

## Report of ISA mission visit to Bamako

**Visit duration: 17<sup>th</sup> to 21<sup>st</sup> 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.

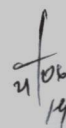
ISA has been framing various Programmes in order to implement various Solar application in the Member Countries. All the Programmes of ISA are member driven. Currently there are 5 ISA programme viz. 1) Scaling Solar Applications for Agricultural use 2) Affordable Finance at Scale 3) Scaling Rooftop Solar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

Team under ISA Secretariat visited Mali from 17<sup>th</sup> June 2019 to 21<sup>st</sup> 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 31<sup>st</sup> 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:

  
21/6/19

  
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**17<sup>th</sup> June 2019**

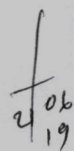
- The meeting on 17<sup>th</sup> June 19 was held with the official of department of Energy Chaired by Secretary General of Ministry of Energy & Water. The meeting was attended by officials mentioned in **Annexure-3**. After sharing the objective of the Mission, an overview of ISA and ISA Programmes 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 take 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.

**18<sup>th</sup> 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

  
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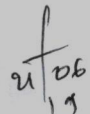
NFP to review the data furnished by ISA and validate so that ISA can get accurate status to help Mali to plan their future Solar Programme and Roadmap.

- 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.

19<sup>th</sup> 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 pumpsets. 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

  
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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

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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.

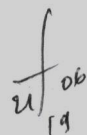
#### 20<sup>th</sup> June 2019

- 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.

#### 21<sup>st</sup> 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

  
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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.

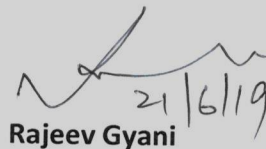
Team conveyed thanks to NFP-Mali and his team for tirelessly extending the hospitalities, Coordination and Guidance through-out the entire Mission duration of Team visit to Mali.

Bamako, 21<sup>st</sup> June 2019.



Dr. Souleymane Berthe

NFP Mali



Rajeev Gyani

NFP Coordinator ISA

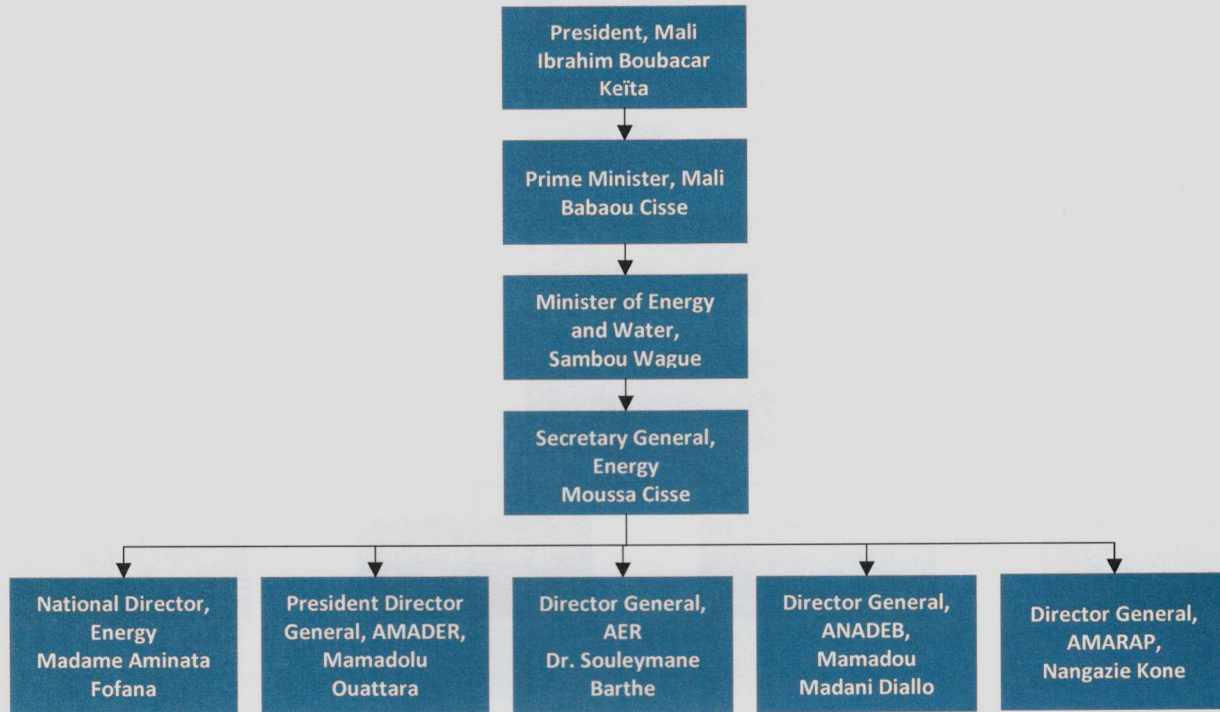
**Annexure-1: ISA Expert Team (Team)**

Sl.No.	Member name	Designation	Organization
1.	Mr. Rajeev Gyani	Additional Director (RE) & NFP Coordinator	International Solar Alliance
2.	Mr. Ramesh Kumar Kuruppath	Additional Director (Programme)	International Solar Alliance
3.	Ambassadaor Ali Illiassou	Ambassador (Event)	International Solar Alliance
4.	Mr. Amadou Diallo	First Counsellor of Embassy of Mali in India	International Solar Alliance
5.	Ms. Aissatou Sonko	Consultant (IR)	International Solar Alliance
6.	Mr. P S S S R Chandramurthy	Senior Consultant	KPMG Advisory Services Private Limited on behalf of ISA

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**Annexure-2: Organogram furnished by NFP Mali**

