

3. Background

The U.S. Department of Energy (DOE) is focused on reducing 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 (PV) systems. The PV Technology Incubator project represents a significant enhancement of DOE’s business strategy of partnering with U.S. industry to accelerate commercialization of photovoltaic system R&D to meet aggressive cost and installed capacity goals.

The PV Technology Incubator will support accelerated commercialization of solar photovoltaic 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 DOE’s 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 3-1, below).
- Expand the U.S.-installed domestic capacity of PV systems to 5-10 gigawatts (GW).

Table 3-1. 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

¹Costs are based on constant 2005 dollars.

²Current costs are based on electric-generation with conventional sources.

³Cost to customer (customer side of meter)

⁴Cost 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 the SETP are shown in Table 3-1 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 the SETP being cost parity with grid-generated electricity, these targets will be revised over time as new information warrants.

Further goals for the SETP relate 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 overall objective of 5-10 GW.

For the purpose of this Letter of Interest (LOI), Responders will be required to directly address Technical Improvement Opportunities (TIO) and Key Performance Parameters (KPP), as defined

in Section 4 - Objectives, with the goal of commercialization by 2012. It is expected that the proposed innovative technology and projected KPP's provide a pathway towards meeting or exceeding the 2015 SETP goals.

The 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.

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 to 10MW, while much larger systems are currently under development. Designs include both fixed and tracking configurations.

PV Technology Incubator Scope

The PV Technology Incubator provides significant opportunities for collaboration and partnership among industry and university researchers to develop and improve solar energy technologies. This "PV Technology Incubator" is targeted at innovative research and development on PV cell and module prototypes with demonstrated functionality in either large-area cell/module 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 2012 commercialization.

Companies that do not currently have a commercial product for grid-tied markets are eligible responders to this LOI. It is also anticipated that some companies previously funded under the Incubator Project may be eligible (see Item 6 – Qualification Requirements). Additionally, companies that have a gen2 product which is still in the incubation phase, and is substantially differentiated from their current commercial technology, could have merit for DOE funding under this solicitation.

Advances are needed to achieve prototype modules and pilot production, which will be facilitated through projects funded under subcontracts awarded under this LOI. It is expected that the subcontract duration will be for 18 months for each award made under this Solicitation. Entrance opportunities for the Incubator project are anticipated every 12 months through future LOI Solicitations. The Entrance Criterion is demonstrated laboratory PV

process technology (feedstock, wafers, cells or modules). A successful demonstration for the entrance criterion is a quantifiable and verifiable baseline measurement. The successful Exit Criterion would be technology manufactured on a pilot production line capable of >2MW/year annual manufacturing capacity. These entry and exit criteria are provided to applicants as general guidelines for maturity of technology that DOE/NREL 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 ~2MW/year pilot production at the completion of their “Incubator” project. Other funding opportunities, such as the Next-Gen and the Pre-Incubator Projects, are available for companies if they do not meet the entrance and exit criteria stated here. The PV Technology Pre-Incubator project is positioned to take innovative technologies, with the potential for disruptive improvement in solar energy conversion, that are currently at the concept or concept validation stage of technology development and accelerate the transition to a commercially viable prototype.

4. Objectives

The primary objective of this PV Technology Incubator project is to shorten the timeline for companies to transition innovative 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 Technology Pathway Partnership awards. Successful participation in this Incubator project will quickly move companies into commercial production and position those companies to be competitive for the next funding opportunity.

Technology Improvement Opportunities

To achieve this objective, Responders are expected to focus their efforts to a limited number of high impact module TIOs that lay on the critical path to scaling-up their technology to full manufacture.

For reference and context, SETP has identified four primary TIOs related to a PV system. Each of these TIOs has a longer list of subcategories (e.g. Tier 2 TIOs) upon which research efforts can be focused and prioritized. Table 4-1 shows this list of TIOs. The focus of responses submitted to this LOI shall 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 are expected to perform their own Tier 2 TIO analysis for technologies to be developed in their PV Technology Incubator projects. It is acceptable for a Responder to modify the example Tier 2 TIO structure or develop a new Tier 2 TIO structure if the example given does not allow for an adequate functional decomposition of the Responder’s technology.

