Statement of Project Objectives
[Award Number] [Mod Number]
[Recipient Organization Name]
[Project Title]

[The instructional red and blue text and attachments below should be removed in the final version of the SOPO]

Formatting
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*All of the information to be included in the SOPO must be consistent with the Application and any Negotiation Strategies upon which the award was selected. Specifically, the SOPO must be consistent with the Work Plan portion of the Technical Volume submitted by the Applicant. The SOPO should accurately define **what** work is to be done and the expected progress to be achieved. See the FOA for specific pages limits of the SOPO.*

The following items should not be included in the SOPO:

- *Dollar amounts.*
- *Specific dates (only include general time frames (i.e. Demonstrate XYZ result by Month 3, not Demonstrate XYZ by June 8th, 2013).*
- *Subcontractors, vendors or individuals by name. The award is with the prime and, as such, the SOPO should not generally reference the subcontractors.*

Intellectual property information and other aspects of the project that could be considered proprietary or business confidential should be clearly marked in the final version of the SOPO. The SOPO must be marked as follows and identify the specific pages containing confidential, proprietary, or privileged information:

Notice of Restriction on Disclosure and Use of Data:
Pages [list applicable pages] of this document may contain confidential, proprietary, or privileged information that is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance agreement between the submitter and the Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.

The header and footer of every page that contains confidential, proprietary, or privileged information must be marked as follows: "Contains Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure."

In addition, every line and paragraph containing proprietary, privileged, or trade secret information must be clearly marked with double brackets or highlighting.

A. Project Objectives

Note: This content must be consistent with the 'Project Objectives' section of the Work Plan submitted by the Applicant.

Provide a clear and concise (high-level) statement of the goals and objectives of the project as well as the expected outcomes. If the award is to be structured in Budget Periods, include the objective(s) for each Budget Period.

B. Technical Scope Summary

Note: This content must be consistent with the 'Technical Scope Summary' section of the Work Plan submitted by the Applicant.

Provide a summary description of the overall work scope and approach to achieve the objective(s). The work scope description needs to be divided by Budget Periods that are separated by discrete, approximately annual decision points (see below for more information on go/no-go decision points). The applicant should describe the specific expected end result of each performance period.

C. Tasks To Be Performed

Note: This content must be consistent with the 'Work Breakdown Structure (WBS) and Task Description Summary' section of the Work Plan submitted by the Applicant.

The section should describe the specific activities to be conducted over the life of the project. This section provides a summary of the planned approach to this project and should clearly articulate what work must be accomplished to execute the project scope and thus meet the established project objectives.

The task descriptions should be structured with a hierarchy of performance period separated by at least one project-wide go/no-go decision point at the end of each budget period, approximately every 12 to 18 months of the project. In other words, tasks should be organized in a logical sequence and should be divided into the budget periods of the project, as appropriate.

Each task and/or subtask is to have a unique number and title and an indication of the approximate duration of the task or subtask in months. Each task and/or subtask is to have a task summary that describes the objectives, what work is to be accomplished, and relationship to project deliverables or expected results. Appropriate milestones and go/no-go decision criteria should be incorporated into the task and subtask structure.

Milestones: The SOPO should identify appropriate milestones throughout the project to demonstrate success. A milestone may be either a progress measure (which can be activity based) or a SMART technical milestone. SMART technical milestones should be **S**pecific, **M**easurable, **A**chievable, **R**elevant, and **T**imely, and must demonstrate a technical achievement rather than simply completing a task. Unless otherwise specified in the FOA, the minimum requirement is that each project must have at least one milestone per quarter for the duration of the project with at least one SMART technical milestone per year (depending on the project, more milestones may be necessary to comprehensively demonstrate progress). The Applicant should also provide the means by which the milestone will be verified. In addition to describing milestones in the SOPO text, the milestones should be included in the Milestone Summary Table below.

