Report of ISA mission visit to Bamako

Visit duration: 17th to 21st Jun 2019

Mission member details: Enclosed at Annexure-1 (herein referred as Team)

Introduction:

THE INTERNATIONAL SOLAR ALLIANCE (hereinafter referred to as “ISA”) is a treaty based inter-governmental organization which was launched on 30 November 2015, in Paris, France, with Headquarters in India (UN Registration No. 54949). ISA is established to collectively address key common challenges to the scaling up of solar energy in its Member Countries. Mali is one of the founding members of ISA.

ISA has been framing various Programmes in order to implement various Solar application in the Member Countries. All the Programmes of ISA are member driven. Currently there are 5 ISA programme viz. 1) Scaling Solar Applications for Agricultural use 2) Affordable Finance at Scale 3) Scaling Rooftop Solar 4) Scaling Solar Mini Grids and 5) Scaling Solar E-mobility and storage.

Team under ISA Secretariat visited Mali from 17th June 2019 to 21st June 2019. The objectives of the Mission are: 1) To create awareness of ISA Programme and its activities among all the important Ministries/ Departments and other stakeholders in Mali under the guidance of Dr Souleymane Berthe, the National Focal Point (NFP) of ISA in Mali 2) To carry out pre-feasibility studies for implementation of demand of 15,000 Number of Solar Water Pumping Systems, given by Mali against the call for Expression of Interest issued by the Secretariat of ISA. 3) To discuss and understand the demand submitted by Mali, after 31st Dec 2018, for Solar Rooftop and Solar Mini Grids. 4) Discuss regarding I-Star center & capacity building of Mali in Solar Applications.

Apart from the above, the ISA mission wanted to understand the existing Energy scenario of Mali including Renewable Energy activities, Agriculture/ Irrigation Infrastructure and various policies/ regulations in the Country which will help ISA to guide Mali to scale up Solar applications in the Country. NFP-Mali also wanted ISA to look into the Projects posed by Mali to Government of India under Line of Credit (LoC), where they are facing some issues. Team met H E Mr. Pradeep Gupta, Ambassador of India Embassy in Mali to understand the issues and coordinate with Embassy of Mali in New Delhi.

NFP- Mali had prepared the schedule of the meetings various concern officials and dignitaries of the Government of Mali. Accordingly, Team held meetings with various Ministries / Departments such as DNE, AMADER, AER, CREE, ADM-SA, ATI, DNGR, DNDP, along with NFP-Mali, briefing about ISA programme and activities. The organogram furnished by NFP Mali is enclosed at Annexure-2. Date wise meeting details are as following:
17th June 2019

- The meeting on 17th June 19 was held with the official of department of Energy Chaired by Secretary General of Ministry of Energy & Water. The meeting was attended by officials mentioned in Annexure-3. After sharing the objective of the Mission, an overview of ISA and ISA Programmes was explained through a power point presentation by the Team.

- A meeting was held with H E Mr. Pradeep Gupta, Ambassador, Indian Embassy situated in Bamako, Mali. A brief discussion of the objective of the ISA Mission was discussed with him and his officials. HE Ambassador explained about the status of three Solar Projects submitted by Government of Mali to Government of India under LoC of Exim Bank of India. HE Ambassador said that they have not received the report of Solar Project for irrigation of 2,500 Hectares land. NFP Mali during the meeting with H E Ambassador requested to change the status of 2 MW solar project at Mopti from ECOWAS funding to bilateral funding with Government of India (GoI), to get the project preparation facility. The ambassador replied that an official request is required for Government of Mali in this regard and also informed that it may make more time to change the status. Ambassador also suggested ISA to guide Mali in choosing the better option for Mali for 50 MW Fana project as informed by Indian Embassy in Mali. (The copy of the note Verbal from Indian Embassy was enclosed as Annexure-4.) The Team informed that the matter will be taken with DG-ISA.

During meetings held with various Ministries/Departments/Agencies, Team impressed upon the solar potential in Mali and the need for immediate necessity to shift to solar energy in view of rapid deforestation due to increased use of bio-mass for energy consumption, low grid penetration in rural areas apart from dependence of majority of population on agriculture and farmers depending on rainfall for irrigation, which is erratic in nature many of the times. This awareness creation amongst different concern stakeholders will facilitate NFP Mali to channelize various internal assistance to furnish the data on their current status/plan and also seek the help required from ISA. It was impressed upon that creation of Country level Taskforce with nomination of Country Representatives for each of the ISA Programme is very important for speedy implementation of the ISA Programme in the country. NFP-Mali informed that the nominations of Country Representatives is in process and will inform ISA about the same at the earliest.

18th June 2019

- A meeting was held with representatives from DNA, AEDD, DFM, DGCT, DGESRS, AER, DNUH and EDM-SA representing, Power generation, Transmission and Distribution Company, Rural Electrification Agency. The meeting was also attended by members from Land and Finance Departments. The list of the official attended the meeting is at Annexure-5. Team shared the Energy scenario and current status of Solar Projects of Mali, which was prepared by ISA, based on the information available on internet. ISA requested...
NFP to review the data furnished by ISA and validate so that ISA can get accurate status to help Mali to plan their future Solar Programme and Roadmap.

- Further, it was appraised by department of AER that Mali is building 2 new cities together with 3,000 households within 20 km radius of Bamako, capital city of Mali. It is proposed that post formulation of regulations for Solar rooftop projects in Mali, implementation of large-scale solar rooftop projects in these cities can be envisaged.

- A Meeting was held with an official of Agriculture Ministry to understand the prevailing implementation strategy of Agricultural activities for supporting Solar Water Pumping Systems programme in Mali. Meeting was organized under the guidance of NFP-Mali. The present ISA activities about Solar Water Pumping Systems was explained to the official of Agricultural Ministry. For ISA programme on Agricultural Pumps, on enquiry related to the details of 15,000 Agriculture Pumps it is informed that Mali is yet to finalize the details in regard to locations, financing model, implementation strategy etc.

- Team visited workshop and R&D center in campus of AER and it was suggested to NFP Mali that the campus be proposed as I-Star center for Mali.

- Team went to meet CEO of AER and updated him about the ISA and its activities.

19th June 2019

- **Team met President Director General (PDG) of ATI**, which is an Agency for Land Management and Irrigation. After brief introduction about ISA and its activities, it was mentioned by PDG that solar pumping systems are already deployed for private irrigation in Mali and ground level feedback suggests that solar pumps are functioning better than diesel pumps. It was informed to Team that Mali is in process of planning to scale up solar pumping systems for irrigation across the country. 15,000 Solar Water Pumping Systems will be for both surface and submersible pumpsets as per requirement.

- Further, Team informed that the International Competitive Bidding documents in French language has already been shared with NFP Mali to circulate to interested prospective bidders in Mali to participate in the tender. Based on the discussion it was concluded that after making internal discussion NFP Mali will inform the details of Mali Strategy for Solar Pumping Programme including the proposed locations, financial plan and implementation strategy.

- Team met Special Advisor on Energy to the President of Mali, in his office.

- The Special Advisor appreciated the efforts taken by ISA in understanding its needs and helping the Country to plan for large capacity addition in Solar related applications which will give major boost in its economic growth.

- ISA team impressed the Special Advisor regarding the progress on Price exploratory global tender issued by ISA through EESL (a Government of India Public sector Company) and the Country specific prices are expected to be known by July/August 2019. The Special Advisor informed that Mali will give details regarding deployment of 15000 Nos. Solar Pumpsets and will make all efforts to enter into contract with the selected Agencies based
on the outcome of the referred tender issued. The Special Advisor requested ISA support on regulatory framework for Solar Rooftop Programme in French and English. He further suggested to meet Minister of Investment and suggest about all lacking/gaps in present policy.

- **Regarding Mali National Strategy for Renewable Energy**, The Special Advisor mentioned that they are in the process of making National Strategy for Renewable Energy in Mali with focus on access to electricity, education, health, water and large-scale promotion of small-scale industries. He mentioned that, ISA having the sector experts with lot of experience can help them finalizing the policy, regulations and strategy. ISA team agreed to help Mali on the above on written request of NFP-Mali. Further, ISA has suggested that separate chapter be carved out for Solar as part of the RE policy with due emphasis and focus on promotion of solar energy.

- ISA also appraised the need to take up Energy efficiency initiatives/Demand Side Management in parallel with solar deployment and that ISA can help in identifying concern organizations which can assist Mali in rolling out energy efficiency services. As a case in point, ISA suggested how replacement of existing sodium vapor street lamps with LED lamps can decrease power consumption and lead to power saving to the tune of 75%.

- **Regarding Multinational solar deployment solution**, The Special Advisor, mentioned that Mali along with neighboring countries viz Togo, Niger, Burkina Faso, Benin and Gabon, are planning a multinational solar deployment solution assisted by AFD. It was discussed that there can be a large Solar Project in Solar Park model with capacity in the range of 2 GW to 5 GW and the power generated to be shared between these countries because of same currency, same geographical and social infrastructure. He requested ISA to develop a programme on this which help these Countries to develop large Solar Parks. It was mentioned that Mali was taking initiative to create common platform for procurement of various items through International online bidding.

- **Meeting was held with the Electricity Regulatory Authority (CREE)**. In regard to Rooftop Programme, during the discussion with Regulatory Authority officials (CREE) along with NFP, it has been noted that currently there is no solar rooftop policy (net or gross metering), Standards for metering, connectivity etc. ISA team impressed upon the Regulatory Authority (CREE) that enabling Regulations, Policy and Connectivity standards, Grid code etc. are vital for large scale addition of the Rooftop as well as Ground mounted Solar in the Country. The regulatory team mentioned that the Government is in the process of revising this policy. ISA Team informed that ISA can assist them in bringing out a Policy / Regulation based on the vast experience, on a written request from NFP. Further CREE has informed that Terms of Reference (TOR) being made in collaboration with AER shall be shared with ISA within 2 weeks for feedback and suggestions. It was also concluded that AER shall provide details to ISA of all existing projects in solar rooftop that are being undertaken in Mali currently. Further, CREE appraised ISA that approval for off-grid solar projects upto 250 kW shall be given by AMADER and AER and approval for
projects greater than 250 kW is in the purview of CREE. It was also informed by CREE informed that the current proposed 2 MW at Mopti needs to be enhanced to larger size. Also, the link and hard copies for tariff details in Mali were given by CREE to ISA Team.

