SOLICITATION FOR SUBMISSION OF FINANCIAL ASSISTANCE APPLICATIONS

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

SOLICITATION NUMBER DE-PS36-03GO93015

CHEMICALS AND FOREST PRODUCTS INDUSTRIES OF THE FUTURE

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All information regarding this solicitation is available on the Department of Energy's Industry Interactive Procurement System (IIPS) web site at: http://e-center.doe.gov/

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NOTICE TO APPLICANTS: Differences in printers and user format preferences may change the pagination and appearance of this document from its original format.

Chemicals and Forest Products Industries of the Future
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I. INTRODUCTION

The Office of Industrial Technologies of the Department of Energy's (DOE), Office of Energy Efficiency and Renewable Energy, is soliciting Applications for research and development (R&D) projects that will reduce energy consumption, enhance economic competitiveness, and reduce environmental impacts of the domestic chemical and forest products industries. DOE intends to provide financial support to assist in the development of such technologies under provisions of the Energy Policy Act of 1992 (EPAct).

Under this Solicitation, DOE is soliciting Applications for R&D projects that will focus primarily on technology development in the areas of Catalytic Oxidation (Appendix E), Distillation (Appendix F), Wood/Composites (Appendix G), Fiber Recycling (Appendix H), and New Forest-Based Materials (Appendix I). Other promising technology areas demonstrating energy efficiency in the chemical industry may be considered in addition to areas in Catalytic Oxidation, Distillation, Wood/Composites, Fiber Recycling, and New Forest-Based Materials.

Organizations applying under this solicitation are required to develop collaborative project teams involving industry, university, and/or national laboratory participants. A minimum of two chemical or forest products organizations must be involved in each application.

Awards under this Solicitation will be Cooperative Agreements with a term of three to five years beginning in 2004. Subject to funding availability, the total DOE funding available under this solicitation for the first 12 months of selected R&D projects will be approximately $4 million for technology development in catalytic oxidation and distillation and approximately $3 million for technology development in wood/composites, fiber recycling and new forest-based products. Subject to funding availability, a maximum of approximately $16 million is planned to fund the remaining years of the chemical projects and a maximum of approximately $12 million is planned to fund the remaining years of the forest products projects. DOE anticipates selecting four to seven applications for chemical projects and four to eight applications for forest products projects for negotiation toward Award.

Although this Solicitation is being issued in Fiscal Year (FY) 2003, selections are planned in early FY 2004 (FY 2004 begins October 1, 2003). The possibility for awards to be made will depend on the availability of funds in the FY 2004 congressional appropriation. Continuation of funding for the full project period will be contingent upon the availability of funds beyond FY 2004. DOE reserves the right to fund in whole or in part, any, all, or none of the Applications submitted in response to this Solicitation. This Solicitation does not obligate DOE to make any awards.

Applicant cost share is required in order to be considered for an Award under this Solicitation. A minimum Cost Share of 30% from non-federal sources for applied research projects and 50% from non-federal sources for projects involving commercial demonstration of technologies (See Section II.J) for each year of the project is required.

The above minimum Applicant cost share requirement of 30% is specific to this Solicitation and exceeds

the minimum required cost share specified in the Energy Policy Act of 1992 for research and development activities (EPAct Section 3002). Technologies in the chemical and forest products areas targeted by this solicitation are advancing both technically and economically and show significant potential for eventual successful commercialization. As a result, DOE has determined that additional Applicant cost share above the minimum is warranted.

All awards under this Solicitation will include requirements for reporting to DOE. Progress and financial status reports will be required on a quarterly basis and review meetings will also be held periodically. Applicants should also assume travel for a kickoff meeting and at least two trips per year for review meetings. Also, a detailed final report will be required at the conclusion of the project.

Appendix A contains definitions of terms and acronyms that are used in this solicitation.

A. Background

The U.S. Department of Energy (DOE) through its Industrial Technologies Program (ITP) supports U.S. industries in their efforts to increase energy efficiency, reduce waste and increase productivity. The goal of ITP is to accelerate the development and use of advanced energy efficient, renewable, and pollution prevention technologies that benefit industry, the environment, and U.S. energy security.

B. Objective

Development and implementation of high risk, new technology is a continuing goal of the ITP. Proposed research should focus on developments robust enough to handle process conditions found in systems of commercial interest. These technologies should be applicable to many sectors of the respective industry, and should achieve energy savings of at least 10 trillion BTUs/yr or more for the Chemical industry and at least 5 trillion BTUs/yr or more for the Forest Products industry, when fully implemented across their respective industry. For the purpose of this RFP, technologies, which displace fossil fuels with renewable energy resources, are considered energy saving technologies. Proposals must show significant advantages over current technology and attractive returns on capital invested.

C. Scope

This Solicitation seeks financial assistance Applications for R&D projects that will focus primarily on technology development in the areas of Catalytic Oxidation, Distillation, Wood/Composites, Fiber Recycling, and New Forest-Based Materials. Other promising technology areas demonstrating energy efficiency in the chemicals and forest products industries may be considered in addition to areas in Catalytic Oxidation, Distillation, Wood/Composites, Fiber Recycling, and New Forest-Based Materials. Below is a brief discussion of priorities within these areas:

Chemicals and Petrochemical
Priority areas in the Chemical and Petrochemical industries include the development of new or improved catalytic oxidation and distillation technologies to enhance productivity of chemical and refining processes. Technology needs in these areas have been identified in the following industry roadmaps: Reaction Engineering, New Process Chemistry, and Separations 2000. For further information on these roadmaps, please refer to the following web site: http://www.oit.doe.gov/chemicals/visions.shtml.

Additional information on Catalytic Oxidation research topics is provided in Appendix E.

Additional information on Distillation research topics is provided in Appendix F.

Forest Products
Priority areas in the Forest Products industry include the development of new or improved **wood/composite and fiber recycling technologies, and new forest-based materials.** Technology needs in these areas have been identified in *Agenda 2020 The Path Forward: An Implementation Plan*. For further information, please refer to http://www.oit.doe.gov/forest/visions.shtml

Additional information on Wood/Composite Technologies research topics is provided in Appendix G.

Additional information on Fiber Recycling research topics is provided in Appendix H.

Additional information on New Forest-Based Products research topics is provided in Appendix I.

General Areas of Technology
This solicitation seeks technical applications for R&D projects in the preferred areas of technology identified above. However, we recognize that other technical areas have the potential to enhance the energy efficiency and productivity of the U.S. chemical and forest products industries. Therefore, we welcome proposals for R&D projects within the Chemical and Forest Product industries that are outside of the preferred technical areas if the applicant is able to make a strong case for enhanced energy performance along with meeting the other requirements of this solicitation. The same evaluation criteria identified in Section IV of this solicitation will be applied to these proposals.

II. GENERAL INFORMATION

A. Eligibility Requirements

For-profit and non-profit organizations, state and local governments, Indian Tribes, institutions of higher education, or non-Federal agencies or entities may submit applications in response to this solicitation unless otherwise restricted by the Simpson-Craig Amendment (Reference Section VI.K. of this solicitation). Each project funded under this solicitation must involve a minimum of two chemical or forest products organizations working in a multi-disciplinary team arrangement. Single organization awards will not be considered. Industrial partners must be included as either primary applicants or as cost sharing partners.

A "chemical or forest products organization" is defined as a private (profit or non-profit) organization that manufactures chemicals and/or petrochemicals and/or forest products, or provides products or services to such manufacturers. In addition to chemical and forest products manufacturers, raw material suppliers, equipment and technology suppliers, architectural and engineering companies, software and consulting firms, trade and professional associations, and research institutes that routinely conduct a minimum of 10% of their business as, with, or for the chemical, forest products industry manufacturers, are all within the scope of the definition.

In addition to the chemical and forest products organizations defined above, teams should also include organizations such as industry, universities, National Laboratories, trade and professional associations,

DOE Laboratories, and small businesses that facilitate technology transfer to the private sector, promote commercialization, and enhance U.S. competitiveness.

The intent of this solicitation is for DOE to award Grants or Cooperative Agreements, as appropriate, in accordance with the DOE Financial Assistance Regulations (10 CFR 600). Applicants awarded a Grant or Cooperative Agreement will be required to submit quarterly and final reports to DOE and participate in expert peer review meetings. In addition, the applicant will be required to travel to kickoff meetings and will be responsible for the overall administration of the award.

Applications submitted by Federally Funded Research and Development Centers (FFRDCs), as defined by Federal Acquisition Regulation (FAR) 35.017, will not be considered for Award. However, Applications proposing a portion of the work to be performed by a FFRDC, including a DOE research laboratory, will be considered for Award. Federal laboratory personnel who have participated in the development of this Solicitation are ineligible to participate as team members. Instructions for including FFRDC activities within an Application are provided in Section II.

B. Pre-Applications

DOE is not accepting Pre-Applications under this solicitation. In addition, a Pre-Application conference is not planned for this Solicitation.

C. Amendments

All Amendments to the Solicitation shall be posted on the DOE Industry Interactive Procurement System (IIPS) at http://e-center.doe.gov . Each Amendment file will be available in the folder located next to the Solicitation Number on the IIPS page that lists all opportunities/solicitations for the Golden Field Office (this folder does not appear if no Amendments or messages have been posted by DOE for the Solicitation). To be notified of Amendments, see "Join Mailing List" in Appendix C. However, during the open period of this Solicitation, potential Applicants are responsible for periodically checking the DOE IIPS web site specified above to determine if Amendments have been posted (even if Applicants joined the mailing list in case e-mail notifications are not successfully delivered).

