National Renewable Energy Laboratory
Solicitation for Letters of Interest (LOI) No. RAT-7-77015

"SOLAR AMERICA INITIATIVE (SAI) PV TECHNOLOGY INCUBATOR"

REQUEST FOR LETTERS OF INTEREST

READ THIS DOCUMENT CAREFULLY

This Solicitation is being conducted under the procedures for competitive Letters of Interest established by the National Renewable Energy Laboratory (NREL). NREL will select a LOI for potential subcontract award based on the following.

- All requirements being met
- The best combination of:
  - Technical factors (based on qualitative merit criteria) and
  - Evaluated price

Issue Date: 03/27/07 Due Date: 05/07/07 Time Due: 4:00 P.M. Mountain Time

A Net Conference to address questions regarding the Solicitation is scheduled for 04/10/07; 9:30 – 11:00 A.M. Mountain Time. Interested parties can participate by calling (877) 601-3551. Interested parties can also participate via the Internet at https://www.mymeetings.com/nc/join/. Conf. Number: PG6618930. Code: 1833765

Technical questions regarding the Solicitation must be received in writing no later than 04/17/07

1. Solicitation Type **Best Value Letters of Interest**

SMALL BUSINESS SET-ASIDE

Submit responses to and request information from the NREL LOI Contact below

2. NREL LOI Contact

Submit LOI to and request information from The NREL LOI Contact

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Electronic (PDF) copies of forms and appendices can be found at:
http://www.nrel.gov/business_opportunities/related_docs.html

3. Background

In January 2006, the President announced his Advanced Energy Initiative (AEI), which is designed to reduce the nation's dependence on foreign sources of energy by promoting broader research and development (R&D) to achieve substantive breakthroughs in a variety of energy resources, including solar photovoltaic systems. An integral part of this Initiative is the U.S. Department of Energy's (DOE's) *Solar America Initiative* (SAI). Authorized under the Energy Policy Act of 2005, the SAI represents a significant enhancement of DOE's business strategy of partnering with U.S. industry to accelerate commercialization of photovoltaic (PV) system R&D to meet aggressive cost and installed capacity goals.

The SAI will drive towards accelerated commercialization of solar photovoltaic (PV) systems to a milestone in 2015, at which time they will be competitive with conventional sources of electricity in all domestic grid-tied market sectors. The main goals of this nine-year mission are:

- Substantively accelerate development of U.S.-produced PV systems so that PV-produced electricity reaches parity with the cost of electricity in select grid-tied target markets across the nation (identified in Table 1-1, below).
- Expand the U.S.-installed domestic capacity of PV systems to 5-10 gigawatts (GW).

These targets are described in the Solar Energy Technology Program's (SETP) Posture Plan, http://www.eere.energy.gov/solar/solar_america/about.html, which illustrates how the SETP aligns with the SAI mission and the President's Advanced Energy Initiative.

Table 1-1. Cost Targets for Grid-Connected PV Systems in Key Market Sectors

Market Sector	Current U.S. Market Range (c/kWh)[1,2]	Solar Electricity Cost – Current and Projected (c/kWh)[1]		
		Benchmark	Target	
		2005	2010	2015
Residential[3]	5.8-16.7	23-32	13-18	8-10
Commercial[3]	5.4-15.0	16-22	9-12	6-8
Utility[4]	4.0-7.6	13-22	10-15	5-7

[1]Costs are based on constant 2005 dollars.
[2]Current costs are based on electric-generation with conventional sources.
[3]Cost to customer (customer side of meter)
[4]Cost of generation (utility side of meter)

Since the cost basis of electric energy in these markets is the kilowatt-hour, SETP has established targets for PV systems based on the Levelized Cost of Energy (LCOE) delivered by these systems. LCOE is a measure of total lifetime costs of a PV system divided by expected lifetime energy output, with appropriate adjustments for time value of money, etc. The overall cost goals for SAI are shown in Table 1-1 above. These targets are based on Energy Information Administration (EIA) projections of relatively flat electricity prices (in real terms) over this time period, based on current conventional fuels. The 2005 Benchmark LCOEs of PV systems and target projections are based on SETP internal analyses and the U.S. PV Industry Roadmap. With the ultimate goal for

SAI being cost parity with grid-generated electricity, SETP will revise these targets over time as new information warrants.

Further goals for SAI are presented in the SAI Posture Plan, related to market penetration, job creation, natural gas use reductions, and avoided emissions. These goals, however, are expected outcomes of the primary LCOE goals stated above and the overall objective of 5-10 GW. For the purpose of this Letter of Interest (LOI), Responders will be required to directly address Target Markets and Key Performance Parameters (KPP) addressed in Section 4, for 2010 commercialization. It is expected that these KPP's will provide a pathway towards 2015 LCOE stated goals.

The SAI PV Technology Incubator is structured to allow the utmost in flexible, innovative approaches targeted at research and development of PV systems and component prototypes to achieve prototype modules and pilot production to service the markets described below.