- A meeting was held with Hon’ble Minister of Energy and Water, Government of Mali and updated him about ISA and its activities. Also updated him about the various meeting being arranged by NFP-Mali. Hon’ble Minister reaffirmed the commitment of Mali to ISA and requested ISA to facilitate speedy implementation of solar projects. Further, he requested ISA to reinforce capacity building in Solar sector in Mali.

20th June 2019

- A visit was made to the proposed site to irrigate 2500 Hectare area with 5 MW Solar pumping system at Selingue. This Project has been posed by Government of Mali under LOC, Exim bank, India through MEA. At Selingue, a meeting was held with the Director General, ODRS, Government of Mali. During the meeting, he informed that Exim Bank of India had appointed a consultant M/s. Mahindra and they visited the site in November 2018 and since then they have not received any report or information. Further, he mentioned that the discussions were held with farmers during the visit of Mahindra and presently the farmers are enquiring the progress. He requested ISA and Embassy of Mali, India, to take up with MEA, Government of India, to expedite the feasibility study report and other processes. It was agreed that Embassy of Mali in India will initiate with MEA and take help of ISA to sort out the issues at the earliest, if required.

- During the travel to the above site, it was observed that there are many villages with potential for implementation of solar mini grids. Further, there is a dam and 44 MW Hydro project at Selingue where it is worth to explore the possibility to install large scale Solar Project including floating solar PV project.

21st June 2019

- A meeting was held with National Director of Energy, Government of Mali and updated her about ISA and its activities. She assured that whatever is required from her end will be provided to the Team, as and when required through NFP-Mali.

- A meeting was held with Director General, Public Debt, Government of Mali along with NFP-Mali and Team. Updated him about the ISA and its activities. Also conveyed him about the Solar Pumping International Competitive Bid for Price Discovery. Team suggested to go for OPEX Mode for commercial solar projects including rooftops, rather than CAPEX mode to reduce the financial burden of the country. Team agreed to provide information about CAPEX and OPEX mode. Team conveyed him that there is a huge potential of Solar Applications in all sections of society of Mali, which he seconded. He conveyed that Mali is in process of capturing the potential of Solar. He also requested NFP
Mali to submit Pre-Feasibility report of LoC projects under Government of India, as soon as he receives, so as to facilitate speedy conclusion of financial agreement.

- Meeting was held with NFP-Mali and officials of AER to sum up the Mission report. It was also requested to get the Amended ISA Framework Agreement to be approved by the Mali Government. NFP-Mali informed that it is already in process.

Following presentations are attached as Annexures. These presentations are used by Team for purpose of creating awareness about ISA and its activities:

Annexure 6 a- General presentation on ISA
Annexure 6 b- Presentation on Scaling Solar Application for Agricultural Use
Annexure 6 c- Presentation on Scaling Solar Rooftop
Annexure 6 d- Presentation on Scaling Minigrids

Following Questionnaire and information sheet is attached as Annexures. These formats are related to the information regarding Solar Pumping Systems, Solar Rooftop and Solar Mini Grids:

- Annexure A – For Solar Pumps
- Annexure B – For Solar Rooftop
- Annexure C – For Solar Mini Grids

ISA request NFP-Mali to share the desired information through these formats, at the earliest. NFP Mali requested Team for French version of all questionnaires and formats.

Team conveyed thanks to NFP-Mali and his team for tirelessly extending the hospitalities, Coordination and Guidance through-out the entire Mission duration of Team visit to Mali.

Bamako, 21st June 2019.

Dr. Souleymane Berthe
NFP Mali

[Signature]

Rajeev Gyani
NFP Coordinator ISA
### Annexure-1: ISA Expert Team (Team)

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Member name</th>
<th>Designation</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mr. Rajeev Gyani</td>
<td>Additional Director (RE) &amp; NFP Coordinator</td>
<td>International Solar Alliance</td>
</tr>
<tr>
<td>2</td>
<td>Mr. Ramesh Kumar Kuruppath</td>
<td>Additional Director (Programme)</td>
<td>International Solar Alliance</td>
</tr>
<tr>
<td>3</td>
<td>Ambassador Ali Illiassou</td>
<td>Ambassador (Event)</td>
<td>International Solar Alliance</td>
</tr>
<tr>
<td>4</td>
<td>Mr. Amadou Diallo</td>
<td>First Counsellor of Embassy of Mali in India</td>
<td>International Solar Alliance</td>
</tr>
<tr>
<td>5</td>
<td>Ms. Aissatou Sonko</td>
<td>Consultant (IR)</td>
<td>International Solar Alliance</td>
</tr>
<tr>
<td>6</td>
<td>Mr. PSSSR Chandramurthy</td>
<td>Senior Consultant</td>
<td>KPMG Advisory Services Private Limited on behalf of ISA</td>
</tr>
</tbody>
</table>
Annexure-2: Organogram furnished by NFP Mali

Organogram for Energy sector in Mali

- President, Mali
  Ibrahim Boubacar Keïta

- Prime Minister, Mali
  Babaou Cisse

- Minister of Energy and Water
  Sambou Wague

- Secretary General, Energy
  Moussa Cisse

- National Director, Energy
  Madame Aminata Fofana

- President Director General, AMADER, Mamadou Ouattara

- Director General, AER
  Dr. Souleymane Barthe

- Director General, ANADEB, Mamadou Madani Diallo

- Director General, AMARAP, Nangazie Kone
Organogram for Agriculture in Mali:

President, Mali Ibrahim Boubacar Keïta
Prime Minister, Mali Babaou Cisse
Minister of Agriculture
Secretary General, Agriculture

Director, DNA,
Director General, OPV
President Director General, ATI, Dr. Lamissa Diakite
Director General, ODRS Hamidou Coulibaly

Annexure-3,4,5,6: Please refer enclosure
Annexure-A,B,C: Please refer enclosure
Draft Questionnaire for ISA Programme 3 on Scaling of Solar Mini Grid Program

Programme Code: ISA/03/2017/SMG

1 Country:
2 Continent/Region:
3 Department/Agency responsible for program:
   - Ministry of Energy/Power
   - Ministry of Agriculture
   - Ministry of Rural Development
   - State Govt / Central Govt Public Utility
   - Others, please specify_____________________________
4 Contact details of Authorized Ministry/Agency:
   i) Name of the Head of the Authorized Ministry / Agency:
   ii) Designation:
   iii) Phone:
   iv) Fax:
   v) Email:
   vi) Postal Address:
   vii) Web Address:
   viii) Cell No. (Optional)
5 Is there a National Solar Policy / Implementation Plan?
   Yes   No
   If yes, please attach a copy and provide the web link
6 Is there any Regulatory Agency and Solar Regulation in place?
   Yes   No
   If yes, then please attach a copy of the Regulation and the web link
   Contact details of Regulator:
   i) Name of the Head of Regulatory Commission:
   ii) Designation:
   iii) Phone:
iv) Fax:  
v) Email:  
vi) Postal Address:  

vii) Web Address:  
viii) Cell No. (Optional):  
Note: If the National Government itself is the Regulatory Agency then also please give details as above  
7 Tariff Structure (prevailing): in US $ / Cents per Kwh  

<table>
<thead>
<tr>
<th>LT Connection</th>
<th>HT Connection</th>
</tr>
</thead>
</table>

i) Domestic:  
ii) Commercial:  
iii) Industrial:  
iv) Agriculture:  
8 Is there any Solar PV Feed-in-Tariff?  
Yes  
No  
If yes then prevailing Feed-in-Tariff: __________ US $ / Cents per Kwh  
9 Installed Capacity of Electricity Generation: __________ MW (Total)  

<table>
<thead>
<tr>
<th>Installed Capacity</th>
<th>Annual Energy Generation</th>
<th>Annual Peak Demand</th>
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<tbody>
<tr>
<td>Coal: __________ MW</td>
<td>__________ Mwh</td>
<td>__________ MW</td>
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<tr>
<td>Gas: __________ MW</td>
<td>__________ Mwh</td>
<td>__________ MW</td>
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<tr>
<td>Diesel: __________ MW</td>
<td>__________ Mwh</td>
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<td>Hydro: __________ MW</td>
<td>__________ Mwh</td>
<td>__________ MW</td>
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<tr>
<td>Nuclear: __________ MW</td>
<td>__________ Mwh</td>
<td>__________ MW</td>
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<tr>
<td>TOTAL __________ MW</td>
<td>__________ Mwh</td>
<td>__________ MW</td>
</tr>
</tbody>
</table>

vi) RE: Total installed capacity: __________ MW  
(a) Solar: __________ MW  
(b) Biomass: __________ MW  
(c) Wind: __________ MW  
(d) Small Hydro: __________ MW  
(e) Any other: __________ MW (Please specify)  
Note: If Hydro is part of RE then also please mention the Hydro capacity under RE
10. Renewable Energy Generation (Annual) as % of total generation of the Country: ______ %

11. Any National Plan to increase RE Generation from ____ % (as mentioned in S.No.10 above):
   Till 2022: __________   Till 2030: __________

12. Per capita electricity consumption in _____ Kwh

13. Electrification status of the country:
   i) Electrification % in Urban Area: _______ %
   ii) Electrification % in Rural Area: _______ %

14. Status of Village Electrification as per prevailing National Census data:
   i) No. of Villages electrified: _______
   ii) No. of Villages unelectrified: _______

15. No. of Villages to be electrified: _______
   i) Average number of Households per village in unelectrified areas?
   ii) Total number of minigrids installed in the country as on May 2019
   iii) Type of service offered through minigrids in the country (e.g. domestic, commercial, industrial etc.)