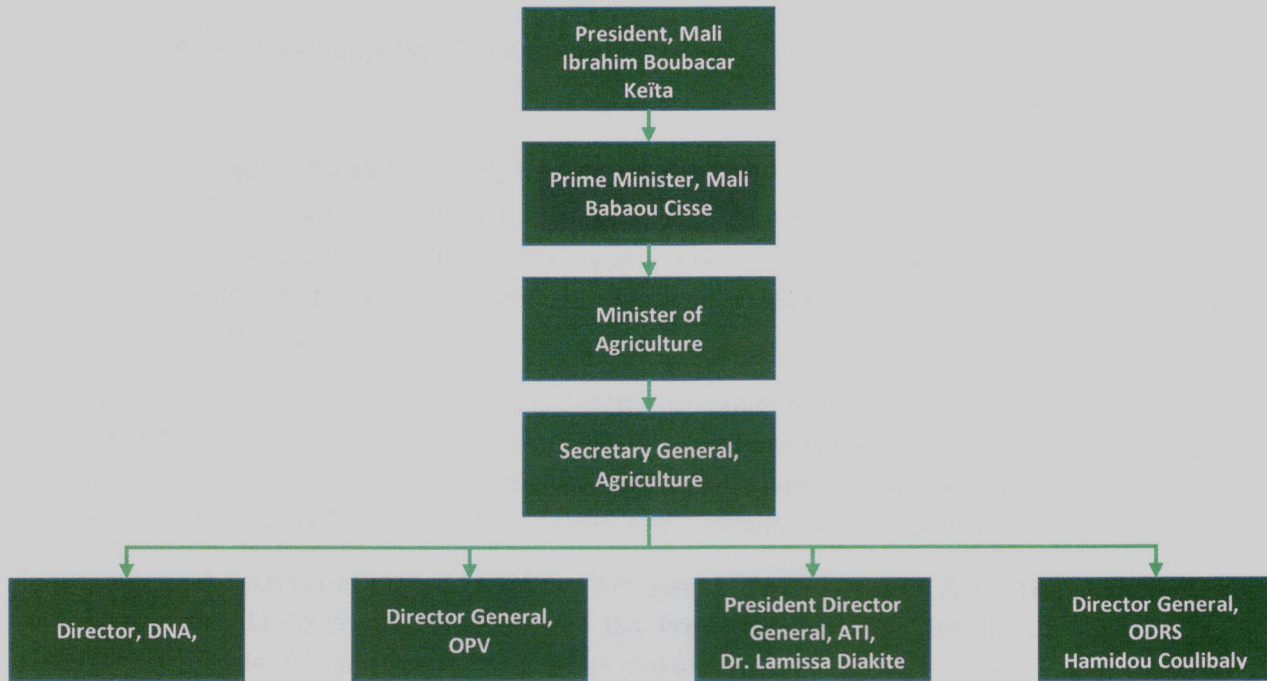
Organogram for Energy sector in Mali



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Organogram for Agriculture in Mali:



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)

Yes	No
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5 Is there a National Solar Policy / Implementation Plan ?  
 If yes, please attach a copy and provide the web link

Yes	No
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6 Is there any Regulatory Agency and Solar Regulation in place ?  
 If yes, then please attach a copy of the Regulation and the web link

Yes	No
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- 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

LT Connection                      HT Connection

- 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)

	Installed Capacity	Annual Energy Generation	Annual Peak Demand
i) Coal:	_____ MW	_____ Mwh	_____ MW
ii) Gas:	_____ MW	_____ Mwh	_____ MW
iii) Diesel:	_____ MW	_____ Mwh	_____ MW
iv) Hydro:	_____ MW	_____ Mwh	_____ MW
v) Nuclear:	_____ MW	_____ Mwh	_____ MW
TOTAL	_____ MW	_____ Mwh	_____ MW

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: Total \_\_\_\_\_ %

i) Electrification % in Urban Area: \_\_\_\_\_ %

ii) Electrification % in Ruiral 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.)

iv) 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?

iii) Source of power for irrigation pumps in rural areas?

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):

i)	Name of the Region/District	No. of villages
ii)		
iii)		
iv)		
	Total	

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 upto 25% : To be highlighted in **Voilet** 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:

Type of Solar Electrification	No. of installation under each category			Total KWp
	1KWp to 10KWp	>10KWp to 25KWp	>25KWp to 50KWp	
i) Solar Off-grid				
ii) Solar Grid Connected				
Total in KWp				

19 Proposed Plan to implement the above assessed capacity:

i) In the year 2018	_____ MWp
ii) In the year 2019	_____ MWp
iii) In the year 2020	_____ MWp
iv) In the year 2021	_____ MWp
v) In the year 2022	_____ MWp
Total	_____ MWp

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


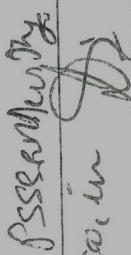

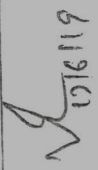

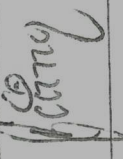
Name:

Designation:

## LISTE DE PRESENCE

17/6 19 Obj: Rencontre avec les experts de l'ISA au cabinet du NEE

PRENOMS ET NOMS	FONCTION/STRUCTURE	CONTACT	EMAIL	EMARGEMENT
Souboulaye Doustera	DSA / AER-Nali	66443704 66436342	edoulayeDoustera@gmail.com	
Souleymane BENTHE	D.G / AER-Nali	73967335	souleymane.berthe@gmail.com	
Idy Mohamed COULIBALY	Ing / CREE	66844162	soulilyaly@creemali.org	
Amame Coulibaly	Ministere Energie et Eau	66747600	Coulibalydra@gmail.com	
Amadou KAMISSOFO	CT / MEE	65709759	kamalcan2002@yahoo.com	
Adama TRAORE	AER-Nali	63771171	adissatran@gmail.com	
Paulin DIARRA	AER-Nali	74078456	paulindiarra@gmail.com	
Abamadou KANTA	DAF / ANHORE	76389895	mohamkanta@yahoo.fr	

amadou SIDIBE	Chaf. Division Etudes HEE/DNE	69550872	amadousidibe25@yahoo.fr	
SSSR Murthy	Prime Minister Ambassade de l'Inde en Inde	+91-805789933 8375047461	pebandramurthy@tpng.com fontecourse@centralbankny.com in v.meshkumar@isolaralliance.org	
ANILSH KUMAR KURUJATH	Additional Director (Supervision) ISA	+91 9650990311		Ram
Aissatou SOUKO	Consul Pravit ISA	+221 77700 3621	aisatou@isolaralliance.org	
RAJEEV GYANI	ADDITIONAL DIRECTOR (CRE) & NFP COORDINATOR	+91 9425503742	RATEEV GYANI@ISOLAR ALLIANCE.ORG	
ILLIASSOU	EX Ambassadeur du Niger en Inde	+227 91151570	a.illiasou@yahoo.fr	
USSEYNI DIARRA	C. DES SPS/EDM-SA	+223 66759217	fochiourra@edmsa.ml	

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भारत का राजदूतावास  
बमाको (माली)  
Embassy of India  
Bamako (Mali)

No. BAM/COM/205/22/2017

Le 2 mai 2019

L'Ambassade de l'Inde à Bamako présente ses compliments au Ministère des Affaires Etrangères et de la Coopération Internationale de la République du Mali et a 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 financier estimatif et les parts obligatoires indiennes pour les options sont indiquées ci-dessous:

<b>Option 1- avec la disponibilité des infrastructures de transmission de courant sur le site.</b>		
	Montant (en million de dollars)	Part indienne
1. 50 Mwp/37 Mwac SPV Power Project with 100 Mwh BESS	71.47	57%
2. 50 Mwp/37 Mwac SPV Power Project with 60 Mwh BESS	60.65	65.90%
<b>Option 2- accroître la capacité de transmission des lignes sur le site du projet</b>		
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 Etrangères et de la Coopération Internationale de la République du Mali les assurances de sa plus haute considération.