SAI PV Technology Incubator Target Markets

As noted, this LOI is focused on developing new prototype modules and pilot production to eventually service the residential, commercial, and utility market sectors of grid-tied electric power. These markets are described as follows:

Residential Rooftop Market: Typically mounted on rooftops and range in size from under 1kW to 10kW, most commonly in the 3 – 4 kW range. These systems are connected to the grid on the retail (customer) side of the utility meter. These systems can be retrofitted onto existing homes or integrated into new construction through building-integrated PV (BIPV) designs.

Commercial Rooftop Market: Typically mounted on the large flat roofs of commercial, institutional, and industrial buildings, ranging in size from less than 10kW to 500kW. These systems are connected on the retail side of the utility meter. Retrofits and BIPV are possible applications in this market as well.

Utility Market: Large-scale (multi-megawatt) systems that displace conventional utility generated intermediate load electricity on a wholesale basis. Typically, utility PV systems are ground-mounted and range in size from 1MW to10MW, while much larger systems are currently under development. Designs include both fixed and tracking configurations.

SAI PV Technology Incubator Scope

The SAI provides significant opportunities for collaboration and partnership among industry and university researchers to develop and improve solar energy technologies. This "SAI PV Technology Incubator" is targeted at research and development on PV cell and module prototypes with demonstrated functionality in either large-area coupon form or, preferably, prototypes produced in pilot-scale operations. The emphasis on proposed activities should be focused on the barriers to manufacturing scale-up and 2010 commercialization. It is expected that prototype technologies will have already completed proofs-of-concept for new manufacturing processes, either through contractor equipment, the NREL Process Development and Integration Laboratory (PDIL) facilities

or other appropriate facilities. The PDIL is composed of an integrated set of deposition, processing and characterization tools designed specifically to accelerate the movement of solar technologies from the laboratory to the market place. This design incorporates open ports that allow industry tools to mount directly to an existing integrated suite of tools, resulting in access to a controlled and diverse set of capabilities not found at their own facilities.

Through a separate solicitation under which selections have already been made, DOE is supporting industry-led Technology Pathway Partnerships (TPPs) for achieving the aggressive cost goals of the SAI by 2015 (Information abut these selections can be found at http://www.eere.energy.gov/solar/solar_america/technology_pathway_partnerships.html).

To prepare companies for applications to the next TPP funding opportunity announcement expected in 2010, advances are needed to achieve prototype modules and pilot production, which will be facilitated through projects funded under this LOI. It is expected that the subcontract duration will be for 18 months for each award made under this Solicitation. It is anticipated that successful participants in the Incubator project will position themselves to compete for awards in the next TPP funding opportunity announcement (FOA) in the 2010 timeframe. Entrance opportunities for the Incubator project are anticipated every 9 months as funding opportunities become available. The Entrance Criterion is demonstrated coupon-scale PV cells or process lab devices or modules. The successful Exit Criterion would be for prototype modules and pilot production demonstration > 3MW/year. These entry and exit criteria are provided to applicants as general guidelines for maturity of technology that DOE intends to fund through this LOI, but the guidelines are flexible – applicants may be more advanced than the stated entrance criteria at the time of application, and may plan to be more advanced than ~3MW/year pilot production at the completion of their "Incubator" project.

4. Objectives

The primary objective of this SAI PV Technology Incubator project is to shorten the timeline for companies to transition prototype and pre-commercial PV technologies into pilot and full-scale manufacture. Generally, the Incubator concept will apply to those companies that were not far enough along with their technology and product development pathways to be positioned to qualify for the first of the SAI's Technology Pathway Partnership (TPP) awards. Successful participation in this Incubator project will quickly move companies into commercial production and position those companies to be competitive for the next TPP funding opportunity, which is expected to be issued in the 2010 timeframe.

Technology Improvement Opportunities (Critical Success Factors)

To achieve this objective, Responders will be expected to focus their efforts funded with Incubator subcontracts to a limited number of high impact module technical improvement opportunities that lie on the critical path to scaling-up their technology to full manufacture.

Table 4-1. Example List of PV System TIOs and Associated Metrics

TIOs		Metrics			
TIER 1 TIOs	TIER 2 TIOs	Performance Efficiency	Cost	O&M	Reliability
Modules	Module				
	Absorber				
	Cells and Contacts				
	Interconnects				
	Packaging				
	Manufacturing				
Inverter & BOS	Inverter				
	Inverter Software				
	Inverter Components/Design				
	Inverter Packaging/Manufacturing				
	Inverter Integration				
	Other BOS				
Systems Engineering & Integration	System Engr. & Integration				
	System Manufacturing/Assembly				
	Installation & Maintenance				
Deployment Facilitation					

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For reference and context, SETP has identified four primary Technical Improvement Opportunities (TIOs) related to a PV system for its own planning purposes. Each of these TIOs has a longer list of subcategories upon which research efforts can be focused and prioritized. Table 4.1 shows this list of TIOs, associated metrics, and analytical results of how these TIOs and metrics affect overall system LCOE for a residential system as determined by the SETP based on specific reference system configurations. The focus of project responses submitted to this LOI should be on the Tier 1 MODULE Technology Improvement Opportunity.

