

“Solar For All”

# **Changing The Energy Landscape In Developing Countries**

Contest For Innovative Photovoltaic Off-Grid  
Power Supply Systems

## **Guidelines**

Presented by



# Content

<b>1. ABSTRACT</b>	<b>3</b>
THE CHALLENGE	3
THE SOLUTION	3
EVALUATION CRITERIA FOR THE SELECTION PROCESS	4
AWARD	4
WHO CAN APPLY FOR THE “SOLAR FOR ALL” CONTEST?	4
TIMELINE	5
THE JURY	5
CONTACT	5
<b>2. REQUIREMENTS</b>	<b>5</b>
<b>3. DETAILED SPECIFICATION ON TECHNICAL DESIGN OF THE PV SYSTEM AND MARKET APPROACH</b>	<b>7</b>
3.1 TECHNICAL DESIGN OF THE PV SYSTEM	7
3.1.1 <i>Technical design of innovative PV off-grid power supply systems</i>	7
3.1.2 <i>Technical specifications</i>	7
3.1.3 <i>Metering, control and monitoring</i>	8
3.1.4 <i>Other indicators for large-scale production</i>	9
3.1.5 <i>Quality assurance</i>	9
3.2 MARKET APPROACH	9
3.2.1 <i>Market penetration strategy</i>	10
3.2.2 <i>Installation / Maintenance</i>	11
3.2.3 <i>End-user financing</i>	11
3.2.4 <i>Business plan</i>	11
3.2.5 <i>Geographic scalability</i>	12
3.2.6 <i>Other socio-economic impacts</i>	12
<b>4. EVALUATION CRITERIA</b>	<b>13</b>
4.1 PARTICIPANT QUALIFICATIONS	13
4.2 PARTICIPANTS ELIGIBILITY	13
4.3 PROOF OF CAPACITY AND EXPERIENCE	13
4.4 CONFORMANCE OF SYSTEM DESIGN AND MARKET APPROACH	13
<b>6. ANNEX I: RECOMMENDATIONS ON TECHNICAL COMPONENT SPECIFICATIONS</b>	<b>15</b>
6.1 SOLAR PHOTOVOLTAIC MODULES	15
6.2 PHOTOVOLTAIC CHARGE / SYSTEM CONTROLLER	15
6.3 RECHARGEABLE DEEP CYCLE BATTERY	15
6.4 INVERTERS	15

## **Guidelines for the “Solar for All” contest for innovative PV off-grid power supply system solutions together with strategies for market implementation**

The “Solar for All” Initiative invites contestants to submit proposals to participate in a contest to find the most innovative PV power supply system solutions for low income off-grid customers together with strategies for their market implementation.

### **1. Abstract**

Ashoka and the Canopus Foundation, initiators of the ‘Solar for All’ initiative, are launching the “Solar for All” contest to find the most innovative solutions for providing affordable solar photovoltaic systems to low income off-grid households. The competition is open to all participants from across the PV supply chain including manufacturers, PV system integrators, and social entrepreneurs working to provide sustainable and reliable energy to low income end-users without access to the electricity grid.

### **The Challenge**

Presently 1.6 billion people worldwide, mostly in developing countries, live without access to energy. Modern energy fulfils basic needs, but is also a necessary engine for socio-economic development. Electricity advances developmental factors such as small business development, access to appliances (e.g., refrigeration), extended operation and working hours, access to communications, more security, enhanced education levels and rural development. Energy can improve the life of millions.

In many developing countries with limited access to energy, decentralized solar energy provides a sustainable and reliable energy source. Yet, access to energy remains constrained by factors such as limited access to well-adapted affordable technology, fragmented small markets, prohibitive taxes, and limited financial resources. The ‘Solar for All’ initiative wants to meet these technical and financial challenges with a global design contest.