**Ministère des Affaires Etrangères  
et de la Coopération Internationale  
de la République du Mali  
Bamako**



**Ampliation:** Dr. Soulemane Berthé, DG, Ministère de l'énergie et de l'eau, République du Mali.

MINISTRE DE L'ENERGIE ET DE L'EAU  
SECRETARIAT GENERAL

REPUBLIQUE DU MALI  
Un peuple-Un but-Un foi

Agence des Energies Renouvelables du Mali (AER-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

	NOM ET PRENOMS	STRUCTURES	CONTACTS	EMAIL
1.	Sékou Sala Sissoko	DNA	75-09-60-53	Sissoko.sala.sala@gmail.com
2.	Thomas Haidara	AEDD	76 37 39 91	haidaramohamed@yahoofr
3.	OUEBLE Magzani	DFN	78 10 95 03	magzani2015@yahoo.fr
4.	Djéliba Kary KANISSOKO	DGCT	79 49 31 8 karytbeurman@gmail.com	JKary
5.	Moussa SAMAKE	DGERS	76 45 60 64 moussa_md@yahoo.fr	MSamak

27/506

6.	COULIBALY Lassana	DNUH	76361262/63490386	lassana.coul88@hotmail.com
7.	Kanambaye Hansana	Radio FR3	763A 1582/66171468	hkanambaye@yahoo.fr
8.	Idrissa Traore	AER-Nali	63781175	idrissanoriel@gmail.com
9.	Pasé Kamate	AER-Mali	76102982	Kamatebe@yaleo.com
10.	DIARRA Balla	ED17-SA	66747837	balladiarra@ectmiser.net
11.	DANOGO youssouf	AER-Nali	76134877	santogpenergie@gmail.com
12.	Abassi DIAVO	AER-Nali	65550046	abassi.dialla@yahoo.fr
13.	Ahoua Kane	AER-Nali	62759367	ahouaahoua@yahoo.fr
14.	Adama Coulibaly	AER-Nali	66735810	coulibalyadama69@yahoo
15.	Paulin Diarra	AER-Mali	74078756	paulindiarra@gmail.com
16.	Amadou DIAVO	Ambassade des Nali en Inde	—	first.coulibaly@ndhamb.org
17.	PSSSR Murthy	KPMG, Indre	+91-8055739933	pehondra.murthy@kpmg.com

18.	ASSOU SOUKO	ISA	+22177903621	
19.	Souleymane IBRAHIMÉ	AER-NABU	73 96 7335	souleyv1@yahoo.fr
20.	Ramesh Kumar KUNUSAMY	ISA	+91 9650990311	ve.meshtkumar@isoban511.com.in
21.	ALI ILLIASSOU	ISA	+227 91151570	a_illiasou@yahoo.fr
22.	TRAORE Béidari	AER-MALI	+223 66984995 +223 79118447	beidari.traore56@gmail.com
23.	Assou Soukoko	AER-NABU	+223 66984995	
24.				
25.				
26.				
27.				
28.				
29.				

LISTE DE PRESENCEOrdre du jour: Echange avec la mission de l'Alliance Solaire Internationale (ISA)

NOMS ET PRENOMS	STRUCTURES	N° TELEPHONES	E-MAIL	EMARGEMENTS
KASSAMBABA Brehima	CRSEF	7463970	skanembana@crensol.org	BKAS
RAMESH KUMAR KURUPATH	ISA	+91 9650 990311	kumar9mesh2015@gmail.com	Ramr
PSSR CHANDRAMURTHY	KPMG	+91 8095233523	chandramurthy@kpmg.com	PSSR Murthy
AISSATOU SONKO	ISA	+221 77 7503621	aiissatou@isolaralliance.org	AISSATOU
RATEEV GYANI, ADDL DIR	ISA	+91 942 5505742	rateevgyani@isolaralliance.org	R
ALI ILLIASSOU	ISA	+227 91151570	a.illiasou@yahoo.fr	A
Souleymane BÉNIHÉ	AER-Mali	73 967335	souleymane.benihé@gmail.com	Souleymane
Amadou MALLO	Ambassade de Mali en Inde	90 12 14 39	firstcoursellor@malienbassy.co.in	A
Paulin. DIARRA	AER-Mali	74 078756	paulindiasse@guai.fr	Paulin
BAH TOUSSERNOU	CRSEF	67 16 20 20	bahouyoub@crensol.org	B

Bamako, le 19 juin 2019

MINISTRE DE L'AGRICULTURE  
 .....  
 OFFICE DE DEVELOPEMENT RURAL  
 DE SELINGUE

REPUBLIQUE DU MALI  
 Un Peuple - Un But - Une Foi



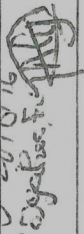
.....  
 DIRECTION GENERALE



Objet : ..... Rencontre O.D.R.S / ISA (International Solar Alliance)  
 Lieu : Selingue

N°	Prénoms & Noms	Fonctions	Contacts (tél, fax, Email)	Signatures
1	Hannidou Coulibaly	DG/O.D.R.S	73331260	
2	Dramane Diouré	DA/O.D.R.I	63633025	
3	Hannet KATA	Chf D.A.V.E.R/O.D.R.S	hamet1773@go.hn.ch	
4	AISSATOU SONKO	Consultant ISA	aissatou@islandali.info.org	
5	Ramesh kumar kuyuspath	Adm Director (ISA)	+91 9650990311	Ramz
6	PSS& Muestry	Sonbr Consultant Kfing	+91 8055739933	Nendu
7	Paulin Diarra	Chf département EP	74078756	
8	Amadou DIAKLO	Premier Conseiller Ambassade de Malawi Foud	-	
9	ALI ILLIASSOU	Personne Ressource ISA	+227 91151570	

Annexe 5 C

10	Souleymane BERKÉ	DG. AER-Rali	73967335	
11	RAJEEV GYANI	ADDITIONAL DIRECTOR	+91 9425 03742	
12	Aly Ouboguem	ISA Agent <del>OPER</del> ODMS	76156082 / ouisloguem@alisonet35.org	
13				
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MINISTÈRE DE L'AGRICULTURE

