Appendix C – Workplan Format

**[Control Number]**

**[Applicant Organization Name]**

**[Project Title]**

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

*The Workplan should fully describe the work to be accomplished and how the Applicant will achieve the milestones, will accomplish the final project goal(s), and will produce all deliverables.*

*The following items should not be included in the Workplan:*

* *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 Workplan 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. The Workplan 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.*

1. **PROJECT SUMMARY**

Provide a clear and concise (high-level) statement of the goals and specific objectives of the project (e.g., install approximately 162 kW of solar photovoltaic systems) as well as the expected outcomes (measureable results or end-products) (e.g., reduce 80% of the electricity usage in the buildings, saving $6 million over the life of the system, reduce carbon footprint). Additionally, provide any applicable Vision Statement and/or long-term energy goals (e.g., energy sufficient, protect the environment, reduce electricity costs).

The Project Summary is expected to be a concise overview of the proposed project and only a few of paragraphs long.

**B. BACKGROUND**

Provide a brief summary of the Applicant, goals and objectives, and any relevant background related to the proposed project, such as a description of past studies, previous energy projects or initiatives, existing strategic energy plan, tribal energy portfolio standard or other similar regulations or codes, or other relevant background.

The Background is expected to be limited to only a few paragraphs long.

**C. PROJECT APPROACH**

Provide a description of the overall work scope and approach to achieve the objective(s) and the specific expected end results of the project.

In additionally, this section should include a general description of the project management plan, including the following:

* The overall approach to and organization for managing the work
* The roles of each Project Team member
* Any critical handoffs/interdependencies among Project Team members
* The approach to project risk management
* A description of how project changes will be handled

**D. TASKS TO BE PERFORMED**

The section should describe the specific activities to be conducted over the life of the project. This section provides a substantive description 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 milestones. In other words, tasks should be organized in a logical sequence and may be divided into performance periods of the project, as appropriate.

Each task and subtask is to have a unique number and title and an indication of the approximate duration of the task or subtask. Each task and subtask is to have a substantive description of the objectives, what work is to be accomplished, and relationship to project deliverables or expected results. Appropriate milestones should be incorporated into the task and subtask structure.

**Milestones:** The Workplan should identify appropriate milestones throughout the project to demonstrate success, where success is defined as technical achievement rather than simply completing a task. Milestones should follow the SMART rule of thumb, which is that all milestones should be **S**pecific, **M**easurable, **A**chievable, **R**elevant, and **T**imely. 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 (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 Workplan text, the milestones should be included in the Milestone Summary Table below.

*Below is an example of a typical task structure. While the example illustrates three tasks, the specific project work scope will dictate the appropriate tasks and subtasks:*

**Task 1.0:** Distinctive Title

**Task Details:** Explicitly describe what work is to be accomplished, identify the project objectives/outcomes being addressed and provide a substantive description 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, Subtask Description

**Subtask Details:** 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, Subtask Description

(Continue until all Task 1 subtasks are listed)

**Task 2.0:** Distinctive Title

**Subtask 2.1**: Title, Subtask Description

**Subtask 2.2**: Title, Subtask Description

**Task 3.0:** Distinctive Title

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

**E. REPORTING**

Progress and financial status will be documented in quarterly reports. A separate comprehensive Final Report will be submitted that will include the project results, data collected and other documentation as provided in the guidance. Reports and other deliverables will be provided in accordance with the Federal Assistance Reporting Checklist following the instructions included therein.

Further, progress shall also be presented at annual Program Reviews to be held each year in Denver, Colorado.

**F.** **PROJECT SCHEDULE AND MILESTONES**

The following milestone table summarizes the schedule and milestones associated with the project activities.

The Applicant’s milestone table should provide a detailed schedule for the entire project, including task and subtask durations, and milestones.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Milestone Summary Table** | | | | | | | |
| **Recipient Name:** | |  | | | | | |
| **Project Title:** | |  | | | | | |
| **Task Number** | **Task or**  **Subtask (if applicable) Title** | **Milestone Type (Milestone)** | **Milestone Number\*** | **Milestone Description** | **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 below |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

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

*Note 1: All milestones should follow the SMART rule of thumb:* ***S****pecific,* ***M****easurable,* ***A****chievable,* ***R****elevant, and* ***T****imely*

**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:** | |  | | | | | |
| **Project Title:** | |  | | | | | |
| **Task Number** | **Task or**  **Subtask (if applicable) Title** | **Milestone Type (Milestone** | **Milestone Number\*** | **Milestone Description** | **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 |
| 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 |
| 4.3 | Customer Sales | Milestone | 4.3.1 | Customer sign-off on supply agreement for high volume manufacturing supply chain and quality assurance process | 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 |

***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 Number\*** | **Milestone Description** | **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. Identify at least 3 viable anchor sites per turbine. | DOE project manager to verify collection and analysis of at least 1 core sample at each potential turbine site to inform foundation/anchor design. Verification completed through report review. | 2 | 1 |
| 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 wind farm site, interconnection, rights of way. | DOE project manager reviews report on progress towards permitting and regulatory compliance, verifying that all requirements have been initiated. | 12 | 4 |
| 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 |
| 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 Number\*** | **Milestone Description** | **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. |  |  |
| 2.6 | 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 |  |  |
| 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. |  |  |
| 5.7 | 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. |  |  |
| 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 250 tons/day of feedstock. | Recipient provides summary reports as defined in deliverables requirements. DOE and DOE's Independent Engineer randomly sample data logs at Recipient site. |  |  |
| 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 |  |  |