Go/No-Go Decision Points: The SOPO should include project-wide go/no-go decision points at the end of each budget period. A go/no-go decision point is a risk management tool and a project management best practice to ensure that, for the current budget period or period of performance, technical success is definitively achieved and potential for success in future budget periods or periods of performance is evaluated, prior to actually beginning the execution of future budget periods. Unless otherwise specified in the FOA, the minimum requirement is that each project must have at least one project-wide go/no-go decision point for each budget period (approximately each 12 to 18 month period) of the project. The SOPO should also include the specific technical criteria that will be used to evaluate the progress and make the go/no-go decision. In addition to describing the go/no-go decision points in the SOPO text, the go/no-go decision points and their method of verification should be included in the Milestone Summary Table below. Go/no-go decision points are considered “SMART” and can fulfill the requirement for an annual SMART milestone.

End of Project Goal: The SOPO should include one SMART end of project goal. The Applicant should also provide the means by which the goal will be verified. In addition to describing the end of project goal in the SOPO text, the end of project goal should be included in the Milestone Summary Table below.

Below is an example of a typical task structure. While the example illustrates two Budget Periods and three tasks, the specific project work scope will dictate the appropriate number of budget periods, tasks and subtasks:

Budget Period 1 [Enter Title] – *Budget Period designations may not be necessary for all awards but are required for multi-year projects when subsequent work authorization is dependent on meeting success or acceptance criteria associated with major milestones or go/no-go decision points. Text describing the milestone or go/no-go decision is to be inserted into the task structure at the point where prior completed work is expected to confirm attainment of the milestone or support the criteria established to make the go/no-go decision.*

Task 1.0: Distinctive Title [***Optional:*** *Date range of the task in months (M1-M4)*]

Task Summary: Task summaries shall explicitly describe what work is to be accomplished, identify the project objectives/outcomes being addressed and provide a concise statement of the objectives of that task. In addition, the description should indicate the project deliverables or expected results that this task will help achieve.

Milestone 1.1 (if applicable)
Milestone 1.2 (if applicable)
Etc.

Subtask 1.1: Title [***Optional:*** *Date range (M1-M2)*]
Subtask Summary: Describe the specific and detailed work efforts that go into achieving the higher-level tasks.

Milestone 1.1.1 (if applicable)
Milestone 1.1.2 (if applicable)
Etc.

Subtask 1.2: Title [***Optional:*** *Date range (M3-M4)*]
(Continue until all Task 1 subtasks are listed)

Task 2.0: (continue in the format above until all tasks and subtasks are listed)
Subtask 2.1: Title, Date range, Subtask Summary Description
Subtask 2.2: Title, Date range, Subtask Summary Description

Budget Period 1 Go/No-Go Decision Point: Insert go/no-go decision description, including the specific technical criteria or basis on which the decision is to be made.

Budget Period 2 [Enter Title]

Task 3.0: Distinctive Title [***Optional:*** *Date range of the task in months (M12-M14)*]

(Continue in the format above until all tasks and subtasks are listed)

D. Project Management and Reporting

This section should briefly describe relevant project management and reporting activities during all budget periods, including any special reporting requirements or deliverables.

Reports and other deliverables will be provided in accordance with the Federal Assistance Reporting Checklist following the instructions included therein.

Additional deliverables as indicated in the task/subtask descriptions include the following:
Note: If items other than those identified on the "Federal Assistance Reporting Checklist" will be delivered to DOE, these deliverables will be identified within the text of the Statement of Project Objectives and should be identified here. See the following examples:

1. *Subtask 1.1 - (Topical Report or Item (e.g., hardware for testing) Description)*
2. *Task 2 - (Topical Report or Item (e.g., hardware for testing) Description)*

Milestone Summary Table							
Recipient Name:	[Enter Recipient Name]						
Project Title:	[Enter Project Title]						
Task Number	**Task or Subtask (if applicable) Title**	**Milestone Type (Milestone, Go/No-Go Decision Point, End of Project Goal)**	**Milestone Number* (Go/No-Go Decision Point Number)**	**Milestone Description (Go/No-Go Decision Criteria)**	**Milestone Verification Process (What, How, Who, Where)**	**Anticipated Date (Months from Start of the Project)**	**Anticipated Quarter (Quarters from Start of the Project)**
			See Milestone Summary Table examples in Attachment 1 below				

Note: This content must be consistent with the 'Milestone Summary' section of the Work Plan submitted by the Applicant.

** Milestone numbering convention should align with Task and Subtask numbers, as appropriate. For example, M1.1, M3.2, etc.*

Note 1: It is required that each project has at least one milestone per quarter for the entire project duration. It is required that each project have at least one SMART technical milestone per year. It is not necessary that each task have one milestone per quarter.

