FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U. S. Department of Energy

NATIONAL ENERGY TECHNOLOGY LABORATORY

Advanced Gasification Technologies Development and Gasification Scoping Studies for Innovative Initiatives

Funding Opportunity Number: DE-FOA-0000784

Announcement Type: Initial

CFDA Number: 81.089 Fossil Energy Research and Development

Issue Date:	**02/15/2013**
Letter of Intent Due Date:	**Not Applicable**
Pre-Application Due Date:	**Not Applicable**
Application Due Date:	**04/22/2013 at 8:00.00 PM Eastern Time**

NOTE: Applications in response to this Funding Opportunity Announcement (FOA) must be submitted through Grants.gov.

Applications can be submitted any time before the closing date/time and all Applicants are strongly encouraged to submit their applications well in advance (at least 48 hours) of the closing date of 04/22/2013.

NOTE: REGISTRATION/SUBMISSION REQUIREMENTS

Registration Requirements

There are several one-time actions you must complete in order to submit an application in response to this Announcement (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the System for Award Management (SAM), and register with Grants.gov). Applicants who are not registered with SAM and Grants.gov should allow at least 44 days to complete these requirements. It is suggested that the process be started as soon as possible.

Applicants must obtain a DUNS number. DUNS website: http://fedgov.dnb.com/webform.

Applicants must register with the SAM. SAM website: http://www.sam.gov/. If you had an active registration in CCR, you should have an active registration in SAM. More information about SAM registration for applicants is found at: https://www.sam.gov/sam/transcript/Quick_Guide_for_Grants_Registrations_v1.7.pdf.

Applicants must register with Grants.gov. There are 3 steps to this process.

1) **The Authorized Organizational Representative (AOR) must register at: https://apply07.grants.gov/apply/OrcRegister .**
2) **An email is sent to the E-Business (E-Biz) POC listed in SAM. The E-Biz POC must approve the AOR registration using their MPIN from their SAM registration.**
3) **AOR verifies that registration was completed at: http://grants.gov/applicants/applicant_profile.jsp.**

More information about the above steps is provided at: http://www.grants.gov/applicants/organization_registration.jsp.

Applicants must register with FedConnect to submit questions. FedConnect website: www.fedconnect.net.

Questions

Questions relating to the registration process, **system requirements, or how an application form works** must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov.

Questions regarding the **content** of the announcement must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. DOE will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Application Preparation and Submission

Applicants must download the application package, application forms and instructions, from Grants.gov. Grants.gov website: http://www.grants.gov/.

Additional instructions are provided in Section IV.A of this FOA.

Where to Submit

Applications must be submitted through Grants.gov to be considered for award. You cannot submit an application through Grants.gov unless you are registered. Please read the registration requirements carefully and start the process immediately. Remember you have to update your SAM registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

IMPORTANT NOTICE TO POTENTIAL APPLICANTS: When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).

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SECTION I - FUNDING OPPORTUNITY DESCRIPTION

Statutory Authority

In accordance with Public Law 95-91, the DOE Organization Act, as amended by Public Law 109-58 Energy Policy Act 2005, the Department of Energy (DOE) plans to issue Financial Assistance Cooperative Agreements as the award instrument for applications selected for support in response to the Funding Opportunity Announcement entitled "*Advanced Gasification Technologies Development and Gasification Scoping Studies for Innovative Initiatives*". The DOE Financial Assistance Regulations are found at 10 CFR Part 600.

Description

Gasification is used to convert a solid feedstock – such as coal, petcoke, or biomass – into a gaseous form, referred to as syngas, which is composed primarily of hydrogen and carbon monoxide (CO). With gasification-based technologies, pollutants can be easily captured and then disposed of or converted to useful products. In the DOE's vision for clean power using gasification, steam is added to syngas in a water-gas shift (WGS) reactor to convert the CO to carbon dioxide (CO_2) and to produce additional hydrogen. The hydrogen and CO_2 are separated – the hydrogen is combusted to make power and the CO_2 is captured and sent to storage, converted to useful product, or used for enhanced oil recovery (EOR).

The Gasification Systems Technology Area takes full advantage of the flexibility inherent in gasification. For instance, technologies designed to clean syngas to chemical production standards also clean syngas for power production (i.e., integrated gasification combined cycle [IGCC]), often with significantly lower contaminant levels than the United States Environmental Protection Agency's (EPA) criteria for power plant emissions. Technologies that lower the cost of producing high-hydrogen syngas for fuels or chemical production will also reduce the carbon footprint of IGCC. Advanced technologies being developed under the Gasification Systems Technology Area will provide a more efficient and economical platform for the capture and utilization of CO_2.

In addition to efficiently producing electric power, a wide range of liquids and/or high-value chemicals and fuels (especially diesel and gasoline) can be produced from cleaned, high-hydrogen syngas, thereby providing flexibility capable of capitalizing on a range of dynamic changes to either domestic energy markets or global economic conditions. Continued advances in gasification-based technology will enable the conversion of our Nation's abundant coal reserves into energy resources (power and liquid fuels) needed to support the U.S. economy with unprecedented environmental performance.

There will be three (3) Areas of Interest (AOIs) under this Funding Opportunity Announcement (FOA). The first two (2) AOIs (Coal Feed Technologies - Low-rank Coal Feed or Coal-woody Biomass Feed Technologies and Lower-cost Oxygen Production Systems) will look to further develop and expand on concepts already included in the Gasification Systems Program that will significantly reduce gasification's capital and operating costs. The third AOI (High Hydrogen Syngas Production) will begin exploration (through systems analysis and small-scale research and development [R&D]) of novel technologies to reduce the cost of creating chemical-grade hydrogen and/or high-hydrogen syngas. The hydrogen content of typical raw syngas is roughly equivalent to the CO content, whereas most liquids and chemical production require at least a 2:1 ratio and high carbon capture IGCC configurations to make power require an even higher hydrogen content gas feed to the turbine. All three AOIs are designed to assure significant reduction in the cost of coal conversion using gasification systems, enabling gasification to both improve U.S. economic competitiveness and provide environmental benefits across the world.

To be considered for selection, a proposed technology must support reducing the environmental impact of gasification and have the potential to significantly reduce the costs of: (1) IGCC with 90 percent carbon capture, and/or (2) creating liquid fuel from coal with carbon capture levels resulting in life cycle greenhouse gas emissions at or below petroleum-based fuels.

This FOA consists of the main body of the FOA plus three (3) additional attachments described as follows:

Attachment 1 is the Merit Review Criteria and Application Requirements Table, which shows the evaluation criteria and sub-criteria that will be used to evaluate the applications received under this FOA. This table also shows the weight of each criterion with regard to the final score for the application. Correlated to each sub-criteria are the submission requirements that reviewers will use – along with the sub-criteria summary – to evaluate the applications received. Applications must be structured to address each sub-criterion in the order shown in this table, identified at least by the criterion number and sub-criterion letter; reviewers will not review or consider information external to the application and required documents to support an application's sub-criterion strengths.

Note: Insufficiently addressed sub-criteria will be considered a major weakness.

Attachment 2 is the Design Basis for Techno-economic Analyses Deliverables. Please reference Attachment 2 for details.

Attachment 3 is the Project Management Plan Template. Please reference Attachment 3 for details.

Additional FOA Notes:

Theory and mechanisms that constitute the underpinnings of the technology should be discussed in detail within the application. Within the recommended page limits of the Scientific and Technical Merit section, the Applicant shall substantiate all claims for the technology with graphs and data based on prior experimental results.

Applications should provide substantial discussion of the requested information and avoid over-utilization of references and citations to other publications and attachments as the merit scoring of the application will correspond to the completeness of the discussion contained within the application only. External references and citations will not be considered by the reviewers.

Anticipated benefits, as well as challenges for the technology should also be discussed in detail within the application.

Applications are sought for the following three (3) AOIs. Multiple applications from the same performing entity are permitted; however, applicants should clearly delineate the AOI under which each application is being submitted. Each application must respond to only ONE (1) AOI as defined below.

AOI 1: Coal Feed Technologies - Low-rank Coal Feed or Coal-woody Biomass Feed Technologies

Projects are sought to meet the following ojectives:

Technical Objectives:

- Develop a fuel feed technology for high-pressure gasifiers that will result in significantly lower-cost coal gasification plant construction and/or operation for production of power with carbon capture; or that will result in significantly lower-cost coal gasification plant construction and/or operation for production of liquid fuels with carbon capture. Applications shall primarily focus on the use of U.S. sub-bituminous coal , lignite and/or coal-wood mixtures (up to 20 percent woody biomass [e.g. poplar, pine and hardwoods]).

- Complete a techno-economic analysis using the technology for IGCC with carbon capture; or using the technology for coal-to-liquids (either methanol or diesel), with carbon capture.

DOE's National Energy Technology Laboratory (NETL) may utilize the results of these studies to develop comprehensive system studies and/or models, as well as to identify future R&D activities. Attachment 2 is the Design Basis for Techno-Economic Analyses Deliverables.

Schedule Objective: The proposed project shall make progress on fuel feed technology development such that the technology is on a path to be ready for first-of-a-kind commercially relevant demonstration by 2020.

Background information on the status of DOE R&D for this technology type can be found at the following web address:

http://www.netl.doe.gov/technologies/coalpower/gasification/adv-gas/index.html.

The required format title for applications submitted under this AOI shall be as follows: "AOI 1 – (Insert Project Title)".

AOI 2: Lower-cost Oxygen Production Systems

Projects are sought to meet the following ojectives:

Technical Objectives:

- Develop advanced oxygen production systems for use in gasification plants that will result in a significantly lower cost compared to conventional processes for applications to produce power with carbon capture or liquid fuels with carbon capture.

- Complete a techno-economic analysis using the technology for IGCC with carbon capture; or using the technology for coal-to-liquids (either methanol or diesel), with carbon capture. DOE/NETL may utilize the results of these studies to develop comprehensive system studies and/or models, as well as to identify future R&D activities. Attachment 2 is the Design Basis for Techno-Economic Analyses Deliverables.

Schedule Objective: The proposed project will make progress on oxygen production technology development such that the technology is on a path to be ready for first-of-a-kind commercially relevant demonstration by 2020.

Background information on the status of DOE R&D for this technology type can be found at the following web address:

http://www.netl.doe.gov/technologies/coalpower/gasification/gas-sep/index.html.

The required format title for applications submitted under this AOI shall be as follows: "AOI 2 – (Insert Project Title)".

AOI 3: High-hydrogen Syngas Production

DOE seeks to facilitate creative, broad-application solutions to reduce the costs of coal conversion to chemical-grade hydrogen, liquid fuels, or high-hydrogen syngas, including scoping studies and small-scale R&D projects. These studies will help to establish costs, risks, potential economic performance, and environmental impacts of such facilities and identify commercial/market potential for the products.

At a minimum, the project must include generation of lab-scale data, or must provide pre-existing data, showing the potential value of the advanced technologies through the project system analyses.