Shading in the table indicates example assessments of impacts on each metric. Red is high, yellow is medium, no shading is low. To the extent feasible, Responders will be expected to perform their own Tier 2 Technology Improvement Opportunity (TIO) analysis for technologies to be developed in their SAI PV Technology Incubator projects. It is acceptable for a Responder to modify the example TIO structure or develop a new structure if the example given does not allow for an adequate functional decomposition of the Responder's technology. The NREL Source Evaluation Team will then use the analysis data provided by Responders in evaluating responses. Ultimately, data presented that represents a Responder's baseline technology (starting point of the subcontract) will be used to assess future progress. The Solar Advisor Model (SAM), which was developed and utilized by the DOE/NREL/Sandia team to conduct the TIO sensitivity studies on overall systems that resulted in the shading in Table 4-1, is available for those wanting to evaluate the impact of their proposed component improvements on a system (http://www1.eere.energy.gov/solar/solar_america/analytical_tools.html). The use of SAM, however, is not required for a Responder's LOI to be accepted and evaluated. No matter the

methodology, Responders must fully articulate, in a quantitative fashion, which Tier 2 TIOs will be addressed and what the impact is of the proposed improvements.

While it is expected that Responders will focus on Tier 2 (or lower) level TIOs for a single component of the MODULE Tier 1 TIO, consideration and evaluation of how that component's characteristics impact overall system performance should be undertaken. As noted above, the use of SAM or an equivalent full systems analysis is not required, but this approach can be useful to illustrate how the proposed component improvements will impact overall systems performance and position the Responder to address 2015 SAI targets.

Key Performance Parameters

As shown in Table 4-2 below, SETP has defined a set of Key Performance Parameters (KPPs) as a means of tracking progress for individual subcontracts and the overall program. In addition to these KPPs, Responders will be expected to establish appropriate additional metrics to track progress toward Project objectives. Explicit relationships between TIOs, their projected improvements, and the relevant KPPs must be included in the response. Responders should clearly articulate which of the TIOs is being addressed, quantitatively baseline the current status of that TIO, detail the improvements to that TIO that will be undertaken, and assess how those improvements will impact relevant KPPs. Manufacturing capacity and cost per watt (efficiency and cost per area to produce) are expected to be the most relevant KPPs for these projects. Reliability (Mean Time Between Failure - MTBF) should also be an important factor in any technology development plan.

Table 4.2. Key Performance Parameters

Metric	Units	Comments
Levelized Cost of Energy (LCOE)	$/kWh	Principle metric that measures degree of competitiveness with conventionally produced electricity
Annual manufacturing capacity	MW/yr	MW of annual subsystem and/or component manufacturing capacity in a given year at the target LCOE cost level. Like LCOE, this is a driving metric for SAI.
Direct manufacturing cost	$/Wp	This is the direct manufacturing cost of a subsystem and/or component that includes materials, labor, equipment depreciation, facilities costs, etc.
PVcomponent performance factor(s)	Unit To Be Determined by Responder	This performance factor(s) should be selected by the TPP to represent the driving contribution to system-level performance that will be provided by the subsystem and/or component they are improving. For example, a module development project might select the "nameplate" rated power output for the module (Wp_{dc}). This factor can be calculated on a daily or annual basis, but daily calculations must be averaged over an operating year. This metric is based on performance only, and does not take into account cost or lifetime issues.
Mean Time Between Failure (MTBF)	Time (hrs)	Expressed as the "average" time between failures for a subsystem and/or component – i.e. the reciprocal of the failure rate in the special case when failure rate is constant.

Stage Gate Management

It is also the objective of the SAI PV Technology Incubator project to continuously monitor and optimize its investment portfolio. To that end, ***the SAI PV Technology Incubator requires the use of a Stage-Gate Management approach in the subcontracted projects***. This requirement will serve to assure rigorous project management and support NREL's continuous assessment of its investment in the SAI PV Technology Incubator.

To incorporate Stage-Gate management into proposed projects, Responders should define technology development stages that are separated by "Stage Gates." Stage Gates should be designated in terms of specific technical/business commitments or deliverables that will be assessed at the Stage Gate Reviews. Stage Gates should be defined in terms of very specific and quantitative metrics that, when achieved, represent the addressing of critical success factors along the technology development pathway. Conversely, not meeting Stage Gate targets along the critical path would trigger an assessment of continued viability of the project and a decision to redirect, recycle, or terminate the effort. In requiring the use of Stage Gate Management, NREL does not wish to overly constrain the logical development of new products or processes. Applicants are therefore encouraged to tailor the Stage Gate guidelines as needed in the formulation of their Technical/Project Plan. Each Responder should be prepared to complete the table shown on the next page (Table 4-3). A minimum of one Stage Gate review at the nine-month point of the project will be required. While at least one formal Stage Gate is required for project monitoring and management by NREL, it is expected that a given project will have a number of other, less formal, internal decision points that will be used to guide the subcontractors' technology through the development process. If the nine-month Stage Gate has not been met, NREL will not authorize the second nine-month period of performance (see exit requirement, Section 3 - Background).