SECRETARIAT GENERAL

AGENCE D'AMENAGEMENT DES TERRES ET  
DE FOURNITURE DE L'EAU D'IRRIGATION (ATI)

Tel : (00223) 20 23 02 87 - 20 23 01 54

Hamdallaye ACI 2000- Bamako



La liste des présences

Bamako, le 19/06/2019

N°	Prénoms et Noms	Structures	Fonctions	Adresse/Email et contact Téléphonique
1	Souleymane BERANE	AER-Nale	D.G	Souley et Syahou.fr 73967335
2	Lamissa Diakité	ATI	PDG	diakite@univ-ecoweb.fr 76485279
3	Sadio Cisse	ATI/POAZA	Directeur Technique	Sadio_cisse@yahoo.fr
4	Lassine TRAORE	ATI	Directeur de Planification et des Etudes	traorelassine@gmail.com 66045212/76167693
5	Abdoulaye Ouattara	AER-Nali	DGA -	6603631201 abdoulaye Ouattara@yahoo.fr



	Hamou Koumou	AER-Mali	chef de service mior- centrale ingeur électrique AER	ouctra@univ-b@yahoo.fr 62759367
	BE Kamate	AER-Mali	chef de service promote technologie	Kamatebe@yahoo.com
	Daouda O. CISSE	MAECI	chef de section au dep. AER au MAECI	daoudaoumarciss@univ-b.com
	Ramesh Kumar Koushpath	ISA	ADDL Director (Program)	rameshkumar@univ-b.org
0	ALI ILLIASSOU	ISA	Personne Ressource	alilliasou@yahoo.fr
11	PSSR Mesthy	KPMG	Series Consultant	pebandremesthy@kpmg.com
12	Edwin Treva	AER-Mali	chef de poutre	edwin-treva@univ-b.com
13	Paulin Diarra	AER-Mali	Chief DRIHE	paulindiarra@univ-b.com
14	FISSATE SOUKO	ISA	Consultant (RI)	fiissate@univ-b.com
15	RAJEEV GYANI	ADDL DIR, ISA	Additional Director	RATEEVGYANI@ISOCARALLAH
16				
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19				
20				
21				



# AN OVERVIEW

18<sup>th</sup> 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.



# VISION & MISSION

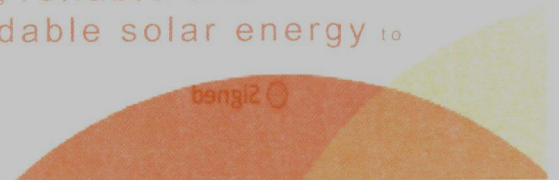
To provide a global platform for cooperation among solar resource rich countries to help achieve the common goals of increasing the use of solar energy in a safe, convenient, affordable, equitable and sustainable manner

## Governance

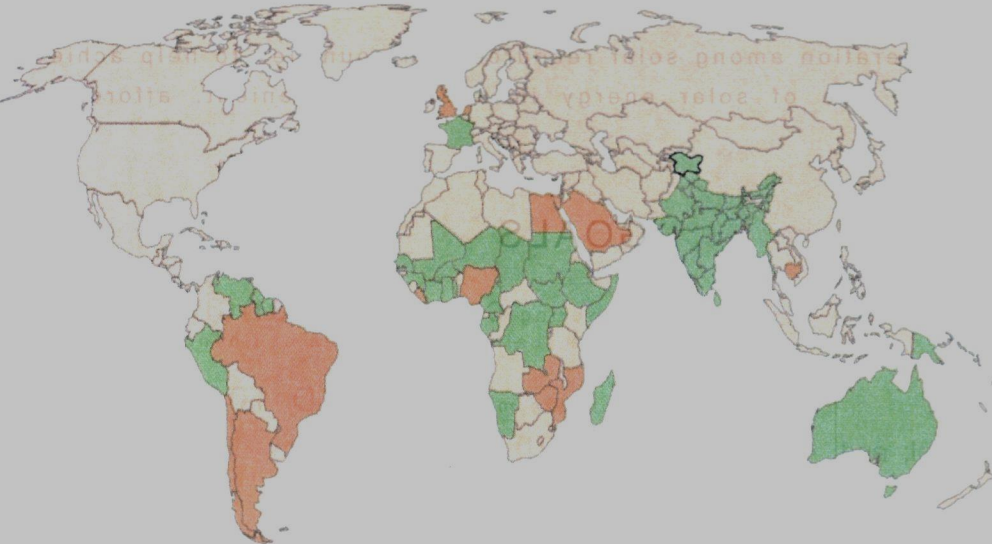
- Assembly of the ISA; President-India; Co-President-France
- Eight Committees of the ISA:
  - Standing Committee
  - Programmes; General and Legal; and Finance Committee
  - Four Regional Committee- Asia and Pacific; Latin America and the Caribbean; Africa; and Europe and others
- 6 Taskforces and 2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



# OUR PRESENCE



● Signed   ● Ratified   ● Prospective

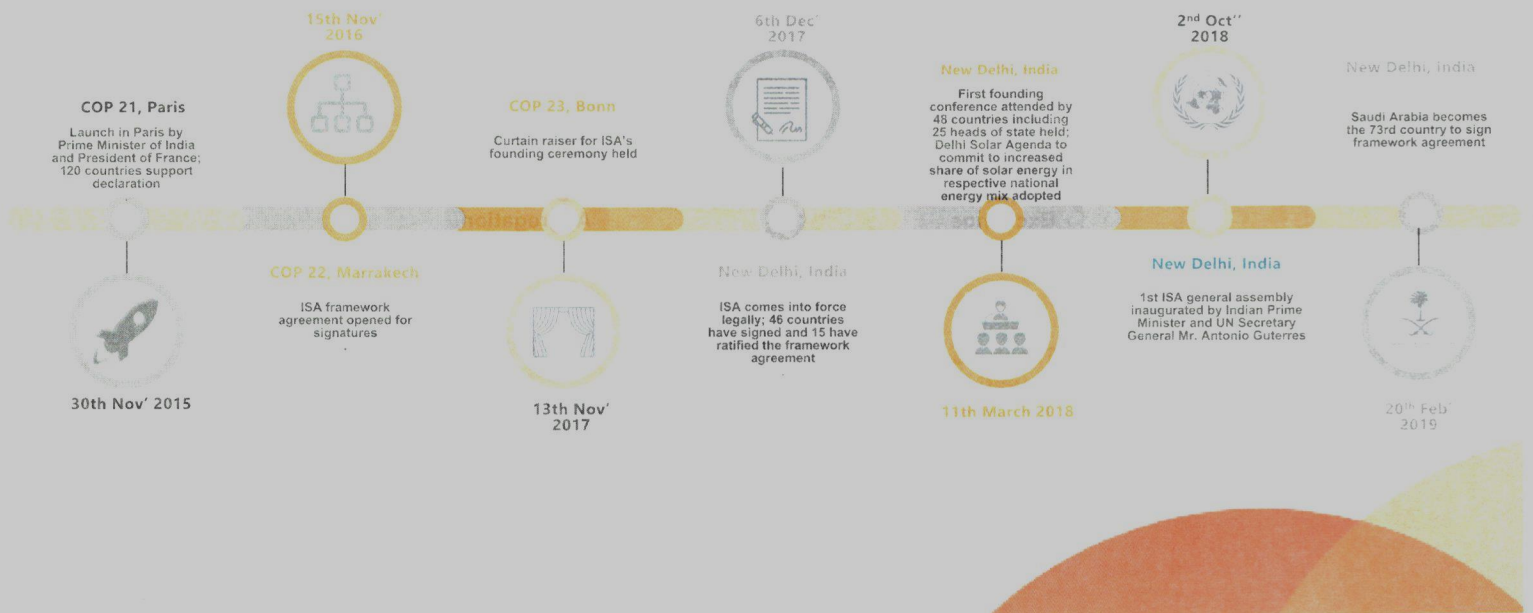
Population without access to electricity



