ppm)	
Membrane Feed Pressure*	psia	
Permeate Pressure*	psia	

Definitions for Table 5:
Membrane Geometry – Flat discs or sheets, hollow fibers, tubes, etc.
Pressure Standardized Flux – For materials that display a linear dependence of flux on partial pressure differential, this is equivalent to the membrane's permeance.
GPU – Gas Permeation Unit, which is equivalent to 10-6 $cm^3/(cm^2 \cdot s \cdot cmHg)$ at 1 atm and 0 °C. For non-linear materials, the dimensional units reported shall be based on flux measured in $cm^3/(cm^2 \cdot s)$ (at 1 atm and 0 °C) with pressures measured in cm Hg. Note: 1 GPU = 3.3464×10-6 $kgmol/(m^2 \cdot s \cdot kPa)$ [SI units]
Type of Measurement – Either mixed or pure gas measurements; projected permeance and selectivities shall be for mixture of gases found in de-sulfurized flue gas.
Flow Arrangement – Typical gas-separation module designs include spiral-wound sheets, hollow-fiber bundles, shell-and-tube, and plate-and-frame, which result in either co-current, counter-current, cross-flow arrangements, or some complex combination of these.
Packing Density – Ratio of the active surface area of the membrane to the volume of the module.
Shell-Side Fluid – Either the permeate or retentate stream.
Details on membrane reactivation or replacement – Include information about reactivation process and rates or membrane replacement during the long-term test
Starting CO_2 Capture Efficiency – Capture efficiency achieved in the first hour of long-term testing
Ending CO_2 Capture Efficiency – Capture efficiency achieved in the last hour of long-term testing
CO_2 Product Purity – Average purity of the CO_2 product from the capture system during the long-term testing
CO_2 Product Oxygen Concentration – Oxygen content of the CO_2 produced during the long-term testing
Membrane Feed Pressure – Pressure of gas fed to the membrane for separation during the long-term test. *Repeat this parameter for each stage of membrane used during the long-term test
Permeate Pressure – Pressure of the corresponding permeate of the membrane that accounts for the trans membrane pressure drop and any vacuum used. * Repeat this parameter for each stage of membrane used during the long-term test

Table 6. Synthesis of Value-Added Organic Products: Technology Performance Data

	Units	Measured/Current Performance	Projected/Target Performance
Synthesis Pathway Steps[1]			
Step 1 (based on CO_2)	mol^{-1}	Balanced chemical equation	
Step 2	mol^{-1}	Balanced chemical equation	
Step n	mol^{-1}	Balanced chemical equation	
Source of external intermediate 1		(e.g., natural gas, oil, renewable energy, etc.)	
Source of external intermediate 2		(e.g., natural gas, oil, renewable energy, etc.)	
Source of external intermediate n		(e.g., natural gas, oil, renewable energy, etc.)	
Reaction Thermodynamics[2,3]			
Reaction[4]			
ΔH^o_{rxn}	KJ/mol	Calculated from standard enthalpies of formation	
ΔG^o_{rxn}	KJ/mol	Calculated from standard free energies of formation	
Conditions		(range)	(range)
CO_2 Source[5]			
Catalyst[6]			
Pressure	bar		
CO_2 Partial Pressure	bar		
Temperature	^oC		
Performance		(range)	(minimum)
Nominal Residence Time[7]	sec		
Selectivity to Desired Product[8]	%		
Product Composition[9]		(range)	(optimal)
Desired Product	mol%		
Desirable Co-Products	mol%		
" "	mol%		
Unwanted By-Products	mol%		
" "	mol%		
Grand Total	**mol%**	**--**	**100%**

Notes

[1] Balanced equations for each step in the synthesis pathway. Intermediates provided from externalsources (e.g., ethane, methane, hydrogen, etc.) should be shown in **BOLD** type. Intermediates generated as part of the synthesis pathway should be in standard type.

[2] *STP* – Standard Temperature and Pressure (25°C, 1 atm)

[3] If Standard Enthalpies and Gibbs Free Energies of Formation cannot be found for some chemical speciesin the proposed chemical reaction(s), they should be estimated; however, *the method used must be clearlyreferenced or described*.

[4] Identify the type of reaction for example, thermochemical, electrochemical, photochemical, etc.

[5] Identify the CO_2 source for example, coal-fired flue gas, natural gas-fired flue gas, pure CO_2, etc.

[6] Identify the catalyst composition.

[7] Reactor residence times are difficult to quantify, especially early in any laboratory-scale development effort. Definitions vary based on whether the reaction is being carried out in a batch or continuous reactorand whether a homogeneous, heterogeneous or no catalyst is being used. For the calculation of NominalResidence Time, the recipient should use the following equations:
For experimental systems involving batch reactors:
{Nominal Residence Time} = {Length of Time Reactor is Operated}For continuous reactors operated at steady state, employing a solid catalyst:
{Nominal Residence Time} = {Mass of Catalyst in Reactor} / {Total Mass Flowrate into Reactor}For continuous reactors operated at steady state, employing a homogenous or no catalyst:
{Nominal Residence Time} = {Volume of Reactor} / {Total Volume Flowrate into Reactor}
[8] Selectivity to Desired Product is the fraction of the carbon in the Desired Product (see definition below)to the total amount of available carbon reacted, expressed as mole-percent.
[9] Recipient should define the primary product of interest. Standardly, this is either the highest value or largest volume compound or material produced. Desirable co-products are any other reaction productsof sufficient value that they would be profitable for the producer to recover, purify, transport and market. Whether to maximize or minimize production of these co-products is an economic decision.
Unwanted by-products are produced from undesired side reactions, which may result from systemupsets or may be an unavoidable consequence of the current state of technology development.

Table 7. Production of Inorganic Materials (Solid Carbon Products): Technology Performance Data

	Units	Measured/Current Performance	Projected/Target Performance
Reaction Thermodynamics[1,2]			
Reaction[3]			
Chemical Equation	mol^{-1}	Balanced chemical equation	
$\Delta H°_{rxn}$	kJ/mol	Calculated from standard enthalpies of formation	
$\Delta G°_{rxn}$	kJ/mol	Calculated from standard free energies of formation	
Reaction Conditions			
CO_2 Source[4]	-		
Catalyst[5]	-		
Pressure	bar		
CO_2 Partial Pressure	bar		
Temperature	°C		
Nominal Residence Time[6]	sec		
Once-Through Performance[7]			
CO_2 Conversion[8]	%		
Selectivity to Desired Product[9]	%		
Yield of Desired Product[10]	%		
Product Composition			
Desired Product[11]	-		
Main Product Impurities[12]	-		
Purity of Finished Product[13]	%		
Product Production[14]	kg/hr.		
Co-Products[15]	-		
Co-Product Production[16]	kg/hr.		
Product Properties[17]			
Density	kg/m^3		
Particle Size	(microns)		
Surface Area	m^2/g		
Commercial Product Properties[18]		**Current**	
Density	kg/m^3		
Particle Size	microns		
Surface Area	m^2/g		
U.S. Market Size	Tonnes/yr.		
Global Market Size	Tonnes/yr.		
Market Price	$/kg		

Notes

[1] STP – Standard Temperature and Pressure (25°C, 1 atm)

[2] If Standard Enthalpies and Gibbs Free Energies of Formation cannot be found for some chemical species in the proposed chemical reaction(s), they should be estimated; however, the method usedmust be clearly referenced or described.

[3] Identify the type of reaction for example, thermochemical, electrochemical, photochemical, etc.

[4] Identify the CO_2 source for example, coal-fired flue gas, natural gas-fired flue gas, pure CO_2, etc.

[5] Identify the catalyst composition.

[6] For the calculation of Nominal Residence Time, the recipient should use the following equations:For experimental systems involving batch reactors:
{Nominal Residence Time} = {Length of Time Reactor is Operated}For continuous reactors operated at steady state, employing a solid catalyst:
{Nominal Residence Time} = {Mass of Catalyst in Reactor} / {Total Mass Flowrate into Reactor}For continuous reactors operated at steady state, employing a homogenous or no catalyst:
{Nominal Residence Time} = {Volume of Reactor} / {Total Volume Flowrate into Reactor}

[7] Once-Through Performance should be reported for the reaction(s) based on moles of CO_2 in the feed.[8] CO_2 Conversion is the quotient of the CO_2 reacted to the initial CO_2 in the feed, expressed as mole- percent.
CO_2 Conversion =100 x (moles CO_2 reacted) / (moles CO_2 in feed)

[9] Selectivity to Desired Product (as defined below) is the quotient of the moles of carbon from CO_2 in the Desired Product to the moles of CO_2 reacted, expressed as mole-percent.
Selectivity to Desired Product =100 x (moles of carbon from CO_2 in Desired Product) / (mols CO_2 reacted)

[10] Yield of Desired Product = (CO_2 Conversion) × (Selectivity to Desired Product) / 100

[11] Identify the desired product, for example graphene, carbon nanotubes, carbon black, etc. finished, commercial carbon products are defined by the performance specifications required for their specific uses. As used here, the term 'Desired Product' refers to the morphology of the carbon: nanotubes, graphene or graphitic sheets or flakes, etc., and does not include impurities left in the finished product.[12] Identify the main product impurities for the example byproducts contaminants, etc. that are not separated from the finished product.

[13] Purity of Desired Product = (mass of the desired product) / (Total mass of the finished product)
Where the 'Total mass of the product' is the mass of the desired product plus the mass of the product impurities or contaminants.

[14] Product Production is the mass flowrate of the desired product produced during the proposed testing.

[15] List the main Co-product, if applicable.

[16] Co-Product Production is the mass flowrate of the co-product produced during the proposed testing.

[17] Product Properties are the properties of the desired product produced during testing.

[18] Commercial Product Properties are the properties of the commercial product that the finishedproduct of the proposed technology plans to produce or compete against.

Table 8. Production of Inorganic Materials: Maximizing Carbon Uptake in Concrete and Cement Technology Performance Data

	Units	Measured/Current Performance	Projected/Target Performance
Reaction Thermodynamics[1,2]			
Chemical Equation	mol^{-1}	Balanced chemical equation	
$\Delta H°_{rxn}$	kJ/mol	Calculated from standard enthalpies of formation	
$\Delta G°_{rxn}$	kJ/mol	Calculated from standard free energies of formation	
Reaction Conditions			
CO_2 Source[3]			
Pressure	bar		
CO_2 Partial Pressure	bar		
Temperature	°C		
Nominal Residence Time[4]	sec		
Alkaline Reactant Source[5]			
Process Route[6]	(direct/ indirect)		
Once-Through Performance[7]			
CO_2 Conversion[8]	(%)		
CO_2 Uptake Potential[9]	(g-CO_2/g material)		
CO_2 Uptake Actual[10]	(g-CO_2/g material)		
Product Properties[11]			
Desired Product			
Compressive Strength[12]	(MPa)		
Density	(kg/m^3)		
Product Production	(kg/h)		
Commercial Product Properties[13]		**Current**	
Commercial Product			
Compressive Strength[12]	(MPa)		
Density	(kg/m^3)		
U.S. Market Size	(Tonnes/yr.)		
Global Market Size	(Tonnes/yr.)		
Market Price	($/kg)		

Notes

[1] STP – Standard Temperature and Pressure (25°C, 1 atm)

[2] If Standard Enthalpies and Gibbs Free Energies of Formation cannot be found for some chemical species in the proposed chemical reaction(s), they should be estimated; however, the method usedmust be clearly referenced or described.

[3] Identify the CO_2 source for example, coal-fired flue gas, natural gas-fired flue gas, pure CO_2, etc.

[4] For the calculation of Nominal Residence Time, the recipient should use the following equations:For experimental systems involving batch reactors:

{Nominal Residence Time} = {Length of Time Reactor is Operated} For continuous reactors operated at steady state, employing a solid catalyst:

{Nominal Residence Time} = {Mass of Catalyst in Reactor} / {Total Mass Flowrate into Reactor}

For continuous reactors operated at steady state, employing a homogenous or no catalyst:

{Nominal Residence Time} = {Volume of Reactor} / {Total Volume Flowrate into Reactor}

[5] Identify the Alkaline Reactant Source for example, fly ash, slags, mine tailings, etc.

[6] Process Route: Identify the process as direct (carbonation of the feed occurs as a single step withoutextraction or dissolution of the mineral ions) or indirect (extraction or dissolution of mineral ions fromthe feed occurs in a separate step before carbonation)

[7] Once-Through Performance should be reported for the reaction(s) based on moles of CO_2 in the feed.