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. The use of SAM, however, is not required for a Responder’s LOI to be accepted and evaluated. Further information on SAM and how to download it may be found at: <https://www.nrel.gov/analysis/sam/>

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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Key Performance Parameters

The SETP has defined a set of KPPs as a means of tracking progress for individual subcontracts and the overall program (Table 4-2). In addition to these KPPs, Responders may 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. 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. ***Responders must clearly articulate which of the TIOs is being addressed, quantitatively baseline the current status of that TIO, detail improvements to that TIO that will be undertaken, and assess how those improvements will impact relevant KPPs. Responder’s quantitative baseline of the laboratory device/cell or module should be provided in terms of measurements and characterization data or other data that can show demonstration of a baseline process to commercialization. A clear example of this would be an I-V curve of the device/cell and/or other quantifiable data.***

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 SETP
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.
PV component 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 ($W_{p_{dc}}$). 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 PV Technology Incubator project to continuously monitor and optimize its investment portfolio. To that end, the 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 PV Technology Incubator. It is anticipated with the Stage-Gate Review that incorporates additional programmatic merit criteria, approximately 25-30% of applicants may not pass into Phase II.

To incorporate Stage-Gate management into proposed projects, Responders must 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 and evaluated by the Technical Evaluation (T&E) Team. Stage Gates should be defined in terms of very specific and quantitative metrics that, when achieved, represent the addressing of TIOs along the technology development pathway. Conversely, not meeting Stage Gate targets and deliverables along the critical path would trigger an assessment of continued viability of the project.

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 below (Table 4-3). A minimum of one Stage Gate review at the nine-month point of the project will be required.*** If the nine-

month Stage Gate has not been met as well as other deliverables requirements, NREL will not authorize the second nine-month period of performance.

Table 4-3. Stage Gate Review Planning Sheet

STAGE GATE REVIEW PLANNING SHEET					
Incubator Company:					
PI:			Ph:	E-mail:	
Gate #	Planned Review Date	Criteria (Specific, Measurable, Achievable, Relevant, Timely)	Deliverable	Deliverable Date	How will achieving criteria be demonstrated?
1	9-months from subcontract execution	10%, 0.5 sq meter pre-production prototype modules	4 pre-production modules for test	8 months after subcontract execution	Test results from T&E team
		Manufacturing line design with equipment ordered	Design Report	6 months after subcontract execution	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 subcontract execution	Damp heat test
		Report on direct manufacturing cost at scale-up with substantiating equipment acquisition cost and process step times	Report	8 months after subcontract execution	Report and substantiating documentation evaluated to assess direct mfg cost target achievement

5. LOI Scope of Interest

NREL is soliciting LOIs from individual U.S. small businesses and/or U.S. small-business-led teams working on innovative research and development of demonstrated PV cell and module prototypes. The emphasis of this LOI is on overcoming the barriers to manufacturing scale-up and 2012 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 multi-junction, 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
- Dye Sensitized Solar Cells

- NanoStructure-based concepts
- Rectenna-based design
- Module/Cell/Wafer Components or Feedstock Manufacturing

6. Qualification Requirements

- The entrance criterion for this LOI is the quantitative demonstration of laboratory PV process technology (feedstock, wafers, cells or modules) that are based on the technology chosen for pilot production.
- 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 Responder shall perform, at a minimum, 80% of the total proposed project work effort.
- 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 Response 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. Funding available for each individual award under this Solicitation will not exceed \$3 million for the anticipated 18-month duration of the work effort (NREL retains the right to continue the work effort beyond this initial period based on Subcontractor performance and evaluation). NREL reserves the right to conduct site visits to responders of this LOI prior to selection. NREL shall further have the option to complete testing/validation of cell/devices or modules for verification purposes during the negotiation process.

It is anticipated that subcontracts awarded under this solicitation will be funded in whole or in part by funds provided under the American Recovery and Reinvestment Act (“Recovery Act”). Further guidance regarding Recovery Act terms and conditions; representations and certifications; and reporting requirements will be provided when available through an amendment to this LOI.

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 price participation to the project by the Responder and by price participation by the Responder’s lower-tier subcontractors or suppliers at no cost to NREL.

The following information is provided for planning purposes only and is not part of the submittal requirements of this LOI.