Note 2: It is required that each project has at least one project-wide go/no-go decision point at the end of each budget period, approximately every 12 to 18 months. If a decision point is not specific to a particular task, then you may leave the task information blank for those decision points.

Attachment 1 – Example Milestone Summary Tables

Below are three examples of Milestone Summary Tables.

Example 1 is a milestone table for an R&D project with parallel efforts for material development, tool design and reliability testing.

Example 2 is a milestone table for an offshore wind demonstration project that will complete the initial engineering design, as well as initiation of all permitting or studies required for regulatory compliance and the NEPA review process, with a DOE down-select of funded projects at the end of the first budget period.

Example 3 is a milestone table for an Integrated Bio-Refinery (IBR) demonstration project.

Example 1: Milestone Summary Table for an R&D project with parallel efforts for material development, tool design and reliability testing.

Milestone Summary Table							
Recipient Name:	[Enter Recipient Name]						
Project Title:	[Enter Project Title]						
Task Number	**Task or Subtask (if applicable) Title**	**Milestone Type (Milestone or Go/No-Go Decision Point)**	**Milestone Number* (Go/No-Go Decision Point Number)**	**Milestone Description (Go/No-Go Decision Criteria)**	**Milestone Verification Process (What, How, Who, Where)**	**Anticipated Date (Months from Start of the Project)**	**Anticipated Quarter (Quarters from Start of the Project)**
1.0	**Material synthesis**						
1.1	Batch Quality	Milestone	1.1.1	Demonstrate a 1L batch size with a >1.5% absolute performance improvement over a non-coated device	Send 5 slides to NREL for transmission test, 3 must meet pass over 350~1000nm ASTM173 spectrum	1	1
1.1	Batch Quality	Milestone	1.1.2	Demonstrate a 1L batch size with a >2.0% absolute performance improvement over a non-coated device	Send 5 slides to NREL for transmission test, 3 must meet pass over 350~1000nm ASTM173 spectrum	6	2
1.1	Batch Quality	Milestone	1.1.3	Demonstrate a 1L batch size with a >2.5% absolute performance improvement over a non-coated device	Send 5 slides to NREL for transmission test, 3 must meet pass over 350~1000nm ASTM173 spectrum	14	5
1.2	Batch Volume	Milestone	1.2.1	Demonstrate a 100L batch size with a >2.0% absolute performance improvement over a non-coated device	Send 5 slides to NREL for transmission test, 3 must meet pass over 350~1000nm ASTM173 spectrum	10	4
1.2	Batch Volume	Milestone	1.2.2	Demonstrate a 1000L batch size with a >2.5% absolute performance improvement over a non-coated device	Send 5 slides to NREL for transmission test, 3 must meet pass over 350~1000nm ASTM173 spectrum	16	6
2.0	**Coating Area & Uniformity**						

2.0	Coating Area & Uniformity	Milestone	2.1	Demonstrate a 1x1 cm coating with a >1.5% absolute performance improvement for entire device over a non-coated device	Send 5 slides/sheets to NREL for transmission test measured at the center and 4 corners, 3 must meet pass over 350~1000nm ASTM173 spectrum	1	1
2.0	Coating Area & Uniformity	Milestone	2.2	Demonstrate a 10x10 cm batch size with a >2.0% absolute performance improvement for entire device over a non-coated device	Send 5 slides/sheets to NREL for transmission test measured at the center and 4 corners, 3 must meet pass over 350~1000nm ASTM173 spectrum	9	3
2.0	Coating Area & Uniformity	Milestone	2.3	Demonstrate a 1x1 m2 batch size with a >2.5% absolute performance improvement for entire device over a non-coated device	Send 5 slides/sheets to NREL for transmission test measured at the center and 4 corners, 3 must meet pass over 350~1000nm ASTM173 spectrum	15	5
		Go/No-Go Decision Point	Go/No-Go # 1	Demonstrate 100L batch size with a >2.0% absolute performance improvement over a non-coated device on a 10x10 cm glass slide	Send 5 slides/sheets to NREL for transmission test measured at the center and 4 corners, 3 must meet pass over 350~1000nm ASTM173 spectrum	12	4
3.0	**Tool development**						
3.1	Pilot Tool	Milestone	3.1.1	Pilot Tool - Design, Fabrication, Debug Complete, Switch-On	Video of tool operation, including full sequence of glass panel from input to output. Uploaded to DOE web site	18	6
3.1	Pilot Tool	Milestone	3.1.2	Demonstrate Pilot-Tool cycling of material through coat & dry process steps with IPA as simulated coating fluid	Video of tool operation, including full sequence of glass panel from input to output. Uploaded to DOE web site	18	6
3.1	Pilot Tool	Milestone	3.1.3	Demonstrate air handling system, VOC abatement systems operational	Video includes sequence showing HVAC & VOC Oxidizer systems in operation	18	6