[8] CO_2 Conversion is the quotient of the CO_2 reacted to the initial CO_2 in the feed, expressed as mole- percent. CO_2 Conversion =100 x (moles CO_2 reacted) / (moles CO_2 in feed)

[9] CO_2 Uptake Potential is the mass of CO_2 that can theoretically be reacted per mass of the unreactedmaterial that produces the final product after carbonation

[10] CO_2 Uptake Actual is the actual mass of CO_2 reacted per mass of the unreacted material that producesthe final product after carbonation

[11] Product Properties are the properties of the desired product produced for during testing

[12] Compressive strength following 28 days of aging

[13] Commercial Product Properties are the properties of the current commercial product that theproposed technology plans to produce or compete against

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Federal Assistance Reporting Checklist

Attachment 3

1. Award Number: DE-FE0032382	2. Program/Project Title: Bipartisan Infrastructure Law (BIL) Community Alliance for Direct Air Capture
3. Recipient: Regents of the University of California	

4. Reporting Requirements (see also the Special Instructions)	Frequency	Addresses
I. PROJECT MANAGEMENT REPORTING		
☒ A. Performance Report – Narrative	**Q**	A. NETL FITS
☒ B. Performance Report – Quantitative	**Q**	B. NETL FITS
☒ C. Financial Report (SF-425)	**F, Q**	C. NETL FITS
☒ D. Scientific and Technical Reporting		
☒ 1. Accepted Manuscript of Journal Article(s)	**A5, P**	D.1. OSTI E-Link
☒ 2. Conference Product(s)	**A5, P**	D.2. OSTI E-Link
☒ 3. Technical Report(s)	**A5, P**	D.3. OSTI E-Link
☒ 4. Software & Manual(s)	**A5, P**	D.4. DOE CODE
☒ 5. Dataset(s)	**A5, P**	D.5. EDX
☒ 6. Other STI (Dissertation / Thesis, etc.)	**A5, P**	D.6. OSTI E-Link
☒ E. Intellectual Property Reporting		
☒ 1. Intellectual Property Reporting	**A5, P**	E.1. iEdison
☒ 2. Invention Utilization Report	**A5, P**	E.2. iEdison
☒ F. Project Management Plan (PMP)	**A5**	F. NETL FITS
☒ G. Special Status Report	**A5**	G. NETL FITS
☒ H. Continuation Application	**A5**	H. NETL FITS
☒ I. Other Project Management Reporting (see Special Instructions)	**A5**	I. See Special Instructions
II. AWARD MANAGEMENT REPORTING		
☒ A. Current and Pending Support	**A5**	A. NETL FITS
☐ B. Reserved	**A5**	B. Reserved
☒ C. Financial Conflict of Interest Report	**A5**	C. NETL FITS
☐ D. Tangible Personal Property Report – Annual Property Report (SF-428 & SF-428A)	**Y**	D. NETL FITS
☒ E. Tangible Personal Property Report – Disposition Request/Report (SF-428 & SF-428C)	**A5**	E. NETL FITS
☒ F. Uniform Commercial Code (UCC) Financing Statements	**A5**	F. See section II. F. for instructions and due dates
☒ G. Federal Subaward Reporting System (FSRS)	**A5**	G. FSRS
☐ H. Annual Incurred Cost Proposal	**Y180**	H. See section II. H. for instructions and due dates
☐ I. Fringe Reconciliation Form	**Y180**	I. See section II. I. for instructions and due dates
☐ J. DOE For-Profit Compliance Audit	**O**	J. See section II. J. for instructions and due dates
☒ K. Single Audit: States, Locals, Tribal Governments, and Non-Profits	**O**	K. See section II. K. for instructions and due dates
☐ L. Other Award Management Reporting (see Special Instructions)	**A5**	L. See Special Instructions
III. CLOSEOUT REPORTING		
☒ A. Final Scientific/Technical Report		
☐ A.1. Final Scientific/Technical Report – Unlimited	**F**	A.1. OSTI E-Link
☒ A.2. Final Scientific/Technical Report – Data Protection	**F**	A.2. OSTI E-Link
☒ B. Invention Certification (DOE F 2050.11)	**F**	B. NETL FITS
☒ C. Tangible Personal Property Report – Final Report (SF-428 & SF-428B)	**F**	C. NETL FITS
☒ D. Verification of Receipt of Accepted Manuscripts	**F**	D. See section III. D. for instructions and due dates
☒ E. Other Closeout Reporting (see Special Instructions)	**F**	E. See Special Instructions
IV. POST-PROJECT REPORTING		
☒ A. Scientific and Technical Reporting	**P**	A. OSTI E-Link
☒ B. Intellectual Property Reporting	**P**	B. iEdison

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4. Reporting Requirements (see also the Special Instructions)	Frequency	Addresses
V. BIPARTISAN INFRASTRUCTURE LAW/INFLATION REDUCTION ACT REPORTING		
☒ A. Community Benefits Report	**A5, Y, F**	A. NETL FITS
☒ B. Boosting Domestic Manufacturing	**A5, Y, F**	B. NETL FITS
☒ C. Quality Job Creation		
☐ 1. Direct Jobs	**A5**	C.1. See Section V. C. I for instructions and due dates.
☐ 2. Training Outcomes	**A5, Y, F**	C.2. NETL FITS
☒ 3. Good Jobs Outcomes	**A5, Y, F**	C.3. NETL FITS
☐ 4. Permanent Jobs	**Q**	C.4. NETL FITS
☒ D. Equity and Justice		
☐ 1. Community Engagement Process	**Q**	D.1. NETL FITS
☒ 2. Engagement Events and Technical Assistance	**Q**	D.2. NETL FITS
☐ 3. Community Ownership	**Q**	D.3. NETL FITS
☐ E. Pathway to Net-Zero		
☐ 1. Infrastructure Supported	**A5, Y, F**	E.1. NETL FITS
☐ 2. Hydrogen Production	**A5, Y, F**	E.2. NETL FITS
☐ 3. Carbon Capture, Removal, and Storage	**A5, Y, F**	E.3. NETL FITS
☐ 4. Energy Saved	**A5, Y, F**	E.4. NETL FITS
☐ F. Davis Bacon Act Semi-Annual Labor Compliance Report	**A5**	F. NETL FITS
☒ G. Locations of Work	**A5**	G. NETL FITS

FREQUENCY CODES AND DUE DATES:

A5 – As Specified or within five (5) calendar days after the event.

F – Final; within 120 calendar days after expiration or termination of the award.

O – Other: See instructions for further details.

P – Post-project (after the period of performance); within five (5) calendar days after the event, or as specified.

Q – Quarterly; within 30 calendar days after the end of the federal fiscal year quarter.

S – Semiannually; within 30 days after end of the reporting period.

Y – Yearly; within 90 calendar days after the end of the federal fiscal year or termination of the award.

Y180 – Yearly; within 180 calendar days after the close of the recipient's fiscal year.

FULL URLS:

OSTI E-Link: https://www.osti.gov/elink/2413-submission.jsp
Energy Data Exchange (EDX): https://edx.netl.doe.gov/
DOE CODE: https://www.osti.gov/doecode/
iEdison: https://www.nist.gov/iedison
NETL FITS: FITS@netl.doe.gov
FSRS: https://www.fsrs.gov

5. Special Instructions:

Recipient's fiscal year end date: 06/30

☐ No indirect costs proposed
☐ De minimis rate used/No fringe proposed

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5. Special Instructions (Continued):

I. Project Management Reporting:

H. Continuation Application

Continuation Application to proceed from Budget Period 1 (Phase 0a) to Budget Period 2 (Phase 0b) is due **45 days** before the end of Budget Period 1. See additional Continuation Application requirements contained in the Statement of Project Objectives.

I. Other

All deliverables identified in Section D of the Statement of Project Objectives shall be submitted to the NETL Program Manager identified in Block 15 of the Assistance Agreement.

II. Award Management Reporting:

F. Uniform Commercial Code (UCC) Financing Statements:

If a piece of equipment is planned to be purchased by a for-profit Recipient or a for-profit Subrecipient with either Federal and/or non-Federal funds, and when the DOE share of the prime award exceeds $1M, the for-profit Recipient or the for-profit Subrecipient must record Uniform Commercial Code (UCC) financing statement(s) before being reimbursed for the DOE share of the equipment. See "Reporting Instructions" for specific guidance.

I. DOE For-Profit Compliance Audit

If the Recipient is a for-profit entity and expends $750,000 or more in DOE awards during their fiscal year, the Recipient must have a compliance audit conducted for that year. See "Reporting Instructions" for specific guidance.

III. Closeout Reporting:

E. Other:

The Recipient must submit a Scientific and Technical Information (STI) Certification to the cognizant Grants Management Specialist. The STI Certification can be found here: STI Form. The purpose of this certification is to ensure that the STI resulting from the DOE-funded research and development is properly submitted in accordance with the terms and conditions of the award. STI includes, but is not limited to, technical reports, scientific/technical conference papers and presentations, theses and dissertations, journal citations, manuscripts and published articles, videos, software, patents, and datasets.

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Federal Assistance Reporting Checklist

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Reporting Instructions (0/2024)

*** ***Throughout the performance of the project, it is important that you mark Protected Data/Limited Rights Data as described in Appendix A. It is equally important that you not submit Protected Personally Identifiable Information (Protected PII) to DOE. See Appendix A for guidance on Protected PII.*** ***

I. Project Management Reporting

A. Performance Report Narrative (PRN)

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within 30 calendar days after the end of the quarterly reporting period (January 30, April 30, July 30, October 30)

Every quarter, the prime recipient is required to submit a Performance Report - Narrative (PRN) and a

Performance Report Quantitative (PRQ) for the project. Together these two documents summarize the entirety of work performed by the prime recipient, subrecipients, and contractors. The Performance Report - Narrative contains qualitative information on the project progress. The Performance Report - Quantitative captures quantitative information on the project progress. The PRN must include the following information. A template is available at: https://www.energy.gov/infrastructure/reporting-checklists.

1. Cover Page

a. Federal Agency and Organization Element to Which Report is Submitted
b. Federal Grant or Other Identifying Number Assigned by Agency
c. Project Title
d. Program Director/Principal Investigator/Lead Project Manager (PD/PI) Name, Title, and Contact Information (e-mail address and phone number)
e. Business Contact Name, Title, and Contact Information (e-mail address and phone number)
f. Submission Date
g. Recipient Organization (Name and Address)
h. Period of Performance (Start Date, End Date)
i. Budget Period (Start Date, End Date)
j. Reporting Period (Start Date, End Date)
k. Certification by the Submitting Official that includes: Signature of Submitting Official (electronic signatures (i.e., Adobe Acrobat) are acceptable); date of signature; and the following certification statement:

> By signing this report, I certify to the best of my knowledge and belief that the report is true, complete, and accurate. I am aware that any false, fictitious, or fraudulent information, misrepresentations, half-truths, or the omission of any material fact, may subject me to criminal, civil or administrative penalties for fraud, false statements, false claims or otherwise. (U.S. Code Title 18, Section 1001, Section 287 and Title 31, Sections 3729-3730). I further understand and agree that the information contained in this report are material to Federal agency's funding decisions and I have an ongoing responsibility to promptly update the report within the time frames stated in the terms and conditions of the above referenced Award, to ensure that my responses remain accurate and complete.

2. Summary

The purpose of the Summary is to describe a high-level status on the items listed below. This section should be a mix of short paragraphs and bullet points.

Major Goals and Objectives

Provide a summary of the major project goals and objectives. This should be the same from quarter to quarter and align with the Statement of Project Objectives (SOPO)/Statement of Work (SOW).

Technical Achievement(s)
Provide a summary of all significant technical progress of the project in achieving objective and programmatic goals during the life of the project. This should include key outcomes or other achievements, such as major findings, developments, or conclusions (both positive and negative), information dissemination, etc. This section should be a cumulative summary of technical achievements with newly added comments for the current reporting period highlighted.

Impact
State how the findings, results, or techniques developed in this project will continue to make an impact on the specific fields of research in this project and in other disciplines, which may include training and educational experiences; human resource development in science, engineering, and technology; technology transfer; and societal impacts.

Project Schedule Status
Provide a narrative summary of the status of tasks with respect to the plan for the quarter and budget period. If deviations from the schedule are noted, describe the impacts and mitigation alternatives that are in place or planned in the Changes/Problems section below.

Project Budget Status
Provide a summary of the project expenditures and costs with respect to the plan for the quarter and budget period. If applicable, describe the variance, associated impacts, and mitigation alternatives that are in place or planned in the Changes/Problems section below.

Changes/Problems
Include any planned or anticipated changes to scope, schedule, or budget. Proposed award modifications noted solely within a Performance Report do not constitute a proposed award modification. Significant changes to the award scope, schedule, and budget must be submitted to the Grants Management Specialist/Contract Specialist and the Project Officer and must be approved by the Contracting Officer/Grants and Agreements Officer. If there is nothing significant to report during this reporting period, state “Nothing to Report.”

Key Personnel Changes
Describe planned or actual changes in principal investigator, business contacts, or senior/key personnel and the impact to achieving project objectives.

Scope Issues
Describe issues with completing the required project scope identified in the SOPO/SOW, the impacts to achieving project objectives and program goals if applicable, and proposed mitigation alternatives. The quantitative impact to achievement of Technical Milestones and Go/No Go decision points and key deliverables should also be addressed.

Schedule Issues
Describe issues with achieving the planned activities identified in the project schedule and the impact to the award budget period end dates and the overall award period of performance. The quantitative impact to the timing of Technical Milestones and Go/No Go decision points, and key deliverables should also be addressed.

Budget Issues
Describe changes during the reporting period that may have a significant positive or negative impact on expenditures or the overall budget.