Table 4-3 Stage Gate Review Planning Sheet

STAGE GATE REVIEW PLANNING SHEET					
Incubator Company:					
PI:			**Ph:**	**E-mail:**	
Gate #	**Planned Review Date**	**Criteria** (**S**pecific, **M**easurable, **A**chievable, **R**elevant, **T**imely)	**Deliverable**	**Deliverable Date**	**How will achieving criteria be demonstrated?**
1	9-months from project start	10%, 0.5 sq meter pre-production prototype modules	4 pre-production modules for test	8 months after start	Test results from T&E team
		Manufacturing line design with equipment ordered	Design Report	6 months after start	Report will document design and analysis of cost
		Module packaging design and prototype encapsulated pre-production models	4 pre-production encapsulated modules	5 months after start	Damp heat test
		Report on direct manufacturing cost at scale-up with substantiating equipment acquisition cost and process step times	Report	8 months after start	Report and substantiating documentation evaluated to assess direct mfg cost target achievement

5. Scope of Interest

NREL is soliciting LOIs from individual U.S. small businesses- and/or U.S. small-business-led teams working in research and development on PV cell and module prototypes with demonstrated functionality in either large-area coupon form or, preferably, prototypes produced in pilot-scale operations. The emphasis will be on overcoming the barriers to manufacturing scale-up and 2010 commercialization.

Topic Areas include, but not limited to:

- Novel wafer-based silicon modules
- Polycrystalline thin films
- Film silicon on a foreign substrate
- High-efficiency cells, including multijunction, and CPV module concepts
- Organic PV, dye-sensitized solar cells, or other polymer-based solar cells
- Low-X concentration CPV systems with limited or 1-axis tracking module designs
- Low-X Si modules, 3-10X

The entrance criterion for this LOI is the demonstration of coupon-scale PV cells or process lab devices or modules. The successful exit criterion would be for prototype modules and pilot production demonstration > 3MW/year.

6. Qualification Requirements

- All efforts funded under this project shall be performed by a United States (U.S.) company in the United States or its territories. A U.S. company is defined as a business incorporated or formed as a legal entity in the U.S.

- This Solicitation will accept Responses from U.S. small businesses only (See Section 16 – NAICS Code and Small Business Size Standard). U.S. small businesses submitting an LOI in response to this Solicitation are referred to herein as Responders.

- Responders to the LOI may propose and lead a team subject to the following restrictions:
  - The Responder will be NREL's point of contact;
  - The Responder will execute the subcontract with NREL and be responsible for all subcontracted obligations and activities (including lower-tiers);
  - U.S. small businesses, U.S. large businesses, U.S. non-profit entities, and U.S. educational institutions are eligible to be lower-tier subcontractors to the Responder;
  - U.S. small businesses, U.S. large businesses, U.S. non-profit entities, and U.S. educational institutions are eligible to be lower-tier subcontractors on more than one response to this LOI;
  - U.S small businesses can be a Responder on only one (1) response to this LOI;
  - Lower-tier funding to U.S. large businesses is limited to no more than 20% of the total subcontracted amount;
  - Federally Funded Research and Development Centers (FFRDCs) are not eligible for funding under this Solicitation and therefore cannot be lower-tier subcontractors.

- The Response must contain at least 20% price participation on behalf of the Responder/Team, relative to the entire project price. This requirement is applied to the entire project price, not each team member's price independently.

- Any proposed funding amount exceeding the maximum funding level, as defined in Section 7, will be considered part of the Responders Price Participation.

- All activities shall be conducted in a safe and environmentally responsible manner. The improvement of operations to further reduce waste streams and conduct operations in a safe work environment may be elements in the proposed work effort.

- The Response must clearly address the Objectives detailed in Section 4 of this Solicitation.

- The Response must strictly adhere to the LOI Preparation Information contained in Section 13 of this Solicitation.

7. Potential Subcontract Award and Available Project Funding

It is the intent of NREL to award a total of 6 to 10 firm fixed price (w/price participation) subcontracts under this Solicitation. The actual number of awards may vary based on the LOIs received and the availability of funds. NREL reserves the right to make any number of awards or to make no awards under this Solicitation. It is anticipated that funding available for each individual award under this Solicitation will not exceed $2 million for the anticipated 18 month duration of the work effort.

This Solicitation for LOIs is for R&D to result in a demonstration of prototype modules and pilot production. It is not intended to fund the acquisition of production line equipment. **Therefore, there are no capital equipment funds available under this Solicitation.** Capital equipment is defined as equipment with a unit value of $50,000 or more, including applicable shipping and installation charges, and having a life expectancy of two years or more. Responders are further advised that all equipment (personal property) purchases must be acquired through funds contributed to the project by the Responder and by funds contributed by the Responder's lower-tier subcontractors or suppliers at no cost to NREL.