3.1	Pilot Tool	Milestone	3.1.4	Demonstrate safety systems & interlocks operational	Video includes sequence showing operation of safety interlocks	18	6
3.1	Pilot Tool	Milestone	3.1.5	Demonstrate ability to coat 2x1m glass panel in Pilot tool.	Coating process documented by video, uploaded to DOE web site	18	6
3.1	Pilot Tool	Milestone	3.1.6	Achieve average 2% absolute performance improvements 6 sample points	Send 6 coupons to NREL cut according to 2x1m test grid, 4/6 must meet requirement over 350~1000nm ASTM173 spectrum	21	7
3.1	Pilot Tool	Milestone	3.1.7	Coat, assembly and test full size 1x2m panels	Coating process documented by video, confirm assembly success by providing post assembly flash test data to DOE	24	8
3.1	Pilot Tool	Milestone	3.1.8	Achieve at least 75% yield against defect spec.	No significant visible defect detected by eye at a distance of 2m with optimal lighting for defect detection	24	8
3.2	Production Tool	Milestone	3.2.1	Production Tool - Design, Fabrication, Debug Complete, Switch-On	Video of tool operation, including full sequence of glass panel from input to output. Uploaded to DOE web site	25	9
3.2	Production Tool	Milestone	3.2.2	Demonstrate air handling system, VOC abatement systems operational	Video includes sequence showing HVAC & VOC Oxidizer systems in operation	26	9
3.2	Production Tool	Milestone	3.2.3	Demonstrate safety systems & interlocks operational	Video includes sequence showing operation of safety interlocks	27	9
3.2	Production Tool	Milestone	3.2.4	Produce 1st articles of coated glass to full design spec.	Panels tested with hand-held Konica 2600d reflectometer, using 5-point pattern in 2x1m test grid	27	9
3.2	Production Tool	Milestone	3.2.5	Demonstrate operation at design through-put (at least 50 units per hour).	Video of tool operation, including full sequence of glass panel from input to output. Uploaded to DOE web site	28	10

3.2	Production Tool	Milestone	3.2.6	Demonstrate coating of one or more glass panels to customer agreed coating spec.	Panels tested with hand-held Konica 2600d reflectometer, using 5-point pattern in 2x1m test grid	32	11
3.2	Production Tool	Milestone	3.2.7	Sign-off on safety systems & Ready to ship	Provide copy of release to ship paperwork to DOE	34	12
4.0	**Customer Engagement**						
4.1	LOI	Milestone	4.1.1	Provide LOI from prospective customer for delivery of a production tool	Copy of letter provided to DOE	16	6
4.1	LOI	Milestone	4.1.2	Provide LOI from 2 additional prospective customer for delivery of a production tool	Copy of letters provided to DOE	30	10
4.2	Customer Acceptance	Milestone	4.2.1	Tool acceptance specification agreed and signed by customer	Provide copy of signed document to DOE	33	11
4.2	Customer Acceptance	Milestone	4.2.2	Sign-off of tool acceptance specification by customer. Verification & agreement that all performance metrics have been met or exceeded.	Provide copy of release to ship paperwork to DOE	34	12
		Go/No-Go Decision Point	Go/No-Go #2	Demonstrate ability to coat 2x1m glass panel in Pilot tool and achieve an average of 2.5% absolute performance improvements 6 sample points with a 50UPH throughput and at least 75% yield against defect spec.	Send 6 coupons to NREL cut according to 2x1m test grid, 4/6 must meet requirement over 350~1000nm ASTM173; No significant visible defect detected by eye at a distance of 2m with optimal lighting for defect detection spectrum.	30	10
		Go/No-Go Decision Point	Go/No-Go #3	1 tool sold and installed	Provide copy of signed supply agreement to DOE	36	12
5.0	**Reliability**						
5.1	Outdoor Testing	Milestone	5.1.1	Coat 6 units send coated units to NREL with 6 uncoated units to perform outdoor testing	Letter from NREL verifying receipt and installation will be sent to DOE.	1	1