3. **Special Reporting**
Respond to any special reporting requirements specified in the award Terms and Conditions, as well as any award specific reporting requirements outlined in the FARC Special Instructions.

B. Performance Report Quantitative (PRQ)

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within 30 calendar days after the end of the quarterly reporting period (January 30, April 30, July 30, October 30)

Every quarter, the prime recipient is required to submit a Performance Report Narrative (PRN) and a Performance Report - Quantitative (PRQ) for the project. Together these two documents summarize the entirety of work performed by the prime recipient, subrecipients, and contractors. The Performance Report - Narrative contains qualitative information on the project progress. The Performance Report - Quantitative captures quantitative information on the project progress. The PRQ must include the following information. A template is available at: https://www.energy.gov/infrastructure/reporting-checklists.

1. **Organizations**
   Identify all subrecipients, contractors, U.S. National Laboratories, partners, and collaborating organizations. Recipients must also include all foreign collaborators as outlined in the Foreign Collaboration Considerations term of the award Terms and Conditions. For each, provide name, UEI, zip code or latitude/longitude, role in the project, contribution to the project, and start and end date.

2. **Tasks and Milestones**
   Enter all tasks and milestones identified in your Statement of Project Objectives (SOPO), Project Management Plan (PMP), or other document which outlines your project scope, schedule and budget, Community Benefits Plan (CBP), and Cybersecurity Plan (if directed by your DOE Project Team). Each quarter, update the status of the task/milestone, the physical percent complete, and, when applicable, the actual month complete.

3. **Contractual Cost Summary**
   For each subrecipient and contractor working on the project (excluding FFRDCs), provide a summary of the work, approved budget, and actual expenses.

4. **Cost Summary**
   Using your approved budget, enter the project costs by budget category and report actual expenses each quarter. Also include budgeted and actual recipient cost share.

5. **Spend Plan**
   For both federal and recipient cost share, enter the planned spending for the entire project period. Planned spend means when the project team anticipates incurring costs. Each quarter, update with actual federal and recipient spend.

6. Earned Value Management

When required by your DOE project team, complete the table for Earned Value Management.

7. Products

What has the project produced?

List any products resulting from the project during the reporting period. Specific product submission instructions can be found in Scientific and Technical Reporting. Examples of products include: publications, conference papers, and presentations; website(s); technologies or techniques; inventions, patent applications, and/or licenses; and other products, such as data or databases, physical collections, audio or video products, software or NetWare, models, educational aids or curricula, instruments or equipment, research material, interventions (e.g., clinical or educational), new business creation or any other public release of information related to the project.

a. Publications, conference papers, and presentations

Report the publication(s) resulting from the work under this award.

Please note: Recipients must use the DOE acknowledgement and legal disclaimer language as described in the Special Terms and Conditions.

The recipient is reminded that all data produced under the award should comply with the award's data management plan (DMP). The DMP provides a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publication. At a minimum, the DMP (1) describes how data sharing and preservation will enable validation of the results from the proposed work, how the results could be validated if data are not shared or preserved and (2) has a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publications.

i. Accepted Manuscript(s) of Journal Article

List peer-reviewed articles or papers that have been submitted for publication in scientific, technical, or professional journals. Include any paper submitted for peer-reviewed publication in the periodically published proceedings of a scientific society, a conference, or the like. A publication in the proceedings of a one-time conference, not part of a series, should be reported under "Books or other non-periodical, one-time publications."

Identify for each publication: Author(s); title; journal; volume: year; page numbers; status of publication (published; accepted, awaiting publication;

submitted, under review; other); acknowledgement of federal support (yes/no); legal disclaimer language (yes/no). Also see instructions under **II. Scientific/Technical Reporting** regarding the submission of accepted manuscripts and other STI as appropriate.

ii. **Books or other non-periodical, one-time publications**
Report any book, monograph, dissertation, abstract, or the like published as or in a separate publication, rather than a periodical or series. Include any significant publication in the proceedings of a one-time conference or in the report of a one-time study, commission, or the like.

Identify for each one-time publication: author(s); title; editor; title of collection, if applicable; bibliographic information; year; type of publication (book, thesis or dissertation, other); status of publication (published; accepted, awaiting publication; submitted, under review; other); acknowledgement of federal support (yes/no); legal disclaimer language (yes/no).

iii. **Other publications, conference papers and presentations**
Identify any other publications, conference papers and/or presentations not reported above. Specify the status of the publication as noted above.

b. Website(s)
List the URL for any Internet site(s) that disseminates the results of the research activities. A short description of each site should be provided. It is not necessary to include the publications already specified above in this section.

c. Technologies or techniques
Identify technologies or techniques that have resulted from the research activities. Describe the technologies or techniques and how they are being shared.

d. Inventions, patent applications, and/or licenses
Identify inventions, patent applications with date, and/or licenses that have resulted from the research. Submission of this information as part of an interim report or Final Technical Report is not a substitute for any other invention reporting required under the terms and conditions of an award.

e. Other products
Identify any other significant products that were developed under this project. Describe the product and how it is being shared. Examples of other products are: Data or databases; Physical collections; Audio or video products; Software or NetWare; Models; Educational aids or curricula; Instruments or equipment; Research material (e.g., germplasm, cell lines, DNA probes, animal models); Interventions (e.g. clinical, educational); new business creation; and Other.

8. **Participants**

The following information on participants (individuals) was provided during award negotiations. On a quarterly basis, provide updates as needed. For most projects, recipients must identify and provide specific information for the following individuals at the prime and subrecipient level: (1) all senior and key personnel (including project director(s)/principal investigator(s)); and (2) each person who has worked or is expected to work at least 160 hours on the project at least one person month per year on the project regardless of the source of compensation (a person month equals approximately 160 hours of effort). In limited circumstances, typically large-scale construction projects, recipients are only required to report on (1) senior and key personnel for the prime recipient and subrecipients. Please refer to the Participants and Other Collaborating Organizations Term in your award Terms and Conditions to determine what level of reporting is required for your specific award.

a. **What individuals have worked on the project?**

Provide the following information for individuals at the prime recipient and subrecipient level: (1) all senior and key personnel; and (2) each person who has worked or is expected to work at least one person month per year on the project regardless of the source of compensation (a person month equals approximately 160 hours of effort).

i. Name
ii. Organization
iii. Job Title
iv. Role in the project
v. Start and end date (month and year) working on the project
vi. State, U.S. territory, and/or country of residence
vii. Whether this person collaborated with an individual or entity located in a foreign country in connection with the scope of this Award, and
viii. If yes to a.vii, whether the person traveled to the foreign country as part of that collaboration, and, if so, where and what the duration of stay was.

9. **Special Reporting Requirements**

Respond to any special reporting requirements specified in the award terms and conditions, as well as any award specific reporting requirements.

C. Financial Report SF-425 Federal Financial Report

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within 30 calendar days after the end of the quarterly reporting period (January 30, April 30, July 30, October 30) **and** within 120 calendar days after expiration or termination of the award

Every quarter, the prime recipient is required to submit a completed SF-425 for the project to DOE, covering the entirety of work performed by the prime recipient, subrecipients, and contractors – to DOE. A fillable version of the SF-425 is available at https://www.grants.gov/forms/forms-repository/post-award-reporting-forms.

D. Scientific and Technical Reporting

The dissemination of scientific and technical information (STI) ensures public access to the results of federally funded research. STI refers to information products in any medium or format used to convey results, findings, or technical innovations from research and development or other scientific and technological work that are prepared with the intention of being preserved and disseminated in the broadest sense applicable (i.e., to the public or, in the case of controlled unclassified information or classified information, disseminated among authorized individuals). By properly submitting STI to DOE Energy Link System (E-Link), the information will be made available to the public through OSTI.GOV.

NOTE: SCIENTIFIC/TECHNICAL PRODUCTS INTENDED FOR PUBLIC RELEASE MUST NOT CONTAIN PROTECTED PERSONALLY IDENTIFIABLE INFORMATION (PII). Please refer to Appendix A for more information.

1. Accepted Manuscript of Journal Article

Submit to:	DOE Energy Link System (E-Link) available at https://www.osti.gov/elink/2413-submission.jsp
Submission deadline:	No later than the published online date of the article

Public access to scholarly publications is enabled by providing the Accepted Manuscript (AM) of the Journal Article to DOE OSTI and is consistent with the U.S. Government's retained license to published results of federally-funded research. If the recipient has a journal article accepted for publication which includes information/data produced under the award, then the recipient must submit an Announcement Notice (AN) 241.3, as described below, no later than the published online date of the article.

Content. The recipient is to provide the final peer-reviewed AM, i.e., the version of a journal article that has been peer reviewed and accepted for publication in a journal. Do NOT submit the journal's published version of the article, i.e., do NOT submit a copyrighted reprint.

DOE will make no additional review of the content of the AM because the AM is the version of the journal article with the content to be published (i.e., publicly released) by the journal publisher.

The recipient must self-certify at the time of submission to DOE via E-Link that the content is appropriate and that it is not a copyrighted reprint, i.e., the final version of the published article. Recipients are reminded that the article is to include an acknowledgement of federal support and a legal disclaimer as required in the "Publications" Term in the award Special Terms and Conditions.

The recipient is also reminded that all data produced under the award should comply with the award's data management plan (DMP). The DMP provides a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publication. At a minimum, the DMP (1) describes how data sharing and preservation will enable validation of the results from the proposed work, how the results could be validated if data are not shared or preserved and (2) has a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publications.

Electronic Submission Process. The AM of the Journal Article must be provided electronically via the DOE Energy Link System (E-Link) and must be accompanied by a completed DOE Announcement Notice (AN) 241.3 (https://www.osti.gov/elink/2413-submission.jsp).

2. Conference Product(s)

Submit to:	DOE Energy Link System (E-Link) available at https://www.osti.gov/elink/2413-submission.jsp
Submission deadline:	Within five (5) calendar days after the event, or as specified

The recipient must submit a copy of any scientific/technical conference papers, proceedings, or presentations.

Content: The content should include a copy of the paper, presentation, or proceeding and: (1) name of conference; (2) location of conference; (3) date of conference; and (4) conference sponsor. Also include an acknowledgement of federal support and a legal disclaimer as described in the Special Terms and Conditions.

Electronic Submission Process: Scientific/technical conference proceedings, papers/presentations or must be submitted via the DOE Energy Link System (E-Link) with a completed DOE Announcement Notice (AN) 241.3 (https://www.osti.gov/elink/2413-submission.jsp).

The recipient is responsible for ensuring the suitability of the content for public release. The terms and conditions of award provide that submissions must not contain any Protected Personally Identifiable Information (PII), limited rights data (proprietary data),

classified information, information subject to export control classification, or other information not subject to release.

3. Technical Report(s)

Submit to:	DOE Energy Link System (E-Link) available at https://www.osti.gov/elink/2413-submission.jsp
Submission deadline:	Within five (5) calendar days after the event, or as specified

The recipient must submit a copy of any scientific/technical reports.

Content: The content should include a copy of the report as well as an acknowledgement of federal support and a legal disclaimer as described in the Special Terms and Conditions.

Electronic Submission Process: Scientific/technical reports must be submitted via the DOE Energy Link System (E-Link) with a completed DOE Announcement Notice (AN) 241.3 (https://www.osti.gov/elink/2413-submission.jsp).

The recipient is responsible for ensuring the suitability of the content for public release. The terms and conditions of award provide that submissions must not contain any Protected Personally Identifiable Information (PII), limited rights data (proprietary data), classified information, information subject to export control classification, or other information not subject to release.

4. Software & Manual(s)

Submit to:	DOE CODE: https://www.osti.gov/doecode/
Submission deadline:	Within five (5) calendar days after the event, or as specified

The recipient must submit all software deliverables created under the award, as well as any accompanying documentation or manuals.

DOE CODE is DOE's software services platform for submitting and searching for software resulting from DOE-funded research. Through submission to DOE CODE, users have the option to obtain a Digital Object Identifier (DOI) for the code, making it more easily discoverable, citable, and shared.

Content. When a recipient submits software to OSTI through DOE CODE, a set of required metadata elements and a link to the software repository must be provided.

Submission Process. Recipients will submit software by going to https://www.osti.gov/doecode/. Before submissions can be made, the recipient will be required to create an account. The recipient may create an account by visiting the top right of the DOE CODE homepage. Once the account is created, submissions may be made through the submit software/code link on the homepage. For more information about DOE CODE please visit https://www.osti.gov/doecode/faq.

5. Dataset(s)

Submit to:	Energy Data Exchange (EDX) available at https://edx.netl.doe.gov/
Submission deadline:	Within five (5) calendar days after the event, or as specified

Scientific/technical datasets (data-streams, data files, etc.) support the technical reports and published literature resulting from DOE-funded research. They are also recognized as valuable information entities in their own right that, now and in the future, need to be available for citation, discovery, retrieval, and reuse. The assignment and registration of a Digital Object Identifier (DOI) is a free service for DOE-funded researchers which is provided by OSTI at time of submission to enhance access to this important resource.