D. IIPS Registration and Electronic Signature

Applicants should register in IIPS at least 14 days prior to the Solicitation closing date in accordance with instructions in Appendix C (instructions are also available on the DOE Golden Field Office Home Page at http://www.golden.doe.gov/businessopportunities.html, under "Solicitations"). Only registered users will have the capability to transmit their Applications. Once prospective Applicants are registered, only DOE personnel and expert evaluators will have access to Application information. Submission of electronic Applications via IIPS constitutes submission of signed copies of the required documents. The name of the Applicant's authorized official shall be entered (typed or electronic signature) in the appropriate space shown on the forms.

If any registration problems are encountered, contact the IIPS Help Desk via e-mail at IIPS_HelpDesk@e-center.doe.gov or via telephone at 1-800-683-0751.

E. Time and Place for Submission of Applications

IIPS WILL AUTOMATICALLY TIME-STAMP EACH APPLICATION WHEN THE TRANSMISSION BEGINS. ALL APPLICATIONS MUST HAVE AN IIPS TRANSMISSION TIME STAMP NO LATER THAN 8:00 P.M. EASTERN TIME ON **November 30, 2003**. An Applicant that begins transmission after the aforementioned date and time will not be considered for Award. IIPS will provide a verification of submission for all files. If the Applicant finds that there are any missing files, a 24-hour grace period will be allowed to submit the missing files. Transmission of those files to IIPS must begin by 8:00 p.m. Eastern Time on December 1, 2003.

DOE reserves the right to extend the closing date for Applications, if necessary, and will provide notification via an Amendment to this Solicitation posted on IIPS (see Section II.C, "Amendments").

All Applications shall be submitted as 'MS Word for PC' files (except that the optional Attachments described in Section III may also be submitted in pdf format) through the DOE IIPS, in accordance with the IIPS instructions in Appendix C or the instructions on the Golden Field Office Homepage at http://www.golden.doe.gov/businessopportunities.html, under "Solicitations." For questions regarding the operation of IIPS, contact the IIPS Help Desk via e-mail at IIPS_HelpDesk@e-center.doe.gov or via telephone at 1-800-683-0751. Applications submitted other than through IIPS or in other than MS Word for PC format (except optional Attachment files in pdf format) will be considered non-responsive and will not be considered for an award.

Applicants are strongly encouraged to begin transmission at least 48 hours in advance of the deadline in order to prevent any transmission difficulties.

F. Questions

All questions concerning this Solicitation must be submitted through IIPS by **November 17, 2003**. See Appendix C regarding the "Submit Question" feature. The questions and associated answers will be posted on IIPS and can be accessed on the IIPS "Solicitation Form" page by clicking on the button titled "View Questions" (the button will not appear if no questions/answers have been posted by DOE). Potential Applicants are responsible for periodically checking the DOE IIPS web site at http://e-center.doe.gov to determine if Questions and Answers have been posted. Any data, information, or instructions from any other source are not official and should not be considered by Applicants.

G. Award Instrument

DOE intends to Award Grants or Cooperative Agreements, as appropriate, to the successful Applicants.

H. Catalog of Federal Domestic Assistance (CFDA) Number

The CFDA number for this Solicitation is 81.086, Conservation Research and Development. Additionally, it is the opinion of DOE that Executive Order 12372, which requires review of certain Financial Assistance Applications by states, does not apply to this action. However, each Applicant should contact its state office of Federal programs to determine if the order applies.

I. Financial Assistance for Application Preparation

DOE assumes no responsibility for any costs associated with Application preparation or submission of

Applications. In addition, no funding will be available under the DOE Minority Economic Impact (MEI) loan program for preparation of Applications in response to this Solicitation.

J. Cost Sharing

This solicitation requires cost share to ensure pro-active industrial involvement, risk-taking by industry, and to encourage enabling technology development for widespread application in industry for the development of energy efficient industrial processes. There will be no waivers of this cost share requirement.

Only proposals submitted with the following cost share requirements will be considered:

1) For applied research and/or development projects: a 30% minimum cost share from non-federal sources
2) For projects involving commercial demonstration of technologies: a 50% minimum cost share from non-federal sources.

As an example, the minimum Applicant cost share requirement for a hypothetical project with a total cost of $500,000 would be:

Total Project Cost:	$500,000
Applicant share, 30%	$150,000
DOE share, 70%	$350,000

Please note that the required minimum Applicant cost share is **not** based on 30% of the DOE share, but is based on 30% of the Total Project Cost.

Cost share contributions need not be monetary (e.g. in-kind contributions are allowed). Industrial and/or supplier involvement and cost sharing above the required minimums are strongly encouraged. In evaluating the cost share, the percentage calculated from the cost information will be rounded to the nearest full percentage. Prior costs (e.g., costs for prior R&D, patents, or to develop technical reports) should not be proposed and will not be considered as cost share. Fee or profit will not be paid under any award and foregone fee or profit will not be accepted as cost share. Cost share may not be other federal funding.

If DOE Laboratories are teaming partners, their participation will be funded directly by DOE and the costs associated with the Laboratory's participation will count towards the Government's cost share, not the Applicant's cost share. Additionally, the recipient's cost sharing requirement will be based on the total cost of the project including both the recipient and the DOE laboratory portions of the effort.

Applications should clearly identify the sources and amounts of cost sharing proposed. The Applicant must include a summary table showing the cost-sharing breakout for each of the identified portions of the project (as specified above) that will be included in their Application. This will facilitate DOE evaluations of the proposals and will expedite final negotiations prior to a financial assistance award for projects selected for funding, helping to avoid delays at crucial steps in the process.

Reference 10 CFR 600.123 and 10 CFR 600.127 located at the following URL:
http://www.access.gpo.gov/nara/cfr/waisidx_01/10cfr600_01.html

Eligible Association of State Energy Research and Technology Transfer Institutions (ASERTTI) members may be interested in cost sharing some of the research efforts under this solicitation. ASERTTI is the

association of state-level public interest research, development, demonstration and deployment (RDD&D) organizations. It promotes, funds, and conducts collaborative public interest energy RDD&D at the state, regional, and national levels (See Appendix B for the list of ASERTTI members.) Applicants are encouraged to contact ASERTTI early in the process to see if their research effort is one that an eligible ASERTTI member would be interested in cost sharing (NOTE: DOE Laboratories and other federally funded members are not allowable sources of cost share). The contact for ASERTTI is: Sherry Benzmiller, Energy Center of Wisconsin, 595 Science Drive, Madison, Wisconsin 53711. Phone: (608) 238-8276 ext. 121, E-mail: sbenzmiller@ecw.org, Fax: (608) 238-8733.

K. Federally Funded Research and Development Centers

Applications submitted by Federally Funded Research and Development Centers (FFRDC's), as defined by Federal Acquisition Regulation (FAR) 35.017, will not be considered for Award. The FAR can be obtained electronically at http://www.arnet.gov/far/.

Applications proposing a portion of the work to be performed by a FFRDC will be considered for Award. However, a FFRDC cannot perform an effort that exceeds 50% of total award dollars, including all Cost Share. If an Application proposing work by a FFRDC is selected for funding, DOE may make an Award to the Applicant for its portion of the effort and may provide direct funding to the FFRDC for its portion of the effort. The Applicant will be responsible for securing the written approval of the cognizant Federal Contracting Officer for any work proposed by a FFRDC. The FFRDC's effort, therefore, may not be accomplished through a subcontract with an Applicant, as defined in 10 CFR Part 600.3. The Applicant must execute an agreement with the FFRDC, and the Applicant will be the responsible authority, without recourse to the Government, 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.

The portion of work designated for any research laboratory that is funded directly by DOE would count as DOE funding, and would require any matching Cost Sharing by the Applicant. Also see "Cost Sharing" above.

L. Work by DOE Research Laboratories

DOE research laboratories are Federally Funded Research and Development Centers and must comply with the following requirements in addition to those described above. If an Application includes work to be performed by a DOE laboratory, the following additional information is required:

(1) Field Work Proposal: The Application must include a Field Work Proposal (See DOE O 412.1 Work Authorization System) from the DOE research laboratory proposing work.

The Application must also describe 1) the portion of the Project that will be conducted by the Applicant and the portion that will be conducted by the DOE research laboratory and 2) the legal agreement, possibly a no funds "CRADA", the Applicant will execute with the DOE research laboratory, meeting the requirements for FFRDCs as described above. The amount of work to be performed by the DOE research laboratory may not be greater than 50% of total award dollars, including all Cost Share. DOE will review the Application to determine that it meets this criterion and reserves the right to reject any Application that fails to do so.

(2) Workscope: The Application must provide a scope of work for the effort to be performed by the

Applicant and a separate scope of work for the effort to be performed by the DOE research laboratory.

(3) Authorization from the DOE Contracting Officer. The Applicant must obtain the approval of the cognizant DOE Contracting Officer for the laboratory authorizing the respective DOE research laboratory to participate in the proposed work effort. The Application should include the name and phone number of the Contracting Officer to expedite verification.

M. Sub-Awards to Debarred and Suspended Parties

Applicants and Participants, at any tier, must not make any sub-award or permit any sub-award to any party which is debarred, suspended, or is otherwise excluded from or ineligible for participation in Federal Assistance programs under Executive Order 12549, "Debarment and Suspension," or is otherwise ineligible hereunder. The list of parties excluded from Federal procurement and non-procurement programs can be accessed through the Excluded Parties List System (EPLS) at http://epls.arnet.gov.