Projects are sought to meet the following ojectives:

Technical Objectives:

- Investigate technologies that have the potential to significantly decrease the cost of producing hydrogen or syngas that is high in hydrogen, low in methane (CH_4) and nitrogen (N_2), and with near-zero trace contaminants, such that it is applicable to power production with carbon capture and liquid fuels production with carbon capture. Technologies need not be limited to 100 percent coal fuel; however, coal must be the predominant fuel (i.e., >50 percent by heating value) for the economic analysis of the plant. Possibilities include (but are not limited to) novel gasifiers, new applications for commercial gasifiers, co-gasification approaches, new technologies to increase the hydrogen content of commerically available syngas, and technologies to separate CO and H_2.

- Complete preliminary conceptual designs and techno-economic analyses that predict plant efficiency, cost of products, and environmental performance. The techno-economic analysis must include at least these configurations: (1) IGCC with carbon capture and (2) coal-to-liquids (either methanol or diesel) with carbon capture. If the proposed technology will excel in other applications, these may also be proposed for analysis. Warm gas cleanup may be used in the economic analysis to demonstrate integrated technology value. DOE/NETL may utilize the results of these studies to develop comprehensive system studies and/or models, as well as to identify future R&D activities. Attachment 2 is the Design Basis for Techno-Economic Analyses Deliverables.

Schedule Objective: The proposed project will make progress on technology development such that the technology is on a path to be ready for first-of-a-kind commercially relevant demonstration by 2030.

Note – As it concerns AOI 3, the following applications are not of interest under this FOA:

- Applications to improve stand-alone water-gas-shift technologies/catalysts

- Applications utilizing electrolysis as the primary source of hydrogen

Background information on the status of DOE R&D for this technology type can be found at the following web address:

http://www.netl.doe.gov/technologies/coalpower/gasification/gas-sep/index.html.

The required format title for applications submitted under this AOI shall be as follows: "AOI 3 – (Insert Project Title)".

SECTION II - AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT

DOE anticipates awarding Cooperative Agreements under this Funding Opportunity Announcement (see Section VI.B.2 Statement of Substantial Involvement).

B. ESTIMATED FUNDING

Approximately $13,000,000 is expected to be available for new awards under this announcement. Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

C. MAXIMUM AND MINIMUM AWARD SIZE

There is no pre-determined maximum amount for an individual award made under this announcement.

There is no pre-determined the minimum amount for an individual award made under this announcement.

D. EXPECTED NUMBER OF AWARDS

Under this FOA, the DOE anticipates making the following number of awards under each AOI:

Area of Interest:	Number of Awards:
AOI 1	0 - 2
AOI 2	0 - 2
AOI 3	1 - 3

As outlined above, the DOE anticipates making 2-5 awards under this FOA depending on the size of the individual awards. Please note that the number of applications selected for negotiations leading to award will depend on the quality of applications submitted under this FOA and the availability of funds. Due to application quality and availability of funds some AOIs may not have any applications selected.

E. ANTICIPATED AWARD SIZE

The anticipated award size for projects under each AOI under this announcement is as follows:

AOI	DOE Share	Required Cost Share	Total Award Value
AOI 1	$3,000,000 - $12,000,000	Minimum of 30% of Total Award Value	DOE Share + Required Cost Share
AOI 2	$3,000,000 - $12,000,000	Minimum of 30% of Total Award Value	DOE Share + Required Cost Share
AOI 3	$750,000 - $1,000,000	Minimum of 20% of Total Award Value	DOE Share + Required Cost Share

F. PERIOD OF PERFORMANCE

The anticipated period of performance for projects under each AOI under this announcement is as follows:

AOI	**Period of Performance**
AOI 1	Thirty-Six (36) Months
AOI 2	Thirty-Six (36) Months
AOI 3	Twelve (12) Months

G. TYPE OF APPLICATION

DOE will accept only new applications under this announcement.

SECTION III - ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS

All types of entities, including DOE National Laboratory Contractors, are eligible to apply, except other Federal agencies, non-DOE Federally Funded Research and Development Center (FFRDC) Contractors, and nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995.

B. COST SHARING

AOI 1 Cost Share - The cost share must be at least 30% of the total allowable costs for research and development projects (and 50% of the total allowable costs for any portion of the project that will directly support demonstration and commercial applications of the proposed technology) and must come from non-Federal sources unless otherwise allowed by law. The sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project (See 10 CFR 600 for the applicable cost sharing requirements).

AOI 2 Cost Share - The cost share must be at least 30% of the total allowable costs for research and development projects (and 50% of the total allowable costs for any portion of the project that will directly support demonstration and commercial applications of the proposed technology) and must come from non-Federal sources unless otherwise allowed by law. The sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project (See 10 CFR 600 for the applicable cost sharing requirements).

AOI 3 Cost Share - The cost share must be at least 20% of the total allowable costs for research and development projects (and 50% of the total allowable costs for any portion of the project that will directly support demonstration and commercial applications of the proposed technology) and must come from non-Federal sources unless otherwise allowed by law. The sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project (See 10 CFR 600 for the applicable cost sharing requirements).

C. OTHER ELIGIBILITY REQUIREMENTS

FFRDC/National Laboratories

Federally Funded Research and Development Center (FFRDC) Contractors - FFRDC contractors may be proposed as a team member on another entity's application subject to the following guidelines:

- Authorization for non-DOE FFRDCs - The Federal agency sponsoring the FFRDC contractor must authorize in writing the use of the FFRDC contractor on the proposed project and this authorization must be submitted with the application. The use of a FFRDC contractor must be consistent with the contractor's authority under its award and must not place the FFRDC contractor in direct competition with the private sector.

- Authorization for DOE FFRDCs - The cognizant contracting officer for the FFRDC must authorize in writing the use of a DOE FFRDC contractor on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization.

  "Authorization is granted for the [*Name*] Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complimentary to the missions of the laboratory, will not adversely impact execution of the DOE assigned programs at the laboratory, and will not place the laboratory in direct competition with the domestic private sector."

- Value/Funding - The value of, and funding for, the FFRDC contractor portion of the work will not normally be included in the award to a successful applicant. Usually, DOE will fund a DOE FFRDC contractor through the DOE field work proposal system and other FFRDC contractors through an interagency agreement with the sponsoring agency.

- Cost Share - The applicant's cost share requirement will be based on the total cost of the project, including the applicant's and the FFRDC contractor's portions of the effort.

FFRDC Contractor Effort:

- The scope of work to be performed by the FFRDC contractor may not be more significant than the scope of work to be performed by the applicant.

- The FFRDC contractor effort, in aggregate, **shall not exceed 25%** of the total estimated cost of the project, including the applicant's and the FFRDC contractor's portions of the effort.

- Responsibility - The applicant, if successful, will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues, including but not limited to, disputes and claims arising out of any agreement between the applicant and the FFRDC contractor.

National Laboratory Contractors

A DOE National Laboratory Contractor is eligible to apply as a prime for funding under this announcement if its cognizant contracting officer provides written authorization and this authorization is submitted with the application. If a DOE National Laboratory Contractor is selected for award, the proposed work will be authorized under the DOE work authorization process and performed under the laboratory's M&O contract. The following wording is acceptable for the authorization:

> "Authorization is granted for the [*Name*] Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complimentary to the missions of the laboratory and will not adversely impact execution of the DOE assigned programs at the laboratory."

Eligibility Note: Federal Agencies and the DOE NETL are not considered eligible for award under this announcement and may not be proposed as a team member on another entity's application. An application that includes a Federal Agency or the DOE NETL as a team member will be considered nonresponsive to this FOA.

SECTION IV - APPLICATION AND SUBMISSION INFORMATION

A. ADDRESS TO REQUEST APPLICATION PACKAGE

Application forms and instructions are available at Grants.gov. To access these materials, go to http://www.grants.gov, select "Apply for Grants," and then select "Download Application Package." Enter the CFDA and/or the funding opportunity number located on the cover of this announcement and then follow the prompts to download the application package.

B. LETTER OF INTENT AND PRE-APPLICATION

1. Letter of Intent

Letters of Intent are not required.

2. Pre-application

Pre-applications are not required.

C. CONTENT AND APPLICATION FORMS

You must complete the mandatory forms and any applicable optional forms (e.g., Disclosure of Lobbying Activities (SF-LLL)) in accordance with the instructions on the forms and the additional instructions below.

Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.

1. SF 424 (R&R)

Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. The list of certifications and assurances referenced in Field 17 can be found on the DOE Financial Assistance Forms Page at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Certifications and Assurances.

2. RESEARCH AND RELATED - Other Project Information

Complete questions 1 through 6 and attach files. The files must comply with the following instructions:

Project Summary/Abstract (Field 7 on the Form)

The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (i.e., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as the Department may make it available to the public after awards are made. The project summary **must not exceed one (1) page** when printed using standard 8.5" by 11" paper with 1" margins (top, bottom, left and right) {single spaced} with font not smaller than 11 point. To attach a Project Summary/Abstract, click "Add Attachment."

Project Narrative (Field 8 on the Form)

The project narrative, which is comprised of the applicant's responses to the Merit Review Criteria (MRC) 1 – 4 (see below) **must not exceed forty (40) double spaced pages for applications submitted under AOI 1 and AOI 2 and twenty-five (25) double spaced pages for applications submitted under AOI 3.** The page count limit for each AOI includes the application's cover/title page, table of contents, charts, graphs, maps, photographs, tables, and other pictorial presentations, when printed using standard 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) with **font not smaller than 11 point**. EVALUATORS WILL ONLY REVIEW THE NUMBER OF PAGES SPECIFIED IN THE PRECEDING SENTENCES. Do not include any Internet addresses (URLs) that provide information necessary to review the application, because the information contained in these sites will not be reviewed. See Part VIII.D for instructions on how to mark proprietary application information. To attach a Project Narrative, click "Add Attachment."

Appendices to the Project Narrative are to be utilized to validate information within the Project Narrative as appropriate and should not be utilized as an extension for information requested to be addressed in the narrative. The **font must not be smaller than 11 point**. Information in the appendices **WILL NOT COUNT** toward the AOI page limit of the Project Narrative.

Applications submitted in response to this FOA will be evaluated and scored in accordance with the Merit Review Criteria (MRC), (see Section V.A.2 of this FOA) and the corresponding weights listed within each MRC (see Attachment 1 for reference):

MRC 1 - Scientific and Technical Merit (40%)
MRC 2 - Technical Approach/Statement of Project Objectives (30%)
MRC 3 - Team Capabilities, Project Management, Facilities and Equipment (20%)
MRC 4 - Project Management Plan (10%)

Project Narratives must adhere to the specific AOI page limit outlined above - 40 pages double spaced for AOI 1 and AOI 2 and 25 pages double spaced for AOI 3. It is recommended that the pages used towards the page limit are used to address each criterion and be commensurate with the weight of the criterion.

The MRCs are to be delineated as Sections MRC 1, MRC 2, MRC 3 and MRC 4 of the Project Narrative. The DOE **strongly** recommends that applicants address these four (4) MRC separately in their respective Project Narrative sections. Each Project Narrative section is to contain a thorough discussion of the respective sub-criteria and information requested under this FOA. Applications that avoid substantial discussion of the requested information by utilization of references to other publications, project narrative appendices and attachments outside the Project Narrative will be judged nonresponsive to the criterion and rated accordingly. Referenced publications and attachments are to be supplied to validate the discussion.