16. Payment mode for minigrid services (e.g. fixed demand with limited use, pay as you use, prepaid and postpaid models etc.)
   iii) Type of productive applications in rural areas?
   iv) Share of government, private and NGO based minigrids in India?
   iv) Cost of diesel/lit in rural areas?
   No. of House Holds to be electrified: By the year 2022 ______ By the year 2030: _______

16. No. of villages to be electrified Region/Province/District wise (Optional):

<table>
<thead>
<tr>
<th>Name of the Region/District</th>
<th>No. of villages</th>
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<tbody>
<tr>
<td>i)</td>
<td></td>
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<tr>
<td>ii)</td>
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<td>iii)</td>
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<td>iv)</td>
<td></td>
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<tr>
<td>Total</td>
<td></td>
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</table>

17. Attach the country map highlighting the locations of unelectrified villages as per below (Optional):
   i) Area where % of electrified villages is 0-10% : To be highlighted in Red Color
   ii) Area where % of electrified villages is up to 25% : To be highlighted in Violet Color
iii) Area where % of electrified villages is upto 50% : To be highlighted in Blue Color
iv) Area where % of electrified villages is more than 50% : To be highlighted in Green Color

18 Assuming maximum consumption of 4Kwh per House Hold per day (equivalent to 1Kwp of Solar Power Plant with battery bank), please mention the assessed potential requirement of Solar Power Plant capacity as per following, for proposed solar electrification of unelectrified villages in the country:

<table>
<thead>
<tr>
<th>Type of Solar Electrification</th>
<th>No. of installation under each category</th>
<th>Total KWP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1Kwp to 10Kwp</td>
<td>&gt;10Kwp to</td>
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<tr>
<td></td>
<td></td>
<td>&gt;25Kwp to</td>
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<tr>
<td></td>
<td></td>
<td>&gt;50Kwp</td>
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<tr>
<td>i) Solar Off-grid</td>
<td></td>
<td></td>
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<tr>
<td>ii) Solar Grid Connected</td>
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<tr>
<td>Total in KWP</td>
<td></td>
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19 Proposed Plan to implement the above assessed capacity:

<table>
<thead>
<tr>
<th>Year</th>
<th>MWp</th>
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<tbody>
<tr>
<td>i) In the year 2018</td>
<td></td>
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<tr>
<td>ii) In the year 2019</td>
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<tr>
<td>iii) In the year 2020</td>
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<tr>
<td>iv) In the year 2021</td>
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<tr>
<td>v) In the year 2022</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
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</table>

20 Any assistance/facilitation required from ISA in following:
   i) Solar Minigrid Policy & Regulation
   ii) Capacity Building
      (a) Training of Technicians/Engineers for installation of Solar Minigrid
      (b) Training of Technicians/Engineers for O&M of Solar Minigrid
   iii) Financing
   iv) Any other (Please specify)

21 Attach the list of Agencies/Departments of the country, to be involved in implementation of Solar Minigrid program
22 Attach a list of Agencies/Companies already involved in implementation of Solar Systems in the country
23 Do you have any empanelment procedure of such agencies/companies, as stated at S. No.22
24. Preferred mode of ownership and O&M activities (Please tick the option stated below):
   i) Community Ownership
   ii) Local DISCOM/Utility/Department
   iii) Successful Bidder/Market Operator
   iv) Any other (Please specify)

25. The Member Country preferred option for financing Solar Mini Grid Project:
   (Please tick the option stated below)
   i) Countries Budgetary Support
   ii) LOC Exim Bank of India
   iii) Multilateral Funding #:
   iv) Private Investment
   v) All of above

NOTE:
   i) This exercise is tentative assessment of potential in Solar Mini Grid Segment
   ii) The detailed Solar Mini Grid potential assessment shall be based on actual project(s) and preparation of Detailed Project Report
   iii) Each page of the Questionnaire to be signed by NFP or the Authorized Signatory
# World Bank / Asian Development Bank / African Development Bank

Date: _____________________________
Place: _____________________________
Signature of NFP or authorised signatory
Name: _____________________________
Designation: ________________________
# LISTE DE PRESENCE

**Objet:** Réunion avec les experts de l'ISA au cabinet du MEE.

<table>
<thead>
<tr>
<th>PRENOMS ET NOMS</th>
<th>FONCTION/STRUCTURE</th>
<th>CONTACT</th>
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<tr>
<td>Mahabaye Douraré</td>
<td>DGA / AER-Nalé</td>
<td>76 444 37 04</td>
<td><a href="mailto:red.pereDourare2@gmail.com">red.pereDourare2@gmail.com</a></td>
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<tr>
<td>Fouleymane Benke</td>
<td>D.G / AER-Nalé</td>
<td>73 967 38 5</td>
<td><a href="mailto:souleymane.ber.che@gmail.com">souleymane.ber.che@gmail.com</a></td>
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<tr>
<td>Ousmane DIENG</td>
<td>Ing / CREE</td>
<td>66 84 41 62</td>
<td><a href="mailto:scoulibaly@creemali.com">scoulibaly@creemali.com</a></td>
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<td>Amadou Sow</td>
<td>Ministère Energie et En</td>
<td>66 74 00 0</td>
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<tr>
<td>Sawane KAMISSO</td>
<td>CT / MEE</td>
<td>65 70 97 5</td>
<td><a href="mailto:jeman20085@gmail.com">jeman20085@gmail.com</a></td>
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<td>ABDERRAHMANE TARAHI</td>
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<td>63 77 11 77</td>
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<td>Mahamadou KANTA</td>
<td>DGA / ANAOER</td>
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</tr>
<tr>
<td>Name</td>
<td>Position</td>
<td>Email</td>
<td>Phone</td>
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L’Ambassade de l’Inde à Bamako présente ses compliments au Ministère des Affaires Étrangères et de la Coopération Internationale de la République du Mali et à l’honneur de se référer à la communication en cours relative au projet de ligne de crédit du gouvernement indien pour l’installation d’une centrale solaire photovoltaïque de 50 megawatts à Fana et de la visite d’un consultant indien au Mali en octobre 2018 en vue de faire une étude de faisabilité du projet.

2. Le Consultant a, dans son rapport, indiqué deux options avec deux alternatives pour chacune des deux options. Le coût finacier estimatif et les parts obligatoires indiennes pour les options sont indiquées ci-dessous:

<table>
<thead>
<tr>
<th>Option 1- avec la disponibilité des infrastructures de transmission de courant sur le site.</th>
<th>Montant (en million de dollars)</th>
<th>Part indienne</th>
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<tr>
<td>1. 50 Mwp/37 Mwac SPV Power Project with 100 Mwh BESS</td>
<td>71.47</td>
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<tr>
<td>2. 50 Mwp/37 Mwac SPV Power Project with 60 Mwh BESS</td>
<td>60.65</td>
<td>65.90%</td>
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| Option 2- accroître la capacité de transmission des lignes sur le site du projet |
|-------------------------------------------------|-----------------------------|---------------|
| 3. 65.5 Mwp/50 Mwac SPV Power Project with 60 Mwh BESS | 76.56 | 69% |
| 4. 65.5 Mwp/50 Mwac SPV Power Project without BESS | 58.70 | 84% |

3. Le Ministère estimé est prié de nous communiquer l’option la plus convenable pour permettre à l’Ambassade de le traiter pour approbation de l’autorité compétente du gouvernement indien.

4. L’Ambassade de l’Inde à Bamako saisit cette occasion pour renouveler au Ministère des Affaires Étrangères et de la Coopération Internationale de la République du Mali les assurances de sa plus haute considération.

Ministère des Affaires Étrangères et de la Coopération Internationale de la République du Mali

Amélioration: Dr. Soulemane Berthé, DG, Ministère de l’énergie et de l’eau, République du Mali.
LISTE DE PRESENCE

Date : Mardi 18 juin 2019

Ordre du jour : Rencontre d’échanges avec les points focaux locaux et les experts de l’Alliance Solaire Internationale

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**LISTE DE PRESENCE**

**Ordre du jour:** Echange avec la mission de l’Alliance Solaire Internationale (ISA)

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</table>

Bamako, le 19 juin 2019
## MINISTÈRE DE L'AGRICULTURE
### OFFICE DE DÉVELOPPEMENT RURAL DE SELINGUE
#### DIRECTION GÉNÉRALE

**Objet:** Rencontrez ODRS / ISA (International Solar Alliance)

**Lieu:** Selingué

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<td>1</td>
<td>Hamidou CONBILEY</td>
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<td>Position</td>
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<td>AER-Mali</td>
<td>Chef DMHE</td>
<td><a href="mailto:paulintiana@ginafrica.com">paulintiana@ginafrica.com</a></td>
<td></td>
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<tr>
<td>Assane Sylla</td>
<td>ISA</td>
<td>Consultant (RI)</td>
<td><a href="mailto:aissasou@isofaralliance.fr">aissasou@isofaralliance.fr</a></td>
<td></td>
</tr>
<tr>
<td>Rajeev Gyan</td>
<td>ADDL DIR, ISA</td>
<td>Additional Director</td>
<td><a href="mailto:rajeev.gyan@isocaralliance.fr">rajeev.gyan@isocaralliance.fr</a></td>
<td></td>
</tr>
</tbody>
</table>
AN OVERVIEW

18th June 2019 | Bamako, Mali
Paris Declaration:
Launched at COP 21 as a
India’s proposal for a
common platform for
cooperation among solar
rich countries lying fully
or partially between the
Tropics of Cancer and
Capricorn.