N. National Environmental Policy Act (NEPA) Requirements

All Applicants selected for negotiations shall complete an Environmental Checklist, GO-EF1. The Environmental Checklist is a series of questions designed to gather information in the following general areas as related to the proposed Project: chemicals, waste generation, emissions, permitting, natural resources and any unique or controversial issues. The requested information will be used by DOE to evaluate any potential impacts (positive and negative) on the environment and contain enough detail for the Department to meet its requirements under NEPA.

Applicants are restricted from taking any irreversible action prior to DOE reaching a final NEPA decision regarding the proposed Project. Irreversible actions include demolition of existing buildings, site clearing, ground breaking, construction, and/or site specific detailed design. Provided DOE has authorized the work, this restriction does not preclude the Applicant from developing plans, preliminary designs, or performing other necessary support work prior to DOE reaching its final NEPA decision.

O. EPAct Eligibility Requirements

Section 2306 of the Energy Policy Act (EPAct), Public Law 102-486 establishes eligibility requirements for companies that participate in Financial Assistance programs covered under Titles XX through XXIII of the EPAct. The section was established to ensure the participation of U.S. companies or that the U.S. benefits from funding provided under covered Awards.

If selected for negotiations, all for-profit business entities other than an organization of the type described in section 501(c)(3) of the Internal Revenue Code of 1954 (26 U.S.C. 501(c)(3)) shall complete Form GO-PF21, EPAct Certification, in order for DOE to determine eligibility. State Governments, Local Governments, and 501(c)(3) organizations are not required to submit an EPAct certification. Based on the information provided, a determination by DOE that the EPAct eligibility requirements are met shall be made prior to making an Award. Additional information may be required for determination of eligibility prior to Award. An Award cannot be made if the Applicant does not meet the eligibility requirements of the EPAct Section 2306.

III. APPLICATION PREPARATION INSTRUCTIONS

A. General Instructions

The overall Application shall be submitted in sections or distinct files as described below and submitted through IIPS at http://e-center.doe.gov (see also Appendix C). Applications for different projects may be submitted under this Solicitation. The Application must include the items in the order below.

IIPS Application Format for Financial Assistance

1) Application for Federal Assistance (Standard Form 424)
2) Certifications and Assurances (Only required if selected for Award)
3) Project Summary (Publicly-releasable summary)
4) Narrative (Technical proposal)
5) Budget (Form DOE F 4600.4)
6) Budget Narrative (Budget Explanation, Form GO-PF20(std)) (Only required if selected for Award)
7) Attachment 1 - optional
8) Attachment 2 - Not required for this Solicitation
9) Attachment 3 - Not required for this Solicitation
10) Attachment 4 - Not required for this Solicitation

NOTE: The following sections of this Solicitation specify page limits for certain portions of the Application. Any pages that exceed the specified maximum number of pages for any item will be removed and will not be considered during the evaluation.

All files must be submitted in MS Word for PCs. Compressed files and paper copies will not be accepted. All files must be prepared per the instructions herein, prior to beginning transmission to IIPS. Computer file sizes shall be kept to a minimum to reduce transmission times.

The file name(s) should be consistent with the following structure: 1) last seven alpha-numeric digits of the solicitation number (i.e., GO93015); 2) Applicant name (shortened); 3) Abbreviated title or form number (i.e., 424, Summ, Narr, 4600.4, PF20) or attachment (i.e., Att1, Att2, Att3, or Att4). Each segment should be separated by a dash. For example, GO93015-acme-424.doc.

In addition to the forms provided as attachments in IIPS, Application forms may be obtained from the DOE Golden Field Office Home Page at http://www.golden.doe.gov/businessopportunities.html, under "Proposal Forms."

To aid in the evaluation, Applications shall be clearly and concisely written, indexed, and logically assembled. The Application must consist of 8.5" x 11" pages with minimum margins of 1" and must be prepared using a minimum 10-point font. Page limitations refer to files and all associated documents when printed in their entirety.

B. Application Content

Forms may be obtained from the DOE Golden Field Office Home Page at http://www.golden.doe.gov/businessopportunities.html, under "Proposal Forms." Instructions for completion of the forms are provided with each.

1) "Application for Federal Assistance" (SF 424)
   The Application for Federal Assistance, Standard Form 424, must accompany the Application.

The required information must be completed with the name of the individual authorized to sign the form typed in the signature block.

2) Certifications and Assurances (not required for Applications under this Solicitation)
These forms are not required to be submitted with Applications under this Solicitation. All Applicants selected for the negotiation of an award will be requested by DOE to submit these forms at that time, including the following:

a) "Financial Assistance Pre-Award Information Sheet" (GO-PF19)
b) "U.S. DOE Assurance of Compliance" (DOE F 1600.5)
c) "Grantee Certification Regarding Lobbying; Debarment, Suspension and Other Responsibility Matters; and Drug-Free Workplace Requirements" (FA-CERTS)
d) "Disclosure of Lobbying Activities" (SF-LLL) (Complete only if the second block in Section 1 of FA/CERTS is checked, otherwise, leave blank.)
e) ACH Vendor/Miscellaneous Payment Enrollment Form, Standard Form 3881 (Found under "Post Award Forms" "Invoices")
f) "Energy Policy Act (EPAct) Certification" (GO-PF21)
g) NEPA EF1 Environmental Checklist, https://gowba.go.doe.gov/nepa/nepau/Default.ASP

NOTE: All payments will be made by electronic funds transfer. Depending on the payment method, the recipient will either be requested to enroll in ASAP or complete Standard Form 3881.

3) Project Summary (two-page limit)
A one- to two-page summary must be submitted with the Application that describes, in general terms, the proposed Project and Applicant commitment. The summary should only contain information that is releasable to the public.

4) Narrative (technical proposal) (see page limits below)
The Narrative shall be structured in accordance with the criteria and requirements specified in the detailed instructions below in Section III.C.

5) "Federal Assistance Budget Information" (DOE F 4600.4)
A summary of all cost data shall be submitted on this form.

6) Budget Narrative (Budget Explanation, Form GO-PF20 (std))
This information is not required to be submitted with the Application. The GO-PF20 form will be requested in writing by DOE from those Applicants selected for negotiation of an award.

7) Attachment 1 (optional; 10-page limit)
Attachments may be included, if deemed necessary by the Applicant, to further clarify key aspects of the proposed work and associated technology. The attachments shall not include additional explanatory text prepared expressly for this Solicitation (all such material is limited to the Technical Proposal section of the Narrative described below). Allowable attachments include items such as technical papers presented at prior conferences, patents, process flow sheets, equipment drawings, electrical schematics, company informational brochures, maps, layout drawings, etc. At least one reference to each attachment and any associated explanation shall be included in the Technical Proposal section. Attachments must be submitted in MS Word for PCs or pdf format.

C. Narrative Structure

The Narrative shall consist of the following sections, limited to the number of pages where indicated:
- Cover Page
- Table of Contents
- Technical Summary (two-page limit)
- Technical Proposal (20-page limit)
- Resources by Task (no page limit)
- Letters of Commitment (two-page limit per letter)
- Personnel Resumes (two-page limit per resume)
- FFRDC or DOE FFRDC Field Work Proposal, if applicable
- Attachments

NOTE: Any pages that exceed the specified maximum number of pages for any item will be removed and will not be considered during the evaluation.

a) Cover Page

The Narrative cover page must indicate the name and type of organization, the Solicitation Number, the project title and program (i.e. priority areas (Appendices E – I) or "Other") which the project addresses, and both the technical and business points of contact for the Applicant, denoting the names, titles, addresses, telephone and facsimile numbers, and electronic mail addresses.

b) Table of Contents

The Narrative shall include a table of contents and page numbers corresponding to the elements outlined in these guidelines. Certain sections shall be limited to the maximum number of pages specified below.

c) Technical Summary (two-page limit)

A two-page technical summary shall be included in the Narrative to describe the proposed Project in technical terms and explain the proposed Project benefits. The summary may contain information that is not releasable to the public. The name of the Applicant and title of the proposed project shall be indicated at the top of the summary page.

d) Technical Proposal (20-page limit)

The Technical Proposal portion of the Narrative shall be structured in accordance with the following Sections (the structure, order of topics, etc., within a Section are at the discretion of the Applicant). It shall include a Statement of Objectives that provides a task-oriented description of activities that is responsive to the technical requirements of this Solicitation. Applicants must review Section IV.D, "Evaluation Criteria of Technical Volume," to be certain that all aspects of the Evaluation Criteria are adequately covered in the Technical Proposal.

1) Research Concept

Discuss the proposed concept and key innovative components of the R&D activities. Describe how the concept addresses the research needs cited in the respective chemical and forest products industry roadmap documents and how it addresses the priority goal of bringing emerging

technologies into use that have significant advantages over current technology. Discuss how the proposal integrates across identified technology elements and the technical feasibility of the concept. Identify the hurdles to be overcome by the proposed R&D. Describe domestic and worldwide technology status including emerging technologies. Explain why the domestic industry is not already investigating or implementing the proposed concept and why they will not conduct the R&D without government assistance.

2) Project Plan/Statement of Objectives

Describe the project goals, scope of work, and objectives. Provide a work breakdown structure and a milestone plan and schedule. Identify and describe decision points with go/no-go decision criteria (i.e. stage gate criteria), which includes a milestone for completion of the R&D project and transition to technology demonstration phase. Describe project organization and individual responsibilities. Describe how tasks will be integrated among the participants and the project will be coordinated. Describe the project management structure including implementation and monitoring of the R&D. Discuss the management philosophy for achieving project success.