### **The Solution**

The “Solar for All” contest focuses on end-user needs. Applications should demonstrate improvements to the modularity, scalability and replicability of PV systems and advance innovative payment and financing schemes:

1. We are looking for innovative PV off-grid power supply solutions which would be optimal for low-income end-users in developing countries. These may be solar home systems, mini-grids, hybrid solutions or PV systems with special applications. We are open to a broad variety of solutions as long as they produce AC or DC power and are focused on the needs of the end-users. The technical innovation might be a modular system, that is highly adaptable

to local conditions, delivered with an intelligent payment system (e.g. RFID) or an anti-theft measure.

2. We are looking for contributors who in addition to their technical innovation have already developed, or are developing, a strategy for market implementation. This could be a business plan, covering for example: a market penetration strategy, installation and maintenance (e.g. after sales support), end-user financing, as well as the product's potential for geographic scalability or other positive socio-economic impacts such as the involvement of women. Applicants may choose to focus on one or on several of these aspects.

The "Solar for All" Contest focuses on technical solutions but also encourages applications which also address the additional challenges of effective delivery to the end-user as well.

### **Evaluation criteria for the selection process**

In order to carry out the evaluation of the proposals evaluation criteria have been given for each category. The qualification of each item may have three different marks according to general requirements, category and added value.

If you want to discuss whether your work is relevant to the "Solar for All" contest, or have questions about how to fill in the form, then you are welcome to contact us at [contest@canopusfund.org](mailto:contest@canopusfund.org), and one of our team will get in touch with you.

### **Award**

The winner of the 'Solar for All' contest will be awarded a \$250,000 investment by Deutsche Bank Americas Foundation. Three of the finalists will also be recognized for innovations in technology, finance and marketing. Participants in the contest could also be supported by a projected \$100 million solar investment fund. This new fund, to be established by the 'Solar for All' initiative, will invest across the PV solar value chain, including microfinance or other end-user financing schemes that help making the product affordable to the end-user.

### **Who can apply for the "Solar for All" Contest?**

We are looking forward to applications by manufacturers (e.g. PV modules, battery), system integrators, social entrepreneurs, NGOs or universities amongst others. The winning applicants will demonstrate the drive and capability needed to overcome the challenges of bringing their product to the off-grid market in developing countries.

## Timeline

1 December 2009	Announcement of the contest
31 February 2010	Expression of interest (optional)
30 April 2010	End of submission
12 July 2010	Award ceremony

## The Jury

- § Prof. Eicke Weber, Director Fraunhofer Institute for Solar Energy Systems (ISE), Chairman of the jury, Germany
- § Dipal C. Barua, Chairman Bright Future Foundation, Bangladesh
- § Patricio Boyd, Director Emprenda, Argentina
- § David Green, Vice President Ashoka International, USA
- § Gary Hattem, Managing Director Deutsche Bank and President Deutsche Bank Americas Foundation, USA
- § Peter Heller, Director Canopus Foundation, Germany
- § Andreas Kirchschräger, Director elea Foundation, Switzerland
- § Richenda Van Leeuwen, Board member Good Energies Foundation, Switzerland
- § Ms. H el ene Pelosse, Director General IRENA, France
- § Niki Armacost, Director Arc Finance, USA

All the information sent will be seen by the judges and technical assessors. If you become a finalist it may also be shown to Awards funders and to our publicity team, and used in publicity materials. Please make it clear if any information should be restricted to judges only.

## Contact

Canopus Foundation  
E-Mail [contest@canopusfund.org](mailto:contest@canopusfund.org)  
Phone +49 761 2020 172  
Website [www.sfa-pv.org](http://www.sfa-pv.org)

## 2. Requirements

- § Proposals for innovative PV off-grid power supply systems should cover the technical design of the PV off-grid power supply system and set out a market approach (i.e. which off-grid market the product is designed for and a business plan setting out how that product might be rolled out in that target market)

- § Each part comprises compulsory and optional categories (which provide additional value). Each category will be evaluated based on the suggested and expected items.
- § The proposal should follow the “application form” and has to cover all the required criteria.
- § Applications should be submitted in English. Please contact us if submitting a proposal in English presents difficulties for you.
- § The contest proposals must include already-commercialised and established products or at least a promising prototype which has been proven under laboratory conditions. Applications with already-commercialized products should confirm the performance capabilities of the system by providing operational data as well as details of technical applications and demonstration of customer acceptance. If necessary, a technical assessor will contact the applicant to carry out system inspections.