A *minimum* of 20% price participation is required for an award. Price participation is defined as a percentage of the total allowable and allocable costs under the subcontract, which may be met by contributions by the Subcontractor and by contributions from the Subcontractor's lower-tier subcontractors or suppliers at no cost to NREL. All costs must be allowable and allocable under the terms of the Federal Acquisition Regulations and DOE Acquisition Regulations.

8. Competitive Solicitation for Letters of Interest using Best Value Selection

This Solicitation shall be conducted using Best Value Selection that results in the selection of LOIs for potential subcontract award that is most advantageous to NREL based on the best value combination of (a) evaluated qualitative merit and (b) evaluated price of the LOIs submitted.

Best Value Selection is based on the premise that, if all LOIs are of approximately equal qualitative merit, award will be made to the LOIs with the lowest evaluated price. However, NREL will consider selecting an LOI with a higher evaluated price if the offer demonstrates the difference in price is commensurate with the higher qualitative merit. Conversely, NREL will consider selecting an LOI with a lower evaluated qualitative merit if the price differential between it and other LOIs warrant doing so.

9. Qualitative Merit Criteria for Best Value Selection

The scope of interest (see Section 5) and the qualification requirements (see Section 6) in this Solicitation serve as NREL's baseline requirements that must be met by each letter of interest.

The qualitative merit criteria (see 9.1 – 9.3 below) establish what NREL considers the technical factors valuable in an LOI. These qualitative merit criteria are performance-based and permit selection of the LOIs that provides higher qualitative merit for a reasonable, marginal increase in price.

The following qualitative merit criteria will be used by evaluators to determine the technical value of the offer in meeting the objectives of the Solicitation.

Each qualitative merit criteria and its assigned weight are provided below.

9.1. Quality and Relevance of the Proposed Technical Plan (50%)

- Clarity with which TIO(s) to be addressed are articulated.
- Degree to which current technology is quantitatively baselined for the TIO(s) to be addressed.
- Degree to which details of the R&D paths for the proposed TIO(s) are articulated.
- Degree to which improvements to that TIO are linked to impacts on relevant KPPs.
- Extent of technical innovation with regard to price or performance.
- Degree to which detailed technical activities, organization assignments, key milestones and deliverables, and stage-gate commitments within a TIO-based work breakdown structure are articulated.
- Degree to which the technical approach is clearly stated, achievable and technically feasible. Technical viability of the Responder's manufacturing scale-up plan.
- Suitability of the Responder's proposed prototype advances for 2010 manufacturing scale-up and commercialization.
- Adequacy, value and reasonableness of the schedule and quality of the plan in addressing barriers and risks, critical success factors, and approaches to overcoming identified barriers and risks, including proposed deliverables, stage-gates, performance metrics, decision points, etc. Failure to identify specific barriers and risks is considered a greater deficit than an uncertain plan for overcoming them.

9.2. Technical Capability of the Responder/Team (25%)

- Adequacy of the proposed Responder (as defined in Section 6), infrastructure and resources to achieve the project objectives (including proposed lower-tiers).
- Perceived value of the capabilities, experience, qualifications, and credentials of Responder along with demonstrated performance on previous government-funded R&D projects. This includes the perceived value of previously-demonstrated PV innovations by the Responder and participating lower-tiers.
- Experience and record of success of the Responder – both generally and on specific previous DOE/NREL subcontracts.
- Degree of complimentary skills and experiences of the lower-tiers, if a team is proposed, leading to a team that is more capable of addressing the objectives and goals than any one of the team members individually.

9.3. Quality and Relevance of the Proposed Business Strategy (25%)

- Adequacy of quality assurance and quality control measures proposed.
- Financial viability of the manufacturing scale-up plan.
- Likelihood that the long-range business strategy will be successful.
- Degree to which business risks and assumptions are identified and accurately assessed.
- Degree to which the business strategy demonstrates sufficient commitment, capabilities, and resources to achieve the manufacturing and business targets.

10. Price Evaluation for Best Value Selection

The combined qualitative merit value will be considered substantially more important than the price.

11. Additional Factors for Evaluation

In addition to the qualitative merit criteria above, each LOI will be evaluated against other programmatic factors to determine the competitive range and final negotiation rank order. Programmatic factors will include funding, number of Responders in the competitive range, degree of university involvement, and the short/long-term goals of the project. These factors are not weighted.

12. Evaluation Process

NREL will evaluate LOIs in two general steps:

Step One-Initial Evaluation
An initial evaluation will be performed to determine if all required information has been provided for an acceptable LOI. Responders may be contacted only for clarification purposes during the initial evaluation. Responders shall be notified if their LOI is determined not acceptable and the reasons for rejection will be provided. Unacceptable LOIs will be excluded from further consideration.

Step Two-Discussion and Selection
All acceptable LOIs will be evaluated against the scope of interest and the qualification requirements; the qualitative merit criteria, additional factors, and price evaluation listed above. Responders selected through the best value selection process will be contacted with the intent to negotiate an acceptable Statement of Work, based on the Responder's LOI. Subsequently, NREL will issue a Request for Proposal for a technical and price proposal based on this developed Statement of Work.