3) Team Capabilities and Facilities

Provide a summary as to how the multi-disciplinary team members will participate in the proposed R&D activities. Describe the complementary skills and capabilities of the team members, the relevant individual and corporate experience in the area of research; and adequacy of any required facilities and equipment that will be available for this project.

4) Commercialization Plan

Identify the path that will be used by the project team to transfer the technology to industry. Complete the questionnaire found in Appendix J of this solicitation, demonstrating that the project team has been selected to optimize commercialization potential. Limit the response to the questionnaire to five pages (does not count against the overall 20-page limit) and include as an Attachment. Describe the unique characteristics that make the project team ideally suited to successfully develop and commercialize the project technology. Describe how the technology will be made available to a wide cross-section of the chemical or forest products industry at the earliest practicable time. Present current and potential partnering strategies, possible follow-on development phases, licensing strategies, economic analyses that show returns on capital invested, and potential market barriers and how the barriers will be overcome.

5) Energy Savings and Other Benefits

Discuss how the respective chemical or forest products industry will benefit from the proposed project in terms of energy savings, environmental performance, and economic benefits. Each is discussed further below:

a) Estimate the energy benefits of your technology using the internet-based *Energy Savings Estimator*, which is available at www.energetics.com/energysavingstool/. This tool enables the user to estimate energy savings for new technologies used in the chemicals and forest products industry. Step-by-step instructions for using the model are included at the website. Data entered at this website is password-protected and only accessible by the user. Assumptions should be clearly stated for all data entered, and expanded in your discussion if necessary. See Appendix D for more information on the Energy Savings Estimator.

A useful resource for estimating energy savings from process systems in the forest products and chemical manufacturing industries can be found at http://www.oit.doe.gov/bestpractices/steam/pdfs/steam_assess_mainreport.pdf.

b) Estimate the environmental benefits of your technology by technology using the internet-based *Energy Savings Estimator*, available at www.energetics.com/energysavingstool/. This tool enables the user to estimate the reductions in pollutant emissions for new technologies used in the chemicals and forest products industry. Step-by-step instructions for using the model are included at the website. Data entered at this website is password-protected and only accessible by the user. Assumptions should be clearly stated for all data entered, and expanded in your discussion if necessary. See Appendix D for more information on the Energy Savings Estimator.

c) Economic benefits of the proposed project should be described including the general applicability, timeliness, and economic viability of the proposed technology (i.e., probability of commercial application), the estimated size of the potential economic impact (i.e. potential market size); and the potential for enhancing the economic competitiveness of the domestic industry.

e) Resources By Task (no page limit)

The Narrative shall include a summary of resources by Statement of Objectives task. The summary must include the following for the Applicant and each participant:

- The job title and number of hours for each of the individual personnel proposed
- The destination and purpose for all travel
- Proposed equipment, materials, and supplies, for each item over $5,000

f) Statement of Commitment and Cost Sharing (Two page limit)

Firm funding commitments are expected; however only a description of those commitments must be included in the application. The commitment description shall identify the Participant, percentage of total project, dollar amount, and budget category (for in-kind contributions) for the proposed project. For projects with multiple cost sharing, or multiple partners, summarize information in table format.

By submission of an application, the Applicant is certifying that it has signed letters of commitment from all participants that will be providing cost share. If selected for negotiation of an award, letters of commitment, signed by an authorized official, will be required within 14 calendar days of notification.

The "Cost Sharing" definition is contained in 10 CFR 600.30, 600.101, 600.123, 600.224, and OMB Circular A-110. Foregone fee or profit by the Applicant shall not be considered Cost Sharing under any resulting Award. Reimbursement of actual costs will only include those costs that are reasonable, allowable and allocable to the Project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127 and 10 CFR 600.224 for the respective Participants.

g) Personnel Resumes (Two-page limit for each resume)

A resume should be provided for Key Personnel for the Applicant and Participants. Each resume is limited to a maximum of two pages. All resumes must be submitted in MS Word for PCs.

h) FFRDC or DOE FFRDC Field Work Proposal (if applicable)

The Application must include the agreement with the FFRDC or the Field Work Proposal for work done by a DOE FFRDC, if applicable. This information must be prepared in accordance with Section II. These documents must be submitted as a MS Word for PC or pdf file with the Application through IIPS.

i) Attachments

- Attachment J Questionnaire (5 page limit)

C. Proprietary Application Information

Applications submitted in response to this Solicitation may contain trade secrets and/or privileged or confidential commercial or financial information which the Applicant does not want to be used or disclosed for any purpose other than evaluation of the Application. The use and disclosure of such data may be restricted, provided the Applicant marks the cover sheet of the Application with the following legend, specifying the pages of the Application which are to be restricted in accordance with the conditions of the legend:

"The data contained in 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."

Further, to protect such data, each page containing such data shall be specifically identified and marked, including each line or paragraph containing the data to be protected with a legend similar to the following:

"Use or disclosure of the data set forth above is subject to the restriction on the cover page of this Application."

It should be noted, however, that data bearing the aforementioned legend may be subject to release under the provisions of the Freedom of Information Act (FOIA), if DOE or a court determines that the material so marked is not actually proprietary and, thus, not exempt under the FOIA. The Government assumes no liability for disclosure or use of unmarked data and may use such data for any purpose.

Applicants are hereby notified that DOE intends to make all Applications submitted available to non-Government personnel (federal research laboratory personnel) for the sole purpose of assisting DOE in its evaluation of the Applications. These individuals will be required to protect the confidentiality of any specifically identified proprietary information obtained as a result of their participation in the evaluation.

E. If Selected For Award

If an Application is selected for negotiation of an award, additional information may be requested by DOE in writing. The request will specify the documents to be submitted, and to whom they must be submitted. DOE reserves the right to void/deselect an Application if the information requested is not received within the prescribed timeframe.

Within 14 calendar days of notification the Applicant must submit letters of commitment from cost share partners, signed by an authorized official, identifying the organization, the percentage level, the amount, the source of cost sharing, and demonstrating that all aspects of the proposed project scope will be conducted as described by the Applicant.

As a minimum, DOE will request additional information submittals prior to an Award including:

(1) Items noted in Section III.A above as needed only if selected for the negotiation of an Award.
(2) Financial information from the Applicant and any Participant(s) providing a source of Cost Sharing or performing work. The financial information should be outlined and supported in accordance with the following.
   a) If requested by DOE, Annual financial statements (balance sheet and income and expense statement) for the past year from the Applicant and Participants providing Cost Sharing and/or performing work. Where available, financial statements prepared by certified public accountants should be submitted. State and local governments and public universities are exempt from providing financial statements.
   b) In order to qualify for a Financial Assistance Award, the Applicant must demonstrate a financial management system that satisfies 10 CFR 600.121 and 600.220 by describing the system's ability to comply.

IV. EVALUATION OF APPLICATIONS

A. Compliance Review

A compliance review will be performed of each Application submitted, to determine responsiveness to the requirements of the Solicitation. This Compliance Review will include determining if all forms and required contents of the Application (to include page limitations of those documents) have been provided, and whether Minimum Qualifications (see Section IV.B. below) have been met. If a demonstrated effort to complete and provide all forms and contents is ascertained from information provided, but information has been omitted, the Applicant may be contacted to provide the omitted information. To be considered, the requested information must be submitted promptly upon the DOE request, and prior to Comprehensive Evaluations.

B. Minimum Qualifications

Minimum qualifications include fulfillment of the minimum required cost share contribution of 30% of the total project cost for applied research projects or 50% for commercial demonstration projects (see Section II.J), and a Statement of Objectives that is considered to be within the areas of consideration indicated for this Solicitation (see Section I.C and Appendices E through I). If the Minimum Qualifications are not met, the Application shall not be comprehensively evaluated or considered for Award.

C. Comprehensive Evaluation

Comprehensive evaluation of Applications will be performed in accordance with 10 CFR Part 600.13 as implemented by the Office of the Assistant Secretary for Energy Efficiency and Renewable Energy in procedures published in the Federal Register on December 20, 2001. In evaluating Applications, DOE reserves the right to use any assistance deemed advisable, in accordance with applicable regulations, including qualified personnel from other Federal agencies and federal research laboratories. These individuals will be required to protect the confidentiality of any specifically identified trade secrets and/or

privileged or confidential commercial or financial information obtained as a result of their participation in this evaluation. Information contained in the Applications shall be treated in accordance with the policies and procedures set forth in 10 CFR Part 600.15. Submission of an Application constitutes consent to the DOE's use of outside evaluators.

DOE reserves the right to provide Financial Assistance to all, none, or only certain parts of the Application(s) submitted in response to this Solicitation. All Applicants will be notified in writing of the action taken on their Applications. Applicants should allow at least 90 days for DOE's evaluation. The status of any Application during the evaluation and selection process will not be discussed with Applicant(s). Unsuccessful Applications will not be returned to Applicants.

D. Evaluation Criteria of Technical Volume

All timely Applications that fulfill the minimum Application requirements, as determined under the compliance review, will be eligible for comprehensive evaluation.

DOE plans to select for award those Applications judged to provide the greatest public benefit within the estimated available funding. Using the consensus method, the technical and cost proposal information submitted by the Applicant will be evaluated. Applications will undergo a comprehensive technical evaluation in accordance with the criteria listed below. The Technical Proposal will be numerically point-scored. All work proposed for the total project period will be evaluated in accordance with those criteria.