In the event a Responder is selected for negotiations with the intent of reaching agreement on the award of a subcontract, the successful Responder will be required to provide a detailed list of any equipment items planned to be purchased along with a price for the acquisition of each. The individual price proposed for each item shall be verifiable via vendor quote, price sheet, or other means deemed acceptable by 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. Additionally:

- all costs, both proposed NREL price participation amount and Subcontractor's price participation amount, must be allowable, reasonable, and allocable in accordance with the Federal Acquisition Regulations (FAR) Part 31 and DOE Acquisition Regulations (DEAR) Part 931;
- the Subcontractor's and lower-tier subcontractor's price participation amounts shall not be funded by other Federal contracts and/or grants;
- legal, financial, and management costs in connection with the planning or execution of a corporate structure and raising capital (net worth and long term liabilities) are not allowable (FAR 31.205-27) and should not be included in the proposed direct or indirect costs in either NREL's or the Subcontractor's price participation amount;
- material, labor, and other costs incurred for the manufacture of products intended for resale will not be considered under either NREL's or the Subcontractor's price participation amount; and
- foreign travel is not allowable under either NREL's or the Subcontractor's price participation amount.

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 objective (see Section 4), scope (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%)

- Extent of Technical Innovation.
- Degree to which current technology is quantitatively base-lined for the TIO(s) to be addressed as well as articulated.
- Technical viability of the Responder's manufacturing scale-up plan for 2012 manufacturing scale-up and commercialization.
- Degree to which the technical approach is clearly stated, achievable and technically feasible. Technical viability of the Responder's manufacturing scale-up plan.
- Degree to which improvements to that TIO are linked to impacts on relevant KPPs.
- Degree to which details of the R&D paths for the proposed TIO(s) are articulated and technically feasible.
- Degree to which key milestones, deliverables, and stage-gate commitments within a TIO-based work breakdown structure are articulated.
- 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 (20%)

- Adequacy of the proposed Responder's (as defined in Section 6), infrastructure and resources to achieve the project objectives (including proposed lower-tiers).
- Experience and demonstrated performance of the Responder – both generally and on specific previous DOE/NREL subcontracts.
- Degree of complementary skills and experiences of the lower-tiers, if a team is proposed, resulting in a team that is more capable of addressing the objectives and goals than any one of the team members individually.
- 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.

9.3 Quality and Relevance of the Proposed Business Strategy (30%)

- 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.
- Likelihood that the long-range business strategy will be successful.
- Adequacy of quality assurance and quality control measures proposed.

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 final negotiation rank order. Programmatic factors will include funding; responses received under each topic area as defined under Section 5 of this LOI; degree of university involvement; technology topic area portfolio diversity; 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. NREL reserves the right to conduct site visits to Responders of this LOI prior to selection. 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 Response Preparation

LOI responses should be arranged in the following order. The total response should not exceed 24 pages (excluding the Representations and Certifications). ***An LOI response exceeding the 24-page limitation that does not provide an obvious benefit to NREL or the DOE may be rejected as unacceptable.***

13.1 Title Page – 1 page 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. A quantitative baseline must be provided, for example an I-V curve of the device/cell and/or module. The baseline data will then be the starting point for the development pathway to be detailed.

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 Planning 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 from its baseline. 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 of this proposed project.

III. Scope of Work – Technical/Task Descriptions

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 demonstrating a quantifiable baseline from which to begin the pathway of the 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.

IV. Project Plan

The project plan should include the completed Table 13.1 entitled Task Plan and Milestone Schedule (see below) as well as the following additional information:

- Team member(s) responsible for the stated tasks
- Resources necessary for the task
- Critical path identification
- Key technical decision points including the quantifiable baseline for regular progress assessment.
- Nine-month Stage Gate and overall proposed goals and deliverables.
- Internal Decision point milestones

An additional completed table should be included for Deliverables (see Table 13.2 below entitled “Example Deliverable Schedule”) that are associated with the tasks described in Table 13.1. The table should include due dates and the proposed price associated with each deliverable as well as the following information.

- Stage-Gate-Level Deliverables associated with key technical milestones
- Deliverables (including hardware and other deliverables)
- Deliverables for regular progress assessments (quarterly and final reports)
- Schedule for long-term 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 (6) 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.

Note that the following travel requirements should be planned and budgeted:

- One (1) PV Conference (Domestic location TBD – 1 traveler – 3 days); and
- One (1) DOE Annual Review Meeting (Domestic location TBD – 1 traveler – 2 days).

(No travel to Stage Gate reviews as reviews will be conducted via web conference/conference call. Travel to lower-tier subcontractors shall be negotiated.)

The following are Example Tables for the Task Plan and Milestones as well as the Example Deliverable Schedule.