GOAL 7
Ensure access to affordable, reliable,
sustainable and modern energy for all

GOAL 13
Take urgent action to combat
climate change
VISION & MISSION

To provide a global platform for cooperation among solar resource rich countries to help achieve the common goals of increasing the use of solar energy in a safe, convenient, affordable, equitable and sustainable manner.

Governance

- Assembly of the ISA; President-India; Co-President-France
- Eight Committees of the ISA:
  - Standing Committee
  - Programmes; General and Legal; and Finance Committee
  - Four Regional Committee- Asia and Pacific; Latin America and the Caribbean; Africa; and Europe and others
- 6 Taskforces and 2 Working Groups
- Corporate Partners

GOALS

- Lowering cost of financing while scaling-up volumes of financing
- Mobilize more than USD 1000 billion of investments by 2030, in the field of solar energy
- Bringing reliable and affordable solar energy to all
JOURNEY SO FAR

COP 21, Paris
Launch in Paris by Prime Minister of India and President of France, 120 countries support destination
30th Nov' 2015

COP 22, Marrakech
ISA framework agreement signed for signatures
13th Nov' 2017

COP 23, Bonn
Curtain raiser for ISA's founding ceremony held
6th Dec' 2017

New Delhi, India
First founding conference attended by 40 countries including 25 heads of state held. Delhi Solar Agenda to capture 3% increased share of solar energy in respective national energy mix adopted
2nd Oct' 2018

New Delhi, India
Saudi Arabia becomes the 7th country to sign framework agreement
20th Feb' 2019

New Delhi, India
1st ISA general assembly inaugurated by Indian Prime Minister and UN Secretary General Mr. Antonio Guterres
11th March 2018

New Delhi, India
1st QPA promulgation legal act in any country, 40 countries have signed and 15 have ratified the framework agreement
13th Nov' 2017
A CATALYST BUSINESS MODEL FOR GLOBAL SOLAR ENERGY
Proposed Task Force at the Country Level for ISA Programmes implementation

Programme – 1
Scaling Solar Application for Agricultural Use

Programme – 2
Affordable Finance at Scale

Programme – 3
Scaling Solar Mini Grids

Programme – 4
Scaling Rooftop Solar

Programme – 5
Solar E-Mobility and Storage
<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the Country</th>
<th>Demand</th>
<th>Demand of Specific Capacities of Pumps</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Benin</td>
<td>50000</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Democratic Republic of Congo</td>
<td>80000</td>
<td>10hp each</td>
</tr>
<tr>
<td>3</td>
<td>Djibouti</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Fiji</td>
<td>27</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Mali</td>
<td>15000</td>
<td>10000 of 20hp &amp; 5000 of 10hp</td>
</tr>
<tr>
<td>6</td>
<td>Mauritius</td>
<td>00027</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Niger</td>
<td>15000</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>Senegal</td>
<td>4000</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>Somalia</td>
<td>500</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>South Sudan</td>
<td>6800</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>Sudan</td>
<td>50000</td>
<td>5000 of 20 kW; 35000 of 11 kW; 10000 of 4 kW</td>
</tr>
<tr>
<td>12</td>
<td>Tonga</td>
<td>258</td>
<td>-</td>
</tr>
<tr>
<td>13</td>
<td>Tuvalu</td>
<td>10000</td>
<td>-</td>
</tr>
<tr>
<td>14</td>
<td>Uganda</td>
<td>30000</td>
<td>-</td>
</tr>
<tr>
<td>15</td>
<td>Cabo Verde</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>16</td>
<td>Sri Lanka</td>
<td>2000</td>
<td>2kW each</td>
</tr>
<tr>
<td>17</td>
<td>Guyana</td>
<td>111</td>
<td>0.86hp, 2.64hp, 5hp, 7.5hp, 10hp &amp; 15hp</td>
</tr>
<tr>
<td>18</td>
<td>Peru</td>
<td>1750</td>
<td>-</td>
</tr>
<tr>
<td>19</td>
<td>Zambia</td>
<td>6</td>
<td>35hp each</td>
</tr>
<tr>
<td>20</td>
<td>Yemen</td>
<td>1500</td>
<td>-</td>
</tr>
<tr>
<td>21</td>
<td>Nauru</td>
<td>400</td>
<td>5hp and 10hp</td>
</tr>
<tr>
<td>22</td>
<td>Togo</td>
<td>5000</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>272,579</td>
<td>-</td>
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</table>
Details of the demand of Solar Mini-Grid projects received from ISA Member Countries

<table>
<thead>
<tr>
<th>S No</th>
<th>Member Country</th>
<th>Solar Mini-Grids</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Democratic Republic of Congo</td>
<td>10400 MW (104 Mini Grids)</td>
</tr>
<tr>
<td>2</td>
<td>Cuba</td>
<td>0.0094 MW (5 Projects)</td>
</tr>
<tr>
<td>3</td>
<td>Guyana</td>
<td>1.634 MW (15 Projects)</td>
</tr>
<tr>
<td>4</td>
<td>Malawi</td>
<td>2.8 MW (13 locations)</td>
</tr>
<tr>
<td>5</td>
<td>Sri Lanka</td>
<td>3.73 MW (36 Projects)</td>
</tr>
<tr>
<td>6</td>
<td>Sudan</td>
<td>46.042 MW (44 projects)</td>
</tr>
<tr>
<td>7</td>
<td>Tonga</td>
<td>1.008 MW (11 Projects)</td>
</tr>
<tr>
<td>8</td>
<td>Guinea-Bissau (Prospective member country)</td>
<td>5 MW (5 projects)</td>
</tr>
<tr>
<td>9</td>
<td>Zambia (Prospective Member Countries)</td>
<td>2.5 MW (3 Projects)</td>
</tr>
</tbody>
</table>

Summary

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Aggregation capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Mini-grids</td>
<td>10,462.72 MW</td>
</tr>
</tbody>
</table>
Details of the demand of Solar Rooftop projects received from ISA Member Countries

<table>
<thead>
<tr>
<th>S No</th>
<th>Member Country</th>
<th>Rooftop Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Government buildings</td>
</tr>
<tr>
<td>1</td>
<td>Cape Verde</td>
<td>1.39 MW (94 projects)</td>
</tr>
<tr>
<td>2</td>
<td>Democratic Republic of Congo</td>
<td>253.2 MW (2532 Rooftops)</td>
</tr>
<tr>
<td>3</td>
<td>Cuba</td>
<td>0.004 MW (3 projects)</td>
</tr>
<tr>
<td>4</td>
<td>Guinea</td>
<td>1 MW (9 Projects)</td>
</tr>
<tr>
<td>5</td>
<td>Malawi</td>
<td>2.65 MW (85 projects)</td>
</tr>
<tr>
<td>6</td>
<td>Nauru</td>
<td>1.2 MW (5 Projects)</td>
</tr>
<tr>
<td>7</td>
<td>Sudan</td>
<td>4.365 MW (16 projects)</td>
</tr>
<tr>
<td>8</td>
<td>Tonga</td>
<td>0.5 MW (2 projects)</td>
</tr>
<tr>
<td>9</td>
<td>Tuvalu</td>
<td>5 MW</td>
</tr>
<tr>
<td>10</td>
<td>Guine-Bissau (Prospective member country)</td>
<td>4.5 MW (4 projects)</td>
</tr>
<tr>
<td>11</td>
<td>Zambia (Prospective member country)</td>
<td>1.5 MW</td>
</tr>
</tbody>
</table>

### Aggregation capacity

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Aggregation capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Rooftop systems (Govt. Buildings)</td>
<td>275.309 MW</td>
</tr>
<tr>
<td>Solar Rooftop systems (Industrial complexes)</td>
<td>503.3568 MW</td>
</tr>
<tr>
<td>Solar Rooftop systems (Commercial complexes)</td>
<td>256.9 MW</td>
</tr>
</tbody>
</table>
KEY ACHIEVEMENTS

Accelerator
- Aggregated demand for 1000 MW solar and 272000 solar water pumps

Incubator
- Common Risk Mitigation Mechanism

Enabler
- iSTAR-C
- 30 Fellowships
- 200 Training of Trainers

Infopedia

Facilitator
- 2 Billion- EXIM Bank India
- 1.5 Billion- AfD
- MDB investments in solar
- Project preparation support
STAR-C programme

The goals of STAR-C include the following:

- To build a network of training / R&D / Standardization / Technical STAR-centers working on solar energy

- To develop and disseminate training programs (online and in-personne) for all solar energy stakeholders (technicians, trainers, project developers, engineers, policy makers, etc).

- To provide testing and technical certification capabilities to key STAR-centers.

**STAR-C Technical centers**
- Capacity building
- Basic testing facilities

**Can become**

**STAR-C Centers of Excellence**
- Advanced testing facilities
- Certification
- R&D
- Advanced training

**Can become**

**STAR-C Centers of Global Excellence**
- Top-notch R&D
- Standardization
- International recognition / accreditations / certifications
- Consultancy (project planning and documentation)
- Patents
STAR-C network

Support of industry Foundations - Schneider Electric, Tata Trust, Philips etc.

50 iSTAR-Centers by March 2019; 121 by 2022.

Schneider Electric Foundation commitment: 10,000 young technicians in ISA countries (2018-2022)
Capacity-building: on-going projects

- **ISA Kalpana Chawla Solar Award:** Government of Haryana, a province of India has sanctioned an amount INR 10 crore (1 358 250 USD) for instituting an award to researchers working in the solar energy specialization.

- **ISA Equinox circle:** the CESC is providing access to its “Ask-an-Expert” service in order to deliver technical support and expertise on the drafting and design of solar projects for the benefit of governments and affiliated agencies.


