

Technology Requirements Brief (TRB) on Solar Energy for Rural Communities

Purpose: This brief facilitates the scanning of global markets for innovative technologies that address core development challenges. It does not constitute the start of a bidding process but rather outlines specific technical requirements with the aim of building a pool of scalable solutions in Solar Energy that meets the technological demands of IsDB Member Countries. These technologies are intended to be integrated into IsDB financed projects to improve project efficiency and overall impact. IsDB may contact suitable respondents to learn more about technology as part of its due diligence before recommending for its deployment.

1. Development Challenge

Global Electrification dataset of 2023 shows that 49% of IsDB member countries have achieved full electricity access for their populations while those countries still experiencing unreliable supply, such as frequent power outages. Limited electricity access constrains economic growth, hampers technology adoption and digitalization, and reduces the efficiency and productivity of critical sectors including finance, healthcare, and education.

Rural communities face even greater challenges, as extending traditional grids can be prohibitively expensive, discouraging providers from investing without subsidies. While solar energy offers an alternative, its adoption is often hindered by the high cost of reliable, high-quality systems. Lower-cost options, though more affordable, typically have shorter lifecycles, making them less sustainable.

2. Desired Development Outcomes

To improve access and favorably impact on the associated development outcomes, it is important to scale up rural electrification networks through provision of affordable, reliable and sustainable electricity access to businesses and households in underserved communities, particularly rural areas. Therefore, exploring innovative approaches has become a pressing need to i) increase cost-efficient energy access for households and businesses in underserved communities, ii) reduce reliance on fossil fuels, lower carbon emissions, and iii) empowerment of local economies through productive use of energy.

3. Existing conditions, Deployment Context & Readiness

Solar energy is one of the most versatile and rapidly growing sources of renewable energy, in IsDB member countries as well as globally. As the world seeks alternatives to fossil fuels, solar energy stands out as a clean, abundant, and sustainable solution for households seeking to meet their energy needs. Solar technologies capture sunlight and convert it into usable energy forms, such as electricity or heat, through various applications. The widespread use of solar energy systems has been accelerated due to advancements in technology, affordability, and the global push toward reducing carbon emissions.

Deployment of solar energy for household applications in rural communities should come with proper and sustainable business model that involve balancing affordability, accessibility, and sustainability while ensuring financial viability for the provider, primarily through solar home systems, rooftop solar panels, or hybrid setups (e.g., solar + battery + backup grid). This business model aims to reduce reliance on conventional electricity grids, lower household electricity bills for low-to-middle income families with limited upfront capital but long-term savings goals in addition to contributing to environmental sustainability.

4. Required information and Technology Functional and Performance Requirements Technology Requirements

Generally, innovative solar energy solutions should address the challenges highlighted in this brief, with high cost effective, high transformation potential, be environmentally friendly, easily deployable using turnkey modality (from design to operations), mature and tested, market-ready with proven track record, and be easily adaptable within member country contexts. In addition to equipment, civil works, installation, operation and training, the solution provider should introduce a user case for reducing the long-term financial burden of the people in rural areas by being affordable alternative to kerosene lamps, candles, wood fires etc. In addition, cost comparisons should also be made with in-grid electricity.

i) Required information includes the following:

- Evidence of performance – certifications, test results, case studies
- Financial parameters – indicative cost, operational model (CAPEX/OPEX), payback
- Business model and proposed approach for LDMC adaptation
- Existing deployments in developing countries (if applicable)
- Track record of deployment to at least three customers with total sales revenue of at least US\$20 million.

The technology appraisal form ([application link](#)) must be completed in addition to the above information requested.

ii) Specific Technical and Financial requirements:

The following are the specific technical and financial requirements that are to be met by the innovative solar energy technologies in providing a turnkey solution.

Technical Specifications and Attributes

- Recommended Battery: Lithium-Ion Battery (long lifespan, lower maintenance), size 4-5 kWh
- Recommended Inverter: Pure Sine Wave Inverter (better for sensitive electronics), size: 2.5 – 3.0 kW
- Recommended Solar Panels: Monocrystalline with size 1.5 – 2.5 kW
- Systems must withstand dust, humidity, and temperature extremes.
- Modular designs for scalability in diverse rural terrains. Components should be easy to source to ensure long-term maintenance capability.
- Model of delivery that includes a) installation of solution; b) Methodology of providing capacity building/ training provided to customers on usage of the solution
- Details on guarantee provided on solution, maintenance requirements and after-sales service.

Financial requirement

The following are the proposed financial investment and business model.

Proposed Financial Investment	
Initial Investment Costs	\$5,600 - \$10,500
Operating Cost	\$10 – \$100
Long-Term Cost Analysis (10 – 20 years)	\$5,700 - \$12,500

Proposed Business Models				
Business Model	Ownership	Initial Investment	Typical ROI (%)	Payback Period

Direct Sales/ Upfront Purchas	Homeowner	High (\$4,000 – \$10,000 per system)	10 – 15%+	5–8 years
Solar Lease	Third party	Low or None	4 – 7% (indirect, via bill savings)	No ownership, fixed savings
Pay-As-You-Go	Gradually to homeowner	None upfront	8 – 12%, varies by region	3–6 years to ownership
Community Solar	Shared or subscription	No capital expenditures	3 – 6% (energy bill credits)	Immediate benefits, no ownership
Solar-as-a-Service	Provider	None	4 – 7% equivalent savings	Ongoing subscription

5. Potential Risk and Safeguards

In terms of other requirements, it is important to note that turnkey deployment of the innovative solar energy technologies will be aligned with the following mitigation measures to avoid risks:

- **Non-Suitability and/or non-sustainability of technology:** Selected technologies will be subjected to independent evaluations, to determine validity of the claims, and the implications for adapting the technologies. Only proven and tested technologies will be considered, noting that capacity development and technology transfer implications for technology adoption should be clearly outlined in the documents to be uploaded and application link.
- **Cost- effectiveness and competitiveness:** Comparative analysis of available technologies will be conducted to ensure that the cost of the proposed technology is reasonable and competitive.

6. Process and Next Steps

a) Submissions and Responses will be reviewed to:

- Map available technologies by readiness level
- Short list of candidates for the next steps: Due diligence and independent technology evaluations
- Be considered in line with the TDCP for potential partnership

b) Following the shortlisting, selected respondents may be contacted for the following as part of due diligence processes:

- Technical discussions and demonstrations
- Site-visit requests or virtual showcases
- Provision of additional documentation

7. Attachments to be uploaded in the final part of the application in the link given:

- i) Signed covering letter
 - ii) Business/Entity Registration Document
 - iii) Technology summary: Sector, purpose, operational model
 - iv) Evidence of performance: Certifications, test results, case studies
 - v) Deployment requirements
 - vi) Financial parameters: indicative cost, operational model (CAPEX/OPEX), payback
 - vii) Business model and proposed approach for adaptation to developing country needs
 - viii) Track record requirements detailing existing deployments in developing countries
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