The project narrative must include the following information that **WILL** count towards the project narrative page limit detailed above:

- Project Objectives: This section should be a summary (not the full Statement of Project Objectives as described below), that provides a clear, concise statement of the specific objectives/aims of the proposed project.

- Merit Review Criterion Discussion: The section should be formatted to address each of the merit review criterion and sub-criterion listed in Part V.A. Provide sufficient information so that reviewers will be able to evaluate the application in accordance with these merit review criteria. DOE WILL EVALUATE AND CONSIDER ONLY THOSE APPLICATIONS THAT ADDRESS SEPARATELY EACH OF THE MERIT REVIEW CRITERION AND SUB-CRITERION.

- Relevance and Outcomes/Impacts: This section should explain the relevance of the effort to the objectives in the program announcement and the expected outcomes and/or impacts.

- Roles of Participants: For multi-organizational or multi-investigator projects, describe the roles and the work to be performed by each participant/investigator, business agreements between the applicant and participants, and how the various efforts will be integrated and managed.

- Multiple Principal Investigators: The applicant, whether a single organization or team/partnership/consortium, must indicate if the project will include multiple PIs. This decision is solely the responsibility of the applicant. If multiple PIs will be designated, the application must identify the Contact PI/Project Coordinator and provide a "Coordination and Management Plan" that describes the organization structure of the project as it pertains to the designation of multiple PIs. This plan should, at a minimum, include:

  - process for making decisions on scientific/technical direction;
  - publications;
  - intellectual property issues;
  - communication plans;
  - procedures for resolving conflicts; and
  - PIs' roles and administrative, technical and scientific responsibilities for the project.

- Statement of Project Objectives (SOPO): The project narrative must contain a single, detailed Statement of Project Objectives that addresses how the project objectives will be met. The Statement of Project Objectives must contain a clear, concise description of all activities to be completed during project performance and follow the structure discussed below. The Statement of Project Objectives may be released to the public by DOE in whole or in part after award. It is therefore required that it shall not contain proprietary or confidential business information.

  The Statement of Project Objectives is generally **five-ten (5-10) double spaced pages** in total for the proposed work and the above referenced pages **WILL** count towards the Project Narrative page limitation total. Applicants shall prepare the Statement of Project Objectives in the following format:

TITLE OF WORK TO BE PERFORMED

(Insert the title of work to be performed. Be concise, descriptive and consistent with what is being used throughout the application process)

A. OBJECTIVES - Include one paragraph on the overall objective(s) of the work. Also, include objective(s) for each Budget Period of the work.

B. SCOPE OF WORK - This section should not exceed one-half page and should summarize the effort and approach to achieve the objective(s) of the work for each Budget Period.

C. TASKS TO BE PERFORMED - This section provides a brief summary of the planned approach to this project. Guidelines for developing the Task/Subtask structure follows:

- Tasks and subtasks shall include a concisely written summary, provided in a logical sequence that outlines the Technical Approach provided in the Project Narrative, and apportioned within the Budget Periods as appropriate.

- Tasks shall be numbered consecutively throughout the entire duration of the project, starting with Task 1.0 as outlined below.

- Task 1.0, the Project Management and Planning task, shall be the only task that is active throughout the duration of the project and shall be active in multiple Budget Periods.

- Activities should be described at the task and subtask level in this application as appropriate.

Task 1.0 – Project Management and Planning
THIS TASK IS MANDATORY AND MUST ADDRESS THE FOLLOWING:

This Task shall include the necessary activities to ensure coordination and planning of the project with DOE/NETL and other project participants. These activities shall include, but are not limited to, the monitoring and controlling of project scope, cost, schedule, and risk, and the submission and approval of required NEPA documentation.

Note: The project is restricted from taking any action using Federal funds, which would have an adverse affect on the environment or limits the choice of reasonable alternatives prior to DOE providing the final NEPA decision regarding this project.

This Task shall also include all work elements required to maintain and revise the Project Management Plan, and to manage and report on activities in accordance with the plan.

Note: Successful applicants shall revise the version of the Project Management Plan that is submitted with their applications by including details from the negotiation process and through consultation with the Federal Project Officer.

This Project Management Plan will be updated by the applicant as the project progresses, and the applicant must use this plan to report schedule and budget variances as applicable.

Task 2.0 – Title
(Description)

Subtask 2.1 – Title
(Description)

Subtask 2.2 – Title
Description

Task 3.0 – Title
(Description)

Subtask 3.1 – Title
(Description)

Subtask 3.2 – Title
(Description)

Task 4.0 – Title
(Description)

Continue with Tasks as necessary

D. DELIVERABLES - The periodic, topical and final reports shall be submitted in accordance with the attached “Federal Assistance Reporting Checklist” and the instructions accompanying the checklist.

Note: The Recipient shall provide a list of deliverables other than those identified on the "Federal Assistance Reporting Checklist" that will be delivered under their proposed project. These reports will also be identified within the text of the Statement of Project Objectives as either tasks or subtasks. See the following examples:

1. Task 2.0 – Deliverable Description
2. Subtask 3.2 – Deliverable Description

E. BRIEFINGS/TECHNICAL PRESENTATIONS - The applicant will prepare detailed briefings for presentation to the Federal Project Officer at the Federal Project Officer's facility located in Pittsburgh, PA or Morgantown, WV. Briefings will be given by the Recipient to explain the plans, progress and results of the technical effort as requested by the Project Officer.

The Applicant shall make a presentation to the NETL Project Officer/Manager at a project kick-off meeting held within 45 days of the project start date. The Applicant may also attend/present project information at technical conference(s) (subject to approval by the DOE Project Officer during award negotiation).

The Recipient shall provide and present project overview(s) and/or technical paper(s) at the Program Peer Review Meetings or other designated program meetings that are held biannually, typically at the NETL facility located in Pittsburgh, PA or Morgantown, WV.

(End of SOPO)

Appendices to the Project Narrative - The following appendices are to be provided and clearly defined by their respective headings. Appendices are to be utilized to validate information within the Project Narrative as appropriate and should not be utilized as an extension for information requested to be addressed in the narrative. The **font must not be smaller than 11 point**. Information in the appendices **WILL NOT count** toward the page limits of the Project Narrative.

- Identification of Potential Conflicts of Interest or Bias in Selection of Reviewers Appendix: Provide the following information in this section. This appendix **will not count** in the project narrative page limitation:

  Collaborators and Co-editors: List in alphabetical order all persons, including their current organizational affiliation, who are, or who have been, collaborators or co-authors with you on a research project, book or book article, report, abstract, or paper during the 48 months preceding the submission of this application. Also, list any individuals who are currently, or have been, co-editors with you on a special issue of a journal, compendium, or conference proceedings during the 24 months preceding the submission of this application. If there are no collaborators or co-editors to report, state "None."

  Graduate and Postdoctoral Advisors and Advisees: List the names and current organizational affiliations of your graduate advisor(s) and principal postdoctoral sponsor(s) during the last 5 years. Also, list the names and current organizational affiliations of your graduate students and postdoctoral associates.

- Third Parties Contributing to Cost Sharing Appendix: At the time you submit your application, you must have a letter from each third party (i.e., a party other than the organization submitting the application). The letter must state that the third party is committed to providing a specific minimum dollar amount of cost sharing.

By submitting your application, you are providing assurance that you have signed letters of commitment. In an appendix to your Project Narrative, you must identify the following information for each third party contributing to cost sharing: (1) the name of the organization; (2) the scope of the effort to be provided by referencing tasks within the project SOPO; (3) the proposed dollar amount to be provided in cost share; (4) the amount as a percentage of the total project cost; and (5) the proposed cost sharing - cash, services, or property. Letters must be signed by the person authorized to commit the expenditure of funds by the entity and be provided in a PDF format. In order to reduce the number of files attached to your application, please provide the commitment letters as an appendix to your Project Narrative. Do not attach a file in Field 12. This appendix **will not count** in the project narrative page limitation.

- Bibliography & References Cited Appendix: Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers and year of publication. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application. In order to reduce the number of files attached to your application, please provide the Bibliography and References Cited information as an appendix to your Project Narrative. Do not attach a file in Field 9. This appendix **will not count** in the Project Narrative page limitation.

- Facilities & Other Resources Appendix: This information is used to assess the capability of the organizational resources, including subrecipient resources, available to perform the effort proposed. Identify the facilities to be used at each performance site listed (Laboratory, Animal, Computer, Office, Clinical and Other). If appropriate, indicate their capacities, pertinent capabilities, relative proximity and extent of availability to the project. Describe only those resources that are directly applicable to the proposed work. Describe other resources available to the project (e.g., machine shop, electronic shop) and the extent to which they would be available to the project. In order to reduce the number of files attached to your application, please provide the Facility and Other Resource information as an appendix to your project narrative.
Do not attach a file in Field 10. This appendix **will not count** in the Project Narrative page limitation.

- Equipment Appendix: List major items of equipment already available for this project and, if appropriate, identify the location and pertinent capabilities of each. If you are proposing to acquire equipment, describe comparable equipment, if any, already at your organization and explain why it cannot be used. In order to reduce the number of files attached to your application, please provide the Equipment information as an appendix to your project narrative. Do not attach a file in Field 11. This appendix **will not count** in the Project Narrative page limitation.

- Detailed Data Sets, Lab-Scale Results, Drawings and Supporting Analyses Appendix: If additional technical support (whether it be in the form of drawings, etc.) to support the claim of the potential value of the proposed technology exists, it can also be included as an attachment of the Project Narrative. If additional analysis or lab-scale data showing the potential value of the proposed technology is available, it can also be included as an attachment of the Project Narrative. This appendix file **will not** count in the Project Narrative page limitation.

- Authorizing Access to Testing Facilities Appendix: At the time of application submittal, the applicant must have a letter of commitment from each proposed testing facility. The letter must state the following information for each facility: (1) the name of the organization; (2) demonstration of support of the proposed technology by authorizing access to the selected test facility (if selected for award); and (3) a description of the facility to be accessed. Letters must be signed by the person authorized to commit facility access by the entity and be provided in a PDF format. By submitting your application, you are providing assurance that you have signed letters of commitment. In order to reduce the number of files attached to your application, please provide the Commitment Letters as an appendix to your Project Narrative.

Do not attach a file in Field 12. This file **will not** count in the Project Narrative page limitation.

- Budget for DOE FFRDC Contractor Appendix: If a DOE FFRDC Contractor is to perform a portion of the work, you must provide a DOE Field Work Proposal in accordance with the requirements in DOE Order 412.1 Work Authorization System. This order and the DOE Field Work Proposal form are available at https://www.directives.doe.gov/directives/0412.1-BOrder-a/view. In order to reduce the number of files attached to your application, please provide the DOE Field Work Proposal as an appendix to your Project Narrative. Do not attach a file in Field 12. This file **will not** count in the Project Narrative page limitation.