- **ISA Solar Fellowship for Midcareer Professionals:** 20 professionals working in the field of Solar Energy technology will be selected to pursue 2 year Master’s Programme in the field of solar technology, management and economics at IIT Delhi.
INFOPEDIA

An online platform dedicated to the dissemination of information, best-practices and knowledge on Solar Energy:
- To be completed by June 2019
- Launch in October 2019
- Supported by the European Union

- **Country counters**: A dedicated space on the Online Platform for each Member Country to present the solar energy profile
- **Solar Information Hub**: Aggregating solar projects in a central database for best practice sharing among Member countries
- **Solar Academy**: A full-fledged Learning Management System allowing ISA and its partners to create and host courses
- **ISA Communication Tools**: Tools and methodologies to facilitate communication among Member countries
- **Solar Directory**: An self-registration directory for the Solar Industry, NGOs, Research Centers and Financing institutions
Corporate Partner's of ISA

Corporate Partner's made voluntary contributions towards the ISA corpus fund
Rajeev Gyani
Additional Director (Programme)
rajeeyagni@isolaralliance.org

Ramesh Kumar Kuruppath
Additional Director (Programme/Projects)
remeshkumar@isolaralliance.org
ISA-African Mission: Scaling Solar Applications for Agriculture Use (SSAAU)
## Agenda

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>Mission visits</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>About SSAAU</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Business models for solar pump deployment</td>
</tr>
<tr>
<td><strong>4</strong></td>
<td>Demand Aggregation for Solar Water Pumps</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Potential Impact of Solar Water Pumping Programme</td>
</tr>
</tbody>
</table>

Image Courtesy: Specialized Solar Systems
Mission Visits

ISA has planned mission visits to all the participating member countries. A six member team comprising of ISA, KPMG and Nodal Embassies has been formed to meet and interact with various stakeholders.

- To establish a baseline feasibility for implementation programme.
- The reports will provide a detailed as-is assessment of the participating member nations.
- Extensive stakeholder consultations are planned with nodal agencies, line ministries etc.
- The relevant data on pricing pumping systems, water table depth, details on policy measures etc. will be validated through site visits.
- Post the stakeholder consultations, aide-memoire will be signed between ISA and respective line ministry.
- The aid-memoire will serve as the basis, fixing roles and responsibilities of various stakeholders.
About the Programme

Launched in April 2016, SSAAU focuses on promotion of decentralized solar applications in rural settings.

**Focus Technologies**

<table>
<thead>
<tr>
<th></th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Solar Powered Irrigation Systems</td>
</tr>
<tr>
<td>02</td>
<td>Solar Drying</td>
</tr>
<tr>
<td>03</td>
<td>Solar Home/ Street Lighting Systems</td>
</tr>
<tr>
<td>04</td>
<td>Solar Chilling</td>
</tr>
<tr>
<td>05</td>
<td>Other off-grid applications</td>
</tr>
</tbody>
</table>

**Focus Areas**

- Enabling Access to Finance
- Technology Transfer
- Developing common standards
- Demand Aggregation
- Capacity Building
- R&D
Key Activities under SSAAU

- Obtaining data for demand aggregation models
- Bid process management, fixation of price, identification of manufacturer(s)/ supplier(s)

- Developing baseline studies and roadmaps for member nations
- Facilitating affordable financing for implementation of program

- Facilitating in setting Standards, Performance Benchmarks, Testing and Certification Protocols through identified test centers

- Development of media outreach strategy for the programme
- Organization of workshops and seminars
Business models for solar pumps deployment
Standalone off-grid solar pumpsets

- **RRBs, MFI s, Commercial banks, NBFCs**
  - Regular repayments
  - Refinancing by funding agency

- **Beneficiary**
  - Selection of beneficiary by SNA
  - Amount released to suppliers through SNAs

- **State Nodal Agencies (SNAs)**
  - Funding agency
  - Financial support

- **Suppliers/Private players**

- **Solar pumps**

- **Solar Pump owned by the farmer**
  - Ownership
  - Financial support by Funding agencies
  - **Banks:** Remaining amount is either paid upfront by the farmer or in equal installment through bank loan

- **State Benefit**
  - Subsidy savings through reduced Power Purchase Cost (PPC) and T&D loss reduction

- **Farmer Benefit**
  - Savings from installation of new free of cost pump
  - Reliable power supply
Community based solar pumps using irrigation water as a service

A community based model involves sharing of water of solar pump between groups of farmers based on their individual water requirements.

- **Supplier** → Solar pump → **Group of farmers** → Service charges → **Operator appointed by the farmer group** → **Money collected from users** → **Maintenance Fund** → **Savings**

**Service Delivery Models**

- **Co-operative Model**
  - The water is shared between larger group of 15-20 farmers
  - Ownership lies with the farmer co-op/ funding agency

- **Small Co-operative Group**
  - An informal group comprising of 4-10 individuals come together
  - Ownership of asset lies with the group

- **Entrepreneurship Model**
  - The individual would bear the capital expenditure of the asset
  - Charge other farmers based on quantum of water delivered
Portable pumps using irrigation water as a service

Farmer estimates the crop water requirement and places request to solution provider.

Solution provider would bear the capital expenditure of the solution and charge farmer based on water quantum delivered.

Solution provider aggregates the pump deployment.

Avoids prohibitive upfront costs for the farmer and risk of maintenance.

Farmer pays amount based on water delivered.

Payment

Site Visit

Crop Water Requirement

Demand Aggregation

Solution Provider: Supplier/ Farmer Cooperative/ NGO

Portable pump operator visits the farmer’s site, delivers water to his agriculture land.
Demand Aggregation
**Key Activities**

- **Needs Assessment**
  - In collaboration with National Focal Points (NFPs) and Country Representatives, need assessment questionnaires for Solar Water Pumps (SWPs) were circulated to participating member countries.

- **Ascertainment Demand**
  - The filled in needs assessment questionnaires were used to ascertain demand of solar water pumping systems including information on type, quantity and technical specifications in each of the participating member countries.

- **Demand Validation**
  - Coordinating with National Focal Points and Country Representatives for obtaining country specific data and information and for validation of demand.

- **International Bidding for Price Discovery**
  - Hiring of an agency (EESL) for management of International Competitive Bidding for price discovery of various types of solar water pumping systems in participating member countries.
  - Call for Invitation for Bids for supply and installation of 2.72 lakhs of solar water pumping systems for various member countries of ISA.
Demand from various participating member countries

- **22** Number of countries
- **4** Number of continents
- **2,72,000** Total Demand of Solar Pumps

- **Niger**: 15,000
- **Sudan**: 50,000
- **South Sudan**: 6,800
- **Uganda**: 30,000
- **Djibouti**: 100
- **Guyana**: 111
- **Cabo Verde**: 100
- **Senegal**: 4,000
- **Togo**: 5,000
- **Mauritius**: 27
- **Benin**: 5,000
- **Somalia**: 500
- **Mali**: 15,000
- **DRC**: 80,000
- **Zambia**: 6

Additional countries and their demands:
- **Peru**: 1,750
- **Yemen**: 1,500
- **Nauru**: 500
- **Tuvalu**: 10,000
- **Tonga**: 258
- **Fiji**: 27
### Way Forward

<table>
<thead>
<tr>
<th>Activity</th>
<th>Status</th>
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<tbody>
<tr>
<td>Bid document uploaded on EESL/UNDP website</td>
<td>Done</td>
</tr>
<tr>
<td>Pre-bid meeting at ISA headquarters</td>
<td>Done</td>
</tr>
<tr>
<td>Incorporating clarifications/amendments; issuance of revised bid document</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Bid submission</td>
<td>To be done</td>
</tr>
<tr>
<td>Technical Bid Evaluation</td>
<td>To be done</td>
</tr>
<tr>
<td>Price Bid Opening</td>
<td>To be done</td>
</tr>
</tbody>
</table>

**Role of member nations:**
- Choose among the 2 options quoted in the bid (EPC and 5 yr warranty or Installation with 5 year CMC) and according identify and tie up with suitable funding agency
- Entering into agreement with developers
- Facilitating implementation of solar pump sets in the country
Impact of Solar water pumps
Country Snapshot- Mali

The access to electricity in Mali is increasing, albeit slowly

Limited grid access has led to over reliance on biomass for energy supply

- Access to electricity in the rural areas at 18% which is significantly less than 83% access in urban areas.
- Grid unavailability in rural areas has led to increasing reliance on biomass for meeting the energy needs.
- Rapid deforestation
- Farmers depend on rain fed irrigation for meeting their crop water requirements.
- Huge solar potential in the country with average sun duration of 7-9 hours
Advantages to Mali with SSAAU

Present scenario

Generating station → Generating substation → Transmission line

Water pump

Distribution line

Distribution substation

With Off-Grid Solar pumpsets

PV Array

Water pump

No T&D infrastructure to be set up

Decrease in thermal power stations and oil imports
What is this tool and its objectives?

A comprehensive multi-sectorial tool to assist stakeholders in their decision-making for the adoption of climate-resilient interventions.

**CEEW- Using a Decision Support Tool to Guide Action**
What is this tool and its objectives?

- A comprehensive web-based analytical tool to assist stakeholders in their decision-making for the adoption of solar for irrigation

600+ districts | 20 parameters

It helps:
- Prioritise target districts in state or country, based on their relative conditions
- Assess overall suitability of various approaches to deploy solar for irrigation
- Identify relevant policies where solar-based irrigation can be leveraged
- Understand district specific impetus factors and bottlenecks affecting the suitability of solar for irrigation
Adapting this tool to ISA member countries – what data needed?