The technical criteria are significantly more important than cost; however, cost may be a determining factor in making the awards. The DOE Selection Official (SO) will also consider the Program Policy Factors identified below. In preparing Applications, Applicants should present sufficient evidence to ensure that each criterion is fully addressed. Technical reviewers will base their evaluations only on information contained in the Application and shall not consider their familiarity (if any) with the firm, its subcontractors (if any) or key individuals.

Technical Evaluation Criteria

The following evaluation criteria will be used in the comprehensive evaluation. For each criterion, the weighting (out of a total of 100) is indicated to show the relative importance of each.

1. **Research Concept (Weight: 20)**
   The factors used to evaluate this criterion are as follows. 1) The research concept's technical merit and the responsiveness of the proposal in addressing the priority goal of bringing emerging technologies that have significant advantages over current technology into use by the chemical and forest products industries. 2) The responsiveness of the proposal to integrate across identified technology elements, and the technical merit and feasibility of the proposed work (i.e., is it based on sound scientific/engineering principles and on an understanding of current state of the art in the industry).

2. **Project Plan/Statement of Objectives (Weight: 10)**
   The factors used to evaluate this criterion are as follows. 1) The completeness and appropriate timing in the project plan, and the clarity, completeness, and adequacy of the statement of objectives. 2) The degree of coordination, interaction, and adequacy of the overall project management plan across all the efforts, disciplines, partners, and objectives of the project. 3) The adequacy and appropriateness of the project plan, principal milestones, decision points, time for

each task, and the planned assignment of responsibilities and level of manpower to complete the research.

3. **Team Capabilities and Facilities (Weight: 10)**
The factors used to evaluate this criterion are as follows. 1) The adequacy of the Applicant's proposed team to address all aspects of the proposed work including the commitment of the team members, the clarity of the roles of the team members; the approach to managing the team, the priority the Applicant and team members will place on the proposed work; and the assistance that will be provided in any specialty area required to solve specific problems and breadth and depth of the collaboration across industry, academia and other partners. 2) The adequacy of the Applicant's proposed facilities and those of proposed subcontractors, the commitment to use those facilities for the proposed program; and the reasonableness of any request for new facilities and equipment.

4. **Commercialization Plan (Weight: 10)**
The factors used to evaluate this criterion are as follows. 1) The project team's characteristics that make them well suited to successfully develop and enable commercialization of the technology (based in large part on the answers provided in response to questions in Appendix J). 2) The availability of the technology to a wide cross-section of the chemical or forest product industries and the time for it is to be available. 3) The adequacy of current and potential partnering strategies, follow-on development phases, licensing strategies, results of economic analyses that show returns on capital invested, and the plan to overcome market barriers.

5. **Energy Savings and Other Benefits (Overall Weight: 50, with sub-criteria weights as shown below)**

a) **Energy Benefits (Weight: 30)**
The factors used to evaluate this criterion are as follows. 1) Energy benefits considering the potential for the proposed technology to contribute to the reduction of the overall energy consumption and the reduction in the use of fossil based feedstock energy in the U.S. as compared to the current commercial technology to produce the same or similar product(s). Chemical projects are expected to yield energy savings of at least 10 trillion BTUs per year by 2020, and ideally should yield energy savings in excess of 50 trillion BTUs per year by 2020 when fully commercialized across the chemical industry. Forest Products projects are expected to yield energy savings of at least 5 trillion BTUs per year by 2020, and yield energy savings in excess of 10 trillion BTUs when fully implemented across the forest products industry. The energy savings will be evaluated by considering the adequacy, technical merit, assumptions, and completeness of the applicant's energy savings estimates provided through evidence presented by the applicant or by the Energy Savings Estimator tool referenced in Section III.C. 2) The sum of energy savings results for multiple products and markets will be considered, as well as any additional markets identified in the proposer's discussion of energy savings.

b) **Environmental Benefits (Weight: 10)**
The factor used to evaluate this criterion is as follows. 1) The potential for the proposed technology to contribute to the reduction of the overall environmental impact in the U.S. as compared to the current commercial technology that produces the same or similar product(s).

c) **Economic Benefits (Weight 10)**
The factors used to evaluate this criterion are as follows. 1) The general applicability, timeliness, and economic viability of the proposed technology (i.e., probability of commercial

application). 2) The size of the potential economic impact (i.e. potential market size). 3) The potential for enhancing the economic competitiveness of the domestic industry.

E. Cost Evaluation Criteria

The proposed cost elements will not be point scored or adjectivally rated. However, they will be evaluated to determine if the total proposed amount is commensurate with the proposed effort. Also, the proposed cost will be evaluated to ascertain that the Applicant has met the cost sharing requirements specified in the Solicitation. As previously indicated, **those Applications not meeting the minimum cost sharing requirements specified in this Solicitation will be eliminated from further consideration in the initial evaluation for meeting the minimum qualifications.**

The proposed cost elements may also be used during the comprehensive evaluation to assist evaluators in judging the Application.

F. Program Policy Factors

Program Policy Factors, while not necessarily indicators of an Application's individual technical merit, are relevant and essential to the process of selecting Applications that will best achieve the overall DOE programmatic goals. Upon completion of the technical, business and cost evaluations, those Applications which are potential candidates for award will be reviewed and further evaluated by the DOE Selection Official based upon the actual DOE funding available and the following Program Policy Factors:

1. The total proposed cost of the project will not be point scored. Applicants are advised, however, that notwithstanding the lower relative importance of the project cost, the cost may become a consideration in selections.
2. An award will not be made to an applicant whose proposal requires DOE funding in an amount that exceeds the DOE funding available.
3. It is desirable to implement each R&D project as a continuing collaborative effort in which the recipients represent the scientific/engineering research disciplines as well as members of the chemical and forest products industries and their suppliers. Those applications that include collaborations between the chemical and forest products industries, University, Research Institute, and National Laboratory participants as well as partnerships between the industry suppliers will be given additional consideration in the selection process.
4. Programmatic goals include the desire for a portfolio of research projects to be balanced with respect to technical areas, stages of development, and risk (i.e. near-, mid-, and long-term duration).

V. ADDITIONAL INFORMATION

A. Clarifications

DOE may require Applications to be clarified or supplemented to the extent considered necessary for evaluation, either through additional submissions or oral presentations (per 10CFR600.10(e)).

B. Debriefing After Selections

Unsuccessful Applicants will be provided a summary of the strengths and weaknesses of their Applications in writing from DOE. This shall constitute the debriefing.

C. Financial Information

Upon selection for negotiation toward an award, financial information is required from the Applicant and any Participant(s) providing a source of Cost Sharing or performing work, prior to the Award being made. The financial information shall be outlined and supported in accordance with the following instructions:

1) Annual financial statements (balance sheet and income and expense statement) for the past year shall be attached for Applicant and Participants providing Cost Sharing and/or performing work. Where available, financial statements prepared by certified public accountants should be submitted. State and local governments and public universities are exempt from providing financial statements.

2) In order to qualify for a Financial Assistance Award, the Applicant must demonstrate a financial management system that satisfies 10 CFR 600.121 and 600.220 by describing the system's ability to comply.

APPENDIX A - DEFINITIONS

"Amendment" means a revision to a solicitation.

"**Applicant**" means the legal entity or individual signing the Application. This entity or individual may be one organization or a single entity representing a group of organizations (such as a Consortium) that has chosen to submit a single Application in response to a solicitation.

"**Application**" means the documentation submitted in response to a solicitation. NOTE: Application is referred to as Proposal in IIPS.

"**Award**" means the written documentation executed by a DOE Contracting Officer, after an Applicant is selected, which contains the negotiated terms and conditions for providing Financial Assistance to the Applicant. A Financial Assistance Award may be either a Grant or a Cooperative Agreement.

"**Budget**" means the cost expenditure plan submitted in the Application, including both the DOE contribution and the Applicant Cost Share.

"**Budget Period**" means an interval of time, specified in the Award, into which a Project is divided for budgeting purposes.

"**Consortium (plural consortia)**" means the group of organizations or individuals that have chosen to submit a single Application in response to a solicitation.

"**Contracting Officer**" means the DOE official authorized to execute Awards on behalf of DOE and who is responsible for the business management and non-program aspects of the Financial Assistance process.

"**Cooperative Agreement**" means a Financial Assistance instrument used by DOE to transfer money or property when the principal purpose of the transaction is to accomplish a public purpose of support or stimulation authorized by Federal statute, and Substantial Involvement (see definition below) is anticipated between DOE and the Applicant during the performance of the contemplated activity.

"**Cost Sharing**" means the respective share of Total Project Costs required to be contributed by the Applicant and by DOE. The required percentage of Applicant Cost Share is to be applied to the Total Project Cost (i.e., the sum of Applicant plus DOE Cost Shares) rather than to the DOE contribution alone.

"**Financial Assistance**" means the transfer of money or property to an Applicant or Participant to accomplish a public purpose of support authorized by Federal statute through Grants or Cooperative Agreements and subawards. In DOE, it does not include direct loans, loan guarantees, price guarantees, purchase agreements, Cooperative Research and Development Agreements (CRADAs), or any other type of financial incentive instrument.

"Federally Funded Research and Development Center (FFRDC)" means a research laboratory as defined by Federal Acquisition Regulation 35.017.

"Grant" means a Financial Assistance instrument used by DOE to transfer money or property when the principal purpose of the transaction is to accomplish a public purpose of support or stimulation authorized by Federal statute, and no Substantial Involvement is anticipated between DOE and the Applicant during the performance of the contemplated activity.