Other Attachments (Field 12 on the form) - If you need to elaborate on your responses to questions 1-6 on the "Other Project Information" document, attach a file in Field 12.

(End of Project Narrative)

Also, attach the following files:

Project Management Plan (use the template in Attachment 3) - Applicants shall format the PMP (the PMP **WILL NOT count** toward the application page limitations described above) to include the following sections with each section to include the information as described below:

A. Executive Summary - Provide a description of the project that includes the objective, project goals, and expected results.

For purposes of the application, this information is included in the Project Narrative (Field 8) and should be simply copied to this document for completeness, so that the Project Management Plan is a stand-alone document.

B. Risk Management - Provide a summary description of the proposed approach to identify, analyze and respond to perceived risks associated with the proposed project.
Project risk events are uncertain future events that, if realized, impact the success of the project. As 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.

C. 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 and show progress toward budget period and/or project goals.

> Note: During project performance, the Recipient will report the Milestone Status as part of the required quarterly Progress Report as prescribed under Attachment 3 - Reporting Requirements Checklist (Attachment 3 of the award). The Milestone Status will present actual performance in comparison with Milestone Log, and include:
>
> (1) the actual status and progress of the project;
> (2) specific progress made toward achieving the project's milestones; and
> (3) any proposed changes in the project's schedule required to complete milestones.

D. 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 provide a table (the Project Costing Profile) that projects, by month, the expenditure of government funds for the first budget period, at a minimum.

E. 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 for each task, a start date, and end date.

The timeline should show interdependencies between tasks and include the milestones that are identified in the Milestone Log (Section C).

F. Success Criteria at Decision Points - Provide 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.

> Note: As the first task in the Statement of Project Objectives, successful applicants will revise the version of the Project Management Plan that is submitted with their applications by including details from the negotiation process. This Project Management Plan will be updated by the Recipient as the project progresses and the Recipient must use this plan to report schedule and budget variances.

Save this plan in a single file named "pmp.pdf" and click on "Add Attachments" in Field 12 to attach.

Environmental Questionnaire - An Environmental Questionnaire (EQ) must be filled out for each geographic location where activities will be conducted for the project. This will facilitate a National Environmental Policy Act (NEPA) determination by DOE for the project activity site(s). The EQ is available for download at the following website: http://www.netl.doe.gov/business/forms/451_1-1-3.pdf. Save the questionnaire in a single file named "Env.pdf" and click on "Add Attachments" in Field 12 to attach.

3. RESEARCH AND RELATED SENIOR/KEY PERSON

Complete this form before the Budget form to populate data on the Budget form. Beginning with the Project Director/Principal Investigator, provide a profile for each senior/key person proposed. A senior/key person is any individual who contributes in a substantive, measurable way to the scientific/technical development or execution of the project, whether or not a salary is proposed for this individual. Subrecipients and consultants must be included if they meet this definition. For each senior/key person provide the following:

- Biographical Sketch: Complete a biographical sketch for each senior/key person and attach to the "Attach Biographical Sketch" field in each profile. The biographical information for each person **must not exceed three (3) pages** when printed on 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) with **font not smaller than 11 point** and must include the following:

  - Education and Training - Undergraduate, graduate and postdoctoral training; provide institution, major/area, degree and year.

  - Research and Professional Experience - Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

  - Publications - Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication and website address if available electronically.

  - Patents, copyrights and software systems developed may be provided in addition to or substituted for publications.

  - Synergistic Activities - List no more than 5 professional and scholarly activities related to the effort proposed.

- Current and Pending Support - Provide a list of all current and pending support (both Federal and non-Federal) for the Project Director/Principal Investigator(s) (PD/PI) and senior/key persons, including subrecipients, for ongoing projects and pending applications. For each organization providing support, show the total award amount for the entire award period (including indirect costs) and the number of person-months per year to be devoted to the project by the senior/key person. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review. Save the information in a separate file and attach to the "Attach Current and Pending Support" field in each profile.

4. RESEARCH AND RELATED (R&R) BUDGET (TOTAL FED + NON-FED)

Complete the Research and Related Budget (Total Fed & Non-Fed) form in accordance with the instructions on the form and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles and are not prohibited by the funding restrictions in this announcement (See Section IV.G).

Budget Justification (Field K on the form) - Provide the required supporting information for the following costs (see R&R instructions): equipment; domestic and foreign travel; participant/trainees; material and supplies; publication; consultant services; ADP/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify your budget request.
If cost sharing is required, provide an explanation of the source, nature, amount, and availability of any proposed cost sharing. Attach a single budget justification file for the entire project period in Field K. The file automatically carries over to each budget year.

5. R&R SUBAWARD (TOTAL FED + NON-FED) FORM

Budgets for Subrecipients, other than DOE FFRDC Contractors - You must provide a separate cumulative R&R budget for each subrecipient that is expected to perform work estimated to be more than $100,000 or 50 percent of the total work effort (whichever is less).
Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET (Total Fed + Non-Fed) FORM and e-mail it to each subrecipient that is required to submit a separate budget. After the Subrecipient has e-mailed its completed budget back to you, attach it to one of the blocks provided on the form. Use up to 10 letters of the subrecipient's name as the file name.

6. PROJECT/PERFORMANCE SITE LOCATION(S)

Indicate the primary site where the work will be performed. If a portion of the project will be performed at any other site(s), identify the site location(s) in the blocks provided.

Note that the Project/Performance Site Congressional District is entered in the format of the 2 digit state code followed by a dash and a 3 digit Congressional district code, for example VA-001. Hover over this field for additional instructions.

Use the Next Site button to expand the form to add additional Project/Performance Site Locations.

7. DISCLOSURE OF LOBBYING ACTIVITIES (SF-LLL)

If applicable, complete SF- LLL. Applicability: If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant/cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying."

8. SUMMARY OF REQUIRED FORMS AND FILES

Your application must include the following documents:

Name of Document	Format	Attach to
SF 424 (R&R)	Form	N/A
RESEARCH AND RELATED - Other Project Information	Form	N/A
Project Summary/Abstract	PDF	Field 7
Project Narrative – including all applicable appendices	PDF	Field 8
Project Management Plan Template (Attachment 3)	PDF	Field 12
Environmental Questionnaire	Form	Field 12
RESEARCH & RELATED SENIOR/KEY PERSON	Form	N/A
Biographical Sketch including Current and Pending Support	PDF	Attach to appropriate block
RESEARCH AND RELATED (R&R) BUDGET (TOTAL FED + NON-FED)	Form	N/A
Budget Justification	PDF	Field K
R&R SUBAWARD (TOTAL FED + NON-FED) FORM (if applicable)	PDF	Attach to appropriate block
PROJECT/PERFORMANCE SITE LOCATION(S)	Form	N/A
DISCLOSURE OF LOBBYING ACTIVITIES (if applicable)	Form	N/A

D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS

If selected for award, DOE reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to the following:

- Indirect cost information;
- Other budget information;
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5);
- Representation of Limited Rights Data and Restricted Software, if applicable; and
- Additional or updated Commitment Letters from Third Parties Contributing to Cost Sharing, if applicable.

E. SUBMISSION DATES AND TIMES

1. Pre-application Due Date

Pre-applications are not required.

2. Application Due Date

Applications **MUST be received by 04/22/2013, not later than 08:00.00 PM Eastern Time**. You are encouraged to transmit your application well before the deadline (at least forty-eight (48) hours).

The Grants.gov Helpdesk is available for extended periods; please check their website for the Helpdesk hours of operation. **APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.**

You are **encouraged** to transmit your application **well before the deadline** (**at least 48 hours in advance**).

F. INTERGOVERNMENTAL REVIEW

This program is not subject to Executive Order 12372 - Intergovernmental Review of Federal Programs.

G. FUNDING RESTRICTIONS

Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

Cost Principles: Costs must be allowable, allocable and reasonable in accordance with the applicable Federal cost principles referenced in 10 CFR 600. The cost principles for commercial organization are in FAR Part 31.

Pre-award Costs: Recipients may charge to an award resulting from this announcement pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 10 CFR 600. Recipients must obtain the prior approval of the contracting officer for any pre-award costs that are for periods greater than this 90 day calendar period.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

1. Where to Submit

APPLICATIONS MUST BE SUBMITTED THROUGH GRANTS.GOV TO BE CONSIDERED FOR AWARD.

Submit electronic applications through the "Apply for Grants" function at www.Grants.gov. If you have problems completing the registration process or submitting your application, call Grants.gov at 1-800-518-4726 or send an email to support@grants.gov.

2. Registration Process

ONE TIME REGISTRATION PROCESS

You **must COMPLETE** the one-time registration process (all steps) before you can submit your first application through Grants.gov (see http://www.grants.gov/applicants/get_registered.jsp). We recommend that you start this process **at least six weeks before** the application due date. It may take 44 days or more to complete the entire process. Use the Grants.gov Organizational Registration Checklists at http://www.grants.gov/assets/OrganizationRegCheck.pdf to guide you through the process.

IMPORTANT: During the SAM registration process, you will be asked to designate an E-Business Point of Contact (EBIZ POC). The EBIZ POC must obtain a special password called "Marketing Partner Identification Number" (MPIN). When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e., Grants.gov registration).

3. Application Receipt Notices

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of four e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. The titles of the four e-mails are:

Number 1 - Grants.gov Submission Receipt Number
Number 2 - Grants.gov Submission Validation Receipt for Application Number
Number 3 - Grants.gov Grantor Agency Retrieval Receipt for Application Number
Number 4 - Grants.gov Agency Tracking Number Assignment for Application Number

SECTION V - APPLICATION REVIEW INFORMATION

A. CRITERIA

1. Initial Review Criteria

Prior to a comprehensive merit evaluation, DOE will perform an initial review to determine that (1) the applicant is eligible for an award; (2) the information required by the funding opportunity announcement has been submitted; and (3) the proposed project is responsive to the objectives of the funding opportunity announcement. Applications that fail to pass the initial review will not be forwarded for merit review and will be eliminated from further consideration.

2. Merit Review Criteria (MRC)

Applications submitted in response to this FOA for a potential award will be evaluated and scored in accordance with the criteria and the corresponding weights listed within each MRC. The MRC delineated below parallels sections MRC 1, MRC 2, MRC 3 and MRC 4 of the Project Narrative (Section IV.C.2 of this FOA). DOE will consider and evaluate only those applications that address these four MRC separately in their respective Project Narrative sections. Each Project Narrative section is to contain a thorough discussion of the respective sub-criteria and information requested under this FOA. Applications that avoid substantial discussion of the requested information by utilization of references to other publications, project narrative appendices and attachments outside the Project Narrative will be judged nonresponsive to the criterion and rated accordingly. Referenced publications, project narrative appendices and attachments are to be supplied to validate the discussion.