5.2	Initial Lifetime Testing	Milestone	5.2.1	Submit 6 coated units to NREL for lifetime testing	Report from NREL documenting testing results will be sent to the DOE	1	1
5.2	Pass lifetime Test	Milestone	5.2.2	Submit 6 coated units to NREL lifetime testing with 5 units passing	Report from NREL documenting testing results will be sent to the DOE	21	7
5.3	Initial Abrasion Test	Milestone	5.3.1	Submit 6 coated units to NREL abrasion testing	Report from NREL documenting testing results will be sent to the DOE	1	1
5.3	Pass Abrasion Test	Milestone	5.3.2	Submit 6 coated units to NREL abrasion testing with 5 units passing with 5 units passing	Report from NREL documenting testing results will be sent to the DOE	21	7
		End of Project Goal		Pass Abrasion Tests to UL requirement; Provide LOI from prospective customer for delivery of a production tool	Report from NREL documenting testing results will be sent to the DOE; Copy of letter provided to DOE;	24	8

Example 2: Milestone Summary Table for an offshore wind demonstration project that will complete the initial engineering design, as well as initiation of all permitting or studies required for regulatory compliance and the NEPA review process, with a DOE down-select of funded projects at the end of the first budget period.

Milestone Summary Table							
Recipient Name:	ABC Wind Company						
Project Title:	Offshore Wind Demonstration Project						
Task Number	**Task or Subtask (if applicable) Title**	**Milestone Type (Milestone or Go/No-Go Decision Point)**	**Milestone Number* (Go/No-Go Decision Point Number)**	**Milestone Description (Go/No-Go Decision Criteria)**	**Milestone Verification Process (What, How, Who, Where)**	**Anticipated Date (Months from Start of the Project)**	**Anticipated Quarter (Quarters from Start of the Project)**
1	Engineering Design	Milestone	M1.1	Selection of foundation type, support structure and tower design.	Verification of the foundation selection process and selected foundation will be reviewed by DOE and NREL personnel. If DOE project manager deems it necessary, a critical design review with DOE and third-party experts will be convened.	4	2
1	Engineering Design	Milestone	M1.2	Complete scale model testing of platform in wind/wave basin to verify model performance/results.	Verify data collection and experiment execution through testing report and/or site visit during test period.	4	2
1	Engineering Design	Milestone	M1.3	Foundation certification	Achieve type certification for foundation design from third party verification agency (i.e., ABS or DNV). Verify certificate from third party agency.	9	3
2	Site Characterization	Milestone	M2.1	Complete geotechnical studies of site to inform anchor/mooring design.	DOE project manager to verify collection and analysis of at least 1 core sample at each potential turbine site to inform	2	1

				Identify at least 3 viable anchor sites per turbine.	foundation/anchor design. Verification completed through report review.		
2	Site Characterization	Milestone	M2.2	Complete geophysical mapping of potential mooring corridor obstructions	DOE project manager to verify that side-scan sonar of entire field, with focus and higher resolution for mooring corridors completed. Verify that a complete geophysical map of entire wind turbine site to appropriate resolution to document seabed conditions and identify any objects of interest. Verification conducted through report review and site visits.	2	1
3	Metocean and Environmental Monitoring	Milestone	M3.1	Collection of site-specific data including wind, current, wave data	DOE project manager to verify that instrumented buoy(s) are deployed at project site through quarterly reporting or site visit.	5	2
3	Metocean and Environmental Monitoring	Milestone	M3.2	Complete Avian Monitoring study	Traditional thermal imaging (FLIR) and near infra-red (NIR) video systems will be used to assess the presence and behavior of avian and bat species around offshore wind turbine site. Verify that instruments are deployed and collecting data.	9	3
4	Turbine testing	Milestone	M4.1	Certification of turbine	Verify testing will be performed in accordance with International Electrotechnical Commission (IEC) 61400-22 through review of type certification report.	12	4
5	Regulatory Approvals and Permitting	Milestone	M5.1	Initiate process for all required permits and regulatory approvals for	DOE project manager reviews report on progress towards permitting and regulatory	12	4