### **3. Detailed specification on technical design of the PV system and market approach**

Please note that general requirements are compulsory, whereas others add value to your application and can rather be seen as suggestions.

#### **3.1 Technical Design of the PV System**

Description of the main categories and items for the technical design for innovative PV off-grid power supply systems:

##### **3.1.1 Technical design of innovative PV off-grid power supply systems**

###### **General requirements**

- § For each proposal only one system design will be accepted;
- § All systems have to be designed to generate and provide electricity. If extra heat/power generation or other by-products are also produced in addition to electricity this is also eligible;
- § The system design proposed has to be based on Photovoltaic solar energy.

###### **Categorisation**

The PV system design:

- § May be combined with other different renewable energy technologies (Wind, Hydro, Biomass, etc.) as hybrid PV system solutions;
- § is able to provide DC and/or AC power;
- § May have a storage system;
- § May have one of the following configurations:
  - § Stand-alone (i.e. solar home systems)
  - § Hybrid PV systems powering stand-alone applications
  - § Hybrid PV systems powering mini-grids
  - § PV systems for special applications, e.g. solar water pumps or others applications

###### **Exclusions**

Systems based on renewable energy solutions which do not include solar PV or proposals not including the compulsory items will not be considered.

###### **Technical specifications**

The description of the system and the technical design have to include the following technical specifications:

**General requirements**

- § Size, dimension and capacity of the system design;
- § Layout and blueprints;
- § Installation, construction and commissioning (e.g. Installation manuals).

**Added value**

- § Product safeties such as anti-theft measures;
- § Special or innovative features of the design;
- § The extent to which the product is adapted for local conditions: e.g. modularity, use of local content for materials or components, installation and operation advantages, etc.;
- § Main performance indicators of the components and the system. They may highlight the advantages of the system design;
- § Training and user information (e.g. User manuals).

**3.1.2 Metering, control and monitoring**

The PV Off-Grid Power Supply System design should include a measurement system that provides values of the relevant input and output variables during the operation of the system. Relevant input/output variables include for example the generation of kWh of the solar module, the battery throughput and the energy consumed by the end users.

The Innovative PV Off-Grid Power Supply System has to include:

**General requirements**

- § Methods/instruments or other concepts that make it possible to generate information about the operation of the system;
- § The scope of the metering, control and monitoring system has to be specified for each system design and may include the following components:

**Added value**

- § Methods and instruments to guarantee the expected electricity service for the end-user (quality assurance);
- § Methods/instruments/system-interfaces that provide information about the electricity supply for the operator (quality assurance);
- § Identification of electricity demand growth;
- § Identification of failures, O&M abnormalities, maintenance & replacement needs and intervals;
- § Communication possibilities/capabilities for cross-border information and data transfer;
- § Innovative concepts for metering and payment (e.g. RFID)
- § A technology platform to facilitate end-user finance.

### **3.1.3 Other indicators for large-scale production**

#### **Added value**

- § Delivery, construction and commissioning time, specified numbers;
- § After sales services, delivery time and effort for replacement and maintenance;
- § Transportation weight, needed space, special requirements for transportation;
- § Maximization of the potential for local sourcing (materials and work force)

### **3.1.4 Quality assurance**

Quality assurance comprises not only the quality of the system design, but also of the installation, commissioning, operation and maintenance, as well as long term after-sales support. Warranties and certified components enable standardisation across the off-grid industry and ensure that the customer is both protected and aware of the service levels that can be expected.

The Proposal should include:

#### **General requirement**

- § Description of components (technical specifications) of the system design;
- § Minimum warranties for products have to be included. Detailed technical system specifications for main components (PV module or other generators, charge controllers, inverters, storage) and others may be submitted with annexes;

The Innovative PV Off-Grid Power Supply System may also include:

#### **Added value**

- § Detailed technical system specifications/certifications for main components (PV module or other generators, charge controllers, inverters, storage);
- § Operation and maintenance services, and after-sales services may be specified;
- § Modularity and flexibility of the systems and their components to meet unpredictable demand;
- § The possibility of upgrading already existing systems with new products;
- § Recommendations for quality conformance.