MRC 1 (40 %) - Scientific and Technical Merit

The application will be evaluated to determine the overall technical merit and quality of the proposed concept, including the following:

(1) The degree to which development of the proposed technology can be expected to contribute to a scientific or technical breakthrough capable of meeting the AOI Technical Objectives;
(2) The degree to which the application is based on sound engineering and scientific principles, including the thoroughness and relevance of the technical data provided to support project readiness at the proposed scale;
(3) The likelihood that the proposed project will meet the AOI Schedule Objective; and
(4) The degree to which the proposed technology—if successfully developed—will have widespread industrial and commercial usefulness and a beneficial impact on the U.S. economy.

MRC 2 (30%) - Technical Approach/Statement of Project Objectives

The application will be evaluated to determine the overall quality, soundness and reasonableness of the applicant's technical approach to fulfill the requirements of the proposed work, including the following:

(1) The likelihood that the proposed Statement of Project Objectives will result in successful project completion within cost, technical and schedule baselines;
(2) The extent to which the overall approach will conserve project funding and reduce the risk to DOE funding; and
(3) The extent to which the SOPO will meet and/or make progress on the AOI Technical Objectives.

MRC 3 (20%) - Technical Capabilities, Project Management, Facilities and Equipment

The application will be evaluated in terms of the qualifications and relative experience of key personnel assigned to the project (including subcontractors and consultants, if considered key personnel), the qualifications of the participating organizations, the proposed management of the effort and the facilities and equipment, as outlined according to the following:

(1) The ability and commitment of key personnel and subcontractors to support successful completion of the project, including scientific mastery of the described technology, pertinent systems operations and analysis experience, project management experience and demonstrated R&D experience and capabilities relevant to the proposed work;
(2) The extent of prior corporate experience in managing and successfully completing R&D projects of similar type, size, and complexity;
(3) The extent to which the project organization is clearly described and optimized (including technical and administrative responsibilities and lines of authority within the applicant's organization, and those of other participating organizations and key subcontractors) to ensure successful project execution; and
(4) The appropriateness and availability of facilities, equipment, and modeling analysis tools and their relevance to technology development and/or commercial applications, as applicable.

MRC 4 – (10 %) Project Management Plan

This criterion relates entirely to the stand-alone Project Management Plan (PMP) requirements described in the guidance document attached to this FOA. If the application does not include this stand-alone PMP, evaluators will be instructed to assign a score of zero to this criterion.

The application will be evaluated on the degree to which the PMP defines or identifies the following:

(1) The adequacy and completeness of the PMP in establishing the technical scope, budget, and schedule baselines; and
(2) The adequacy and completeness of the PMP in managing project performance relative to technical scope, budget, and schedule baselines; defining the actions that will be taken when these baselines must be revised; and identification of strategies for controlling risks to successful project completion.

3. Other Selection Factors

Program Policy Factors - The selection official will consider the following program policy factors in the selection process:

- It may be desirable to select for award a group of projects which represents a diversity of technical approaches and methods;

- It may be desirable to support complementary and/or similar efforts or projects, which, when taken together, will best achieve the Program's research goals and objectives;

- It may be desirable that different kinds and sizes of organizations be selected for award in order to provide a balanced programmatic effort and a variety of different technical perspectives;

- It may be desirable, because of the nature of the energy source, the type of projects envisioned, or limitations of past efforts, to select for award a group of projects with a broad or specific geographic distribution;

- It may desirable, that different types and sizes of projects be selected for award in order to best support the program budget; and

- It may be desirable to select projects more likely to result in technologies with near term commercial deployment.

B. REVIEW AND SELECTION PROCESS

1. Applications Subject to Merit Review

Applications that pass the initial review will be subjected to a merit review in accordance with the guidance provided in the "Department of Energy Merit Review Guide for Financial Assistance." This guide is available at http://energy.gov/management/office-management/operational-management/financial-assistance under Financial Assistance Policy and Guidance.

2. Selection Official Consideration

The Selection Official will consider the merit review recommendation, program policy factors and the amount of funds available.

3. Government Discussions with the Applicant and Award

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 10 CFR 600; and/or (4) special terms and conditions are required.

Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES

Selection and Award Date - DOE anticipates notifying applicants selected for award by the end of August 2013 and making awards by the end of September 2013.

SECTION VI - AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES

1. Notice of Selection

DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance (see Section IV.G with respect to the allowability of pre-award costs).

Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

2. Notice of Award

An Assistance Agreement issued by the Contracting Officer is the authorizing award document. It normally includes either as an attachment or by reference the following: (1) Special Terms and Conditions; (2) Applicable program regulations, if any; (3) Application as approved by DOE; (4) DOE assistance regulations at 10 CFR part 600, or, for Federal Demonstration Partnership (FDP) institutions, the FDP terms and conditions; (5) National Policy Assurances To Be Incorporated As Award Terms; (6) Budget Summary; and (7) Federal Assistance Reporting Checklist, which identifies the reporting requirements.

For Cooperative Agreements made to universities, non-profits and other entities subject to Title 2 CFR the Award also includes the Research Terms and Conditions located at http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

1. Administrative Requirements

The administrative requirements for DOE grants and cooperative agreements are contained in 10 CFR 600 (see http://www.eCFR.gov). Grants and cooperative agreements made to universities, non-profits and other entities subject to Title 2 CFR are subject to the Research Terms and Conditions located on the National Science Foundation web site at http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp.

DUNS AND CCR REQUIREMENTS

Additional administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR, Part 25 (see http://www.eCFR.gov). Prime awardees must keep their data at the System for Award Management (SAM) current at http://www.sam.gov current SAM is the government-wide system that replaced the CCR. If you had an active registration in the CCR, you have an active registration in SAM. Subawardees at all tiers must obtain DUNS numbers and provide the DUNS to the prime awardee before the subaward can be issued.

SUBAWARD AND EXECUTIVE REPORTING

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and Transparency Act of 2006 (FFATA) are contained in 2 CFR, Part 170 (see http://www.eCFR.gov). Prime awardees must register with the new FSRS database and report the required data on their first tier subawardees. Prime awardees must report the executive compensation for their own executives as part of their registration profile in the System for Award Management (SAM).

2. Special Terms and Conditions and National Policy Requirements

The **DOE Special Terms and Conditions** for Use in Most Grants and Cooperative Agreements are located at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Award Terms.

The **National Policy Assurances** To Be Incorporated as Award Terms are located at http://www.nsf.gov/bfa/dias/policy/rtc/appc.pdf and at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Award Terms.

Intellectual Property Provisions: The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at http://energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards.

Lobbying Restrictions: 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 Representations: In submitting an application in response to this FOA the Applicant represents that:

(1) It is not a corporation that has been convicted (or had an officer or agent of such corporation acting on behalf of the corporation convicted) of a felony criminal violation under any Federal law within the preceding 24 months;

(2) No officer or agent of the corporation have been convicted of a felony criminal violation for an offense arising out of actions for or on behalf of the corporation under Federal law in the past 24 months; and

(3) It is not a corporation that has 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 representations 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.

Foreign National Involvement: All applicants selected for an award resulting from this FOA may be required to provide information to the Department of Energy (DOE) in order to facilitate our responsibilities associated with foreign national access to DOE sites, information, technologies and equipment. Foreign national is defined as any person who was born outside the jurisdiction of the United States, is a citizen of a foreign government and has not been naturalized under U.S. law. If the selected applicant, including subrecipients/contractors, anticipates utilizing a foreign national person in the performance of an award, the selected applicant may be responsible for providing to the DOE representative specific information of the foreign national(s) to satisfy compliance with all of the requirements for access approval.

Statement of Substantial Involvement

There will be substantial involvement between the DOE and the Recipient during performance of this Cooperative Agreement. The DOE Specialist and DOE Project Officer will negotiate a Statement of Substantial Involvement prior to award in which the DOE and Recipient will collaborate and share responsibility for the management of the project as further described in this section.

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 external suppliers, including DOE M&O contractors (if applicable), to ensure effective integration of all work elements;

- Attending annual program review meetings and reporting project status;

- Submitting technical reports and incorporating DOE comments; and

- Presenting the project results at appropriate technical conferences or meetings as directed by the DOE Project Officer.

DOE Responsibilities - 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 program review meetings to ensure adequate progress and that the work accomplishes the program and project objectives as well as recommending alternate approaches or shifting work emphasis, if needed;

- Promoting and facilitating technology transfer activities, including disseminating program results through presentations and publications; and

- Serving as scientific/technical liaison between awardees and other program or industry staff.

C. REPORTING

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement. The checklist is available at: http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Award Forms.

SECTION VII - QUESTIONS/AGENCY CONTACTS

A. QUESTIONS

Questions regarding the content of the announcement must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses.
DOE will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Questions and comments concerning this FOA shall be submitted not later than three (3) business days prior to the application due date. Questions submitted after that date may not allow the Government sufficient time to respond.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. DOE cannot answer these questions.

B. AGENCY CONTACT

Name:	Nicholas Anderson
Email:	Nicholas.anderson@netl.doe.gov
Telephone:	412-386-5266

SECTION VIII - OTHER INFORMATION

A. MODIFICATIONS

Notices of any modifications to this announcement will be posted on Grants.gov and the FedConnect portal. You can receive an email when a modification or an announcement message is posted by registering with FedConnect as an interested party for this FOA. It is recommended that you register as soon after release of the FOA as possible to ensure you receive timely notice of any modifications or other announcements.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

DOE reserves the right, without qualification, to reject any or all applications received in response to this announcement and to select any application, in whole or in part, as a basis for negotiation and/or award.

C. COMMITMENT OF PUBLIC FUNDS

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by other than the Contracting Officer, either explicit or implied, is invalid.

Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

D. PROPRIETARY APPLICATION INFORMATION

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

"The data contained in pages [*Insert pages*] of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award.
This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant."

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

"The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation."

E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL

In conducting the merit review evaluation, the Government may seek the advice of qualified non Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM

Patent Rights: The government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions (See "Notice of Right to Request Patent Waiver" in paragraph G below).

Rights in Technical Data: Normally, the government has unlimited rights in technical data created under a DOE agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE's own needs or to insure the commercialization of technology developed under a DOE agreement.

Program Covered Under Special Protected Data

Special Protected Data Statutes: This program is covered by a special protected data statute. The provisions of the statute provide for the protection from public disclosure, for a period of up to **five (5) years** from the development of the information, of data that would be trade secret, or commercial or financial information that is privileged or confidential, if the information had been obtained from a non-Federal party. Generally, the provision entitled, Rights in Data Programs Covered under Special Protected Data Statutes (10 CFR 600 Appendix A to Subpart D), would apply to an award made under this announcement.

This provision will identify data or categories of data first produced in the performance of the award that will be made available to the public, notwithstanding the statutory authority to withhold data from public dissemination, and will also identify data that will be recognized by the parties as protected data.

G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER

Applicants may request a waiver of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this announcement, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award.

Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784 at http://energy.gov/gc/patents-licensing-and-patent-waivers under the Patent Waivers.

Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. This clause permits domestic small business and domestic nonprofit organizations to retain title to subject inventions. Therefore, small businesses and nonprofit organizations do not need to request a waiver.