"Industry Interactive Procurement System (IIPS)" is DOE's Internet-based procurement system which allows access to DOE's business opportunities database, allows user registration and submittal of Applications. http://e-center.doe.gov/

"**Key Personnel**" means the individuals who will have significant roles in planning and implementation of the proposed Project on the part of the Applicant and Participants, including FFRDCs.

"**Participant**", for purposes of this Solicitation only, means any entity, except the Applicant substantially involved in a Consortium, or other business arrangement (including all parties to the Application at any tier), responding to the Solicitation.

"**Project**" means the set of activities described in an Application, State plan, or other document that is approved by DOE for Financial Assistance (whether such Financial Assistance represents all or only a portion of the support necessary to carry out those activities).

"**Project Period**" means the total period of time indicated in an Award during which DOE expects to provide support contingent upon satisfactory progress and available funds. A Project Period may consist of one or more Budget Periods and may be extended by DOE.

"Proposal" is the term used in IIPS meaning the documentation submitted in response to a solicitation. See also Application.

"**Recipient**" means the organization, individual, or other entity that receives a Financial Assistance Award from DOE and is financially accountable for the use of any DOE funds or property provided for the performance of the Project, and is legally responsible for carrying out the terms and conditions of the award.

"**Selection**" means the determination by the DOE Selection Official that negotiations take place for certain Projects with the intent of awarding a Financial Assistance instrument.

"Selection Official" means the DOE official designated to select Applications for negotiation toward Award under a subject solicitation.

"**Substantial Involvement**" means involvement on the part of the government. DOE's involvement may include: shared responsibility for the performance of the Project; providing technical assistance or guidance which the Applicant is required to follow; and the right to intervene in the conduct or performance of the Project. Such involvement will be negotiated with each Applicant prior to signing any agreement.

"**Total Project Cost**" means all the funds required to complete the effort proposed by the Applicant, including DOE funds (including direct funding of any FFRDC) plus all other funds that will be committed by the Applicant as Cost Sharing.

APPENDIX B – ASERTTI MEMBERSHIP LIST

Members
Advanced Energy Corporation (North Carolina)
California Energy Commission
California Institute for Energy Efficiency
Center for Energy Efficiency & Renewable Energy
Connecticut Office of Policy and Management
Energy Center of Wisconsin
Florida Solar Energy Center
Hawaii Department of Business, Economic Development & Tourism
Iowa Energy Center
Massachusetts Division of Energy Resources
New York State Energy Research & Development Authority
North Carolina Solar Center
Northeast Energy Efficiency Partnerships
Northeast Utilities
Northwest Energy Efficiency Alliance
Pennsylvania Department of Environmental Protection
South Carolina Institute for Energy Studies
Texas A&M University
Washington State University Cooperative Extension Energy Program
University of Illinois at Chicago – Energy Resources Center

Associate Members
Argonne National Laboratory
Bonneville Power Administration
Brookhaven National Laboratory
Consortium for Energy Efficiency
Electric Power Research Institute
Gas Technology Institute
Lawrence Berkeley National Laboratory
National Renewable Energy Laboratory
Oak Ridge National Laboratory
Pacific Northwest National Laboratory

Collaborative Partners
Alliance to Save Energy
American Council for an Energy Efficient Economy
Interstate Renewable Energy Council
National Association of State Energy Officials
US Department of Energy
US Environmental Protection Agency

APPENDIX C – INDUSTRY INTERACTIVE PROCUREMENT SYSTEM (IIPS)

1. Locate Solicitation
   - Go to the IIPS website at http://e-center.doe.gov and click on "Browse Opportunities", or login if you are already registered.
   - Click on any of the options for viewing the Solicitation, whichever is easiest for you to locate the Solicitation. (Viewing "Opportunities by Contracting Activity" is recommended.)
   - Click on "Enter IIPS".
   - Click on the "Financial Assistance" folder.
   - Click on the "Golden Field Office" folder.
   - Locate and click on the Solicitation number.
   - Scroll to the bottom of the page, where you will find the attached Solicitation.

2. IIPS Registration

An Applicant only has to register once to apply for any DOE award. Applicants should register as soon as possible. To register:

- Go to the IIPS website at http://e-center.doe.gov.
- Click on the "Register" button.
- Click on the box that says, "Check this box for Acquisitions greater than Simplified Acquisitions threshold or financial assistance" and then click on the button next to the "Register only" option.
- Click on "Proceed to Form."
- Read the "Notice of Disclaimer" and click on "I Accept" if you are in agreement. (Clicking on "I Decline" will return you to the main registration page.)
- Complete the Registration Form. Also print this page, which contains your password, for future reference.
- Click on "Submit Registration." Applicants will receive a confirmation of receipt of registration.
- Applicants will also receive an email confirming successful registration. If an Applicant does not receive this email confirmation within one business day, contact the IIPS Help Desk.

After the Applicant has registered, it is important to use the IIPS test site at http://doe-iips.pr.doe.gov/iips/busopor.nsf/TestSolicitation?OpenView&login . This test site allows registered users the opportunity to practice uploading/downloading files in IIPS. **Do not click on "Go to Main View" to practice submitting applications, as this button takes you to the live site.** To start the practice session, click on the link to the test solicitation number DE-AA01-02AA00000, then click on the button that says "Click here to Login". If you are already logged in, click on "Create Proposal" (you will not see the "Create Proposal" button until you are logged in).

3. Join Mailing List

It is highly recommended that Applicants join the mailing list.

- To do so, go to "Locate Solicitation", click on the "Join Mailing List" button, enter the required information, and submit.
- After an Applicant has joined the mailing list, the Applicant will receive an email each time a solicitation message is posted.
- However, the Applicant should visit the Solicitation page periodically to ensure receipt of the latest information.

4. Electronic Submission

Applications must be submitted through IIPS at http://e-center.doe.gov, in accordance with the instructions in the Solicitation. A submission by any other medium will not be accepted.

5. Electronic Signature

Applications submitted through IIPS constitute submission of electronically signed Applications. The name of the authorized organizational representative (i.e., the administrative official, who, on behalf of the proposing organization, is authorized to commit the Applicant to the conduct of a project) must be typed in the signature block on the form to be accepted as an electronic signature.

6. Submit Application

Applicants are strongly encouraged to submit Applications as soon as possible to ensure timely submission and allow time to resolve any possible transmission problems. To submit an Application, follow these steps:

Step 1 -- Prepare Application

- Prepare all of the files in accordance with the instructions in the Solicitation prior to starting the transmission process.

Step 2 – Create Application

- Enter the IIPS website at http://e-center.doe.gov.
- Click on the "Login" button.
- Click on the button that says, "Industry Interactive Procurement System" and click on "Login" button again.
- Enter your user name (as shown on your registration email confirmation) and password. Note: These are case sensitive.
- The "View Opportunities as Sorted by:" screen will appear.
- "Locate Solicitation."
- Click on the "Create Application" button and complete the information on the Application Cover Page. In order for DOE to accurately identify each Application, Applicants must enter a unique project title in the "Subject" line.
- Click on "Continue".

Step 3 --- Attach Application

- Click on "Attach Application".
- Scroll to the bottom of the page and attach each file in the corresponding block on the page, as outlined in the Solicitation, and then click on "Submit." Up to 10 files may be attached. Keep file sizes to a minimum to ensure a shorter transmission time. Be patient while your files upload.
- IIPS will provide an acknowledgement.
- Click on the link on the acknowledgement to "Verify Successful Transmission" of your Application.

Once the Applicant begins the "Create Application" process, there will be a record created in IIPS. Therefore, Applicants must verify that duplicate Applications were not inadvertently created in IIPS. If a duplicate was created, follow the steps outlined in 8.a.

In the event that two or more Applications are received from the same Applicant with the same unique project title, only the Application with the latest transmission time stamp will be considered for review.

7. Multiple Applications for Unique Projects

An Applicant may submit multiple Applications under the Solicitation; however, each project must be unique. For each Application, the Applicant is required to follow the instructions in "Submit Application." Each Application must be complete and shall not rely upon another Application as submission of the required documents.

8. Revisions, Deletions, and Withdrawals of Applications

a. To remove an Application or Application file(s) from IIPS:
To delete or withdraw an Application or an Application file, contact the IIPS Help Desk requesting the Application or file be removed. Be sure to identify the Solicitation number, your user name, the Applicant's name, and the subject, as shown on the cover page of the Application. In addition, if an Application is withdrawn after the closing date, inform the Contract Specialist shown on the Solicitation, via email.

b. To submit a revised Application:
After the Help Desk has removed the requested Application, follow the steps in "Submit Application" to submit a revised Application (i.e. cover page and all required files).

c. To submit a revised file:
After the Help Desk has removed the requested file from your Application:
- Locate the Solicitation.
- Click on the yellow folder next to the Solicitation number.
- Click on the cover page of your submission, click on the "Attach Application" link, and attach the revised file. Files received past the due date will not be reviewed.

9. Questions or Problems with Transmission
View the "IIPS Frequently Asked Questions" by clicking on the "Help" button and scrolling to the bottom of the page. You may also contact the IIPS Help Desk at 1-800-683-0751 (select Option 1) or at IIPS_HelpDesk@e-center.doe.gov for questions regarding the operation of IIPS.

10. Submit A Question on the Content of the Solicitation
"Locate Solicitation", then click on the "Submit Question" button and enter required information. You will receive an electronic notification when your question has been answered. DOE EERE will try to respond to a question within 5 business days, unless a similar question and answer have already been posted.