				wind farm site, interconnection, rights of way.	compliance, verifying that all requirements have been initiated.		
6	Vendor Request for Proposals	Milestone	M6.1	Vendor quotes received	DOE personnel review vendor quotes and verify for legitimacy.	11	4
7	Economic Analysis	Milestone	M7.1	Refine levelized cost of energy (LCOE) estimates based on engineering design. The proposed design must meet the local hurdle price of $0.10/kWh.	Verify submitted LCOE estimates through third party independent review during down select review process.	11	4
		Go/No-Go Decision Point	D1	DOE will select up to three projects to proceed to Budget Period 2, based on the following down-selection criteria: 1) Budget Period 1 technical performance and progress towards stated project objectives 2) Innovations and their potential reductions on the cost of energy (LCOE), and 3) Likelihood of project success, advancement of the national knowledge base and commercial impact in the U.S.	Independent cost analysis, design analysis, and permitting progress conducted by DOE, Lab, and third-party subject matter experts.	13	5
8	Budget Period 2 Tasks and milestones to be negotiated after down selection process completed.			TBD	TBD	15	5

Example 3: Milestone Summary Table for an Integrated Bio-Refinery (IBR) demonstration project.

Milestone Summary Table							
Recipient Name:	Biofuels Maker						
Project Title:	250 Ton/Day Biofuel Demonstration Facility						
Task Number	**Task or Subtask (if applicable) Title**	**Milestone Type (Milestone or Go/No-Go Decision Point)**	**Milestone Number* (Go/No-Go Decision Point Number)**	**Milestone Description (Go/No-Go Decision Criteria)**	**Milestone Verification Process (What, How, Who, Where)**	**Anticipated Date (Months from Start of the Project)**	**Anticipated Quarter (Quarters from Start of the Project)**
1	Budget Period 1 Planning Activities	Milestone	M1.1	Critical Decision-2 Approve Performance Baseline (DOE Core)	DOE (with consultation from DOE's Independent Engineer) and Recipient Agree to Performance Baseline for Project		
2.1	Engineering and Environmental - NEPA	Milestone	M2.1	NEPA Approval to Proceed Detailed Design and Construction (DOE Core)	NEPA decision issued. Current schedule assumes Environmental Assessment with associated Finding of No Significant Impact Issued by DOE. If determined that an EIS is required, NEPA scope and associated baseline will be revised through change control process.		
2.4	Engineering and Environmental - External Independent Review	Go/No-Go Decision Point	GN2.2	DOE Preliminary Design Review and Approval to Continue Project	Recipient will submit all preliminary engineering, design, cost models, sites studies, etc. to DOE's Independent Engineer and Risk Analyst as specified in the EIR-1 guidelines. The Independent Engineer and Risk Analyst will submit independent reports to DOE. Recipient must adequately address all deficiencies and risk items to DOE's satisfaction before the project will be authorized to continue.		

2.6	Engineering and Environmental - Equipment Specification	Milestone	M2.6	Completion of Equipment Specification Data Sheets	Equipment Data Sheets will be provided to DOE's Independent Engineer for verification of completion and adequacy. Data sheets must meet the requirements of Recipients data sheet definitions, as defined in the PMP.		
2.8	Engineering and Environmental - Building Design	Milestone	M2.8	Completion of building design specifications.	Building design, specifications, and detailed costing data will be provided to DOE's Independent Engineer for review and verification against all applicable building codes and architectural standards.		
2.12	Engineering and Environmental - Permitting	Milestone	M2.12	Approval of Construction Permit	All required construction permits will be obtained and verified on site by DOE's Independent Engineer		
2.12	Engineering and Environmental - Permitting	Milestone	M2.13	Approval of Operating Permit	All required operating permits (including Title V, water use, and sewer discharge) will be obtained and verified on site by DOE's Independent Engineer.		
2.14	Engineering and Environmental - External Independent Review, Detailed Review	Milestone	M2.14	Submission to and Approval by the DOE (EIR-2)	Recipient will submit all detailed engineering, design, cost models, sites studies, etc. to DOE's Independent Engineer as defined in the EIR-2 guidelines. The Independent Engineer will submit an independent report to DOE. Recipient must adequately address all deficiencies and risk items to DOE's satisfaction before the project will be authorized to continue.		