- Data on parameters used for India’s SPTOOL
  - Exact parameters used
  - Alternatives for these based on criteria mentioned previously
    - E.g. Share of horticulture crops to be replaced with other cash crops in Sub-Saharan African countries

- Facilitation with various departments of the state
  - Understand local context to identify parameters
  - Collate data available with local administrations (in disaggregate form)

- Census vs. survey based data

- Granularity of datasets
  - Country, state/province, district/lower administrative unit
Parameters that be can critical for Mali

- Water availability index
- No. of Diesel pumpsets within a province
- Arable land and irrigated land in hectares
- Electricity penetration
- Rain fed irrigation and pumpset based irrigation
- Monthly per capita expenditure of states on rural agricultural households etc.

ISA offering first cum first serve basis for 10 countries across the world, access to this tool at free of cost
Expectation of ISA Mission visit to Mali

Points for Discussion

✓ Methodology adopted for demand estimation of solar pumps.
✓ Ecosystem in the country for implementation of solar pumps.
✓ Proposed implementation plan for solar pumps.
✓ Support required from ISA for solar pumps.
Thank You

Rajeev Gyani
Additional Director
rajeeygyani@isolaralliance.org
+91-9425 5037 42
## Criteria used for calculating overall score

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><img src="image" alt="Water drop" /></td>
<td>Inadequate access to affordable and reliable irrigation</td>
</tr>
<tr>
<td><img src="image" alt="Currency" /></td>
<td>Economic viability of solar pumps</td>
</tr>
<tr>
<td><img src="image" alt="Wallet" /></td>
<td>Purchasing capacity of farmers</td>
</tr>
<tr>
<td><img src="image" alt="Credit card" /></td>
<td>Access and subscription to institutional credit</td>
</tr>
<tr>
<td><img src="image" alt="Gear" /></td>
<td>Farmers’ attitude towards adoption of new technologies</td>
</tr>
</tbody>
</table>
Scaling of Rooftop Solar Programme in ISA Countries:

A presentation by International Solar Alliance Secretariat

Bamako, Mali
18.06.2019
Energy Scenario in Mali

Primary Energy Supply in (%)

- Biomass (Wood and Charcoal) 18%
- Fossil fuels 35%
- Other 4%

78% Population access to electricity-National (% of population)

Primary Energy Consumption in %

- Household Consumption 10%
- Transport 3%
- Industry 1%
- Agriculture 86%

Electricity final consumption per capita (KWh)

Overall Access to Electricity 42%

Rural Access 19%
Urban Access 94%
Population 18.5 Million
Rural Population 58%
Electricity Demand (YoY) 12%

Overview of Mali's Energy Sector

Data Source: World Bank/IRENA
Electricity subsector in Mali

Installed Capacity in MW

- From fossil fuels: 189
- Hydro Power: 183
- Solar: 6.5

Electricity Consumption in GWh

- 2011: 454
- 2012: 1507.6
- 2013: 2610.8
- 2014: 2245.2
- 2015: 2013.4
- 2016: 3059
- 2017: 4200

Construction of several other solar PV plants of total capacity 260 MW are under pipeline

Overview of Mali's Energy Sector
# Electricity subsector in Mali

## Key Stakeholders

<table>
<thead>
<tr>
<th>Category</th>
<th>Stakeholders</th>
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</thead>
<tbody>
<tr>
<td>Ministry</td>
<td>Ministry of energy and minerals</td>
</tr>
<tr>
<td>National institutions and policy makers</td>
<td>• Agence des Energies Renouvelables – Mali (AER)</td>
</tr>
<tr>
<td></td>
<td>• Agence Malienne pour le Développement de l'Énergie Domestique et de l'Electrification Rural (AMADER)</td>
</tr>
<tr>
<td></td>
<td>• National Energy Directorate (DNE)</td>
</tr>
<tr>
<td>Regulator</td>
<td>• For off-grid: Agency for the Development of Household Energy and Rural Electrification (AMADER)</td>
</tr>
<tr>
<td></td>
<td>• For grid connected: Electricity and Water Regulatory Commission (CREE)</td>
</tr>
<tr>
<td>Governing Policy</td>
<td>• National Energy Policy (NEP)</td>
</tr>
<tr>
<td>RE policy</td>
<td>• National Renewable Energy Development Strategy adopted in 2006 (10% of the energy mix by 2020)</td>
</tr>
<tr>
<td>Policy Framework for Private Sector Engagement</td>
<td>• Rural Electrification Fund</td>
</tr>
<tr>
<td></td>
<td>• National Industrial Development Policy</td>
</tr>
<tr>
<td></td>
<td>• Public Private Partnership Framework</td>
</tr>
<tr>
<td></td>
<td>• Investment Promotion Council of Mali (API-Mali)</td>
</tr>
</tbody>
</table>
Mapping ISA’s services for the promotion of solar in countries of the African sub-continent

- **Technical support**
  - Demand aggregation for:
    - Solar rooftop
    - Solar based mini/micro grids
    - Solar based irrigation pumps
    - Preparing procurement strategies for various

- **Tendering and Bid Support**
  - Assistance in tendering process
  - Bid Process Management
  - Conversation with various implementing agencies, developers, manufacturers
  - Analysing the global prices of various components

- **Innovative financial packages**
  - Facilitating financial packages and programs that shall be low cost
  - Measures for ensuring reduced cost of capital
  - Assistance in preparing lines of credits

- **Capacity Building**
  - Technical trainings to various stakeholders of the solar sector, including ministries, nodal agencies, solar developers etc

- **Innovative technology solutions**
  - Proposing technology solutions which can be easily deployed and cost effective
  - Suggesting policy reforms for the promotion of solar energy
ISA Program: Scaling Solar PV Rooftop
**Background of the program**

- Circulated for Comments with NFPs and other stakeholders
- Received comments from NFPs, GIZ, France, CPI, TERI etc.
- Internal Discussions and technical committee review
- Launched the program during ISA founding Ceremony

- Oct 2017
- Dec 2017
- Jan 2018
- Feb 2018
- March 2018

- ISA Secretariat drafted the Rooftop program
- Fine-tuned the program considering the views and inputs
Action Plan and Activities for Implementation

- Assessment of solar PV rooftop potential/demand
  - Physical survey/checklists/questionnaires
  - GIS Tools/Remote Sensing/Satellite Maps

- ISRO on request of ISA developed Android-based Solar Application for AFRICA as a tool for rooftop/utility scale solar potential assessment

- TERI and C-Step developed GIS Tools/Satellite Maps proposed to be deployed combined with on-site physical survey for rooftop solar potential assessment of Member Countries

- Demand Aggregation/Plan Settings
## 1 GW+ solar PV rooftop potential/demand received from ISA member countries

<table>
<thead>
<tr>
<th>S No</th>
<th>Member Country</th>
<th>Rooftop Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Government buildings</td>
</tr>
<tr>
<td>1</td>
<td>Cape Verde</td>
<td>1.39 MW (94 projects)</td>
</tr>
<tr>
<td>2</td>
<td>Democratic Republic of Congo</td>
<td>253.2 MW (2532 Roofs)</td>
</tr>
<tr>
<td>3</td>
<td>Cuba</td>
<td>0.004 MW (3 projects)</td>
</tr>
<tr>
<td>4</td>
<td>Guinea</td>
<td>1 MW (9 Projects)</td>
</tr>
<tr>
<td>5</td>
<td>Malawi</td>
<td>2.65 MW (85 projects)</td>
</tr>
<tr>
<td>6</td>
<td>Nauru</td>
<td>1.2 MW (5 Projects)</td>
</tr>
<tr>
<td>7</td>
<td>Sudan</td>
<td>4.365 MW (46 projects)</td>
</tr>
<tr>
<td>8</td>
<td>Tonga</td>
<td>0.5 MW (2 projects)</td>
</tr>
<tr>
<td>9</td>
<td>Tuvalu</td>
<td>5 MW</td>
</tr>
<tr>
<td>10</td>
<td>Guinea-Bissau (Prospective member country)</td>
<td>4.5 MW (4 projects)</td>
</tr>
<tr>
<td>11</td>
<td>Zambia (Prospective member country)</td>
<td>-</td>
</tr>
</tbody>
</table>

### Parameter Aggregation capacity

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Aggregation capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Rooftop systems (Govt. Buildings)</td>
<td>275.30 MW</td>
</tr>
<tr>
<td>Solar Rooftop systems (Industrial complexes)</td>
<td>509.35 MW</td>
</tr>
<tr>
<td>Solar Rooftop systems (Commercial complexes)</td>
<td>256.90 MW</td>
</tr>
</tbody>
</table>

Scaling Rooftop Solar
**Next steps**

- Respective member countries to be identified a nodal person for the Program: “Scaling Rooftop Solar” for coordinated efforts with ISA
- To adopt a progressive solar rooftop policy and “Net Metering” Process in harmony with other member countries/groups for rapid scale-up
- To initiate physical assessment of rooftop potential: by deployment of technologies (Through Technical Assistance)
- To launch a country specific rooftop solar schemes- Segment-wise aggregation of demand and incentivizing schemes
Next steps

- To get prepared PFR, RFP and selection of Implementing agencies for the rooftop capacity received through demand aggregation
- To get nominated Masters’ Trainees for attending ISA/MEA sponsored programs
- To work-out modalities for dissemination of Rooftop Training Modules (USAID/PACE-D) for Capacity Building in ISA Member Country/ies and other training programs
- To develop a calendar of Program Specific Awareness Campaign/national or regional workshops/exhibitions
Way forward: ISA intervention across the solar PV rooftop value chain

 MDBs/Financing Agencies/Research Organisations

Existing Programs

- Leveraging existing network
- ISA strengths
- Digital Tools and Infopedia (Platform)-ISTARC

New Programs

- Country specific NFBs
- Impact assessment
- Strengthening and review of ongoing activities
- Facilitation in uptake of identified applications
- Assistance in technology transfer
- Capacity building of member countries

- Bid Process Management expertise
- On-board Training Partners

- Country specific Program/Proposal design (Development of viable framework for participation of MDBs in implementation)
- Demand assessment/aggregation through international bid price discovery
- Facilitation in Implementation of identified technologies
- Capacity building programs
Current Status

- To implement the Programme, ISA is in the process of Finalizing a Project Management Consultant (PMC) with excellent credentials.