13. LOI preparation LOIs should be arranged in the following order. The total response should not exceed 21 pages (excluding the Representations and Certifications). An LOI response exceeding the 21 page limitation that does not provide an obvious benefit to NREL or the DOE may be rejected as unacceptable.

13.1 Title Page – 1page maximum

The LOI must include a title page, which should incorporate the Request for LOI title and number, name of your organization and principal investigator (with postal address, telephone and fax numbers, and email address). The title should be succinct and capture the essence of the Responder's LOI.

13.2 Statement of Work – 14 pages maximum

The proposed Statement of Work should form the bulk of the response to the LOI and should contain the major portion of the technical work effort. It should include the technical discussion of approaches and should be presented in sufficient detail to permit a comprehensive evaluation. It should also contain, as a minimum, the following sections:

I. Background

At its highest level, this background section should be a summary of the proposed project and how it relates and responds to the PV Technology Incubator solicitation's objectives.

Specifically, this section should discuss the history and successes of the Responder's technology and product development, as well as its current status. The Responder should identify the target market(s) into which

products developed under this incubator project could be commercialized. This discussion should then logically link the technical requirements for products servicing the target market(s). A demonstrated understanding of these linkages is critical to the identification and articulation of which technical issues must be addressed to ensure success in the target markets. The discussion of the target markets should include a review of the market(s)' historical trends, as well as that market(s)' growth projections and how the Responder's product will have the competitive advantage needed to secure the market share required to substantiate scale-up. Responders should be as quantitative as possible in this discussion.

Responders also must discuss their current technology status within the context of the relevant KPPs introduced in Section 4 above. An overview should be included that links the technical requirements of the target markets, the issues that must be addressed for the Responder's technology to meet those requirements, impacts on KPPs, and how addressing those issues fits into the Incubator Project objectives.

II. Objectives

This section should be a specific and detailed statement of the Responder's technology development pathway included in the project over its 18 month duration.

This section should contain a high-level narrative discussion introducing the R&D approach that will be pursued under this effort. The discussion should explicitly identify critical success factors the R&D is designed to address to meet the proposed project objectives and the SETP goals and objectives. While attention should be given to the 2010 commercialization-plan, Responders should also discuss the potential risks associated with the R&D and manufacturing approach.

This section should include a table based on the Key Performance Parameters (KPP's) table provided in Table 4.2 of this LOI. The Responder should state specific values that the project will achieve for each of the KPPs at the completion of the 18-month duration of the project.

This section should include a Stage-Gate Review Sheet, which is defined in terms of quantitative metrics (See Table 4.3). A minimum of one Stage-Gate review at the 9-month point of the project will be required.

As noted in Section 4, Responders are required to either adopt or modify the sample TIO structure, or, develop a new one as appropriate to establish the needed context to discuss the improvements to be addressed in this effort. The TIO structure should be viewed as a functional decomposition of the Responder's technology.

Within the Responder's established TIO framework, a Responder will identify which of the TIOs lie on the critical path to scaling up its technology. The Responder will then quantitatively baseline the current status of the critical path TIOs and clearly and quantitatively articulate the improvements needed to ready the technology for manufacture and market. Metrics to be addressed include performance, cost, and reliability. These improvements, in turn, should be linked directly to their impact on the Responder's critical success factors as well as their impact on the relevant KPPs.

As needed, context should also be included for how addressing the proposed improvements fits into or complements critical R&D activities taking place outside the scope this proposed project.

III. Scope of Work – Technical/Project Plan

The technical/project plan should be presented in two parts. It is critical that the specific activities identified in this section are clearly linked to their impact on the identified TIOs and KPPs.

The first portion of the plan should contain a detailed description and task delineation of the specific R&D activities to be conducted over the proposed 18-month project. This portion of the plan should be articulated in the TIO context provided in Section 4 and should clearly address the critical success factors identified above, the technical approaches planned to address the critical success factors, the barriers and risks expected, and the approaches for overcoming those barriers and risks. Such detailed information is the heart of the Response and the main information by which it will be evaluated. For example, failing to identify specific barriers and risks will be considered a greater deficit than an uncertain plan for overcoming them. Similarly, either overly conservative or unrealistic milestones will be considered serious deficits. Multiple pathways early in the effort will be considered important for risk reduction.

This section of the plan should begin with a narrative task-by-task description of the work to be conducted for addressing the TIOs necessary to meet project goals. The task descriptions shall explicitly identify the TIO(s) being addressed as well as whether the task is addressing one or more of the identified critical success factors. Task descriptions should also consist of a distinctive title, a concise statement of the objectives, focus and goals of that task, as well as the proposed subtask activities that make up that task effort. Subtask narratives contained within task description should similarly describe the focus, approach, and goals of each subtask as they relate to reaching the goals of their specific task. Each of the task narratives should also contain a description of the expected results of that task.