## **3.2 Market approach**

The proposal should set out the contestant's proposed market approach i.e. setting out a strategy of how the PV system will be produced, installed, maintained and made affordable for low income customers in the target off-grid market.

The market approach section of the Proposal should include discussion of:

1. Market penetration strategy: e.g. which geography? How many systems are expected to be installed? In what time frame?; Description of the marketing approach;
2. Installation and maintenance: e.g. which product packages will be offered, and description of after sales services; discussion of installation capacity/skills needed/staff required;
3. End-user financing: e.g. which consumer financing models will be adopted, the partnerships needed to offer these, and description of any innovative payment collection methods;
4. Business plan: e.g. description of financing requirements and potential sources of finance; provision of cash flow forecasts with underlying assumptions. The information should demonstrate the economic feasibility of the business plan;
5. Geographic scalability: e.g. is the product region-specific or can it easily be adapted and rolled out in other geographies? Is the product adapted for local cultural preferences in any way?
6. Other socio-economic impacts: e.g. how does the product improve living conditions, what quantifiable measurements demonstrate this? Are there any other societal benefits? (e.g. economic empowerment of women, local job creation).

The main categories and items to guide applicants in setting out their market approach for delivering their innovative PV off-grid power supply system are as follows:

### **3.2.1 Market penetration strategy**

The Proposal should set out a market penetration strategy describing overall marketing and sales projections. The recommended information could cover the following:

- § Sales forecast, e.g. number of systems, time frame, number of people served;
- § Marketing campaign, e.g. which channels will be used to market the product? Examples might be education, communication media, through strategic partners such as NGOs etc;
- § Promoters, e.g. number of promoters and the incentives offered to them;
- § Sales network;
- § Branches/regional offices;
- § Staffing requirements, recruiting strategy, incentives offered to staff;
- § Use of any existing distribution channels, such as micro-finance networks.

### **3.2.2 Installation / Maintenance**

The Proposal should set out the contestant's strategy for installing and providing ongoing maintenance for the solar PV system, including:

- § Description of the installation and support package offered to consumers;
- § Organization and Logistics for installation and maintenance;
- § Technical staff needed (including describing recruiting strategy, training compensation);
- § Description of how equipment performance will be monitored.

### **3.2.3 End-user financing**

The Proposal should set out the Contestant's ideas on how to make the solar PV system affordable to the end-user, for example whether through leasing or through partnership with a micro-finance institution to offer a hire-purchase loan. This section of the Proposal should discuss:

- § What would be the basic consumer finance offer (if any) to the end-user? e.g. Cash payment only, rent, or some form of micro-loan? On what terms?
- § Will this financing be delivered in partnership with an MFI or bank, or in-house? How much capital will be needed to support the end-user financing?
- § What are the technical solutions for collecting payment? e.g. RFID
- § What is the depth of poverty outreach, e.g. can multi-tier pricing be employed in order to reach the lowest income households?
- § What would the applicant's policy be in event of Non Repayment of the micro-loan (if applicable)?

### **3.2.4 Business plan**

The Proposal should set out an indicative business plan, covering the following:

- § Cash flow forecasts for next 5 years, setting out the underlying cost and revenue assumptions (e.g. based on price and sales forecasts)
- § For projects that are already operating, financial statements for the previous 2 years should also be provided (to extent available)
- § Expected working capital requirements of the business and how working capital will be financed
- § Amount of funding needed to implement the business plan
- § Sources and uses of funds, i.e:
  - § Where will the capital be sourced? (e.g. Bank debt, equity, grants)
  - § What will the capital be used for?
  - § How will the capital be repaid? In what time-frame, and with what potential return?

- § End-user finance plan – what are the financing requirements of the consumer finance proposal (if applicable) set out in the Proposal?
- § Risk Assessment of the business plan, highlighting the key risks to implementation and factors to mitigate those risks.