**75 Signatory Countries**  
**53 Countries Ratified**



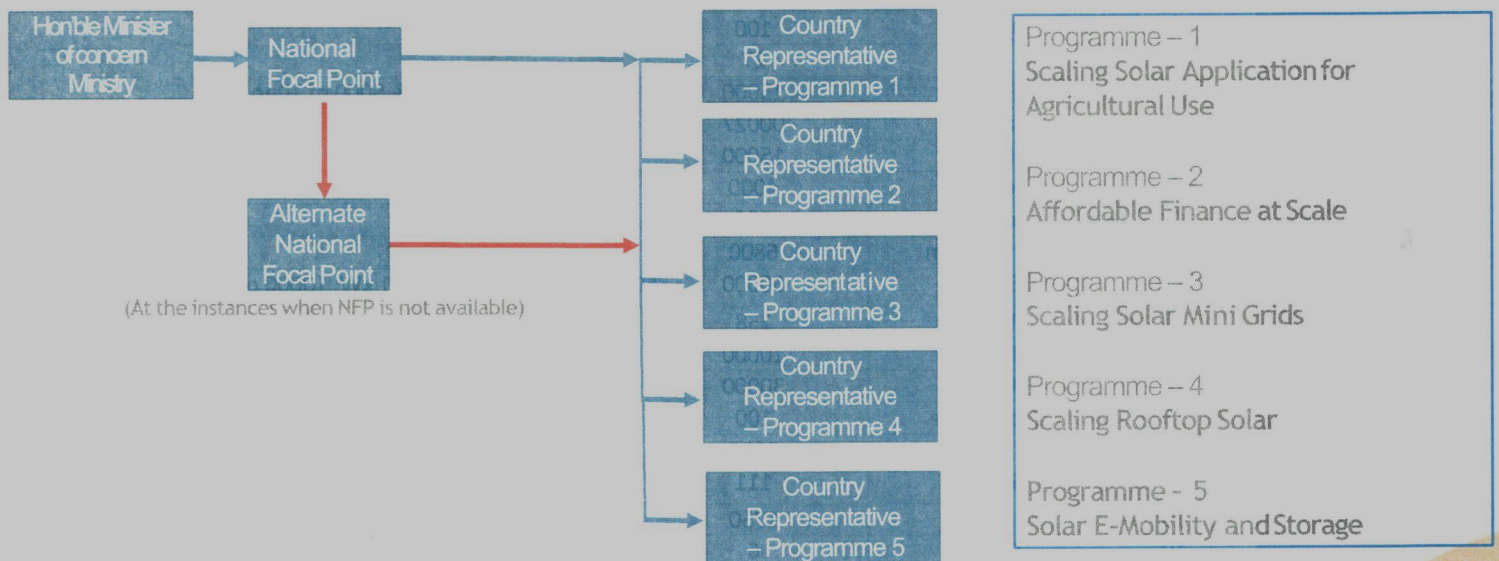
# JOURNEY SO FAR



# A CATALYST BUSINESS MODEL FOR GLOBAL SOLAR ENERGY



## Proposed Task Force at the Country Level for ISA Programmes implementation





### Demand Aggregation of Solar Water Pumps from ISA Member Countries

S. N.	Name of the Country	Demand	Demand of Specific Capacities of Pumps
1	Benin	50000	-
2	Democratic Republic of Congo	80000	10hp each
3	Djibouti	100	-
4	Fiji	27	-
5	Mali	15000	10000 of 20hp & 5000 of 10hp
6	Mauritius	00027	-
7	Niger	15000	-
8	Senegal	4000	-
9	Somalia	500	-
10	South Sudan	6800	-
11	Sudan	50000	5000 of 20 kW; 35000 of 11 kW; 10000 of 4 kW
12	Tonga	258	-
13	Tuvalu	10000	-
14	Uganda	30000	-
15	Cabo Verde	100	-
16	Sri Lanka	2000	2kW each
17	Guyana	111	0.86hp, 2.64hp, 5hp, 7.5hp, 10hp & 15hp
18	Peru	1750	-
19	Zambia	6	35hp each
20	Yemen	1500	-
21	Nauru	400	5hp and 10hp
22	Togo	5000	-
	Total	272,579	

(As on 31<sup>st</sup> Dec 2018)