Content. If the recipient generates publicly available datasets resulting from work funded by DOE, they must provide these datasets to Energy Data Exchange (EDX). Once submitted, EDX will provide a DOI, which ensures long-term linkage between the DOI and the dataset's location. Additional information on EDX is available at https://edx.netl.doe.gov/about.

Electronic Submission Process. Notification of scientific datasets must be submitted electronically via EDX at https://edx.netl.doe.gov/. Within EDX, provide relevant information about the dataset as well as the URL where the dataset can be accessed.

6. Other STI (Dissertation / Thesis, etc.)

Submit to:	https://www.osti.gov/elink/2413-submission.jsp
Submission deadline:	Within five (5) calendar days after the event, or as specified

Recipients are encouraged to announce other forms of STI especially if they are the primary means by which certain research results are disseminated or if they contain research results not already announced to DOE by the recipient in technical reports, accepted journal articles, conference products, software, and datasets.

Other types of scientific and technical information produced which may be used for public dissemination of project results include: dissertation/thesis, patent, book, or

other similar products. These types of STI may also be announced using DOE AN 241.3 by following instructions on the E-Link website (https://www.osti.gov/elink/2413-submission.jsp).

E. Intellectual Property Reporting

1. Intellectual Property Reporting

Submit to:	https://www.nist.gov/iedison
Submission deadline:	Within five (5) calendar days after the event, or as specified

iEdison requires a login and password. If the recipient's organization does not already have an iEdison administrator account, the recipient may register for one at: iEdison Registration.

In accordance with the patent rights clause of the award, the recipient and subrecipient(s), if any, must complete the following intellectual property reports in iEdison when applicable:

Disclosing a subject invention, including anticipated uses and sales (use iEdison's Invention Report);

Reporting publications, manuscript submissions, or other public disclosures concerning a subject invention (add documents to the Invention Report);

If authorized by the award agreement, electing (or declining) to retain title to a subject invention (modify the Invention Report and input "Title Election Date" or "Not Elect Title Reason");

Disclosing the filing or termination of patent applications on a subject invention (i.e., patent applications disclosing or claiming a subject invention). Patent disclosures must be made (using iEdison's Patent Report) for filing the following patent applications:

- An initial domestic patent application (including provisional or non-provisional);
- A domestic divisional or continuation patent application;
- A domestic continuation-in-part application; and
- A foreign patent application.

Discontinuing prosecution of a patent application, maintenance of a patent, or defense in a patent reexamination or opposition proceeding, regardless of jurisdiction (modify the Patent Report); and,

Requesting an extension of time to:

- Elect (or decline) to retain title to a subject invention (modify the Invention Report); and
- File an initial domestic or foreign patent application (modify the Invention Report).

Failure to submit Intellectual Property Reporting Forms in a timely manner may result in forfeiture of the recipient's or subrecipient's rights in the subject inventions and related patent applications.

2. Invention Utilization Report

Submit to:	https://www.nist.gov/iedison
Submission deadline:	For each subject invention, reports are due annually once the recipient or subrecipient elects to retain title to the subject invention and must continue to be provided for 10 years thereafter

The recipient and subrecipient(s) must provide Invention Utilization Reports for each subject invention that the recipient or subrecipient retains ownership. Reports are due annually starting one year after the recipient or subrecipient elects to take title and must continue to be provided for 10 years thereafter or until the recipient or subrecipient informs DOE in writing that it no longer wants to retain title in the subject invention. Failure to submit Invention Utilization Reports in a timely manner may result in forfeiture of the recipient's or subrecipient's rights in the subject inventions.

F. Project Management Plan (PMP)

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within six (6) weeks of the effective date of the award

Iterations and Maintenance

The recipient is required to develop, update, and adhere to a project management plan. The purpose of the plan is to establish cost, schedule, and technical performance baselines, and to formalize the processes by which the project will be managed. These processes include considerations such as risk management, change management, and communications management. While it is primarily the project recipient's responsibility to maintain the plan, federal staff may request changes. The plan is intended to be a living document, modified as necessary, and comprising the following iterations:

Application Draft

The recipient must submit a draft of the project management plan with the initial application for financial assistance.

Negotiation Draft

The selected recipient may be required by the selecting Office to revise its project management plan during the negotiation phase.

Active Plan
Following formal award of the financial assistance agreement, the recipient must submit an updated project management plan, to include any changes requested during negotiation and a timeline based upon the actual award date.

1. Revised Plan(s)

During the life of the project the recipient must submit a revised project management plan based on the following circumstances:

a. Developments that have a significant favorable impact on the project.

b. Problems, delays, or adverse conditions which materially impair the recipient's ability to meet the objectives of the award or which may require the program office to respond to questions relating to such events from the public. Specifically, the recipient must update the plan when any of the following incidents occur:

i. Any event which is anticipated to cause significant schedule or cost changes, such as changes to the funding and costing profile or changes to the project timeline.
ii. Any change to Technology Readiness Level.
iii. Any significant change to risk events (including both potential and realized events) or to risk management strategies.
iv. Failure to meet a milestone or milestones; any dependencies should be adjusted.
v. Any changes to partnerships.
vi. Any significant change to facilities or other project resources.
vii. Any other incident that has the potential for high visibility in the media.

2. Content of revised PMP

Project Title: The DOE award number and project title
Recipient Organization: Official name of the recipient organization
Principal Investigator: The name and title of the project director/ principal investigator
Date of Plan: The date the plan or plan revision was completed

The revised PMP must describe changes to any of the following sections of the PMP as well as provide updated versions of any logs, tables, charts, or timelines.

a. Executive Summary:

Provide a description of the project that includes the objective, project goals, and expected results. The description should include a high-level description of the technology, potential use or benefit of the technology, location of work sites and a brief discussion of work performed at each site, along with a description of project phases (if the project includes phases).

b. Technology Readiness Levels (TRLs):
Identify the readiness level of the technology associated with the project as well as the planned progression during project execution. A detailed explanation of the rationale for the estimated technology readiness level should be provided. Specific entry criteria for the next higher technology readiness level should be identified.

c. Risk Management:
Provide a summary description of the proposed approach to identify, analyze, and respond to potential risks associated with the proposed project. Project risk events are uncertain future events that, if realized, impact the success of the project. At a minimum, include the initial identification of significant technical, resource, and management issues that have the potential to impede project progress and strategies to minimize impacts from those issues. The risk management approach should be tailored to the TRL. If a project or task is expected to progress to a higher TRL, then the risk plan should address the retirement of any risks associated with the first TRL and identify new risks related to moving to the next TRL. Additionally, the risk management approach should include risk opportunities that if realized, could benefit the project.

d. Milestone Log:
Provide milestones for each budget period (or phase) of the project. Each milestone should include a title and planned completion date. Milestones should be quantitative (e.g., a date, a decision to be made, a key event) and show progress toward budget period and/or project goals. Milestones should also be important and few. Higher TRL projects (Demonstration and Deployment) typically have the most detailed milestone logs compared to lower TRL level projects (Research and Development). If applicable, milestones chosen should clearly reflect progress through various TRL stages.

Note: The Milestone Status must present actual performance in comparison with the Milestone Log, and include:

- The actual status and progress of the project,
- Specific progress made toward achieving the project's milestones, and
- Any proposed changes in the project's schedule required to complete milestones.

e. Funding and Costing Profile:

Provide a table (the Project Funding Profile) that shows, by budget period, the amount of government funding going to each project team member. Also, a table (the Project Costing Profile) which projects, by month, the expenditure of both government and recipient funds for the first budget period, at a minimum. The Funding and Costing Profile should show the relationships with the Milestone Log (Item d above) and Project Timeline (Item f below); for example, Funding and Costing information could be shown as an overlay on milestone or timeline charts.

f. Project Timeline:
Provide a timeline of the project (similar to a Gantt chart) broken down by each task and subtask, as described in the Statement of Project Objectives. The timeline should include a start date and end date for each task, as well as interim milestones. The timeline should also show interdependencies between tasks and include the milestones that are identified in the Milestone Log (Item d above). The timeline should also show the relationship to the Project Costing Profile (Item e above). If applicable, the timeline should include activities and milestones related to achieving succeeding TRLs.

g. Success Criteria at Decision Points:
Provide well-defined success criteria for each decision point in the project, including go/no-go decision points and the conclusions of budget periods and the entire project. The success criteria should be objective and stated in terms of specific, measurable, and repeatable data. Usually, the success criteria pertain to desirable outcomes, results, and observations from the project. Key milestones can be associated with success criteria. If applicable, the success criteria should include exit criteria for progressing from one TRL to the next.

h. Key Partnerships, Teaming Arrangements and Team Members:
Provide a list of key team members in the project as well as the role and contact information of each. A hierarchical project organization and structure chart should be provided along with a description of the role and responsibilities of each team member in terms of contribution to project scope. The section should also include key team members who fulfill single or multiple roles within a project as well as the contact information for each.

i. Facilities and Resources:
Provide a list of project locations along with a discussion of capabilities and activities performed at each site in terms of contribution to project scope. The address of each work site should be provided.

j. Communications Management:
Describe the communications needs and expectations for the project team members. The communications plan may be simple or detailed, depending on the

complexity of the project. At a minimum, the plan should include contact information, methods of communicating and anticipated frequency.

k. Change Management:
Provide a description of the process for managing change on the project. Describe how change will be monitored, controlled and documented within the project. This includes, but is not limited to, changes to the Scope, Schedule, and Budget. If applicable, Change Management should include assessing how changes impact TRLs.

G. Special Status Reports

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within five (5) calendar days after the event, or as specified

Problems, delays, or adverse conditions which materially impair the recipient's ability to meet the objectives of the award or which may require DOE to respond to questions relating to such events from the public. The recipient must report any of the following incidents and include the anticipated impact and remedial action to be taken to correct or resolve the problem/condition.

Within forty-eight (48) hours, provide notification to the DOE Program/Project Manager by email, with a copy to the DOE Award Contracting Officer/Grants and Agreements Officer, the following events:

1. Any fatality, injury, or illness that results in loss of consciousness or requires medical treatment beyond first aid involving an employee, or member of the public.
2. An imminent or actual environmental contamination or the need for environmental cleanup (including, but not limited to, contamination or cleanup resulting from an accident connected to or arising from the presence, leakage or spill of hazardous materials) in accordance with National Environmental Policy Act 42 USC §§4321, et seq. Examples of due care may include, but are not limited to, visual site inspection of any portions of the property where environmental contamination is likely or suspected, or other reasonable measures. Such notice must be made to DOE following any immediate mitigation efforts, as appropriate, and contacts made to requisite agencies.
3. Actual physical property damage in excess of $50,000.

Within 48 hours, the recipient is responsible for reporting cybersecurity incident(s) as follows

4. The recipient is responsible for identifying a cybersecurity incident. In general, a cybersecurity incidents is identified as any incident that may cause financial harm or loss of intellectual property created or supported in performance of the award, including malware and ransomware attacks; affecting operations or the security of,

or access to, data, including disruption of both physical operations and business operations for a duration greater than one (1) hour or any Cybersecurity incidents that have national security implications.

Once identified, the Recipient is responsible for reporting Cybersecurity incidents to the Cyber Incident mailbox within 48 hours of the incident. The recipient sends a password protected document via email attachment that includes the date and time of the incident, a high-level description of the incident, a summary of the known impacts, and current and planned mitigation activities. The recipient sends a second email to the Cyber Incident mailbox including the password to the protected document.

The prime recipient is required to report the following events to the DOE Program/Project Manager by email, with a copy to the DOE Award Contracting Officer/Grants and Agreements Officer, within 5 business days:

5. If the recipient or project team member receives any other award of federal funds for activities that potentially overlap with the activities funded under the DOE award, the recipient must promptly notify DOE in writing of the potential overlap and state whether project funds from any of those other federal awards have been, are being, or are to be used (in whole or in part) for one or more of the identical cost items under the DOE award;
6. Any change in ownership or control of the recipient or project team member which increases the percentage of ownership or control by an entity that is based in, funded by, or has a foreign affiliation with a foreign country of risk;
7. If an individual on the project team is or is believed to be participating in a foreign government-sponsored talent recruitment program of a foreign country of risk.
8. If the recipient is considering new collaborations with foreign entities and governments, the recipient must provide written notification to DOE and await further guidance from DOE prior to contacting the proposed foreign entity or government regarding the potential collaboration or negotiating the terms of any potential agreement. In general, a collaboration will involve some provision of a thing of value to, or from, the recipient. A thing of value includes but may not be limited to all resources made available to, or from, the recipient in support of and/or related to the DOE award, regardless of whether or not they have monetary value. Things of value also may include in-kind contributions (such as office/laboratory space, data, equipment, supplies, employees, students). In-kind contributions not intended for direct use on the DOE award but resulting in provision of a thing of value from or to the DOE award must also be reported.
9. The existence of any joint venture or subsidiary that is based in, funded by, or has a foreign affiliation with any foreign country of risk;

10. Any current or pending contractual or financial obligation or other agreement specific to a business arrangement, or joint venture-like arrangement with an enterprise owned by a country of risk or foreign entity based in a country of risk;
11. Any current or pending venture capital or institutional investment by an entity that has a general partner or individual holding a leadership role in such entity who has a foreign affiliation with any foreign country of risk;
12. Any current or pending technology licensing or intellectual property sales to a foreign country of risk; and
13. Any current or pending foreign business entity, offshore entity, or entity outside the United States related to the Recipient or subrecipient.
14. Potential or actual violations of environmental, health, or safety laws and regulations, any significant environmental permit violation, and any incident which causes a significant process or hazard control system failure;
15. Any incident arising out of or relating to work under the award that has the potential for high visibility in the media;
16. Potential or actual violations of federal, state, and municipal laws arising out of or relating to work under the award;
17. Potential or actual noncompliance with DOE reporting requirements under the award;
18. Potential or actual bankruptcy/insolvency of the prime recipient or subrecipient;
19. Potential or actual violation of U.S. export control laws and regulations arising out of or relating to the work under the award;
20. Any notices or claims of patent or copyright infringement arising out of or relating to the performance of the DOE award;
21. Refusal of a subrecipient to accept flow down requirements in the Special Terms and Conditions and/or any Attachment to the DOE award;
22. Any improper claims or excess payments arising out of or relating to work under the award;
23. Potential or actual violations of the cost share requirements under the award;
24. Potential or actual violations of the lobbying restrictions in the award;
25. Any event which is anticipated to cause a significant schedule slippage or cost increase; and
26. Developments that have a significant favorable impact on the project.