11. View Questions and Answers
"Locate Solicitation", then click on the "View Questions" button. If no questions have been submitted and answered, a statement to that effect will appear. Potential Applicants should periodically check the IIPS website for new questions and answers.

12. IIPS Resources

IIPS User Guide

This is an A-Z IIPS User Guide--anything and everything the Applicant would ever want to know about IIPS. This user guide can be found at: http://e-center.doe.gov/doebiz.nsf/Help?OpenForm by scrolling to the bottom of the page.

Golden Field Office Solicitations web site

This site contains a links to our current solicitations posted in IIPS, and provides a multitude of information for Applicants. This site can be found at: http://www.golden.doe.gov/business opportunities/solicitations.html

APPENDIX D – ENERGY SAVINGS ESTIMATOR INFORMATION

To use the *Energy Savings Estimator*, users select a product market and enter estimates for market penetration and market growth. Market data (production) and historical growth factors are embedded in the model. Market penetration is calculated using historical market penetration models suitable for various types of technology. Users input the percentage of energy that is saved when the new technology is compared with conventional technology. Typical energy use per pound of product is embedded in the model in the categories of feedstock, heat/steam, and electricity. Energy use numbers are an average for the industry, and do not necessarily represent the state-of-the-art. After market and energy use data are entered, the model returns a summary page of the projected benefits over the next 20 years. These include energy savings and reductions in criteria pollutants associated with fuel combustion. This summary page should be saved as an electronic file (follow instructions on website) and submitted electronically in addition to the main proposal (Adobe PDF file).

There are cases where an individual technology may impact more than one product market. In this case, proposers may submit up to three (3) summary pages for different markets, and results will be viewed as additive when applying energy savings criterion. Please indicate in your discussion any additional product markets that may be impacted, as well as opportunities outside the chemical and forest products industries, and the estimated quantitative benefits (e.g., Btu/year) if available. State all assumptions concerning additional markets.

If you are submitting a chemicals proposal and your technology does not explicitly apply to any of the top fifty chemicals contained in the Energy Savings Estimator, select a chemical product that is most representative of your market, or alternatively, use the Energy Savings Estimator customized product section where certain product data will be needed to be entered by the user (energy per pound, estimated annual production of chemical, etc.). The customized product information you enter can be a composite of multiple products and markets where the developed technology will impact. Include detailed assumption and data used to develop the composite data.

For technical assistance using the *Energy Savings Estimator*, contact Joan Pellegrino, Energetics, Inc., at 410-953-6202 or via email at jpellegrino@energetics.com.

APPENDIX E - CATALYTIC OXIDATION

The *Chemical Industry Vision2020 Technology Partnership* has identified oxidation catalysis as a leading technology for industrial chemical synthesis with the greatest potential for improved feed stock efficiencies, environmental impact and energy savings. New oxidation catalysis will not only provide direct energy savings, improved economic and environmental impact, but will likely provide leading edge science to influence catalytic developments for many other commercial catalytic transformations. The goal of this research area is to develop innovative oxidation catalytic technology to overcome current limitations of selectivity and efficiency with commercial implementation to achieve substantial energy savings. Improved economic performance translates into enhanced utilization of feedstocks, reduced requirements for materials of construction, and sustainable energy savings. Approaches should consider innovative emerging technologies that bring a multidisciplinary scientific basis to address major challenges in oxidation chemistry.

All industrial syntheses of oxygenated compounds from hydrocarbons involve cracking of paraffins to olefins and subsequent direct or indirect addition of oxygen. The direct addition of oxygen to olefins is exothermic and so energy savings result from saving hydrocarbon feedstock through increased selectivity. Indeed, the enhancement of oxidation selectivity is by far the largest potential improvement of energy efficiency in the chemical industry (Parshall, 1994).

This solicitation for R&D for efficiency improvements of industrial catalytic oxidations emphasizes, but is not limited to, the following topical areas:

- Selective oxidation of petroleum feed stocks for commodity chemicals and monomers to enhance efficiency by reducing over oxidation with CO_2 formation.
- Alkane activation for direct oxidation with molecular oxidation; e.g. methane to methanol, alkanes in place of olefins for monomer synthesis, etc.
- Homologation of methane and/or low molecular weight alkanes to commercially useful products, e.g. Fischer Tropsch Chemistry with air or enriched air.
- Improvements in the Syntheses or Use of Reactive Intermediates:
  - Improved efficiency for distributive synthesis of reactive intermediates such as peroxides
  - Advance technology for in situ generation and consumption of reactive intermediates, to achieve steady state benign operations, e.g. phosgene, or
  - Full replacement of these intermediates, e.g. phosgene, HCN, chorine, etc.
- Direct oxidation of aromatics, such as benzene to phenol
- Heat integration of catalytic oxidations (inorganic and organic) with other exothermic or endothermic processes, for maximum efficiency of energy use in syntheses.

Catalytic oxidation developments of interest may involve a number of specialized technologies, including microorganisms, biological catalysts (enzymes), and traditional catalysis.

Multidisciplinary teams are encouraged to develop the technology to achieve high selectivity and productivity. Research and development at the interface of established disciplines and emerging sciences are of interest to create and implement the fundamental knowledge for the synthesis of new functional catalytic structures. These include, but are not limited to the following:

- Biomimetic catalytic centers that mimic the exceptional selectivity and specificity of enzymes, e.g. bioactive metal centers

- Biocatalytic operating systems that use optimized enzymes with tailored activity/selectivity and ability to operate in non-native environments for conversion of petroleum feed stocks
- Tuning the properties of metal oxide catalysts via surface modification for molecular recognition
- Self-assembly concepts for heterogeneous catalytic centers to achieve high reactivity and better control sintering of supported metals.
- Sol-gel molecular clusters for spatially sequencing different catalytic centers and to control surface properties
- Mesoporous and zeolitic science to develop molecular-scale tubular reactors that make possible the sequential, parallel-processing to achieve high throughput rates and very high selectivity
- Nanotechnology to control both surface composition and molecular environment for sequencing multiple reactions and separation centers

APPENDIX F - DISTILLATION

Significant quantities of inorganic acids, and all commodity organic chemicals, are purified by distillation at some stage in their manufacture. Distillation accounts for more than 60% of the total process energy used for the manufacture of commodity chemicals, and is therefore a meaningful target for improvements in energy efficiency. This solicitation seeks R&D for the development of new technology for significant enhancement of energy efficiency of existing distillation systems used in the U.S. for the manufacture of any major commodity chemical, both inorganic and organic, at an attractive cost, while maintaining (or enhancing) system reliability and safety. Promising technology will be capable of retrofit at attractive cost, and meet or exceed performance characteristics demanded of distillation systems. The new technology can be pure hardware, or software, or a combination of these, as long as a complete description of technology implementation (and its cost) is provided.

Opportunities for enhancing the energy efficiency of distillation systems used in the U.S. should be identified, through careful analyses of the inefficiencies. Technical strategies to overcome the inefficiencies should be identified, and practical means to address them developed. The cost of applying the new technology, and the ease of technology implementation, should be the paramount considerations of practical technology development. Technical and business teams to develop and deploy the new technology should be formed, with the goal of introduction of the new technology for the broadest possible markets in the U.S.

System integration in commodity chemical manufacture that could be implemented at attractive cost and reduce currently needed distillation capacity is responsive to the solicitation, and so is hybridization of distillation with other more efficient means of separation such as membranes. The history of commercial attempts to introduce efficient hybrid distillation systems should be carefully reviewed prior to the development of a proposed approach. The design and development of new column externals, such as the reboiler and the condenser, is responsive to the solicitation, as long it can be demonstrated that the replacement of such equipment can be accomplished at acceptable cost and pay back period. The development of processes that can take advantage of excess chemical industry reactive distillation capacity that may result from regulations on oxygenated fuel additives is also encouraged, as long as the new processes enhance energy efficiency of the processes they replace.

Responsive proposals will review the state of the art of the targeted distillation application used in the U.S., and will provide a sound technical basis for the efficiency gains to be derived from the new technology development. Proposals will also identify the number of distillation units in the U.S. that could apply the new technology, and the energy savings that could be derived by reasonable market penetration of the technology from the period of its commercial introduction.

It is important to summarize what is not being solicited. Modeling or simulation of distillation, or the collection of data, or predictive capability of thermodynamic or transport properties of vapor and liquid, without a methodology to implement the knowledge and the potential benefits so acquired, is not responsive to the solicitation. Incremental improvement of existing technology for efficiency enhancement of distillation is not solicited, nor is technology that is not broadly applicable to distillation as applied today in commodity chemical manufacture. That is, the technology must not benefit only the proposing company, rather the technology should be designed to benefit the widest possible range of distillation applications in the U.S.

APPENDIX G - WOOD/COMPOSITE TECHNOLOGIES

In Wood/Composite Technologies, there are 5 target areas for research: Wood Processing Energy Reduction, Wood Adhesives, Resins and Composites, Wood Building Systems, Innovative Wood Resources, and Environmental Performance.

Wood Processing Energy Reduction

No focused approach has been undertaken to reduce overall energy consumption for wood processing and manufacturing, despite the fact that energy used in production is the single highest wood processing cost. This RFP is soliciting the development of breakthrough approaches, process technologies and control systems that can reduce energy required by 50%. Specific goals include but are not limited to:

- Developing a system to use waste heat from available engines and motors in drying of wood products
- Increasing the use of residuals for process energy and emissions control by 50%.
- Developing energy-efficient composite processing systems.
- Developing breakthrough technologies to reduce energy consumption from emission control by 50% without impacting production cost or production quality.