Table 13.1 Example Task Plan and Milestone Schedule

Task	Month	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 Technical Progress Report				▲			▲						▲			▲			
Stage Gate Review and Technical Progress Report										* ▲									
Draft/Final Technical Progress Reports																			▲▲
Final Review																			◆

- * 9-Month Stage Gate Review
- Decision Point Milestone
- ▲ Quarterly Review of Milestone and Deliverable Status
- ◆ Final Review

Table 13.2 Example 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-3	5th Month	14% of subcontract
* Task 2, D-4	9th Month	10% of subcontract
* Task 2, D-5	18th Month	8% of subcontract
* Task 3, D-6	14th Month	11% of subcontract
* Task 3, D-7	18th Month	15% of subcontract
* Task 4, D-8	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 price 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.

The following information is provided for planning purposes only and is not part of the submittal requirements of this LOI.

Successful Responders will further be required to complete a National Environmental Policy Act (NEPA) Checklist. The checklist must also be submitted within two (2) weeks following receipt of the RFP. The recommended format for the checklist along with preparation instructions can be located on the NREL website at www.nrel.gov/business_opportunities under “Related Documents and Forms”.

Furthermore, the Responder should provide an overview of the business capabilities and plans to have adequate resources available at the time of a potential subcontract award. This summary should identify the type of operations, facilities, equipment, and other resources that are either available and/or planned to support the proposed project. The summary should further identify management expertise commiserate with the proposed level of effort and goals.

The following information is provided for planning purposes only and is not part of the submittal requirements of this LOI.

In the event a Responder is selected for negotiations with the intent of reaching agreement on the award of a subcontract, the successful Responder may be required to demonstrate their financial capability and confirm available funding to support the proposed project, including the successful Responder's proposed price participation.)

13.4 References and Bibliography – 2 pages maximum

Relevant references may be cited, but do not include copies of reference articles in the electronic submission in response to this LOI.

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 Follow-on RFP Process

The following information is provided for planning purposes only and is not part of the submittal requirements of this LOI.

In the event a Responder is selected for negotiations with the intent of reaching agreement on the award of a subcontract:

- *A Request for Proposal (RFP) will be sent to the successful Responder. The RFP will request that a detailed price proposal be submitted with verifiable and substantiating cost and pricing data. The amount of the individual award will be based on an audit of the price proposal, a technical review of the proposed SOW, and negotiations between the NREL Subcontract Administrator and the Responder.*
- *Price proposals and supporting cost/pricing data are required from the successful Responder and each lower-tier subcontractor. The recommended format for the price proposal along with preparation instructions can be located*

on the NREL website at www.nrel.gov/business_opportunities under “Related Documents and Forms”.

- *The proposal submitted during the RFP phase must demonstrate that proposed costs are reasonable, allowable, and allocable in accordance with FAR Part 31 and DEAR Part 931.*
- *Successful Responders must submit adequate price proposals and supporting cost and pricing data within two (2) weeks following receipt of the RFP. Failure to submit the necessary information within the required time period may result in the termination of negotiations.*
- *Successful Responders will further be required to complete a National Environmental Policy Act (NEPA) Checklist. The checklist must also be submitted within two (2) weeks following receipt of the RFP. The recommended format for the checklist along with preparation instructions can be located on the NREL website at www.nrel.gov/business_opportunities under “Related Documents and Forms”*

13.9 Representations and Certifications

A completed “Representations and Certifications” form with original signatures.

www.nrel.gov/business_opportunities/related_docs.html

(A Responder shall not provide a Social Security Number (SSN) or an Employer Identification Number (EIN). 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.)

13.10 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.
- The original hard copy may be either single or double sided, but should be double-sided where practical.

Each LOI response must be submitted in an original hard copy and PDF file sent to the NREL LOI Contact by e-mail. The e-mailed submission must include the LOI Number (RAT-9-99013) and the project title (PV Technology Incubator) in the subject line. The LOI submission must be 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.

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 will not be considered. An 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. Disclaimer

NEITHER THE UNITED STATES; NOR THE DEPARTMENT OF ENERGY; NOR ALLIANCE FOR SUSTAINABLE ENERGY, LLC, MANAGEMENT AND OPERATING CONTRACTOR FOR THE NATIONAL RENEWABLE ENERGY LABORATORY (NREL); 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.

d. 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 (05/10/07)

16. NAICS Code and Small Business Size Standard

- a. The North American Industry Classification System (NAICS) code for this Solicitation is 541712.
- b. The small business size standard for 541712 is 500 employees.

ATTACHMENT A

Letters of Interest (LOI) Price Summary Sheet for LOI No. RAT-9-99013 [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 Responder's Price Participation