H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES

Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

Attachment 1
Merit Review Criteria and Application Requirements Table

Merit Review Criterion Number Title (% of Evaluation Score)	Sub-Criterion Letter	Sub-Criterion Summary	Submission Requirements
1 **Scientific and Technical Merit** **(40%)**	a	The degree to which development of the proposed technology can be expected to contribute to a scientific or technical breakthrough capable of meeting the AOI <u>Technical Objectives</u>	The applicants must clearly describe the technology and explain how the proposed technology (if successfully developed) will significantly contribute to the AOI Technical Objectives. The proposed technology must be compared to state-of-the-art technologies and the Project Narrative must clearly explain why the new technology has the potential to be a significant improvement over existing technologies. This discussion must **briefly** describe the status of other technologies (turbines, gasifier, injectors, etc.) that must first be developed for this technology breakthrough to be of practical value *(this requirement will be described in more detail in sub-criterion 1.c).* Briefly describe and reference other government projects – completed, ongoing and proposed – that integrate meaningfully with this project. To adequately provide reviewers a clear understanding of the proposed process and project, all applications must include a block flow diagram (legible at 8.5 inches by 11 inches) and a corresponding process description.

	b	The degree to which the application is based on sound engineering and scientific principles, including the thoroughness and relevance of the technical data provided to support project readiness at the proposed scale	This sub-criterion will be rated on the quality and quantity of existing experimental data to support the claims made in regards to the potential progress towards the goals of the FOA. The technical basis for the technology must be discussed in detail. Provide evidence (test data, systems analysis results, flow diagrams, similar commercial systems/applications, etc.) to support the potential benefits described in 1.a., and the readiness of the technology to be tested at the proposed test scale. The more advanced the technology is in terms of scale, the more critical it is to provide hard evidence that the (1) technology has been developed to the point where it is ready for the work described in the Statement of Project Objectives (SOPO), and (2) the technology supports the anticipated benefits described in 1.a.
	c	The likelihood that the proposed project will meet the AOI Schedule Objective	Summarize the development work that needs to be completed prior to first-of-a-kind commercially relevant demonstration by the Schedule Objective date. Then specifically describe the technical risks that **will not be** addressed as part of this project and why. For instance, there may be budget, time or other constraints inherent in this FOA – the impact of these should be briefly described *(Details of technical risks to be addressed by this project will be covered under Criteria 2 and 4).* Assuming successful development of this technology, describe any additional R&D needed to enable first-of-a-kind commercially relevant demonstration of this technology by the Schedule Objective date. If the advantages described in 1.a. will require development of another technology (turbines, gasifier, injectors, etc.), explain what R&D external to this project must be completed to gain those benefits and briefly describe the likelihood of these other technologies being developed. Letters of support are encouraged; these letters **will not count** toward the page limit for the Project Narrative. *Note: It is expected that AOI1 and AOI2 applications will provide specific and detailed information for this sub-criterion; whereas AOI3 applications will provide more a qualitative and summarized response.*

	d	The degree to which the proposed technology—if successfully developed—will have widespread industrial and commercial usefulness and a beneficial impact on the U.S. economy	Describe the anticipated extent to which the technology will be available to industry. Any specific/exclusive technology integration requirements or exclusive business agreements that may limit technology deployment must be described. Describe the potential market segment within the energy sector and/or gasification industry that could adopt the proposed technology. Describe other industries (if any) that would benefit from this technology.
2 Technical Approach/Statement of Project Objectives (SOPO) (30%)	a	The likelihood that the proposed Statement of Project Objectives will result in successful project completion within cost, technical and schedule baselines	The Project Narrative must include a SOPO, which includes deliverables. The SOPO template is provided in this Funding Opportunity Announcement. This sub-criterion will be evaluated on the: • Extent to which the proposed SOPO is an organized, logical and complete description of the work elements to be done, which includes appropriate and clearly identified decision points. • Planned experimental protocol, with logic flow for accomplishing the SOPO, including the reasonableness of decision points and for tasks being performed in parallel and the rationale for why the approach was taken. • Completeness and reasonableness of the success criteria at the decision points and at project completion. Must describe deliverables, including results from the techno-economic analysis.

	b	The extent to which the overall approach will conserve project funding and reduce the risk to DOE funding	This section will discuss how the SOPO is structured to conserve project costs and manage cost risks. Describe how the chosen SOPO structure, decision points and end point will limit the cost exposure of technical failure and/or ensure R&D is performed at the smallest practical scale; the considerations taken in account to reduce R&D cost; and justify the project end point. Applicants shall propose a single scale-up step of the technology on the path toward commercialization (i.e., 50 lb → 500 lb <u>or</u> 1,000 lb → 10 ton per day); multiple scale-up phases are not desired.
	c	The extent to which the SOPO will meet and/or make progress on the AOI <u>Technical Objectives</u>	Describe how the successfully completed SOPO will contribute to the AOI <u>Technical Objectives</u>. Include in detail the starting point for the project and what will and will not be established technically through successful completion of this proposed project. The SOPO must include a task for systems analysis work; Attachment 2 is the Design Basis for Techno-Economic Analyses Deliverables.
3 Technical Capabilities, Project Management, Facilities and Equipment (20%)	a	The ability and commitment of key personnel and subcontractors to support successful completion of the project, including scientific mastery of the described technology, pertinent systems operations and analysis experience, project management experience, and demonstrated R&D experience and capabilities relevant to the proposed work	The Application must include sufficient information to support the sub-criterion, including the resumes of key personal and qualifications of project partners. Note: Resumes **will not count** toward the page limit for the Project Narrative.

	b	The extent of prior corporate experience in managing and successfully completing R&D projects of similar type, size, and complexity	The Application must include sufficient information to support the sub-criterion aspect.
	c	The extent to which the project organization is clearly described and optimized (including technical and administrative responsibilities and lines of authority within the applicant's organization and those of other participating organizations and key subcontractors) to ensure successful project execution	The Application must include sufficient information to support the sub-criterion. If receiving cost share from sub-awardees and/or third parties, a letter of cost share commitment/intent from each cost share providing organization must be provided. Note: Letters of cost share commitment **will not count** toward the page limit for the Project Narrative.
	d	The appropriateness and availability of facilities, equipment and modeling analysis tools and their relevance to technology development and/or commercial applications, as applicable	Application must include sufficient information to support the sub-criterion. If pilot scale testing is proposed, letters of support from the potential host site(s) for tests must be provided. Note: Letters of support **will not count** toward the page limit for the Project Narrative.

4 **Project Management Plan (PMP)** **(10%)**	a	The adequacy and completeness of the PMP in establishing the technical scope, budget and schedule baselines	Attach the PMP created according to the template provided in Attachment 3. This section of the Project Narrative will summarize technical scope, budget and schedule baselines from the PMP and reference the location of the information in the PMP. The attached PMP must include sufficient quality information, with respect to the needs of the project as defined by the SOPO, to support: (1) The project cost (including at least qualitative cost estimates on major procurements, consultants, subcontractors, personnel, etc.) and (2) To support the reasonableness of the proposed project schedule. Note: The PMP **will not count** toward the page limit for the Project Narrative.
	b	The adequacy and completeness of the PMP in managing project performance relative to technical scope, budget, and schedule baselines; defining the actions that will be taken when these baselines must be revised; and identification of strategies for controlling risks to successful project completion	This section of the Project Narrative will summarize risk management from the PMP and reference the location of the information in the PMP. Describe planned risk-mitigations for each task and overall project execution. The section is distinct from the criterion 2 discussion focused on setting up the project via the SOPO to reduce technical, cost and schedule risks. This section should address how the PMP will help monitor, control and mitigate potential risks—including cost overruns, schedule impacts and predicament communication with DOE and other partners—as they arise to ensure efficient resolution.

Attachment 2
Design Basis for Techno-economic Analyses Deliverables

This attachment sets forth the minimum criteria to be used in the Techno-economic Analyses (TEA) Deliverables required as project deliverables for the three Areas of Interest (AOIs). The TEA should not be included in the proposal response to the FOA. Table 1 provides the minimum requirements and additional recommendations on the TEA design basis. Table 2 provides the minimum reporting requirements for the TEA. As applicable, requirements are further delineated by AOI and/or primary product (i.e. power or liquids).

References are made to the following NETL publications to provide additional detail on the design basis requirements and recommendations.

- NETL's *"Cost and Performance Baseline for Fossil Energy Plants,"* referred to as "Baseline Studies"[1]
    - *"Volume 1: Bituminous Coal and Natural Gas to Electricity"*
    - Supplement to Volume 1 "*Updated Costs (June 2011 Basis) for Selected Bituminous Baseline Cases*"
    - *"Volume 3: Low Rank Coal and Natural Gas to Electricity"*
    - *"Volume 4: Bituminous Coal to Liquid Fuels"* (anticipated completion April 2013), referred to as the "CTL Baseline"
- NETL's *"Production of Zero Sulfur Diesel from Domestic Coal,"* referred to as the "CBTL study" [2]
    - Update to 2011 dollars anticipated completion April 2013
- NETL's "High Value Gasification Products: Crude Methanol Cases", referred to as the "Crude Methanol study" (anticipated completion April 2013)
- NETL's Series of Quality Guidelines for Energy Systems Studies (QGESS) (links provided within relevant sections of Tables 1 and 2)

Table 1 - Design Basis Requirements for TEA

PARAMETER	MINIMUM REQUIREMENTS	RECOMMENDATIONS
Case Configurations	AOI 1 and AOI 2 One reference IGCC case using conventional technology and one IGCC case using advanced technology. OR One reference gasification-based liquids production case using conventional technology and one gasification-based liquids production case using advanced technology.	If applicable, one of the power or liquid fuels cases in the Baseline Studies or the liquids fuels cases in the CBTL study or the Crude Methanol study could be replicated and utilized for the reference case(s).
	AOI 3 One reference IGCC case using conventional technology and one IGCC case using advanced technology. AND One reference gasification-based liquids production case using conventional technology and one gasification-based liquids production case using advanced technology.	