H. Continuation Application

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within five (5) calendar days after the event, or as specified

A continuation application is a non-competitive application for an additional budget period

within a previously approved period of performance. The continuation application should be submitted at least ninety (90) calendar days before the end of each budget period, or as specified in the Special Terms and Conditions of the award.

I. Other Project Management Reporting (see Special Instructions)

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within five (5) calendar days after the event, or as specified

II. Award Management Reporting

A. Current and Pending Support

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within thirty (30) calendar days only when there is a change to Current and Pending Support (i.e., new PI or senior/key personnel join the project or there are changes to previously submitted current and pending disclosures for this Award)

Applicable for all awards issued after 10/01/2021. For awards issued prior to 10/01/21, refer to your award terms and conditions for applicability.

Prior to award, the Recipient was required to provide current and pending support disclosure statements for each principal investigator (PI) and senior/key personnel, at the recipient and subrecipient level, regardless of funding source. Throughout the life of the award, the Recipient must submit current and pending support disclosure statements and a CV or Biosketch for any new PI and senior/key personnel at the recipient and subrecipient level, added to the project funded under this Award within thirty (30) days of the individual joining the project. In addition, if there are any changes to current and pending support disclosure statements previously submitted to DOE, the Recipient must submit updated current and pending disclosure statements within thirty (30) days of the change. The Recipient must ensure all PIs and senior/key personnel at the recipient and subrecipient level, are aware of the requirement to submit updated current and pending support disclosure statements to DOE.

If there has been a change that would prompt the submission of a new or updated current and pending support disclosure, the instructions to complete the new or updated disclosure is listed below.

Current and pending support is intended to allow the identification of potential duplication, overcommitment, potential conflicts of interest or commitment, and all other sources of support. All PIs and senior/key personnel at the recipient and subrecipient level must

provide a list of all sponsored activities, awards, and appointments, whether paid or unpaid; provided as a gift with terms or conditions or provided as a gift without terms or conditions; full-time, part-time, or voluntary; faculty, visiting, adjunct, or honorary; cash or in-kind; foreign or domestic; governmental or private-sector; directly supporting the individual's research or indirectly supporting the individual by supporting students, research staff, space, equipment, or other research expenses. All foreign government-sponsored talent recruitment programs must be identified in current and pending support.

For every activity, list the following items:

- The sponsor of the activity or the source of funding.
- The award or other identifying number.
- The title of the award or activity. If the title of the award or activity is not descriptive, add a brief description of the research being performed that would identify any overlaps or synergies with the proposed research.
- The total cost or value of the award or activity, including direct and indirect costs and cost share. For pending proposals, provide the total amount of requested funding.
- The award period (start date – end date).
- The person-months of effort per year being dedicated to the award or activity.
- Identify any overlap, duplication of effort, or synergistic efforts, with a description of the other award or activity to the current and pending support.
- Details of any obligations, contractual or otherwise, to any program, entity, or organization sponsored by a foreign government must be provided to DOE.

All PIs and senior/key personnel must provide a separate disclosure statement listing the required information above regarding current and pending support. The individual must sign and date their respective disclosure statement and include the following certification statement:

> I, [Full Name and Title], certify to the best of my knowledge and belief that the information contained in this Current and Pending Support Disclosure Statement is true, complete and accurate. I understand that any false, fictitious, or fraudulent information, misrepresentations, half-truths, or omissions of any material fact, may subject me to criminal, civil or administrative penalties for fraud, false statements, false claims or otherwise. (18 U.S.C. §§ 1001 and 287, and 31 U.S.C. 3729-3730 and 3801-3812). I further understand and agree that (1) the statements and representations made herein are material to DOE's funding decision, and (2) I have a responsibility to update the disclosures during the period of performance of the award should circumstances change which impact the responses provided above.

The information may be provided in the format approved by the National Science Foundation (NSF), which may be generated by the Science Experts Network Curriculum Vita (SciENcv), a cooperative venture maintained at https://www.ncbi.nlm.nih.gov/sciencv/, and

is also available at https://www.nsf.gov/bfa/dias/policy/researchprotection/commonform_cps.pdf. The use of a format required by another agency is intended to reduce the administrative burden to researchers by promoting the use of common formats. If the NSF format is used, the individual must still include a signature, date, and a certification statement using the language included in the paragraph above.

B. Reserved

C. Financial Conflict of Interest Report

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within 180 days of the date of the award and within thirty (30) calendar days only when there is a change

Prior to award, the Recipient was required to: 1) ensure all Investigators on this Award completed their significant financial disclosures; 2) review the disclosures; 3) determine whether a FCOI exists; 4) develop and implement a management plan for FCOIs; and 5) provide DOE with an initial FCOI report that includes all FCOIs (i.e., managed and unmanaged/unmanageable). Within 180 days of the date of the Award, the Recipient must be in full compliance with the other requirements set forth in DOE's interim COI Policy https://www.energy.gov/management/department-energy-interim-conflict-interest-policy-requirements-financial-assistance. Further, the recipient must submit updated reports within 30 days of a change.

The DOE interim Conflict of Interest Policy for Financial Assistance (COI Policy) is applicable to all non-Federal entities applying for, or that receive, DOE funding by means of a financial assistance award (e.g., a grant, cooperative agreement, or technology investment agreement) and, through the implementation of this policy by the entity, to each Investigator who is planning to participate in, or is participating in, the project funded wholly or in part under this Award. The term "Investigator" means the PI and any other person, regardless of title or position, who is responsible for the purpose, design, conduct, or reporting of a project funded by DOE or proposed for funding by DOE. The Recipient must flow down the requirements of the interim COI Policy to any subrecipient non-Federal entities, with the exception of DOE National Laboratories. Further, the Recipient must identify all financial conflicts of interests (FCOI), i.e., managed and unmanaged/ unmanageable, in its initial and ongoing FCOI reports.

D. Tangible Personal Property Report – Annual Property Report (SF-428 & SF-428A)

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within 90 calendar days after the end of the annual reporting period

The prime recipient must submit an annual inventory of federally-owned property (government-furnished) where the award specifies that title to the property vests with the federal government, whether it is in the possession of the prime recipient or subrecipient(s). The prime recipient must complete an SF-428 and SF-428A, available at https://www.grants.gov/web/grants/forms/post-award-reporting-forms.html or https://www.netl.doe.gov/business/business-forms/financial-assistance.

E. Tangible Personal Property Report – Disposition Request/Report (SF-428 & SF-428C)

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within 5 calendar days of the event or as specified

The prime recipient must request disposition instructions for or report disposition of federally-owned property or equipment acquired with project funds, whether the property or equipment is/was in the possession of the prime recipient or subrecipient(s). Recipients may also be required to provide compensation to the awarding agency when acquired equipment is sold or retained for use on activities not sponsored by the federal government. Any equipment with an acquisition cost above $5,000 must be included in the inventory.

If disposition occurs at any time other than award closeout (i.e., at any time throughout the life of the project or after project completion and closeout as long as the federal government retains an interest in the item), the prime recipient must complete an SF-428 and SF-428C, available at https://www.grants.gov/web/grants/forms/post-award-reporting-forms.html or https://www.netl.doe.gov/business/business-forms/financial-assistance.

If disposition instructions are requested at the time of award closeout, the prime recipient must submit the SF-428 and SF-428B (see section III. C. Tangible Personal Property Report – Final Report).

Only the DOE Contracting Officer has authority to approve disposition requests and issue disposition instructions.

F. Uniform Commercial Code (UCC) Financing Statements

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within five (5) calendar days after the event, or as specified.

If a for-profit recipient or subrecipient desires to purchase a piece of equipment for their project, and the per-unit dollar value of said equipment is $5,000 or more, and the federal share of the financial assistance agreement is more than $1M, the recipient or subrecipient must file a UCC financing statement. These financing statement(s) must be approved in writing by the Contracting Officer prior to the recording.

A UCC financing statement provides public notice that the federal government has an undivided reversionary interest in the equipment, and as such the equipment cannot be sold or used as collateral for a loan (encumbered).

The for-profit recipient or subrecipient must file the UCC financing statement(s) with the Secretary of State where the equipment will be physically located and must pay any associated costs for such filings.

The initial UCC financing statement may also be referred to as a UCC1. For additional pieces of equipment not specified in the award budget, TBD equipment, or equipment needed in future budget periods, the recipient can file an amendment to the original UCC1 financing statement, by submitting the UCC3 financing statement amendment.

Each UCC financing statement or amendment is to be filed with the appropriate Secretary of State office, where the equipment will be physically located.

Note: All costs associated with filing UCC financing statements, UCC financing statement amendments, and UCC financing statement terminations, are allowable and allocable costs which can be charged to the federal award.

At a minimum, the recipient must have stated in their UCC financing statement in block 4. (collateral) the following:

- "Title to all equipment (not real property) purchased with federal funds under this financial assistance agreement is conditional pursuant to the terms of 2 CFR 910.360, and the federal government retains an undivided reversionary interest in the equipment at the federal cost-share proportion specified in the award terms and conditions."

- Federal Award Identification Number (e.g., DE-FE000XXXX)

G. Federal Subaward Reporting System (FSRS)

Submit to:	https://www.fsrs.gov/
Submission deadline:	The prime recipient is required to file a FFATA sub-award report by the end of the month following the month in which the prime recipient awards any sub-grant greater than or equal to $30,000.

The Federal Subaward Reporting System (FSRS) is the reporting tool prime recipients use to capture and report subaward and executive compensation data regarding their first-tier subrecipients to meet the FFATA reporting requirements. Prime recipients will report against subrecipients' awards. The subrecipient information entered in FSRS will then be displayed on USASpending.gov associated with the prime recipient's award furthering federal spending transparency.

The prime recipient is required to file a FFATA sub-award report by the end of the month following the month in which the prime recipient awards any sub-award greater than or equal to $30,000.

H. Annual Incurred Cost Proposals

Submit to:	If DOE is the Cognizant Federal Agency, send the Annual Incurred Cost Proposal to one of the following offices: • CostPrice@ee.doe.gov (if the Golden Field Office is Cognizant); OR • IndirectRates@hq.doe.gov (if OCED is Cognizant) • FITS@netl.doe.gov **and** PricingGroup@netl.doe.gov (if NETL is Cognizant) Otherwise, submit the proposal to the Recipient's appropriate Cognizant Federal Agency office.
Submission deadline:	Within 180 calendar days after the close of the recipient's fiscal year* *The end of the period of the performance, or closure of an award, does not dismiss this reporting requirement.

Prime recipients must submit a certified annual Incurred Cost Proposal (ICP), reconciled to its financial records, in order to finalize and reconcile billing rates incurred and billed to the Government.

An ICP submission is required unless one of the following conditions apply to the DOE award:

- Recipient elected to apply the 10% de minimis rate as allowed under 2 CFR 200.414(f);
- Recipient proposed fringe benefits **only**; or
- Recipient has a pre-determined Negotiated Indirect Cost Rate Agreement (NICRA).

Recipients are strongly encouraged to self-assess their ICP using the Defense Contract Audit Agency's (DCAA) ICP Adequacy Checklist to ensure an adequate submission. The ICP must be reconciled to the recipient's financial statements, within 180 calendar days after the close of the recipient's fiscal year, unless the award is based on a predetermined or fixed indirect rate(s), or a fixed amount for indirect or facilities and administration (F&A) costs. The Contracting Officer for Indirect Cost Rates may grant, in writing, reasonable extensions for exceptional circumstances only. The written request for extension should be sent to the cognizant DOE office email address. The format and content of the incurred cost proposal should follow the DCAA ICE (Incurred Cost Electronically) Model in order to be considered an adequate proposal. DCAA's ICE Model and Adequacy Checklist can be found on the DCAA website at: https://www.dcaa.mil/Home/ICEmodel and https://www.dcaa.mil/Home/ICSubmissionAdequacy.