3	Final Optimization of Operating Parameters at Pilot Scale	Milestone	M3.1	Hydrolysis, Fractionation & Purification Optimization (xx C5 and XX C6 sugar yield per lb/feedstock with contamination levels below those specified in the lab data report x-x). Process set points are determined.	Recipient will conduct triplicate reproduction of data for a minimum of xx hours. All data will be provided to DOE. DOE will be on site for at least one run.		
3.4	Biocatalyst operation optimization	Milestone	M3.4	x % v/v fuel titer at xx hours with a x% weight yield. Process setpoints are determined.	DOE's National Laboratory Designee will be on site for minimum of 2 runs. Data for at least 3 runs will be provided to National Lab for review.		
3.5	Co-product catalyst optimization	Milestone	M3.5	Demonstration of x cycles with x% original catalyst activity. Process setpoints are determined.	Full data report will be provided to DOE's technical expert for review and validation.		
4.6	Pre-construction: Risk Mitigation Plan Refinement	Milestone	M4.6	DOE Approval of final risk mitigation plan.	Recipient will provide final risk mitigation plan to DOE for review and approval.		
4.7	Pre-construction: EPC	Milestone	M4.7	EPC Contract Finalized and Signed - (DOE Core)	DOE's Independent Engineer will verify that the EPC contract is fully executed.		
4.8	Pre-construction: Finances	Milestone	M4.8	Financial Closing or Financial Commitment Letter - (DOE Core)	Recipient will send to DOE all financial closing documentation.		
4.11	Pre-construction: Operations Definitions	Milestone	M4.11	Define Commissioning Criteria (DOE Core)	DOE (with consultation from its Independent Engineer) and Recipient agree to final commissioning criteria		
4	Pre-construction	Go/No-Go Decision Point	GN4.16	Critical Decision-3 Approve Start of Construction (DOE Core)	DOE and Recipient make go/no go decision to enter construction. DOE's decision is based on CD-3 criteria, including EIR-2, provided		

					to Recipient at kickoff. Recipient is responsible to deliver any outstanding items identified in the CD-3 guidelines.		
5.2	Pilot Plant Construction	Milestone	M5.2	Construction Contractors Selected by Recipient and Approved by DOE	All major contractors are selected, and budgets and scopes of work submitted to DOE for approval.		
5.4	Commission and Start-up	Go/No-Go Decision Point	GN5.4	Mechanical completion verified.	DOE's Independent Engineer will verify mechanical completion is reached as defined in Recipient's construction and commissioning plan.		
5.7	Commission and Start-up	Milestone	M5.7	Commissioning complete. All criteria in commissioning plan achieved.	DOE's Independent Engineer performs site visit and reviews Recipient's logs and data to verify.		
5.8	Commission and Start-up	Go/No-Go Decision Point	GN5.8	CD-4 Start of Operational Approval - Initiate Shakedown (DOE Core)	DOE reviews project reports, financial reports, and Independent Engineer reports to make a go/no go decision for operations.		
6.4	Operations-Performance Test	Milestone	M6.4	Performance Test Completed	Recipient runs demonstration facility in accordance with performance test plan (approved by DOE) for a minimum of 40 hours. DOE and DOE's Independent Engineer are on site for portions of the test and Recipient delivers all data logs outlined in the performance test plan.		
6.5	Operations-Continued Long-Term Optimization	Milestone	M6.5	Recipient completes 1500 hours of continuous operation with x% uptime, x conversion of biomass to fuel, at a minimum of	Recipient provides summary reports as defined in deliverables requirements. DOE and DOE's Independent Engineer randomly sample data logs at Recipient site.		

				250 tons/day of feedstock.			
7	Final Economic and Commercial Validation	Milestone	M7	Final Report Delivered to DOE	After xxx months of operation, Recipient provides final report which includes updated economic models, life cycle analysis, and plant performance (inputs, outputs, yields, etc.) as defined in the deliverable requirements		