### **3.2.5 Geographic scalability**

The Proposal should address the extent to which the PV system and market implementation strategy are adaptable to other geographies and markets, for example by discussing:

- § Suitability of the product under different solar radiation variances;
- § Environmental adaptivity of the PV system ; e.g. performance in different climates;
- § Cultural preferences – is the product design tailored for a specific market?
- § Regional expansion strategy;
- § Availability of local financial institutions who may be needed as key partners for marketing, distribution, maintenance or end-user finance;
- § Local human resource capabilities – to what extent will module construction/installation/maintenance depend on skilled local staff? Will these be readily available?

### **3.2.6 Other socio-economic impacts**

The Proposal may wish to highlight any other particular socio-economic impacts that the Contestant believes to be important arising from his or her market solution, such as:

- § Improving livelihood and health conditions;
- § Creation of new green jobs;
- § Economic empowerment of women;
- § Encouraging small-business entrepreneurs;
- § Reduction of CO2 emissions;
- § Any other social impacts e.g. contribution to social development.

## **4. Evaluation Criteria**

The contest proposals must include already-commercialised and established products or at least a promising prototype which has been proven under laboratory conditions. Applications with already-commercialized products should confirm the performance capabilities of the system by providing operational data as well as details of technical applications and demonstration of customer acceptance. If necessary, a technical assessor will contact the applicant to carry out system inspections.

### **4.1 Participant Qualifications**

An assessment will be made of the candidate's practical experience in PV systems and applications.

### **4.2 Participants Eligibility**

Any organisation or individual that provides solutions for off-grid power supply based on PV can apply, e.g. suppliers, installers, producers, distributors, system integrators, and others.

### **4.3 Proof of Capacity and Experience**

Proof of adequate capacity (financial and human resources) as well as experience in order to meet the minimum requirements must be provided. An assessment will be undertaken to evaluate all proposals.

- § Previous experience in similar projects (off grid electrification);
- § Quality technical staff;
- § Quality of management team;
- § Quality of project management plan;
- § Financial stability.

### **4.4 Conformance of system design and market approach**

**The categories for Technical Design of the PV System are:**

1. Technical design of innovative PV off-grid power supply systems;
2. Technical specifications;
3. Metering, control and monitoring;
4. Other indicators for large-scale production;
5. Quality assurance.

**The categories for assessing the Market Approach are:**

1. Market penetration strategy;
2. Installation and maintenance;
3. End user financing;
4. Business plan;
5. Geographic scalability;
6. Other socio-economic impacts.

## 5. Annex I: Recommendations on Technical Component Specifications

### 5.1 Solar Photovoltaic Modules

The Solar Panels shall meet the requirements set in IEC 61215:2005.

If thin film silicon modules are used, they shall meet the requirements set in IEC 61646: Thin Film Silicon Terrestrial PV Modules Design Qualification and Type Approval.

Each module must be labelled with Manufacturer, Model, Peak Watt Rating, etc.

Manufacturer of solar panels along with date of manufacture must be stated in current production.

Performance guarantee has to cover at least 20 years of operation.

### 5.2 Photovoltaic Charge / System Controller

The charge controller shall meet the recommended specifications PVRS 6/6A of the Photovoltaic Global Approval Program-PVGAP.

The regulator or charge controller must protect the battery against overcharging and excessive discharge, as well as provide user-information on the general state of the system.

The regulator must protect the loads against damaging related to operation without a battery.

The regulator must include, as a minimum, the following signs:

- § Charging mode;
- § State of battery: charged, half full and empty;
- § The performance guarantee shall cover at least 3 years of operation.

### 5.3 Rechargeable Deep Cycle Battery

The battery should be a maintenance free deep-cycle battery. The battery can be either vented or VRLA gel type lead-acid.

Alternative battery types (e.g. lithium batteries) are allowed as well, if they meet given requirements as it is described in (3).

The battery shall meet the requirements and recommendations given in IEC 61427: 2005.

### 5.4 Inverters

The inverters shall meet at least the recommended specifications PVRS 8/8A of the Photovoltaic Global Approval Program-PVGAP