I. Fringe Reconciliation Form

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within 180 calendar days after the close of the recipient's fiscal year* *The end of the period of the performance, or closure of an award, does not dismiss this reporting requirement.

Prime recipients must submit a certified annual Fringe Reconciliation Form, reconciled to its financial records, to finalize and reconcile fringe billing rates incurred and billed to the Government.

A Fringe Reconciliation Form submission is required when one of the following conditions apply to the DOE award:

- Recipient elected to apply the 10% de minimis rate as allowed under 2 CFR 200.414(f) **and** proposed fringe; or
- Recipient proposed fringe benefits **only**.

The Fringe Reconciliation Form must be reconciled to the recipient's financial statements, within 180 calendar days after the close of the recipient's fiscal year. The Contracting Officer for Fringe Costs may grant, in writing, reasonable extensions for exceptional circumstances only. The written request for extension should be sent to PricingGroup@netl.doe.gov. To be considered an adequate submission, Recipients must use the Fringe Reconciliation Form located at: Fringe Reconciliation Form. The Fringe Reconciliation Form must be sent to FITS@NETL.DOE.GOV.

J. DOE For-Profit Compliance Audit

Submit to:	Email a copy of the annual DOE For-Profit Compliance Audit to: • DOE-Audit-Submission@hq.doe.gov and • The DOE Contracting Officer

	• For awards administered by OCED, also email a copy to RecipientAudits@hq.doe.gov • For awards administered by the DOE NETL Office, also email a copy to PricingGroup@netl.doe.gov and FITS@netl.doe.gov
Submission deadline:	Within the earlier of 30 days after receipt of the auditor's report(s) or 9 months after the end of the audit period (recipient's fiscal year-end)* *The end of the period of the performance, or closure of an award, does not dismiss this reporting requirement.

As required by 2 CFR 910, Subpart F, a For-Profit entity which expends $750,000 or more during the non-federal entity's fiscal year in DOE awards must have a compliance audit conducted for that year.

The DOE For-Profit Compliance Audit must be conducted in accordance with the regulations at 2 CFR 910.500-521 and must refer to the appropriate regulations used by the auditor in their examination.

The compliance audit report must be submitted, along with audited financial statements, if required and available.

K. Single Audit: States, Local Government, Tribal Governments, Institution of Higher Education (IHE), or Non-Profit Organization

Submit to:	Federal Audit Clearinghouse - https://harvester.census.gov/facweb/Default.aspx
Submission deadline:	Within the earlier of 30 days after receipt of the auditor's report(s) or 9 months after the end of the audit period (recipient's fiscal year-end)* *The end of the period of the performance, or closure of an award, does not dismiss this reporting requirement.

As required by 2 CFR 200 Subpart F, non-federal entities that expend $750,000 or more during the non-federal entity's fiscal year in federal awards must have a single or program-specific audit conducted. The single audit must be conducted in accordance with §200.514 Scope of audit, except when it elects to have a program-specific audit conducted.

For most single audits, the requirement is for annual single audits. However, there are occasions where a single audit is not required annually. Per 2 CFR 200.504 - Frequency of audits, a state, local government, or Indian tribe that is required by constitution or statute to undergo its audits less frequently than annually, is permitted to undergo its audits biennially. Also, any nonprofit organization that had biennial audits for all biennial periods ending between July 1, 1992, and January 1, 1995, is permitted to undergo its single audits biennially.

For a program-specific audit, when a recipient expends federal award funds under only one federal program (excluding R&D) and the federal program's statutes, regulations, or the terms and conditions of the federal award do not require a financial statement audit of the auditee, the auditee may elect to have a program-specific audit conducted. A program-specific audit may not be elected for R&D unless all of the federal awards expended were received from the same federal agency, or the same federal agency and the same pass-through entity, and that federal agency, or pass-through entity in the case of a subrecipient, approves in advance a program-specific audit.

The single audit report shall include audited financial statements.

L. Other Award Management Reporting (see Special Instructions)

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within five (5) calendar days after the event, or as specified

III. Closeout Reporting

A. Final Scientific/Technical Report

Submit to:	DOE Energy Link System (E-Link) available at https://www.osti.gov/elink/2413-submission.jsp
Submission deadline:	Within 120 calendar days after expiration or termination of the award

The prime recipient must submit a Final Scientific/Technical Report to DOE for all projects.

The scientific/technical report is intended to increase the diffusion of knowledge gained by DOE-funded research, and all requirements shall be interpreted in that light.

Content: Research findings and other significant scientific and technical information (STI) resulting from the DOE-sponsored projects shall be included in the final scientific/technical report, subject to the following provisions:

1. The scientific/technical report is to cover the entire period of performance. For Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) awards, a final scientific/technical report must be submitted after the completion of each phase, e.g., Phase I, Phase II, and sequential Phase II, as described in the Special Instructions.

2. STI that is publicly accessible need not be duplicated in the report if a citation with a

link to where the information may be found is included in the report. For example, articles found in PAGES (i.e., DOE's Public Access Gateway for Energy and Science, https://www.osti.gov/pages/) are accessible to the public.

3. Provide identifying information: the DOE award number; sponsoring program office; name of recipient; project title; name of project director/principal investigator; and consortium/team members.

4. Include the DOE acknowledgement and legal disclaimer language as described in the Special Terms and Conditions.

5. Include any limitations on public release of the report, if authorized by the award agreement. If the document being submitted contains patentable material or protected data (i.e., data first produced in the performance of the award that is protected from public release for a period of time by terms of the award agreement) as set forth in the award agreement, then (1) prominently display on the cover of the report any authorized distribution limitation notices, such as patentable material or protected data and (2) clearly identify patentable or protected data on each page of the report. Reports delivered without such notices or with restrictive notices not authorized by the award agreement may be deemed to have been furnished with unlimited rights, and the Government assumes no liability for the disclosure, use or reproduction of such reports. Any restrictive markings must also be noted in the distribution limitation section of the Announcement Notice (AN) 241.3. No protected PII should be included.

6. Provide an abstract or executive summary, which should be a minimum of one paragraph and written in terms understandable by an educated layperson. (Refer to https://www.osti.gov/stip/standards for ANSI/NISO guidance as needed.) The abstract included in an application may serve as a model for this.

7. Summarize project activities for the entire period of funding, including original hypotheses, approaches used, and findings. Include, if applicable, facts, figures, analyses, and assumptions used during the life of the project to support the results in a manner that conveys to the scientific community the STI created during the project. To minimize duplication, the report may reference STI, including journal articles, that is publicly accessible. See also #2.

8. For guidance offered by the National Information Standards Organization on typical attributes and content of a technical report, if needed, refer to ANSI/NISO Z39.18-2005 (R2010), Scientific and Technical Reports – Preparation, Presentation, and Preservation (see https://www.osti.gov/stip/standards).

Electronic Submission Process: The final scientific/technical report must be submitted via the DOE Energy Link System (E-Link) with a completed electronic version of DOE Announcement Notice (AN) 241.3, "U.S. Department of Energy (DOE), Announcement of Scientific and Technical Information (STI)." The recipient can complete, upload, and submit the DOE AN 241.3 online via E-Link (https://www.osti.gov/elink/2413-submission.jsp). Please refer to https://www.osti.gov/stip/best-practices-portable-document-format-pdf-creation for PDF document creation.

The recipient must mark the appropriate block in the "Intellectual Property/Distribution Limitations" Section of the DOE AN 241.3. Reports that are electronically uploaded must not contain any limited rights data (proprietary data), classified information, protected PII, information subject to export control classification, or other information not subject to release. During the upload process, the recipient must self-certify that no content of this nature is being submitted. For assistance with reports containing such content, contact the Contracting Officer.

Company Names and Logos -- Except as indicated elsewhere, company names, logos, or similar material should not be incorporated into reports.

Copyrighted Material -- Copyrighted material should not be submitted as part of a report unless written authorization to use such material is received from the copyright owner and is submitted to DOE with the report.

1. **Final Technical Reports – Unlimited**

   If the award does ***NOT*** authorize the recipient, under the provisions of the Energy Policy Act of 2005, to protect the data produced during the award, where public release of the technical report is protected for a limited period-of-time, the technical report must be submitted to E-Link as a "Final Technical Report" (covering the entire project period of performance) and must not have any data protection markings on the cover page. The "STI Product Type" of "Technical Report" with the "Report Sub Type" of "Final Technical Report" must be selected. When submitting the final technical report to E-Link, the recipient must select "unlimited" from the Intellectual Property/Distribution Limitation selections. The final technical report will be released without any protections and may become publicly available immediately.

2. **Final Technical Reports – Protected Data.**

   If the award authorizes the recipient, under the provisions of the Energy Policy Act of 2005, to protect the data produced during the course of the award, where public release of the final technical report is protected for a limited period-of-time, and the recipient elects to protect the report, the recipient will be required to 1) submit a final technical report with the protected data (which will be protected during the identified

data protection period) and 2) a version of the technical report that can be publicly disseminated immediately.

For the protected data version of the final technical report, the report must cover the entire project period of performance, include the proper data protection marking (included in the terms of the award), and place that marking on the cover page of the final technical report before submitting it to E-Link. The "STI Product Type" of "Technical Report" with the "Report Sub Type" of "Final Technical Report" must be selected. The recipient must also select the block in the Intellectual Property/Distribution Limitation section of the DOE AN 241.3 as "Protected Data" and provide a release date for the technical report when submitting the final technical report.

The release date is the date the technical report will become publicly available. The release date must be based on the data protection period authorized by the award. The release date must coincide with the data marking on the technical report.

Additionally, the Department's policy is to ensure timely public access to unrestricted scientific and technical research results. To make these results publicly accessible, even when the award authorizes the recipient to protect the data for a period-of-time, the recipient must also submit an "unlimited" version of the technical report. This version should not include any data subject to data protections. The "unlimited" version of the technical report must be uploaded to E-Link without any markings. The "STI Product Type" of "Technical Report" with the "Report Sub Type" of "Technical Report Other" must be selected. The recipient must select "unlimited" from the Intellectual Property/Distribution Limitation selections. The "unlimited" version of the technical report is submitted with unlimited data rights, and the Government assumes no liability for the disclosure, use or reproduction of such report.

B. Invention Certification (DOE F 2050.11)

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within 120 calendar days after expiration or termination of the award

The prime recipient is required to submit an Invention Certification DOE F 2050.11. The Invention Certification form is available at https://www.netl.doe.gov/business/business-forms/financial-assistance.

The Invention Certification must include a list of all subcontracts at any tier containing a patent rights clause (or state that there were none).

C. Tangible Personal Property Report – Final Report (SF-428 & SF-428B)

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within 120 calendar days after expiration or termination of the award

The prime recipient must submit a final inventory of and request disposition instructions for any federally-owned property and/or property or equipment acquired with project funds with an acquisition cost above $5,000, whether the property is/was in the possession of the prime recipient or subrecipients.

The prime recipient must complete an SF-428 and SF-428B, available at https://www.netl.doe.gov/business/business-forms or https://www.grants.gov/web/grants/forms/post-award-reporting-forms.html.

If disposition occurs at any time other than award closeout, the prime recipient must complete an SF-428 and SF-428C (see section II. E. Tangible Personal Property Report – Disposition Request/Report).

Only the DOE Contracting Officer has authority to approve disposition requests and issue disposition instructions.

D. Verification of Receipt of Accepted Manuscripts

Recipients are required to submit Accepted Manuscripts of Journal Articles resulting in whole or in part from a DOE-funded project to E-Link (see section I. D. 1. Accepted Manuscript of Journal Article).

As part of the closeout process, DOE will verify that all accepted manuscripts have been submitted. Recipients are required to submit all missing accepted manuscript before closeout is finalized.

E. Other Closeout Reporting (see Special Instructions)

Submit to:	FITS@netl.doe.gov
Submission deadline:	Within 120 calendar days after expiration or termination of the award

IV. Post-Project Reporting

A. Scientific and Technical Reporting

Scientific and Technical Reporting requirements as outlined in I. D. Scientific and Technical Reporting remain applicable after the award ends. If the recipient has created Scientific and

Technical Information (STI) such as publications, conference products, technical reports, book chapters, etc. which include information/data produced under the award, they are required to submit this document to https://www.osti.gov/elink/forms.jsp. Recipients must continue to include proper DOE Acknowledgement and Legal Disclaimer language in all STI. Please see section I. D. Scientific and Technical Reporting for additional information on submissions.

Note that after the project ends, recipients are no longer required to submit notification of STI directly to DOE.

B. Intellectual Property Reporting

Intellectual Property Reporting requirements as outlined in section I. E. Intellectual Property Reporting remain applicable after the award ends.

Recipients are required to continue submitting intellectual property reports, as applicable, to iEdison at https://www.nist.gov/iedison.

Note that after the project ends, recipients are no longer required to submit notification of intellectual property directly to DOE.

V. Bipartisan Infrastructure Law/Inflation Reduction Act Reporting

A. Community Benefits Report

Submit to:	FITS@netl.doe.gov
Submission deadline:	Yearly; within 90 calendar days after the end of the federal fiscal year or termination of the award.