The second element of the plan is a Microsoft Project (or equivalent) Gantt chart that includes all project tasks identified above and provides the following information:

- Temporal depiction of task execution and completion
- Team member(s) responsible for the task
- Resources necessary for the task
- Task interdependencies
- Critical path identification
- Key decision points

In addition to these task-specific entries, the Gantt chart should also include the following.

- Reporting schedule
- Review schedule
- Key technical milestones
- Stage-gate-level milestones
- Deliverables (including hardware and other deliverables)
- Deliverables for regular progress assessments
- Specific deliverables associated with stage-gates and key technical milestones
- Schedule for testing and evaluation plan for independent validation of progress and for stage-gate evaluation (see below)

Note that the following reporting and review requirements should be planned and budgeted:

- Quarterly Technical Progress Reports written in a short letter format, not to exceed six pages in length, with emphasis placed on the status rather than a description of the progress; to be followed one (1) week later (via teleconference) by a detailed progress assessment based on milestones and deliverables to date.

IV. Project Plan

This section should consist of a schedule for each task and subtask activity, as well as a proposed reporting schedule, review schedule, key technical decision point milestones and deliverables. It should consist of proposed key technical milestones sufficient for regular progress assessment of each task and subtask with relation to the nine-month stage gate and the overall goals of the proposed project. It should also contain quantifiable deliverables to verify that each internal decision point milestone has been met. It should also contain a table of the Gantt Chart internal decision point milestones as well as a list of the deliverables associated with the review of progress under each task. The list of the deliverables will also contain the proposed cost associated with it. **The following are examples:**

Example of Task Plan and Milestones

\ Month Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Task 1	Δ	.....	■	.....	.....	.....	.....	.....	■									
Task 2	Δ	.....	.....	.....	■	.....	.....	.....	■	.....	.....	.....	.....	.....	.....	.....	.....	■
Task 3									Δ	.....	.....	.....	.....	■	.....	.....	.....	■
Task 4									Δ	.....	.....	.....	.....	.....	.....	.....	.....	■
Quarterly Review			▲			▲						▲			▲			▲
Stage Gate Review									✻									
Final Review																		♦

✻ 9-Month Stage Gate Review

■ Decision Point Milestone

▲ Quarterly Review of Milestone and Deliverable Status

Example of Deliverable Schedule

Deliverable	Due Date	% of Subcontract Price
*Task 1, D-1	3rd Month	9% of subcontract
*Task 1, D-2	9th Month	12% of subcontract
*Task 2, D-1	5th Month	14% of subcontract
*Task 2, D-2	9th Month	10% of subcontract
*Task 2, D-3	18th Month	8% of subcontract
*Task 3, D-1	14th Month	11% of subcontract
*Task 3, D-2	18th Month	15% of subcontract
*Task 4, D-1	18th Month	12% of subcontract
**Quarterly Review	3rd Month	1% of subcontract
**Quarterly Review	6th Month	1% of subcontract
**Stage Gate Review	9th Month	3% of subcontract
**Quarterly Review	12th Month	1% of subcontract
**Quarterly Review	15th Month	1% of subcontract
**Final Review	18th Month	2% of subcontract

*Price allocated to % of work effort associated with this deliverable.

**Total of these deliverables must not exceed 10% of the total subcontract price.

13.3 Business Strategy – 3 pages maximum

The business strategy should articulate how the Responder intends to leverage the advances made under this effort into manufacturing scale-up and the capture of the market share required to finance the scale-up. Resources to capitalize manufacturing expansion will also be addressed. The business strategy should be in sufficient detail to establish that the Responder's management supports and contributes to the advancement of the technology and has a realistic vision of progress through 2015 and beyond. Additionally, the business strategy should show that the Responder has, or intends to establish, guidance from potential customers of the product, system, or component to assure success. It should also establish that the Responder will conduct its operations in an environmentally safe manner.

13.4 References and Bibliography – 2 pages maximum

Relevant references may be cited, but do not include copies of reference articles in the submission.

13.5. Resumes – 2 pages maximum

Abbreviated resumes should be supplied for at least one or two key personnel (Submitted resumes shall not include Social Security Numbers).

13.6 List of Contracts – 1 page maximum

A list and brief description of selected Government contracts and/or NREL subcontracts awarded to the Responder in the past five (5) years, to include the contracting agency's name, the contract or subcontract amount, and a brief description of the project.

13.7. A completed Price Summary Sheet (Attachment A) – 1 page maximum

The price summary shall include all categories of the proposed price and include totals for each 9-month phase, as well as the total 18-month effort (see "Letter of Interest Price Summary Sheet" – Attachment A). The proposed price and delivery terms must be valid for 180 days from the date of your LOI response.

13.8. Representations and Certifications

A completed "Representations and Certifications" form with original signatures. (http://www.nrel.gov/contracts/related_docs.html).

(A Responder shall not provide a Social Security Number (SSN) or an Employer Identification Number (EIN) as requested under Section IV(D) of the Representations and Certifications form. If awarded a Subcontract under this Solicitation, and Internal Revenue Service (IRS) Form W-9 will be provided to the successful Responder to be completed and returned to NREL.)