Scaling Solar Application for Agricultural Use – Demand Aggregation

\* Demand withdrawn

# Scaling Solar Mini-Grids

## Demand Aggregation

### Details of the demand of Solar Mini-Grid projects received from ISA Member Countries

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

### Summary

Parameter	Aggregation capacity
Solar Mini-grids	10,462.72 MW

Scaling  
Rooftop  
Solar

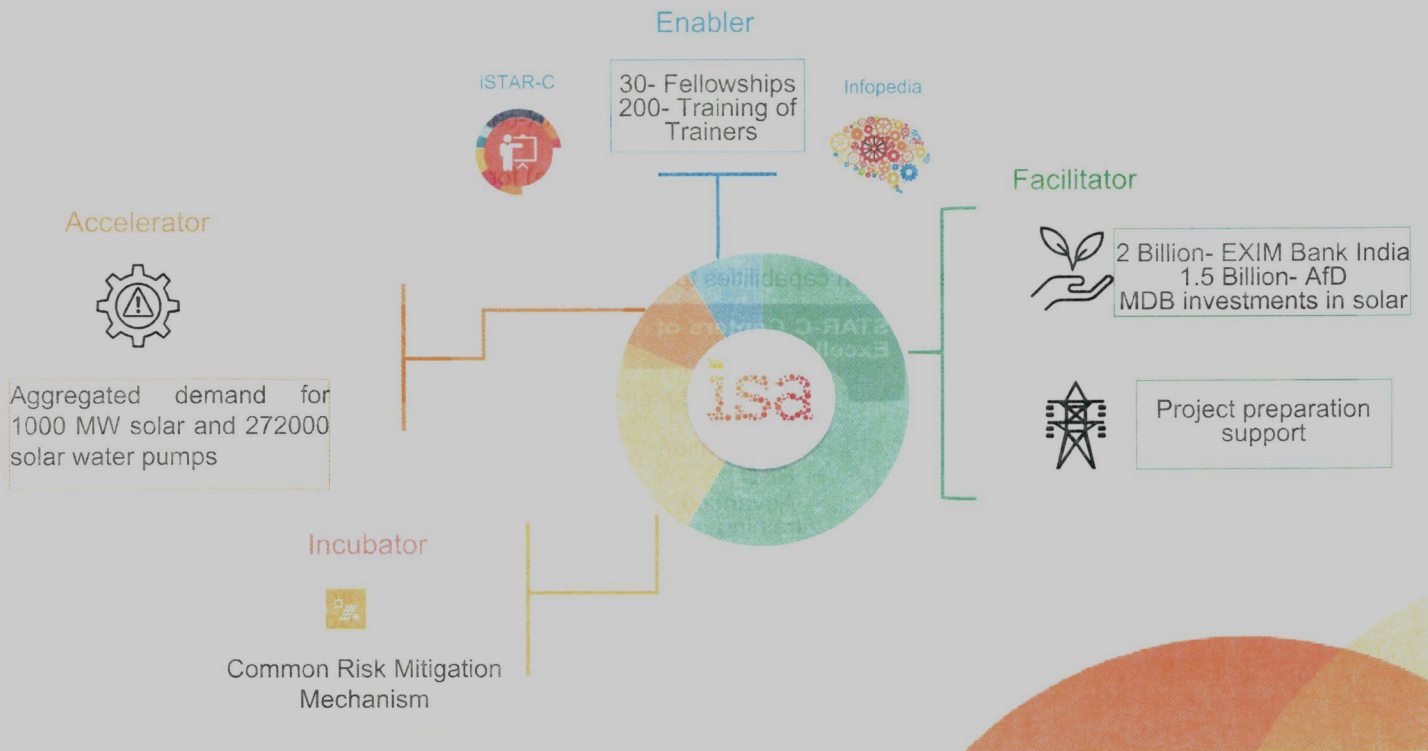
Demand  
Aggregation

### Details of the demand of Solar Rooftop projects received from ISA Member Countries

S No	Member Country	Rooftop Projects		
		Government buildings	Industrial complexes	Commercial complexes
1	Cape Verde	1.39 MW (94 projects)	1.15 MW (29 projects)	2 MW (100 projects)
2	Democratic Republic of Congo	253.2 MW (2532 Rooftops)	506.4 MW (2532 Rooftops)	253.2 MW (2532 Rooftops)
3	Cuba	0.004 MW (3 projects)	0.0068 MW (5 Projects)	-
4	Guinea	1 MW (9 Projects)	-	-
5	Malawi	2.65 MW (85 projects)	-	-
6	Nauru	1.2 MW (5 Projects)	-	1 MW (5 Projects)
7	Sudan	4.365 MW (16 projects)	-	-
8	Tonga	0.5 MW (2 projects)	0.3 MW (1 projects)	0.2 MW (3 projects)
9	Tuvalu	5 MW	-	-
10	Guinea-Bissau (Prospective member country)	4.5 MW (4 projects)	1.5 MW (3 projects)	0.5 MW (2 projects)
11	Zambia (Prospective member country)	1.5 MW	-	-

Parameter	Aggregation capacity
Solar Rooftop systems (Govt. Buildings)	275.309 MW
Solar Rooftop systems (Industrial complexes)	509.3568 MW
Solar Rooftop systems (Commercial complexes)	256.9 MW