The Recipient must meet the stated objectives and milestones set forth in its Community Benefits Outcomes and Objectives, which is incorporated into the Award. A report on the Recipient's progress towards meeting the objectives and milestones must be reported annually. A Community Benefits Reporting Template is available at https://www.energy.gov/infrastructure/reporting-checklists with the intent to reduce the administrative burden by promoting the use of common formats.

B. Boosting Domestic Manufacturing

Submit to:	FITS@netl.doe.gov
Submission deadline:	**As Specified,** within 30 calendar days after the end of the first quarterly reporting period; **Yearly;** within 90 calendar days after the end of the federal

	fiscal year and **Final;** within 120 calendar days after expiration or termination of the award.

There are three tabs of the Boosting Domestic Manufacturing Report. The information contained in all three tabs is required for reporting. A template is available at: https://www.energy.gov/infrastructure/reporting-checklists.

1. **Domestic Manufacturing & Critical Materials and Rare Earth Element Mining, Processing, Production & Recycling Capacity**

   This report applies to projects that support (i.e., construct, establish, retool, re-equip, or retrofit) manufacturing capacity as well as projects that support the mining, processing, production, or recycling of critical minerals or rare earth materials and elements. Recipients of such projects are required to report on direct domestic manufacturing capacity as well as critical materials and rare earth element mining, processing, production, or recycling capacity.

2. **GHG Emissions & Air Pollutants**

   This report documents the increases and decreases in pollutants across the effective useful life of the project as well as GHG emissions created through mining, processing, production, or recycling operations projects and indirect changes in GHG emissions resulting from projects.

3. **Equipment**
   Recipients must provide a list of all equipment in mining, processing, production or recycling facilities projects that emit pollutants or GHGs onsite in facilities listed in the mining processing & production or recycling tab.

C. Quality Job Creation

1. Direct Jobs

Submit to:	https://www.lcptracker.com/
Submission deadline:	Weekly

This award is funded under Division D of the Bipartisan Infrastructure Law (BIL). All laborers and mechanics employed by the recipient, subrecipients, contractors or subcontractors in the performance of construction, alteration, or repair work in excess of $2000 on an award funded directly by or assisted in whole or in part by funds made available under this award shall be paid wages at rates not less than those prevailing on similar projects in the locality, as determined by the Secretary of Labor in accordance

with subchapter IV of chapter 31 of title 40, United States Code commonly referred to as the "Davis-Bacon Act" (DBA).

The Recipient must ensure the timely electronic submission of weekly certified payrolls to LCPtracker unless a waiver is granted to a particular contractor or subcontractor because they are unable or limited in their ability to use or access the software.

2. Training Outcomes

Submit to:	FITS@netl.doe.gov
Submission deadline:	**As Specified,** within 30 calendar days after the end of the first quarterly reporting period; **Yearly;** within 90 calendar days after the end of the federal fiscal year and **Final;** within 120 calendar days after expiration or termination of the award.

This report on training and training outcomes is required for all projects requiring DBA compliance, those that discuss workforce development or training in statute, as well as any projects where recipients utilize a portion of their BIL funding on workforce development. Only career-track training that focuses on skill development or pathways into career-track training such as pre-apprenticeship should be tracked for this metric. Career-track training leads to an appropriate industry-recognized credential, professional qualification, or license. It teaches broad occupational knowledge and skills that can be applied across a range of technologies, leading to several different career paths. Continuing education allowing incumbent workers to keep up with the latest technology and practices, and to advance in their careers, is another important element of career-track training. This report will also track the number of workforce partnerships involving employers, community-based organizations (CBOs), or labor unions, including partnerships specified in community benefits agreements and project labor agreements, or similar.

A template is available at: https://www.energy.gov/infrastructure/reporting-checklists.

3. Good Jobs Outcomes

Submit to:	FITS@netl.doe.gov
Submission deadline:	**As Specified,** within 30 calendar days after the end of the first quarterly reporting period; **Yearly;** within 90 calendar days after the end of the federal fiscal year and **Final;** within 120 calendar days after expiration or termination of the award.

This report if required of all recipients of BIL funding. To assess activities contributing to growing American jobs, improving the quality of energy jobs, and facilitating equitable access to good jobs and training opportunities, all BIL recipients must report annually on good jobs outcomes.

A template is available at: https://www.energy.gov/infrastructure/reporting-checklists.

4. Permanent Jobs

Submit to:	FITS@netl.doe.gov
Submission deadline:	Quarterly; within 30 calendar days after the end of the federal fiscal year quarter

All BIL funding recipients who are creating ongoing operations, maintenance, and production jobs should report the number of hires for each reporting period and associated demographic information.

A template is available at: https://www.energy.gov/infrastructure/reporting-checklists.

D. Equity and Justice

Submit to:	FITS@netl.doe.gov
Submission deadline:	Quarterly; within 30 calendar days after the end of the federal fiscal year quarter

There are three reports associated with Equity and Justice. All three reports are included on the same form provided by the DOE Project Team. While the reports are included on the same form, some recipients may not need to complete all three. Refer to the checklist at the beginning of this document for applicability.

A template is available at: https://www.energy.gov/infrastructure/reporting-checklists.

1. Community Engagement Process

This report applies to all projects that include building, expanding, or retrofitting a facility. Recipients should report on engagement activities such as participatory research, citizen advisory committees, open planning forums, etc. and the outputs of those activities such as memorandums of understanding, letters of support, etc. Information in this tab should reflect the objectives outlined in the Community Benefits Plan.

2. Engagement Events and Technical Assistance

This report applies to all projects that hold stakeholder engagement events as outlined in their Community Benefits Plan. Recipients are required to report on stakeholders engaged and from what, if any, communities of interest.

3. Community Ownership

This report applies to all projects that build or install new clean energy or climate assets. Recipients should report whether any or all their project will be community owned, as well as the compensation the community will receive.

E. Pathways to Net Zero

Submit to:	FITS@netl.doe.gov
Submission deadline:	**As Specified,** within 30 calendar days after the end of the first quarterly reporting period; **Yearly;** within 90 calendar days after the end of the federal fiscal year and **Final;** within 120 calendar days after expiration or termination of the award.

There are four reports associated with Pathways to Net Zero. While all four reports are included on the same form, all four reports are not applicable to each project. Refer to the checklist at the beginning of this document for applicability. All four reports are also required to complete the Infrastructure Identifier tab. The purpose of this tab is to record the infrastructure, facility, or operating site. The metrics associated with each site will be reported in the individual reports (Infrastructure Supported, Hydrogen Production, Carbon Capture, Removal, Storage, and Energy Saved) as applicable.

A template is available at: https://www.energy.gov/infrastructure/reporting-checklists.

1. Infrastructure Supported

This report applies to projects that build, retrofit, retool, repurpose, or otherwise support the construction or continued operation of energy generation, energy storage, or other clean energy infrastructure. Projects that fund infrastructure planning should also report.

Recipients are required to report on planned values, annual actual values for the life of project, and values at closeout. This report is structured by technology type, recipients need only complete the technology type applicable to their project as indicated by the DOE project team.

2. Hydrogen Production

This report applies to projects that build, retrofit, retool, repurpose, or otherwise support the construction or continued operation of hydrogen fuel production. Hydrogen can be utilized across sectors to generate electricity, replace existing feedstock or fuel in the industrial sector, provide residential and commercial heating, or fuel transportation.

Recipients are required to report on planned values, annual actual values for the life of project, and values at closeout.

3. Carbon Capture, Removal, Storage

This report applies to projects that build, or otherwise support the construction or continued operation of carbon capture, carbon removal, carbon storage, or carbon dioxide transport.

Recipients are required to report on planned values, annual actual values for the life of project, and values at closeout. This report is structured by technology type, recipients need only complete the technology type applicable to their project as indicated by the DOE project team.

4. Energy Saved

This report applies to all projects that include energy efficiency upgrades or fuel switching, water conservation upgrades that save energy, or distributed energy resources. Recipients are required to report on interventions completed as well as planned and actual energy savings.

F. Davis Bacon Act Semi-Annual Labor Compliance Report

Submit to:	FITS@netl.doe.gov and email DBAenforcementreports@hq.doe.gov
Submission deadline:	**As Specified,** April 21 and October 21

This award is funded under Division D of the Bipartisan Infrastructure Law (BIL). All laborers and mechanics employed by the recipient, subrecipients, contractors or subcontractors in the performance of construction, alteration, or repair work in excess of $2,000 on an award funded directly by or assisted in whole or in part by funds made available under this award shall be paid wages at rates not less than those prevailing on similar projects in the locality, as determined by the Secretary of Labor in accordance with Subchapter IV of Chapter 31 of Title 40, United States Code commonly referred to as the "Davis-Bacon Act" (DBA).

Calendar year semi-annual reports are required on compliance with and enforcement of the labor standards provisions of the Davis-Bacon Act and its related acts covering the periods of October 1st through March 31st, and April 1st through September 30th, respectively. Please submit your semi-annual report to DOE three weeks after the end of semi-annual reporting period by April 21st and October 21st for the applicable performance period.

A template is available at: https://www.energy.gov/infrastructure/davis-bacon-act.

G. Location(s) of Work

Submit to:	Applicable only to OCED/FECM. Program Offices to complete

U.S. DEPARTMENT OF ENERGY

Federal Assistance Reporting Checklist

Attachment 3

Submission deadline:	**As Specified,** quarterly only when there are changes to report.

Prior to award, the Recipient was required to identify each known location being served directly as a primary project site work location or a location impacted by the project. This includes the location(s) of construction or alteration activity as well as any communities geographically near the proposed project site and/or communities that may be a part of the proposed project's supply or waste life cycle (e.g., where raw materials come from, where waste is being sent). The Location(s) of Work report is required to be validated by the project team on a quarterly basis. If there are any changes to the Location(s) of Work, the recipient must submit the updated information to DOE.

A template is available at: https://www.energy.gov/infrastructure/reporting-checklists.

VI. Appendix A: Notice To Recipients (Prime Recipients And Subrecipients) Regarding Protected Data, Limited Rights Data And Protected Personally Identifiable Information

I. PROTECTED DATA AND LIMITED RIGHTS DATA

The recipient is required to mark protected data and limited rights data in accordance with the IP clause set of the award agreement. Failure to properly mark data may result in its public disclosure under the Freedom of Information Act (FOIA, 5 U.S.C. § 552) or otherwise.

A. Protected Data - Technical Data or Commercial or Financial Data First Produced in the Performance of the Award

The U.S. Government normally retains unlimited rights in any technical data or commercial or financial data produced in performance of Government financial assistance awards, including the right to distribute to the public.

However, under certain DOE awards, the recipient may mark certain categories of data produced under the award as protected from public disclosure for a period of time ("Protected Data"). If the award agreement provides for protected data and the recipient wants the data to be protected, the recipient must properly mark any documents containing Protected Data. The recipient should review the IP clause set of the award agreement to determine the applicability of protected data, the maximum length of period of time for data protection and the required markings that must be used to invoke data protection for the award.

B. Limited Rights Data - Data Produced Outside of the Award at Private Expense

Limited Rights Data is data (other than computer software) developed at private expense outside any Government financial assistance award or contract that embody trade secrets or are commercial or financial and confidential or privileged. Prior to including any Limited Rights Data in any documents to DOE, the recipient should review the award agreement. In most DOE awards, the recipient should not deliver any limited rights data to DOE if the recipient wants to protect the Limited Rights Data. If the DOE award does allow and require the delivery of limited rights data, then the recipient must properly mark any documents containing Limited Rights Data as set forth in the IP clause of the award agreement.

II. PROTECTED PERSONALLY IDENTIFIABLE INFORMATION

The recipient should not include any Protected Personally Identifiable Information (Protected PII) in their submissions to DOE. Protected PII is defined as any data that, if compromised, could cause harm to an individual such as identify theft. Protected PII includes, but is not limited to:

- Social Security Numbers in any form;
- Place of Birth associated with an individual;
- Date of Birth associated with an individual;
- Mother's maiden name associated with an individual;
- Biometric record associated with an individual;
- Fingerprint;
- Iris Scan;
- DNA;
- Medical history information associated with an individual;
- Medical conditions, including history of disease;
- Metric information, e.g., weight, height, blood pressure;
- Criminal history associated with an individual;
- Ratings;
- Disciplinary actions;
- Passport number;
- Educational transcripts;
- Financial information associated with an individual;
- Credit card numbers; and
- Security clearance history or related information (not including actual clearances held).