13.9 Formatting Instructions

Formatting instructions are as follows:

- A page is defined as one side of an 8 ½" x 11" sheet of paper.
- Use 12-point font.
- Maintain at least 1-inch margins on all sides.
- Copies may be either single or double sided, but should be double-sided where practical.

Each LOI submission must contain an **original and 8 copies** directed toward meeting the requirements of the Solicitation. You should provide only the minimum amount of information required for proper evaluation. Keep your LOI as brief as possible, and concentrate on substantive information.

Please note that this Solicitation does not allow the submittal of facsimile or electronic proposals. Also, this Solicitation does not commit NREL to pay costs incurred in the preparation and submission of a response to this request for LOI.

14. Solicitation Provisions—full text provided

a. Late submissions, modifications, and withdrawals of LOIs

LOIs, or modifications to them, received from qualified organizations after the latest date specified for receipt may be considered if received prior to selection, and NREL determines that there is a potential budget, technical, or other advantage, as compared to the other LOIs received. However, depending on the circumstances surrounding the late submission or modification, NREL may consider a late LOI to be an indication of the respondent's performance capabilities, resulting in downgrading of the LOI in the technical evaluation process. LOI may be withdrawn by written notice received at any time before selection. LOIs may be withdrawn in person by a Responder or an authorized representative, if the representative's identity is made known and the representative signs a receipt for the LOI before selection.

b. Restrictions on disclosure and use of data

Responders who include in their LOIs data that they do not want disclosed to the public for any purpose or used by the government or NREL, except for evaluation purposes shall—

1. Mark the title page with the following legend:
   "This LOI includes data that shall not be disclosed outside the government or NREL and shall not be used or disclosed—in whole or in part—for any purpose other than to evaluate this LOI. If, however, a subcontract is awarded to this Responder as a result of—or in

connection with—the submission of this data, the government or NREL shall have the right to use or disclose the data to the extent provided in the resulting subcontract. This restriction does not limit the government or NREL's right to use information contained in this data if obtained from another source without restriction. The data subject to this restriction are contained on pages [insert page and line numbers or other identification of pages] of this LOI"; and

2. Mark each page of data it wishes to restrict with the following legend: "Use or disclosure of data contained on this page is subject to the restriction on the title page of this LOI."

c. Reserved

d. Disclaimer

NEITHER THE UNITED STATES; NOR THE DEPARTMENT OF ENERGY; NOR MIDWEST RESEARCH INSTITUTE, NATIONAL RENEWABLE ENERGY LABORATORY DIVISION; NOR ANY OF THEIR CONTRACTORS, SUBCONTRACTORS, OR THEIR EMPLOYEES MAKE ANY WARRANTY, EXPRESS OR IMPLIED, OR ASSUME ANY LEGAL LIABILITY OR RESPONSIBILITY FOR THE ACCURACY, COMPLETENESS, OR USEFULNESS FOR ANY PURPOSE OF ANY OF THE TECHNICAL INFORMATION OR DATA ATTACHED OR OTHERWISE PROVIDED HEREIN AS REFERENCE MATERIAL.

e. Solicitation Disputes

The General Accountability Office and the Department of Energy do not accept or rule on disputes for solicitations for Letters of Interest issued by Management and Operating Contractors for the Department of Energy (operators of Department of Energy National Laboratories). Should a Responder have any concerns regarding the NREL solicitation process or selection determination, the offeror may contact Marty Noland, Advocate for Commercial Practices, at (303) 384-7550. NREL will address each concern received from a Responder on an individual basis.

15. Solicitation Provisions—incorporated by reference—general access

This Solicitation incorporates one or more solicitation provisions by reference with the same force and effect as if they were given in full text. The following documents can be downloaded from the NREL **general access** website at http://www.nrel.gov/business_opportunities/related_docs.html or the NREL LOI Contact (see Section 2) will make full text available upon request.

- NREL Representations and Certifications for Subcontracts (01/30/07)

16. NAICS Code and Small Business Size Standard

a. The North American Industry Classification System (NAICS) code for this Solicitation is 54171.

b. The small business size standard for 54171 is 500 or fewer employees.

ATTACHMENT A

Letters of Interest (LOI) Price Summary Sheet for LOI No. RAT-7-77015 – [COMPANY NAME]

Description	Phase I 9 Months	Phase II 9 Months	18-Month Total
A. Direct Materials ($)			
B. Direct Labor ($)			
C. Labor Overhead & Fringe ($) (Specify Rates)			
D. Special Testing ($)			
E. Equipment +			
F. Travel ($)			
G. Consultant(s) ($)			
H. Lower-tier Subcontractor(s) ($)			
I. Other Direct Costs ($) (e.g., Publications, etc.)			
J. G&A ($) (Specify rate)			
K. **TOTAL PRICE ($)**			
L. Responder's Price Participation			
M. NREL's Price Participation			

+ Capital Equipment Funds are not available for this Solicitation. All equipment must be included in Respondent's Price Participation