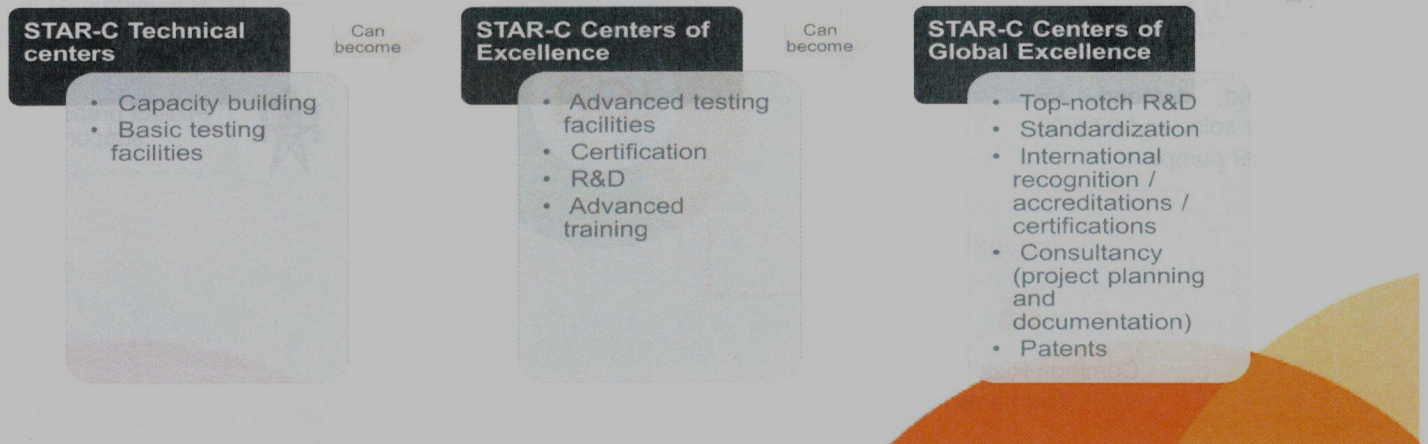
# KEY ACHIEVEMENTS



# 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.





13 Centers

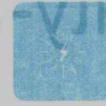


Schneider Electric Foundation

35 Centers



3 Centers



TATA Power Delhi

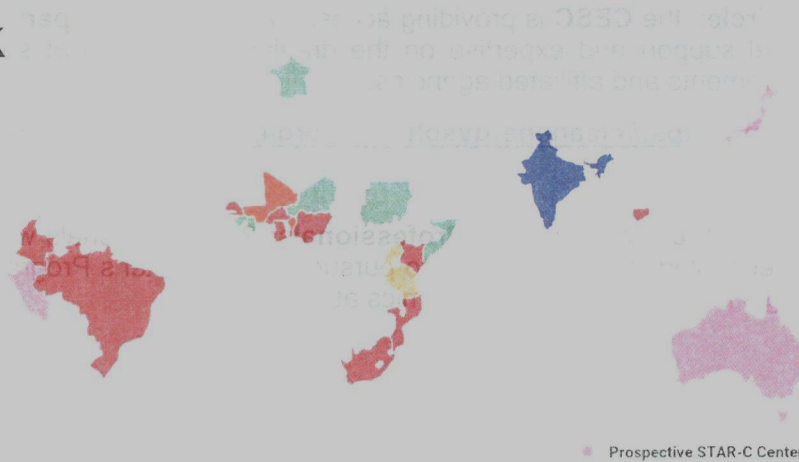
4 Centers

## 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.



- ⇒ More information : <https://cleanenergysolutions.org/expert/profiles/renewable-energy>

- **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.

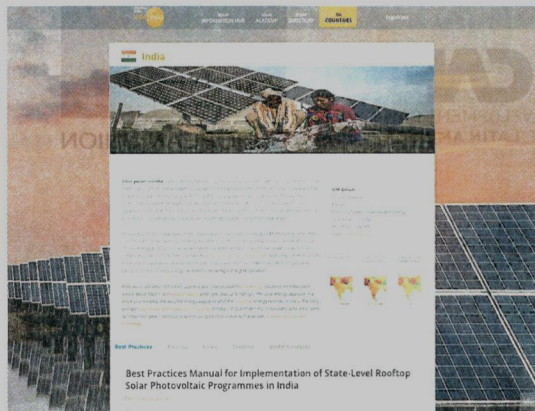


# INFOPEDIA



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

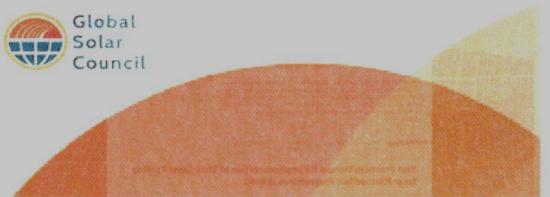




# ISA Partners



ISA have Joint Declarations with Partner Organizations (28) to promote solar energy globally.



## Corporate Partner's of ISA



US\$ 1 million



US\$ 1 million



A Maharatna Company

US\$ 1 million



US\$ 2 million



US\$ 1 million



पावरग्रिड

US\$ 1 million



रूरल इलेक्ट्रिफिकेशन कॉर्पोरेशन लिमिटेड  
Rural Electrification Corporation Limited  
(सरकार द्वारा 100% अंतरिम सहायता : A Navatna Enterprise of Govt. Of India)

US\$ 1 million



US\$ 1 million



US\$ 1 million



Corporate Partner's made voluntary contributions towards the ISA corpus fund





**KEEP  
CALM  
AND  
GO  
SOLAR**

**Rajeev Gyani**

Additional Director (Programme)

[rajeevgyani@isolaralliance.org](mailto:rajeevgyani@isolaralliance.org)

**Ramesh Kumar Kuruppath**

Additional Director (Programme/Projects)

[remeshkumar@isolaralliance.org](mailto:remeshkumar@isolaralliance.org)





# ISA-African Mission: Scaling Solar Applications for Agriculture Use (SSAAU)

19<sup>th</sup> June 2019

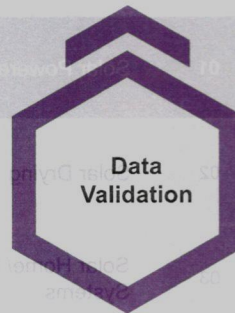
# Agenda



- 1 Mission visits
- 2 About SSAAU
- 3 Business models for solar pump deployment
- 4 Demand Aggregation for Solar Water Pumps
- 5 Potential Impact of Solar Water Pumping Programme

## 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

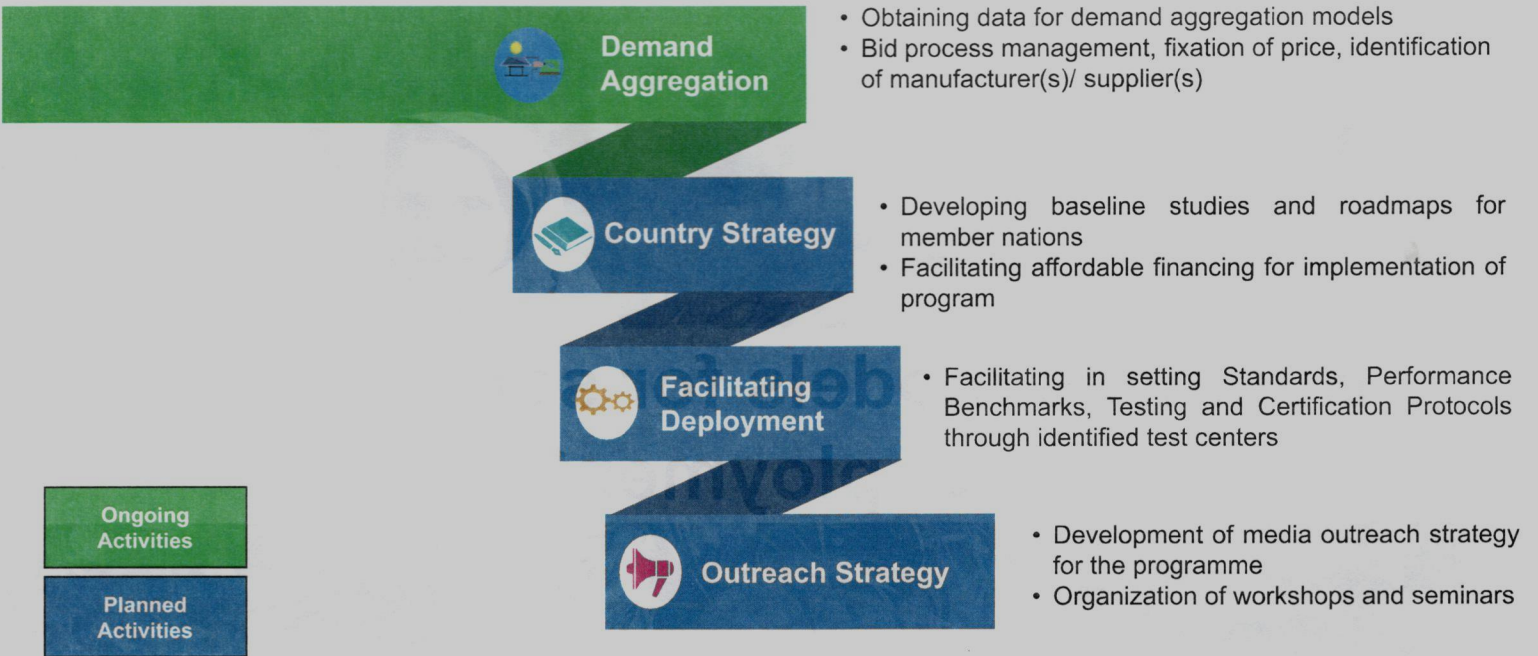
## Focus Technologies

- 01 Solar Powered Irrigation Systems
- 02 Solar Drying
- 03 Solar Home/ Street Lighting Systems
- 04 Solar Chilling
- 05 Other off-grid applications