Applicant Name: The Regents of the University of California Award Number: DE-FE0032382

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Budget Period 1	81.089			$1,105,878	$502,964	$1,608,842
2. Budget Period 2	81.089			$1,538,928	$503,654	$2,042,582
3.						$0
4.						$0
5. Totals		$0	$0	$2,644,806	$1,006,618	$3,651,424

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity				Total (5)
	(1) Budget Period 1	(2) Budget Period 2	(3)	(4)	
a. Personnel	$113,244	$226,036			$339,280
b. Fringe Benefits	$28,392	$61,462			$89,854
c. Travel	$6,219	$6,219			$12,438
d. Equipment	$0	$0			$0
e. Supplies	$0	$0			$0
f. Contractual	$1,197,407	$1,512,690			$2,710,097
g. Construction	$0	$0			$0
h. Other	$15,636	$27,363			$42,999
i. Total Direct Charges (sum of 6a-6h)	$1,360,898	$1,833,770	$0	$0	$3,194,668
j. Indirect Charges	$247,944	$208,812			$456,756
k. **Totals** (sum of 6i-6j)	$1,608,842	$2,042,582	$0	$0	$3,651,424
7. Program Income					$0

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Section C - Non-Federal Resources

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) **Totals**
8. Fossil Energy (FE)			$1,006,618	$1,006,618
9.				$0
10.				$0
11.				$0
12. **Total** (sum of lines 8 - 11)	$0	$0	$1,006,618	$1,006,618

Section D - Forecasted Cash Needs

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th quarter
13. Federal	$1,105,878	$276,469	$279,469	$276,470	$276,470
14. Non-Federal	$502,964	$125,741	$125,741	$125,741	$125,741
15. **Total** (sum of lines 13 and 14)	$1,608,842	$402,210	$405,210	$402,211	$402,211

Section E - Budget Estimates of Federal Funds Needed for Balance of the Project

	Future Funding Periods (Years)			
(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16. Fossil Energy (FE)	$1,538,928			
17.				
18.				
19.				
20. **Total** (sum of lines 16-19)	$1,538,928	$0	$0	$0

Section F - Other Budget Information

21. Direct Charges $3,194,668

22. Indirect Charges $456,756

23. Remarks

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Instructions for the SF-424A

Public Reporting Burden for this collection of information is estimated to average 3.0 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Please do not return your completed form to the Office of Management and Budget; send it to the address provided by the sponsoring agency.

General Instructions

This form is designed so that application can be made for funds from one or more grant

For continuing grant program applications, submit these forms before the end of each funding period as required by the grantor agency. Enter in Columns (c) and (d) the

programs. In preparing the budget, adhere to any existing Federal grantor agency guidelines which prescribe how and whether budgeted amounts should be separately shown for different functions or activities within the program. For some programs, grantor agencies may require budgets to be separately shown by function or activity. For other programs, grantor agencies may require a breakdown by function or activity. Sections A, B, C, and D should include budget estimates for the whole project except when applying for assistance which requires Federal authorization in annual or other funding period increments. In the later case, Sections A, B, C, and D should provide the budget for the first budget period (usually a year) and Section E should present the need for Federal assistance in the subsequent budget periods. All applications should contain a breakdown by the object class categories shown in Lines a-k of Section B.

Section A. Budget Summary Lines 1-4 Columns (a) and (b)
For applications pertaining to a **single** Federal grant program (Federal Domestic Assistance Catalog number) and **not requiring** a functional or activity breakdown, enter on Line 1 under Column (a) the catalog program title and the catalog number in Column (b).

For applications pertaining to a **single** program **requiring** budget amounts by multiple functions or activities, enter the name of each activity or function on each line in Column (a), and enter the catalog number in Column (b). For applications pertaining to multiple programs where none of the programs require a breakdown by function or activity, enter the catalog program title on each line in **Column** (a) and the respective catalog number on each line in Column (b).
For applications pertaining to **multiple** programs where one or more programs **require** a breakdown by function or activity, prepare a separate sheet for each program requiring the breakdown. Additional sheets should be used when one form does not provide adequate space for all breakdown of data required. However, when more than one sheet is used, the first page should provide the summary totals by programs.

Lines 1-4, Columns (c) through (g)

For new applications, leave Columns (c) and (d) blank. For each line entry in Columns (a) and (b), enter in Columns (e), (f), and (g) the appropriate amounts of funds needed to support the project for the first funding period (usually a year).

estimated amounts of funds which will remain unobligated at the end of the grant funding period only if the Federal grantor agency instructions provide for this. Otherwise, leave these columns blank. Enter in columns (e) and (f) the amounts of funds needed for the upcoming period. The amount(s) in Column (g) should be the sum of amounts in Columns (e) and (f).

For supplemental grants and changes to existing grants, do not use Columns (c) and (d). Enter in Column (e) the amount of the increase or decrease of Federal funds and enter in Column (f) the amount of the increase or decrease of non-Federal funds. In Column (g) enter the new total budgeted amount (Federal and non-Federal) which includes the total previous authorized budgeted amounts plus or minus, as appropriate, the amounts shown in Columns (e) and (f). The amount(s) in Column (g) should not equal the sum of amounts in Columns (e) and (f).

Line 5—Show the totals for all columns used.

Section B. Budget Categories
In the column headings (a) through (4), enter the titles of the same programs, functions, and activities shown on Lines 1-4, Column (a), Section A. When additional sheets are prepared for Section A, provide similar column headings on each sheet. For each program, function or activity, fill in the total requirements for funds (both Federal and non-Federal) by object class categories.

Lines 6a-i—Show the totals of Lines 6a to 6h in each column.

Line 6j—Show the amount of indirect cost.

Line 6k—Enter the total of amounts on Lines 6i and 6j. For all applications for new grants and continuation grants the total amount in column (5), Line 6k, should be the same as the total amount shown in Section A, Column (g), Line 5. For supplemental grants and changes to grants, the total amount of the increase or decrease as shown in Columns (1)-(4), Line 6k should be the same as the sum of the amounts in Section A, Columns (e) and (f) on Line 5.
Line 7—Enter the estimated amount of income, if any, expected to be generated from this project. Do not add or subtract this amount from the total project amount. Show under the program narrative statement the nature and source of income. The estimated amount of program income may be considered by the federal grantor agency in determining the total amount of the grant.

Section C. Non-Federal Resources

Lines 8-11—Enter amounts of non-Federal resources that will be used on the grant. If in-kind contributions are included, provide a brief explanation on a separate sheet.

Column (a)—Enter the program titles identical to Column (a), Section A. A breakdown by function or activity is not necessary.

Column (b)—Enter the contribution to be made by the applicant.

Column (c)—Enter the amount of the State's cash and in-kind contribution if the applicant is not a State or State agency. Applicants which are a State or State agencies should leave this column blank.

Column (d)—Enter the amount of cash and in-kind contributions to be made

Section E. Budget Estimates of Federal Funds Needed for Balance of the Project

Lines 16-19—Enter in Column (a) the same grant program titles shown in Column
(a), Section A. A breakdown by function or activity is not necessary. For new applications and continuation grant applications, enter in the proper columns amounts of Federal funds which will be needed to complete the program or project over the succeeding funding periods (usually in years). This section need not be completed for revisions (amendments, changes, or supplements) to funds for the current year of existing grants.
If more than four lines are needed to list the program titles, submit additional schedules as necessary.

Line 20—Enter the total for each of the Columns (b)-(e). When additional schedules are prepared for this Section, annotate accordingly and show the

from all other sources.

Column (e)—Enter totals of Columns (b), (c), and (d).

Line 12—Enter the total for each of Columns (b)-(e). The amount in Column (e) should be equal to the amount on Line 5, Column (f) Section A.

Section D. Forecasted Cash Needs

Line 13—Enter the amount of cash needed by quarter from the grantor agency during the first year.

Line 14—Enter the amount of cash from all other sources needed by quarter during the first year.

Line 15—Enter the totals of amounts on Lines 13 and 14.

overall totals on this line.

Section F. Other Budget Information

Line 21—Use this space to explain amounts for individual direct object-class cost categories that may appear to be out of the ordinary or to explain the details as required by the Federal grantor agency.

Line 22—Enter the type of indirect rate (provisional, predetermined, final or fixed) that will be in effect during the funding period, the estimated amount of the base to which the rate is applied, and the total indirect expense.

Line 23—Provide any other explanations or comments deemed necessary.

Attachment 5 Community Benefits Outcomes and Objectives

Recipient Name: Regents of the University of California

Project Title: Community Alliance for Direct Air Capture (CALDAC)

Award Number: DE-FE0032382

I. Executive Summary

In response to DE-FOA-0002735 Modification 000004 CALDAC will undertake a comprehensive assessment of the technical, social and governance feasibility of establishing a community-informed direct air capture (DAC) hub in California. The Recipient shall develop a Community Benefits Plan Development Proposal (CBPDP) during Phase 0a and a Community Benefits Plan during Phase 0b. The feasibility assessment will include two intersecting and interconnected elements:

- Development of the DAC Hub structure and assessment of the technical feasibility of the DAC Hub, including technology partners, location, business model, and CO_2 storage/utilization/conversion option(s), and
- Assessment of the social and governance feasibility of an innovative, community-led ownership model, governance structure, and community benefits plan that engages local stakeholders as core partners.

The resulting feasibility study will include: a hub design that is technically feasible and meets community-designed criteria for environmental, economic, and safety performance, accountability, and transparency; a hub owner, ownership model, and governance structure that delivers real and measurable community benefits; and co-produced data, accountability metrics, and structures to guide Phases 1 and 2. The Project Team has allocated significant budget to support engagement, including funding for community-based organizations and participant stipends.

The project will utilize a community-guided design process that will include regular meetings with stakeholder groups and the community throughout. The Project Team will hold an inclusive kickoff meeting in Month 1 to establish this process with all project partners. Community input and criteria will inform the technological analysis, environmental, health and safety review, and development of ownership and governance structures to deliver meaningful community benefits.

The Project Team will engage community partners to establish a Community Oversight Council to guide the feasibility study by Month 2 of the project. The Recipient will hold initial roundtables with environmental justice, labor, and environmental organizations in Months 1-3. At those meetings, the Project Team will establish ongoing approaches to collaboration. The Project Team will prepare research memos outlining options for hub ownership and governance structures to deliver meaningful community benefits by Month 8. At the end of Phase 0a (Budget Period 1), the Project Team will have articulated community vision, goals, and constraints for a hub and produced an initial hub design and ownership structure that addresses these criteria.

The Community Oversight Council and community-guided design process will continue through Phase 0b (Budget Period 2). The Project Team will refine ownership and governance structures in response to adjustments to the hub design and hold roundtables to review concepts and get input on the development of the Community Benefits Plan. The Project Team will co-create the Community Benefits

Plan with the Community Oversight Council and other stakeholders and have a draft plan by Month 20 and a Final Plan in Month 22.

II. Milestone Table

Category and Commitment	Existing or Planned	Budget Period 1 milestone	Budget period 2 milestone
Community and Labor Engagement			
Community benefits agreement	☒ Yes ☐ Not at this time		Provide guidance on development of community benefits agreement
Collective bargaining agreement (operating jobs)	☐ Yes ☒ Not at this time		
Project Labor Agreement (construction jobs)	☐ Yes ☒ Not at this time		
Community feedback and data incorporated into the project	☒ Yes ☐ Not at this time (If "Not at this time", please provide an explanation in this cell).	- Community Oversight Council established in Month 2 - Kickoff meeting in Month 1-2 to launch community-guided design process - Roundtables and public meetings, at least monthly - Community vision, goals, and constraints articulated by Month 3 - Launch community-guided design process - Engage stakeholders on research on potential models of hub ownership and governance structures to deliver community benefits	- Maintain Community Oversight Council process - Roundtables and public meetings, at least monthly - Review and receive input on Community Benefits Plan
Investing in Quality Jobs			
Health and Safety Committee with Hourly Worker Representation	☐ Yes ☒ Not at this time		
Other Job Quality and Workforce		- Launch roundtable with local labor	- Develop workforce development plan for eventual Hub design

		organizations in Month 2 - Articulate labor goals to be reflected in feasibility analysis	- Review and receive input on Community Benefits Plan
Diversity, Equity, Inclusion, and Accessibility			
Other DEIA		Work with local labor organizations and Jobs First collaboratives to articulate workforce development goals	- Integrate workforce goals and objectives into Community Benefits Plan - Review and receive input on Community Benefits Plan
Justice40 Initiative (disadvantaged communities)			
Identifies benefits/impacts	☒ Yes (If yes, list communities here) ☐ No	- Disadvantaged and low-income communities - Labor Environmentally-burdened communities	- Disadvantaged and low-income communities - Labor Environmentally-burdened communities
Reduction in energy costs	☐ Yes ☒ No		
A decrease in environmental exposure and burdens	☒ Yes ☐ No	Conduct environmental and energy analysis of Hub design	Conduct environmental and energy analysis of Hub design
An increase in access to low-cost capital	☐ Yes ☒ No		
An increase in quality job creation, the clean energy job pipeline, and job training for individuals	☒ Yes ☐ No	- Work with labor and technology providers to identify job pipelines - Engage with JobsFirst collaboratives in the region	- Develop workforce development plan
Increases in clean energy enterprise creation and contracting	☐ Yes ☒ No		
Increases in energy democracy, including Tribal nation ownership or community ownership of project assets	☒ Yes ☐ No	Conducting research on community ownership and governance models	Identify ownership and governance structures to support implementation of CBP
Increased parity in clean energy	☒ Yes ☐ No	Identify community energy goals to inform feasibility assessment	Final Hub design that meets community energy goals