- A proposal on this has been notified in ISA website on 28th June 19 PMC on swish challenge basis

- PMC finalization is expected in July 2019
Thank you

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rajeeyg@isolaralliance.org

Ramesh Kumar Kuruppath
Additional Director (Programme/Projects)
remeshkumar@isolaralliance.org
Challenges and Way forward
Key Challenges for Rooftop Solar penetration

- Lack of capacity building on rooftop systems
- Limited technical expertise on grid interconnection framework and standards
- Erosion of premium customers
- Weak utility infrastructure to integrate solar PV

- Inadequate capacity to evaluate projects proposals
- Availability of collaterals and payment insecurity (from utilities)
- Small size high cost of financing (e.g., the lending rate in Ghana as high as 29%)
- Lack of standard PPAs and bankable project proposals

- Limited availability of low cost financing
- Credit rating of customers/payment security
- Availability of feasible rooftops
- Weak financial status of utilities

- Lack of net-metering and grid interconnection guidelines
- Lack of compliance and monitoring framework

- Delay in incentives from the government
- Delay in project clearances
- High cost of solar PV systems
- Lack of quality standards

Scaling Rooftop Solar
Objective and Scope

To promote, assess potential, harmonize demand and pool resources for rapid deployment of and scaling up Rooftop Solar (Off-Grid and Grid-Connected) in pursuit of the objectives of the Paris Declaration, 2015 and towards fulfillment of its obligations under Article II and III (2) of Framework Agreement.

Interventions cover all facets of the rooftop sector

- Facilitate on-grid and off-grid solar PV applications in 121 prospective member countries (including island states)
- Focusing on Grid-connected, Off-grid, Hybrid, Integrated with storage/Water Heating for all types, shapes and size/ various segments viz. government buildings, industrial, commercial, residential
- Technology agnostic: Mono Crystalline, Poly-Crystalline, Thin Films etc.
- Any business model: CAPEX/ OPEX/ Lease or Innovative models under public/private/PPP

Participating Countries: Bangladesh, Congo, Fiji, Ghana, Guinea, Mali, Nauru, Niger, Peru, Rwanda, Tonga, Tuvalu, among others evinced interest in this program through Video Conferencing, PPTs in ISA Meets, NFP Conclaves, EoI and Communication
Scope contd..

Harmonization and adoption of common methodologies

- Progressive Rooftop Solar Policy/Regulations
- Draft Solar Roadmaps prepared during NFP Conclaves
- Enabling Building Codes
- Model Bidding documents/Model Power Purchase Agreements (PPAs)
- Grid-Connectivity Norms and Processes; Net and Gross Metering Systems/Procedures
- Draft PPA for RESCO Model and Draft RFP ready for circulation as guidelines for harmonizing contracts

Capacity Building Programs

- Certification Courses through face-to-face class room environment / Practical – Master Trainers’ Program (NISE/ITEC-key partners to impart)
- Developing E-platforms, video enabled courses and training programs, country specific online database and documentation in association with Educational and Technical Training Institutions to build a skilled and trained workforce in the rooftop solar segment.
- Rooftop Training Modules for Entrepreneurs, Bankers and DISCOMs

Development of Quality, safety and monitoring framework (Country Specific)

- Installation and O & M Practices
- Standards, Certification and Quality Assurance Plan
- Safety Measures
- Inspection and Testing
- Monitoring & Verification Protocol
Key activities/actions initiated by ISA team

- ISRO developed solar application for Africa
- 2 NFP conclave held for harmonization of policies and development of solar roadmap including rooftop solar
- Awareness Programs: SunMeets, workshops in association with Knowledge Partners
- Training Program: Master Trainers' Program organized under ITEC for capacity building
- Develop Model RFP and PPA for signing RESCO contracts ready for adoption by Member countries
- Launch Rooftop Program 4 launched after extensive stakeholders' consultation
- Program shared with National Focal Points

Training Rooftop Training Modules for Entrepreneurs, Bankers and DISCOMS developed by USAID under PACE-D adopted by ISA for Capacity Building of ISA
ISA Programme on
Scaling Solar Mini Grids:

A presentation by International Solar Alliance

Bamako, Mali
18.06.2019
ISA's Programme – Scaling Solar Mini-Grids

- **"Scaling Solar Mini Grids" (SSMG)** was launched on 24th May, 2017 during 52nd Meeting of the African Development bank group at Gandhinagar, Gujarat, India.

- 29 Member Countries have joined the Program. The following Member Countries who have expressed their desire to join during outreach events, Assembly and other meetings are as below:

- Bangladesh, Benin; Burkina-Faso; Chad; Djibouti; Ghana; Guinea; Guyana; India; Madagascar; Malawi; Mali; Nauru; Niger; Senegal; Somalia; Sudan; Togolese; Tuvalu; Kiribati; Tonga; Vanuatu; D R Congo; Guinea-Bissau; Liberia; Nigeria; Burundi; Tanzania.
10 Point Action Matrix

- Assisting in specification, standards, performance benchmarks etc.
- Facilitating in preparation of bankable Projects
- Assisting in identification of contractors, financiers and banks.
- Development and potential assessment of reports and country plans

Activities Proposed for Year 2019-20

- Acquiring data for demand aggregation
- Development of Base document on Global Tendering
- Assisting Member countries in adopting progressive mini grid policies.
- Monitoring and field inspection of Program implementation
- Organization of seminars and workshops
- Development of media outreach for SSMG Program
Mini-Grids Demand Aggregation

Aggregation of demand for Solar Mini-Grid Systems (as on 30th December, 2018)

<table>
<thead>
<tr>
<th>S No</th>
<th>Member Country</th>
<th>Demand Aggregation (Capacity in MWp)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Democratic Republic of Congo</td>
<td>10400</td>
</tr>
<tr>
<td>2</td>
<td>Cuba</td>
<td>0.0094</td>
</tr>
<tr>
<td>3</td>
<td>Guyana</td>
<td>1.634</td>
</tr>
<tr>
<td>4</td>
<td>Malawi</td>
<td>2.8</td>
</tr>
<tr>
<td>5</td>
<td>Sri Lanka</td>
<td>3.73</td>
</tr>
<tr>
<td>6</td>
<td>Sudan</td>
<td>46.042</td>
</tr>
<tr>
<td>7</td>
<td>Tonga</td>
<td>1.008</td>
</tr>
<tr>
<td>8</td>
<td>Guinea-Bissau</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>Zimbabwe (Prospective Country)</td>
<td>2.5</td>
</tr>
</tbody>
</table>

Total $10462.72$ $MW_p$
Mini-Grids Policy (Model) ISA - Objectives

Implementation Plan

Presently, private developers are setting up mini grid power projects with or without the Government subsidy. However, the implementation of such projects in the remote and economically weaker areas having poor infrastructural facilities, would need the support of the Government subsidy. Therefore, the Mini-Grid Power Policy envisages the implementation of the Mini-Grid Projects in the following manner -

With Government subsidy:

✓ Project shall be installed in villages/towns identified by Govt. through the private developers.
✓ As per the budget available, projects shall be installed and subsidy shall be provided as per the country norms.
✓ Projects shall be established on Built Own Operate & Maintain (BOOM) basis and 10 years mandatory operation & maintenance shall be done by the developer.
Mini-Grids Policy (Model) ISA - Objectives

- To promote decentralized generation of clean & green power by harnessing solar energy.
- To put in place a conducive investment climate to stimulate private sector participation in decentralized generation of solar power.
- To provide ensured power supply to nearly all households to meet the minimum household needs of power e.g. lighting, fan, mobile charging, TV, refrigeration, irrigation pumps, drinking water systems, entrepreneurial tasks etc.
- To reduce the investments required for development of long distance transmission lines and to reduce the line losses in power transmission.
- To promote establishment of local manufacturing facilities and socio-economic development of backward areas.
- To make available clean and sustainable electrical power to large number of domestic, agriculture and commercial establishments which are deprived of conventional grid.
- To reduce the consumption of fossil fuels.
Success of mini-grid projects is a combination of technical, commercial and community related aspects.
### Key consideration for a successful solar mini-grid programme

<table>
<thead>
<tr>
<th>Focus</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| **Policy**  | - Current policies encourage grid extension and deter mini-grids by not providing long term clarity.  
- Subsidy such as capital subsidies, are aimed at short-term performance –  
  - highly rely on EPC cum short term O&M model  
- Policy to provide long term clarity and performance based incentive for driving sustainable models |
| **Regulation** | - Competition with main grid? Need clarity on operation of mini-grids with areas with existing grid access  
- Regulation to support policy on aspects related to framework for integration with main grid |
| **Institutional** | - Lack of institutional capacity - many state-level agencies lack capacity to properly address rural electrification  
- Distribution, most of the times, not involved in solar mini-grid project allocation and contracting |
Key consideration for a successful solar mini-grid programme

<table>
<thead>
<tr>
<th>Focus</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| Technical | - Solar energy intermittent in nature - Energy storage technology is expensive and can increase the cost of mini-grid projects – right sizing can reduce cost  
  - Hybrid mini-grids add complexity and cost to the system – O&M is more complex  
  - Anchor loads increase commercial viability – good to have better mix  
  - Technicians training at a local level to handle preventative maintenance |
| Financing | - Private developers have tapped developmental bank loans or venture capital funds or CSR funds  
  - Mini-grids considered transition solutions either due to their lack of an anchor customer or grid connection.  
  - Lack of financially sustainable business models, plus banks’ preference to lend to large projects especially those that are grid connected. |
### Key consideration for a successful solar mini-grid programme