[1] http://www.netl.doe.gov/energy-analyses/baseline_studies.html
[2] http://www.netl.doe.gov/energy-analyses/refshelf/PubDetails.aspx?Action=View&PubId=428

PARAMETER	MINIMUM REQUIREMENTS	RECOMMENDATIONS
Fuel Type	All AOIs The fuel type(s) shall be the same for the conventional and advanced cases. If multiple fuels are used (i.e. co-feeding or coal and biomass or coal and natural gas), the fractions of each fuel shall be the same for the conventional and advanced cases. QGESS on “Specification for Selected Feedstocks”[3] provides the specifications for natural gas and multiple coal types. For all AOIs, the coal type for use in the TEA is limited to: Illinois #6 (Bituminous), Montana Rosebud PRB (Sub-bituminous), Wilcox Group (TX lignite) or Beulah-Zap (ND lignite).	
	AOI 1 If proposing an advanced feed system for a coal-biomass mixture, the woody biomass for use in the TEA shall utilize the proximate analysis shown in Table 3 from, “Greenhouse Gas Reductions in the Power Industry Using Domestic Coal and Biomass - Volume 2: PC Plants”[4]. Other types of woody biomass maybe considered but a proximate analysis similar to the one in Table 3 must be provided. The fraction of woody biomass shall be no more than 20% by weight. If not proposing an advanced feed system with a coal-biomass mixture, the coal type for use in the TEA is limited to the PRB or lignite coals listed above.	
	AOI 2 The fuel shall be 100% coal.	AOI 2 Illinois #6 is recommended.
	AOI 3 Coal must be the predominant fuel (i.e. >50% by energy content).	
Product Specifications	Power Cases 100% power	
	Liquids Cases The liquid fuels cases shall either maximize diesel production via Fischer Tropsch (FT) or maximize methanol production. Methanol need not be chemical grade (consistent with the Crude Methanol study). Additional co-products are anticipated (i.e. FT naphtha and LPG). Net power imports or exports are allowed, but shall be minimized.	
CO_2 Removal	Power Cases >90% based on the raw syngas carbon content	
	Liquids Cases For FT: ≥87% based on the raw syngas carbon content. For Methanol: ≥90% based on the raw syngas carbon content. NETL studies show this level of capture results in coal-to-FT liquids and coal-to-gasoline via methanol with life cycle GHG emissions equal to or lower than the petroleum baseline.	

[3] http://www.netl.doe.gov/energy-analyses/refshelf/PubDetails.aspx?Action=View&PubId=418
[4] http://www.netl.doe.gov/energy-analyses/refshelf/PubDetails.aspx?Action=View&Source=Main&PubId=426

CO_2 Purity	Satisfy "Conceptual Design Limits" for Enhanced Oil Recovery as listed in Exhibit 2-1 of the NETL QGESS titled "CO_2 Impurity Design Parameters".[5]	
CO_2 Delivery Pressure	2,215 psia	
Plant Size	<u>Power Cases</u> Enough hydrogen-rich fuel gas production to fill two advanced F turbines (232 MW each) as defined in the Baseline Studies. Adding in the steam turbine power and net of auxiliary loads, the net capacity is typically in the range of 500-550 MW.	
	<u>Liquids Cases</u> 50,000 bpd of product (includes all liquid by-products).	
Ambient Conditions	Choose from locations in the Baseline Studies based on fuel type and/or adjust for delivery (i.e. PRB coal delivered to the Midwest at ISO conditions is acceptable, but lignite cannot be delivered and must be used in Texas or North Dakota).	
System Boundaries	1. Delivered coal entering the power plant, through high-pressure, high-purity CO_2 stream crossing the plant boundary 2. Combustion air or intake air to cryogenic air separation unit 3. Flue gas to stack 4. Net electricity conditioned and sent to electric grid 5. Raw make-up water 6. Waste streams generated by the power plant, including the CO_2 capture system, should be adequately treated on-site prior to disposal either by landfill or other commercial disposal options.	
Power Block	<u>Power Cases</u> Two advanced F Turbines (nominally 232 MW each) and one heat recovery steam generator and steam turbine consistent with the Baseline Studies.	<u>Liquids Cases</u> An advanced F Turbine is recommended for any power generation needs within the plant.
Additional Design Considerations	In addition to those items defined above, the basis for the cases and the *conventional* technologies should be similar to that used for the cases within the NETL studies including: 1. Site Characteristics 2. Air Separation Unit Design 3. Gasifier Design 4. Steam or Gas Turbine Cycle Conditions 5. Environmental Controls and Performance 6. Cooling System 7. Balance of Plant	

[5] http://www.netl.doe.gov/energy-analyses/refshelf/PubDetails.aspx?Action=View&PubId=420

Material and Energy Balances	Material and energy balances shall be performed around the complete power or liquids plant and around all major pieces of equipment therein, including all heating and cooling duties and electric power requirements. All material and energy balance calculations must be accurate, and equilibria, physical and thermodynamic properties must be calculated using rigorous models.	
Process modeling and cost estimating software	There are no specific software requirements for developing the material and energy balances, or costing the capture process. However, all material and energy balance calculations must be accurate, and equilibria, physical and thermodynamic properties must be calculated using rigorous models. Similarly, mass and heat transfer models employed must be based upon a rigorous mathematical description of transport phenomena.	AspenPLUS is preferred process modeling software.
Availability and Capacity Factor	Power Cases The reference case shall assume availability and capacity factor equal to 80%, consistent with the Baseline Studies. If the advanced technology will impact the availability of the entire plant, the basis for such a change shall be clearly stated.	
	Liquid Fuels Cases The reference case shall assume availability and capacity factor equal to 90%, consistent with the CTL Baseline, the CBTL study and the Crude Methanol study (spare gasifier capacity must be consistent with this availability assumption). If the advanced technology will impact the availability of the entire plant, the basis for such a change shall be clearly stated.	
Year Dollars	June 2011	
Capital cost estimating	The code of accounts for the capital cost estimate shall follow those used in the Baseline Studies. Engineering fees, contingencies and owner's costs shall follow the QGESS "Cost Estimation Methodology for NETL Assessments of Power Plant Performance."[6]	The NETL QGESS, "Capital Cost Scaling Methodology"[7] is recommended to scale the accounts with equipment common to base cases within the NETL studies.
Operating and Maintenance (O&M) Costs	Operating and maintenance cost (O&M) shall be itemized and shall utilize the costs in the 2011 Dollar supplement to Volume 1 of the Baseline Studies. Coal and natural gas costs shall follow the costs in the QGESS "Fuel Prices for Selected Feedstocks in NETL Studies".[8] Hybrid poplar costs (in 2011\$/ton) shall be a function of the quantity consumed as follows: $1.25 \times 10^{-11} X^3 - 2.95 \times 10^{-7} X^2 + 3.47 \times 10^{-3} X + 128$ Where: $X = (1 - BMS) \times (AR\ BF)$ BMS = Biomass moisture fraction AR BF = As received biomass feed (tons per day)	

[6] http://www.netl.doe.gov/energy-analyses/refshelf/PubDetails.aspx?Action=View&Source=Main&PubId=355
[7] http://www.netl.doe.gov/energy-analyses/refshelf/ (Anticipated posting February 2013)
[8] http://www.netl.doe.gov/energy-analyses/refshelf/ (Anticipated posting February 2013)

Co-Product Costs	Liquids Cases For net power imports and exports, the power price shall be assumed to be \$60/MWh. Liquid co-product prices shall be indexed to the primary product (diesel/methanol) using the same ratios in the corresponding NETL studies.	
CO_2 Transport and Storage	Transport and storage (T&S) cost for CO_2 shall be location specific as follows: Midwest - \$10/tonne Texas - \$10/tonne North Dakota - \$15/tonne Montana - \$22/tonne	
Finance structure, discounted cash flow analysis and required selling price of product	Power Cases Utilize high risk IOU finance structure (capital charge factor = 0.124) and methodology set forth in the Baseline Studies and the QGESS on Cost Reporting Methodology.	Alternate discounted cash flow analysis approaches and reporting of required selling price may be utilized in addition to the required approach.
	Liquids Cases Utilize Commercial Fuels Projects finance structure set forth in NETL's "Recommended Project Finance Structure for the Economic Analysis of Fossil-Based Energy Projects"[9] (capital charge factor = 0.237) and calculate the crude oil equivalent required selling price as in the CTL Baseline Study or CBTL study and/or the methanol required selling price as in the Crude Methanol study.	

Table 1 - Reporting Requirements for TEA

PARAMETER	MINIMUM REQUIREMENTS
Process Flow Diagram	A process flow or block flow diagram shall be included that identifies all major process equipment for the power or liquids plant including CO_2 capture and compression systems, separation vessels, heat exchangers, pumps, compressors, etc. Complete stream tables showing operating pressures, temperatures, compositions and enthalpies for all streams entering or leaving major process equipment shall be included.
Performance Reporting Requirements	Using the NETL Studies as a template, the final report shall include the following: 1. Plant and component descriptions 2. Performance summary including breakdown of gross power generation, auxiliary power requirements and net plant efficiency at the same level of detail as the NETL Studies 3. Air emissions tables 4. Carbon, sulfur and water balances
Cost Estimating Reporting Requirements	Capital Costs: The code of accounts for the capital cost estimate shall follow those used in the NETL Studies. For each account, costs shall be broken down into bare erected costs, engineering fees, process contingency and project contingency, adding up to an account-level total plant cost. The total plant cost, owner's costs and total overnight cost for the entire plant shall also be reported. O&M Costs: Itemized operating and maintenance costs shall follow those used in the Baseline Studies.

[9] http://www.netl.doe.gov/energy-analyses/refshelf/PubDetails.aspx?Action=View&PubId=401

PARAMETER	MINIMUM REQUIREMENTS
	For power cases: Cost of electricity (first-year as defined in the QGESS on Cost Estimation Methodology) shall be reported. For liquids cases: Crude oil equivalent required selling price for FT liquids cases, and/or required selling price for methanol production cases (first-year). For power and liquids cases, the COEs and required selling prices shall be reported both with and without the cost of CO2 T&S defined in Table 1 above. Cost of capturing CO_2 shall be reported (if a reference non-capture plant is available).
Advanced Technology Details	Additional details are required regarding the advanced technology including: 1. Itemized equipment list for equipment unique to the advanced technology and other equipment required for the integration of the advanced technology into the power or liquids plant. 2. Estimates for equipment and consumables unique to the process being developed. If possible, capital cost estimates for unique equipment will be made based on similar equipment that may exist for other type processes. If equipment analogs do not exist for unique equipment the developer must do a bottoms-up estimate of the unique equipment.
Sensitivity Analyses	Sensitivity of required selling price (COE or liquids-equivalent) shall be performed on the following parameters: 1. Critical advanced technology performance parameters 2. Capital cost of advanced technology 3. Non-coal fuel prices 4. Sales of CO_2 at plant gate prices of $0-60/tonne 5. Cost of CO_2 emissions of $0-60/tonne 6. For liquids cases: - Power price for net imports/exports at $60-135/MWh - Finance structure by assessing capital charge factors of 0.12-0.25
Additional deliverables	Process models with brief documentation and economic spreadsheet tools/models shall be provided. Methods and models used must be documented in the TEA.

Table 2 - Hybrid Poplar Design Analysis[10]

Ultimate Analysis	Dry Basis, %	As Received, %
Carbon	52.36	26.18
Hydrogen	5.60	2.80
Nitrogen	0.37	0.19
Sulfur	0.03	0.02
Chlorine	0.00	0.00
Ash	1.48	0.74
Moisture	0.00	50.00
Oxygen	40.16	20.08
Total	100.0	100.0
Heating Value	**Dry Basis,**	**As Received, %**
HHV, kJ/kg	18,113	15,396
HHV, Btu/lb	8,438	4,219
LHV, kJ/kg	17,593	8,796
LHV, Btu/lb	7,938	3,969

[10] http://www.netl.doe.gov/energy-analyses/refshelf/PubDetails.aspx?Action=View&Source=Main&PubId=426

Attachment 3
Project Management Plan Template

PROJECT MANAGEMENT PLAN

{Agreement Title} [1]

Revision {Revision Letter}
{Date Prepared}

WORK PERFORMED UNDER AGREEMENT

DE-FE000{xxxx}

SUBMITTED BY

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

PRINCIPAL INVESTIGATOR

{Name}
{Phone Number}
{Fax Number}
{E-Mail}

SUBMITTED TO

U. S. Department of Energy
National Energy Technology Laboratory

{FPM Name}
{FMP Email}

[1]NOTE: { } denotes required information.