Wood Adhesives, Resins & Composites

Breakthrough technologies in the production of resins, adhesives and composites will substantially reduce energy requirements, reduce costs, allow penetration into new markets, improve competitiveness and reduce the environmental impact of wood and wood-based products. Today's resins and adhesives lack adequate strength, stiffness, durability and reasonable life-cycle costs to revolutionize composite and construction methods. This portion of the solicitation seeks the development of new adhesives, resins and composites based on materials such as agricultural fibers and plastics, and using advanced materials and techniques such as synthetic fibers and embedded sensors.

Specific goals include but are not limited to:

- Developing durable composite resins that use renewable resources, cost less, cure faster at lower temperatures and higher moisture content, which significantly helps reduce energy requirements, reduce costs and improve environmental performance.
- Enhancing product performance by modifying wood surfaces to improve adhesive systems, paint adhesion, bonding of wood and plastics, and the use of wood fibers for filters, thereby reducing labor and energy requirements.
- Developing improved adhesive fastener systems to facilitate more uniform building practices to reduce labor requirements, thereby reducing energy requirements.
- Combining wood and non-wood materials to meet new market needs and facilitate environmental and energy efficiencies.
- Increasing use of bio-based composites, such as replacing non-renewable petroleum-based plastics with renewable bio-based plastics, in wood-plastic composites.
- Incorporating advanced materials into wood-based composites to enhance performance, including energy performance.
- Using advanced sensor technology and developing smart materials that adapt to their environment, thereby improving energy efficiency.

Wood Building Systems

New approaches to design and manufacture of wood building systems are needed to improve the durability of wood frame buildings from common problems of moisture and mold damage as well as extraordinary events like floods or hurricanes. In addition, today's structural buildings are energy and resource inefficient. New approaches to design and manufacture of wood building systems are needed to substantially improve durability, disaster resistance, increase energy efficiency and occupant health, reduce construction time and labor, and reduce the environmental impact of wood and wood-based products.

Specific goals include but are not limited to:

- Developing designs for new, multi-material hybrid structural systems that will significantly enhance the overall system performance of wood structures, including energy performance.
- Through design improvements, substantially increasing the building performance of wood structures during natural disasters, thereby reducing post-disaster recovery energy requirements.
- Improving performance of wood and wood-based products in wet environments, thereby reducing energy requirements for replacement or remediation.
- Developing environmentally benign, fire-retardant, and preservative systems, thereby reducing environmental impact of disposal and preserving the fuel value of the wood.

Innovative Wood Resources

Today's wood products do not adequately make use of reused or recycled wood. Substantial expansion of the use of recycled and reused wood from deconstruction (some of which is treated with preservatives) will dramatically reduce the environmental demand of wood and wood based products and preserve the energy value of wood.

In addition, wood is not currently grown with predictable wood properties or cross sections. Genetic engineering should be developed to control material properties and cross sections.

Specific goals include but are not limited to:

- Developing methods to permit recycling of 80% of all construction and demolition wood-waste generated, including preservative treated wood, thereby reducing environmental impact of disposal and preserving the fuel value of the wood.
- Providing for the use of wood in round form for structural purposes, thereby reducing energy needs for processing.
- Using biotechnology to grow trees with controllable properties (mechanical, geometric) that will reduce costs and energy demands of processing into lumber, veneer, strands particles and fibers by 50%.
- Incorporating manufactured goods disposal and recycling into the design stage for wood products, thereby reducing life cycle and energy costs of wood products by 30%.

Environmental Performance

Current methods for controlling VOC and HAP emissions from wood products manufacturing are generally effective, but expensive and resource intensive. Furthermore, wood products VOC/HAP control technologies require improvements in their effectiveness.
Although current research into the use of low-temperature plasma could reduce VOC emissions for less cost and energy consumption, there is a strong need for creative research into chemical pathways that convert VOC and HAP precursors into a form that remains with the product, and ways to produce purer, more concentrated forms of specific VOCs that are suitable for sale as a by-product. To be widely accepted, the technologies must be capable of cost-effective and highly efficient control of methanol, acetaldehyde, formaldehyde, and methyl ethyl ketone and require much less energy to implement.

Specific goals include but are not limited to:

- Developing trees with reduced amounts of VOC and HAP precursors which can reduce or eliminate the industry's need for costly emission control devices
- Producing technologies that minimize the conversion of VOC and HAP precursors or which use less VOC and HAP generating materials.
- Developing methods to capture VOCs and HAPs to yield competitively priced byproducts or fuels.
- Developing highly efficient VOC and HAP destruction technologies are needed that are less costly and more resource efficient than thermal oxidation technologies.

APPENDIX H - FIBER RECYCLING

There has not been sufficient advancement in recycling technology to meet present and future needs for energy reductions, operating cost reductions and quality improvements. Furthermore, increasing use of low quality feedstocks (e.g. single stream collection, foreign OCC) presents challenges to making quality goods from recycled materials.

There are also opportunities to increase the resource efficiency at the mill to reduce the amount of out-of-spec material that is produced. The production of out-of-spec materials results in lower yield, loss of chemicals and a significant increase in energy consumption.

Gross contamination and mixes of fiber types that the recycling mill cannot handle are increasing. Glass contamination in particular, causes difficulties because of equipment abrasions. In addition, once inappropriate fibers like unbleachables in white ledger grade get into the pulper, the subsequent processing equipment cannot remove or bleach them. There is currently a lack of effective grade specifications relevant to recycle mill operations and lack of low-cost technologies to monitor and sort contaminants and paper types.

The Forest Products industry lacks effective repulping methods that retain or regain fiber performance properties. The existing repulping, screening and cleaning, and deinking equipment has been around for decades. There are no new and interesting ways of processing fiber that cuts costs and reduces energy consumption. In addition, the strength/cost ratio of recycled paper must be improved.

Specific goals include but are not limited to:

- Developing technologies that result in higher product uniformity in the mill including clear separation of fiber types.
- Developing technologies that remove gross contamination from recycled paper.
- Developing technologies that lower energy use like novel chemical, enzyme or other treatments.
- Developing processes that reduce water use
- Streamlining existing systems to produce simpler process flow.

APPENDIX I - NEW FOREST-BASED MATERIALS

The forest products industry is the largest producer of renewable bio-based materials, but these materials are under strong competition from steel, plastic and plastic based composites. The challenge for the forest products industry is to significantly increase the materials flow from sustainable forests while reducing society's need for non-renewable resource to supply material needs.

One means of increasing the output of sustainable forests is to produce useful chemicals and materials from what are currently waste products. One example is to use isolated wood-based sugars to produce biodegradable microbial polyesters. It is estimated that if bio-based products can capture just 10% of the polyester fibers market, it would lead to an annual energy savings of 81 trillion BTU. Alternatively, sugars from forest products could be used to ferment into ethanol. Utilizing 2/3 of the hemicellose produced in processing forest products could provide 2.4 million gallons of ethanol, which is more than the 1.8 million gallons of fuel ethanol produced in the US in 2001.

Forest productivity can be potentially increased by using alternative feedstock like willow biomass which has an energy multiple (energy input divided by energy content harvested) greater than ten. The high rate of carbon capture per unit of fossil fuel input significantly enhances the overall energy efficiency compared to other feedstock production systems.

Specific goals include but are not limited to:

- Developing novel primary fractionation technology to separate cellulose, hemicellulose, lignin and extractives.
- Developing technology to fractionate (clean/unsulfonated) lignin into multiple molecular structures with emphasis on high molecular weight and relatively unchanged form.
- Developing cost effective hydrolysis of cellulose and hemicellulose to sugars and conversion to products.
- Isolating fibers with preserved nano structure of cellulose and hemicellulose
- Developing cost effective molecular recognition and separation technologies for the small molecules isolated.
- Developing microscale testing methods is desired to allow the screening of the usefulness of isolated components based on quantities that can be obtained from bench scale research.

APPENDIX J - ADDITIONAL QUESTIONS FOR APPLICATION

Please provide complete yet concise answers to the following questions. The response should be submitted as a separate attachment to the Application and is limited to five pages.

1. Does the proposed technology address a well-defined industry need or priority?
2. Have any potential customers expressed a willingness to demonstrate the technology if it is a commercial success? If so, is that potential customer part of your project team?
3. Describe the current state of the art technology commercialized in the worldwide market. Also describe any ongoing research (that is known to the author) of competing technologies that could reach the market in the next 5 years. Please describe how the capital and energy costs as well as the environmental impacts of the proposed technology compare with the current state of the art technology and competing technologies under development.
4. Describe the current market condition for selling a new technology to the target industry. Based on this estimate of the target industry, what is the probability that this technology will be implemented in the U.S.? In other words, how will the proposed technology benefit the U.S. chemical and forest products industries, and not its foreign competitors? Will this technology be used for retrofits in existing plants?
5. Describe the current state of patents that can cover the proposed technology. Who owns these patents and can they be licensed? When will the relevant patents expire? Describe how the patents held by other companies will likely affect the commercialization of the proposed technology.

Please provide your best estimate for the following questions regarding the proposed technology.

6. What is the planned start-up year for the proposed technology?
7. What is the maximum production capacity (Million units/year) of the technology under theoretically ideal operation and control?
8. What is the total number of years that the technology will be in place and functional?
9. What is the estimated cost of equipment used directly for manufacturing (i.e., the Inside Battery Limits cost).
10. Please list the cost per unit, and consumption per unit of product for all raw materials, catalysts and consumables, and utilities.
11. Please list the price per unit, and production per unit of product for all by-products.