<table>
<thead>
<tr>
<th>Focus</th>
<th>DESCRIPTION</th>
</tr>
</thead>
</table>
| Market                       | • Customer engagement: Engaging with, acquiring and retaining paying customers is often a challenge  
                                • Need to ensure adequate demand and long term sustainability for attracting good players  
                                • Formation of Village level communities assisted in some models (WBREDA Sunderban) |
| Technological interventions  | • IT based solutions to reduce operation cost – bill payment, metering  
                                • Involvement of local entrepreneurs for retailing energy credits |
### Challenges to be addressed

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Challenges</th>
<th>Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Adequate financial return from the project</td>
<td>Address through better policy and incentives</td>
</tr>
<tr>
<td>2.</td>
<td>Availability of quality equipment at competitive price</td>
<td>Increased aggregated demand will result in competitive pricing and higher volumes with higher international quality standards.</td>
</tr>
<tr>
<td>3.</td>
<td>Absence of regulatory framework</td>
<td>ISA model guidelines which can be adopted by Member Countries for a uniform regulatory Framework</td>
</tr>
<tr>
<td>4.</td>
<td>Threat of grid expansion</td>
<td>Integration and grid independence</td>
</tr>
<tr>
<td>5.</td>
<td>Payment collection from the customers</td>
<td>Community and cooperative models have proved to be effective</td>
</tr>
<tr>
<td>6.</td>
<td>Absence of financing</td>
<td>Providing line of credit from financial institutions and grants and subsidies as per the government policies.</td>
</tr>
</tbody>
</table>
Way Forward

- Preparation of Feasibility reports
- Empanelment of experts for mini-grids to prepare feasibility reports and project proposals along with financial proposal.
- Identification of agency to carry out the implementation of project on a RESCO Model.
- In-house capacity building measures.
- Exploring national and international agencies and Government agencies like REC to partner ISA on implementation of the mini-grid.
- Proposed system of implementation: community developer or cooperative model or entrepreneurship model.
- A Global Price Exploratory Tender would then be initiated by ISA to support ISA Member Countries to implement SMG program in their respective Countries.
- A support group has been formed along with a knowledge partner to support the Mini-grid programme of ISA.
Thank You

Please visit ISA website for updates:
www.isolaralliance.org
ISA African mission: Key questions

1. Basic Information

The country profile and ISA link with the country (NFP, Ministry, etc.):

- Name and contact details National Focal Point (designation, postal address, E Mail, Telephone, Whatsapp Number – of NFP)

- Nodal Ministry/Department responsible for implementation of solar water pumping systems and its structure (state level, provincial level & district level, etc.)

2. Country profile:

The country’s present statistics about energy and agriculture:

- Total area of country (in Square kilometers)

- Total area under agriculture (in Square kilometers/hectare)

- Energy scenario of the country (may attach sheet for details)

- The crop pattern and number of crops per year

- Existing irrigation methods/techniques (canal, sprinkler, drip irrigation, any other.)

- Existing farming techniques/methods (individual, community based, co-operative, commercial, any other.)

- Average land holding of the farmers (in hectares)

- Number of farmers with land holding of
  (a) _ (less than or equal to) 1 Hectare
  (b) 1 – 2 Hectare
  (c) _ (greater than or equal to) 2 Hectare

3. Technology

Aspects related to pumping systems

- Number of agricultural pumps already installed in the country (number of diesel pumps/electricity run pumps) (# number)

- What was the approach adopted for determination of number of solar pumps including area wise distribution or crop wise distribution?
• What are the types of solar pumps required in the country (off-grid, grid connected, etc.)?

• The capacity of pumps required for installation (normal range is 3, 5, 7.5, 10 hp; AC/DC; Surface, submersible.)?

• Data availability for ground water, recharging rate and water table level?

• If data for ground water is not available, any proposal to assess the water availability by the country?

• Who are the existing players in the diesel/ grid connected pumps?

• Is there are service delivery mechanism for irrigation? If yes, what is the model and what are the typical charges paid by the farmers?

4. Policy/Finance

• What is the current funding mechanism for financing government based irrigation projects? How much of it is spent by the government exchequer? What are the typical lending rates for these projects?

• What is the sources of funding for existing pump sets? Does the farmer take loans from banks or does government provides subsidy/ financing for the same?

• Whether any financial assistance is available in the country to support SWPS programme

• If financial assistance is available, what is the pattern and model of implementation?

• What could be the modality of implementing the programme if there is no financial assistance available by the government?

• Which are the financial institutions/banks active in the area of SWPS implementation?

• Any international cooperation available for financing of SWPS/solar projects?

• Any Foundations/ Non-Government Organizations active in the country to support the SWPS/solar programme?
5. Existing ecosystem for solar pumps

- Has there been prior pilot projects implemented for solar pumps in the country? If yes, how has been the experience/challenge etc.? 

- What is the estimated utilization of solar pumps by farmers practicing subsistence farming?

- What is the level of theft/security for solar technology in general and solar pumps in particular?

- What is the custom/import duties/taxes on various solar pump components?

- What are the requirements from international/national solar pump suppliers to do business in the country? Is there any mandatory requirement of setting up of project office for solar pump supplier?

- Which are existing solar pump suppliers in the country?

- What is the general awareness levels of the farmers regarding solar technology in general and solar pumping technology in particular?

- What are the views of the state on implementation of solar pumps programme and possible business models?

6. Project feasibility

- What are the prevalent interest rate for RE projects in the country?

- What is the cost of diesel pump per HP?

- What is the cost of diesel?

- What are the living expense of the farmer (as a % of crop revenue)?

- What is the month on month crop water requirement?

- How many days in a year does a farmer typically use a pump set?
7. Project implementation

- What are the required timelines for delivery of solar pumps?

- What is the implementation plan for solar pumps including agency to be involved, human resource capabilities, training requirements, phase wise implementation etc.

- Have the sites been identified for solar pump implementation? If yes, can these be shared on the map?

- What are the areas where ISA can facilitate the implementation of solar pumps?

8. Others

- Any other information the country would like to share that shall facilitate the implementation of solar pumps?
**INFORMATION SHEET FOR IMPLEMENTING ROOFTOP SOLAR**

### A) GENERAL DATA

<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>INFORMATION SOUGHT FROM MEMBER COUNTRY</th>
<th>DETAILS</th>
</tr>
</thead>
</table>
| 1      | (i) Name of the Agency Coordinating Rooftop Solar Programme in Member Country  
        | (ii) Contact Person  
        | (a) Name  
        | (b) Whatsapp/mobile no  
        | (c) Email  
        | (d) Address |
| 2      | Energy Scenario:  
        | (i) Installed Capacity(MW)  
        | (a) Thermal  
        | (b) Hydro  
        | (c) Solar/wind/other RE  
        | (d) Solar PV rooftop capacity  
        | (ii) Yearly energy generation (in Million Units) and percentage of RE in total Energy Generation  
        | (iii) Demand growth pattern for the last five years for various category of consumers  
        | (iv) (a) Domestic  
        | (v) (b) Industrial  
        | (vi) (c) commercial |
| 3      | Renewable Energy Policy and enabling provision for Solar power (Rooftop) |
| 4      | National Solar targets with timelines |
|        | Solar Rooftop Programme under implementation , if any |
| 5      | Tax on different components used in solar PV rooftop plants  
        | (a) Solar PV modules  
        | (b) Structure  
        | (c) Inverters  
        | (d) Batteries  
        | (e) Electric wiring (cables)  
        | (f) Installation services |
| 6      | Any Financial/Fiscal incentives for promoting Rooftop Solar like custom duty/VAT/Income tax exemptions or Accelerated depreciation etc. |
| 7      | Net Metering policy and Grid Integration Regulation for Solar Rooftop* |
|        | Electricity Tariff rates for various categories of Consumers  
        | (a) Industrial  
        | (b) Commercial  
        | (c) Domestic  
        | (d) Agriculture |
|        | Average grid availability ( number of supply hours for various category of consumers) |
(a) Industrial  
(b) Commercial  
(c) Domestic  
(d) Agriculture

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Whether there is any Regulated Benchmark cost of Rooftop Solar PV system?</td>
</tr>
<tr>
<td>9</td>
<td>Is there any Feed in Tariff for Rooftop solar? If yes, please share details</td>
</tr>
<tr>
<td>10</td>
<td>Indicative list of Local supplier/EPC companies with contact details</td>
</tr>
<tr>
<td>12</td>
<td>List of financing agencies (Banks and other institutions active in the country)</td>
</tr>
<tr>
<td>13</td>
<td>List of skill development/training programs if any?</td>
</tr>
</tbody>
</table>

Name & Signature

Dated:

**B) SITE SPECIFIC DATA:**

<table>
<thead>
<tr>
<th>SR.NO.</th>
<th>INFORMATION SOUGHT</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>List of Buildings identified for Rooftop solar (category wise)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Government/Industrial/Commercial/Institutional)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Name, address and contact details of each Building/site owner</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Clear shadow free area available for Rooftop installation in each building(In Sq.Meter)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Present source of electricity(grid, DG set, solar etc)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Connected load and voltage level</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Annual average electricity consumption in MU (month wise)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Overall energy consumption per year in MU of each identified building:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. From electricity grid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. From back up options like DG set</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Type of roof structure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• RCC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Asbestos</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Tin shed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Others (Please specify)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Orientation and tilit of the roof:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1. Flat roof</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. Slant</td>
<td></td>
</tr>
</tbody>
</table>
Name & signature

Dated:

**Reference Documents:**
1) English version of the report may please be provided.
2) Please attach the Annual Reports of the preceding 3 years of the Energy/ Ministry concerned
3) Please attach Energy/ Electricity reports of Multilateral Agencies, Consultants etc.
4) *Please attach Policy and Regulatory documents related to Power and Solar in particular.
5) Contract documents like PPA used, if any
6) Details of Technical Standards followed, if any