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APPENDICES

TABLES AND FIGURES

1. EXECUTIVE SUMMARY

Provide a description of the project that includes the objective, project goals and expected results. The summary should also include a succinct project background and project rationale. In reference to an application in response to a Funding Opportunity Announcement, this information should be a summary of the pertinent information that is included in the Project Narrative (Field 8).

2. RISK MANAGEMENT

The Applicant (Recipient) shall provide a summary description of the proposed approach to identify, analyze, and respond to perceived risks associated with the proposed project. Project risk events are uncertain future events that, if realized, impact the success of the project. Since risk is inherent to all projects, regardless of the level of complexity, cost or visibility, project risk must be addressed to the appropriate level for every project. It is recognized that the depth of analysis and the complexity and cost of the resulting risk management approach (and plan) will differ from project to project and among organizations. Commonly accepted approaches, such as those supported by The Project Management Institute's A Guide to the Project Management Book of Knowledge, should be considered.

As a minimum, the Applicant (Recipient) should provide sufficient information with the application to demonstrate an appropriate approach to managing risks during project execution. This must 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. For fundamental research and modeling studies it is anticipated that risks would focus on technical uncertainties that are the result of this type of work.

3. MILESTONE LOG

The Applicant (Recipient) shall provide a minimum of two milestones for each budget period of the project. Each milestone is to include a title, planned completion date and a description of the method/process/measure used to verify completion. The milestones developed should be quantitative and show progression towards budget period and/or project goals. At the time of award negotiations, a suite of milestones sufficient to adequately assess progress shall be developed cooperatively by the Recipient and the DOE Federal Project Manager.

Milestones are different than success criteria (Section 7) in that milestones typically show progress through the execution of the budget period and project, whereas success criteria are used by the DOE to determine if specific goals were met at the completion of a budget period or other appropriate point in project execution.

A suggested format for the milestone log is shown in Table 1. The Recipient shall report progress against the Milestone Log in the Progress Reports submitted quarterly, throughout the duration of the award, in accordance with the requirements of the Federal Assistance Reporting Checklist.

4. FUNDING PROFILE AND SPENDING PLAN

The Applicant (Recipient) shall provide a table that shows, by budget period, the amount of government funding going to each team member/subcontractor along with the associated cost share. All subcontracts with a total value (DOE + Cost Share) of ≥ $100,000 shall be identified. The table shall also calculate totals and cost sharing percentages. Table 2 - "Project Funding Profile" below is an example.

In addition, the Applicant shall provide a second table that shows, by fiscal quarter within the current budget period, the amount of government funding going to each team member/subcontractor along with associated cost share. The table shall also calculate totals and cost sharing percentages. Table 3 - "Current Budget Period Spending Plan" below is an example.

It is recognized that detailed out-year costing profiles are less certain, as the appropriate allocation of available resources among the specific Statement of Project Objectives tasks is dependent on the results of the current RD&D approach; consequently, a new "Current Budget Period Spending Plan" table shall be provided at the beginning of each budget period. Note that BP 1 in the "Project Funding Profile" example table is 12 months in duration; budget periods can be more or less than 12 months in duration, as specified in the Funding Opportunity Announcement or by the DOE during award negotiations.

Anytime the planned total cost (DOE + Cost Share) of a project exceeds ≥$1,000,000, the Applicant (Recipient) shall provide the Table 2 - "Project Funding Profile" and Table 3 - "Current Budget Period Spending Plan" information for each Task within the Statement of Project Objectives. This guidance is not applicable to projects in which the Recipient is a university.

The PMP shall be revised to update the information in these tables ONLY at the time of award or in the event of amendments or modifications to the award that affect the project budget. **Table 2 – "Project Funding Profile" and Table 3 – "Current Budget Period Spending Plan" shall be consistent with the DOE-approved budget for the project at all times.**

The Recipient shall report against the Project Funding Profile and Current Budget Period Spending Plan in the Progress Reports submitted quarterly, throughout the duration of the award, in accordance with the requirements of the Federal Assistance Reporting Checklist.

5. ORGANIZATIONAL STRUCTURE AND MANAGEMENT

Provide a chart showing the entities (Recipient organization divisions, subcontractors, consultants, etc.), relationships, roles (referenced to Statement of Project Objectives Tasks) and lead personnel for the project team. Specifically identify key personnel, defined as those personnel deemed critical to project success.

Describe how staffing and resource assignments will be managed during ramp-up at project start, as well as be managed throughout the project life, to support accomplishment of project objectives on schedule and within the planned expenditure of funds. A "Direct Labor Plan" (see Table 4 for an example) shall present direct labor effort (man hours) by labor classification (e.g., management, engineering/scientist, technician, etc.) for each task and budget period. A table shall be provided for the prime Recipient and each subcontract with a total value in excess of $100,000.

6. PROJECT TIMELINE

The Applicant (Recipient) shall provide a timeline of the project broken down by each task and subtask, as described in the Statement of Project Objectives. The timeline shall include for each task: start date, end date, approximate cost and team members participating on the task and their role. The timeline shall also show any interdependencies with other tasks and note the milestones identified in the Milestone Log (Section 3). It is highly recommended that the Applicant (Recipient) consider using a commercial software package to generate the timeline as a Gantt chart (see Figure 1 as an example) or other applicable format.

7. SUCCESS CRITERIA AND DECISION POINTS

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 experimental efforts. The success criteria should not be based on interpretations. Typically, the expected performance parameters should be established with a technical and economic comparison made to the competing technologies or methods. A discussion should be included on the probable advantages and possible disadvantages. Advantages could include, but are not limited to:

a. Validation/confirmation/identification of scientific/engineering knowledge.
b. Cost savings expected over existing technologies.
c. Performance enhancements to existing technologies.
d. Reduction in health and safety risks to the public and workers, and reduction in environmental risks.
e. Ease of installation, operation, and maintenance.
f. Decrease in capital, operating, and maintenance cost.

Success Criteria are different than milestones (Section 3) in that milestones typically show progress through the execution of the budget period and project, whereas success criteria are used by the DOE to determine if specific goals and objectives were met at budget period ends. Typically, these goals and objectives represent requirements established by the R&D program as evidence of progress in advancing a technology area or scientific/engineering knowledge. The success criteria may be used to assist DOE in deciding whether to proceed into subsequent budget period(s), if required.

8. REVISION HISTORY

This section shall provide the revision history of the Project Management Plan. Each revision shall be accompanied by a detailed explanation and the date of the change. Each revision shall be identified by a new revision letter - the revision letter on the title page shall be incremented accordingly. Examples of reasons for revision include amendments or modifications to the cooperative agreement/grant/FWP that change the approved budget, project schedule and/or SOPO, changes to the organizational structure, etc. All revisions require the concurrence of the DOE Federal Project Manager.

APPENDICES

Include the following documents (where applicable) as appendices to the Project Management Plan:

- Statement of Project Objectives (SOPO)
- Field Work Proposals (where applicable)
- Major subcontract documents (>$100K)
- Field test plans (as completed during the course of the project)

Table 1 – Milestone Log

MILESTONE LOG						
Budget Period	ID	Task Number	Title	Description	Planned Completion Date	Verification Method

Table 2 – Project Funding Profile

This table should replicate the budget information in the award document.

	BP1										BP2		Total	
	Q1		Q2		Q3		Q4		Total		DOE	Cost Share	DOE	Cost Share
	DOE	Cost Share	DOE	Cost Share	DOE	Cost Share	DOE	Cost Share	DOE	Cost Share				
Prime Applicant (Recipient)	$800,000	$200,000	$1,000,000	$250,000	$1,000,000	$250,000	$500,000	$125,000	$3,300,000	$825,000	$3,000,000	$3,000,000	$6,300,000	$3,825,000
Subcontractor 1	$100,000	$25,000	$100,000	$25,000	$0	$0	$0	$0	$200,000	$50,000	$200,000	$200,000	$400,000	$250,000
Subcontractor 2	$50,000	$15,000	$100,000	$25,000	$10,000	$2,500	$10,000	$2,500	$170,000	$45,000	$0	$0	$170,000	$45,000
Subcontractor 3														
Total	$950,000	$240,000	$1,200,000	$300,000	$1,010,000	$252,500	$510,000	$127,500	$3,670,000	$920,000	$3,200,000	$3,200,000	$6,870,000	$4,120,000
Cost Share %	79.8%	20.2%	80.0%	20.0%	80.0%	20.0%	80.0%	20.0%	80.0%	20.0%	50.0%	50.0%	62.5%	37.5%

Table 3 – Current Budget Period Spending Plan

This table is the Cost Baseline for BP1 and actuals and variances against this baseline should be reported in the Quarterly Reports.

	BP1									
	Q1		Q2		Q3		Q4		Total	
	DOE	Cost Share	DOE	Cost Share	DOE	Cost Share	DOE	Cost Share	DOE	Cost Share
Prime Applicant (Recipient)	$800,000	$200,000	$1,000,000	$250,000	$1,000,000	$250,000	$500,000	$125,000	$3,300,000	$825,000
Subcontractor 1	$100,000	$25,000	$100,000	$25,000	$0	$0	$0	$0	$200,000	$50,000
Subcontractor 2	$50,000	$15,000	$100,000	$25,000	$10,000	$2,500	$10,000	$2,500	$170,000	$45,000
Subcontractor 3										
Total	$950,000	$240,000	$1,200,000	$300,000	$1,010,000	$252,500	$510,000	$127,500	$3,670,000	$920,000
Cost Share %	79.8%	20.2%	80.0%	20.0%	80.0%	20.0%	80.0%	20.0%	80.0%	20.0%

Table 4 – Direct Labor Plan

	BP1			BP2			Total		
	Management	**Engineering/Scientist**	**Technician**	**Management**	**Engineering/Scientist**	**Technician**	**Management**	**Engineering/Scientist**	**Technician**
Task 1									
Task 2									
Task 3									
Total									

Figure 1 – Sample Project Timeline (Gantt Chart)

Year	2007				2008				2009			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4
Task 1.0 Project Management and Planning												
Task 2 .0 Descriptive Title												
Subtask 2.1 Descriptive Title			**A**									
Subtask 2.2 Descriptive Title						B						
Task 3.0 Descriptive Title								C, 1				
Subtask 3.1 Descriptive Title									D			
Subtask 3.2 Descriptive Title												
Continue with Additional Phases & Tasks												

A, B, C etc. – Milestones from Milestone Log

1,2,3 etc – Decision Points

Note: Timelines for each task and subtask has an associated level of effort, typically budgeted cost