## Focus Areas



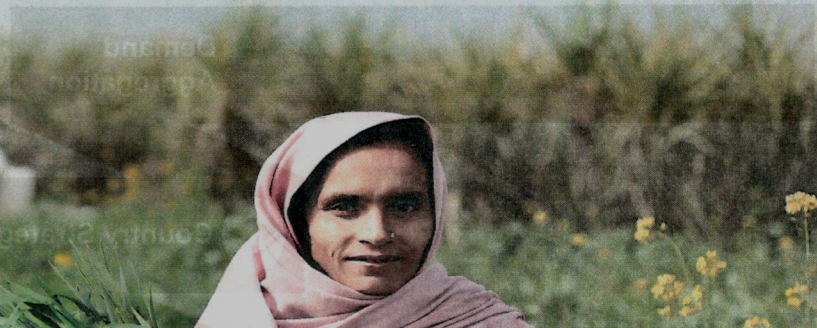
# Key Activities under SSAAU





Key Activities under SSAU

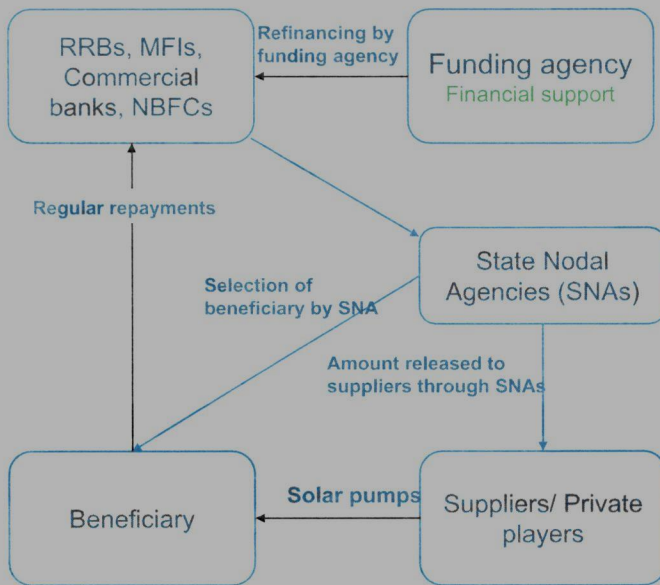
- Obtaining data for demand aggregation models
- Bid process management, fixation of price, identification of manufacturer(s), supplier(s)
- Developing baseline studies and roadmaps for member nations
- Facilitating affordable financing for implementation of program



# Business models for solar pumps deployment

# Standalone off-grid solar pumpsets

## Solar pumps business models

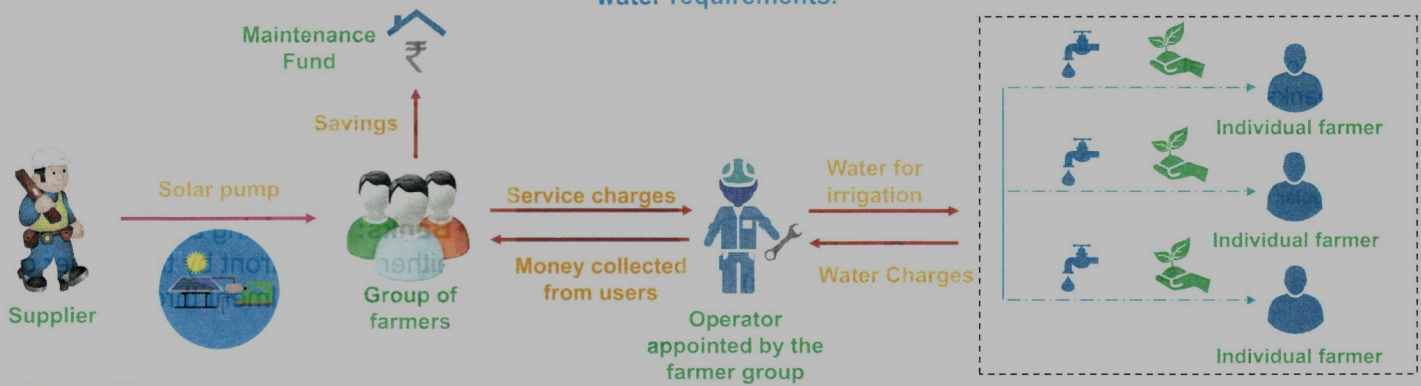


- Ownership** Solar Pump owned by the farmer
- Financing**
  - Financial support by Funding agencies
  - **Banks:** Remaining amount is either paid upfront by the farmer or in equal installment through bank loan
- State Benefit** Subsidy savings through reduced Power Purchase Cost (PPC) and T&D loss 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

Solar pumps business models

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



Subsidy savings through reduced

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

*Solar pumps business models*

Farmer estimate 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

Farmer pays amount based on water delivered



Solution provider aggregates the pump deployment

Avoids prohibitive upfront costs for the farmer and risk of maintenance

Portable pump operator visits the farmer's site, delivers water to his agriculture land

**Solution Provider: Supplier/ Farmer Cooperative/ NGO**



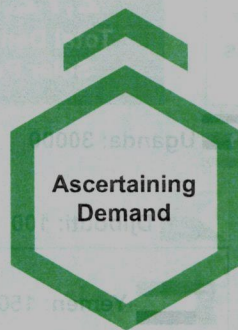
# Demand Aggregation

## Key Activities

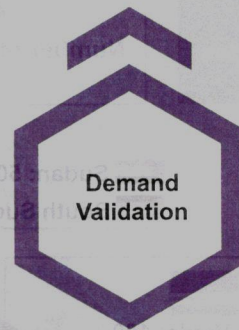
### Demand Aggregation



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



- 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



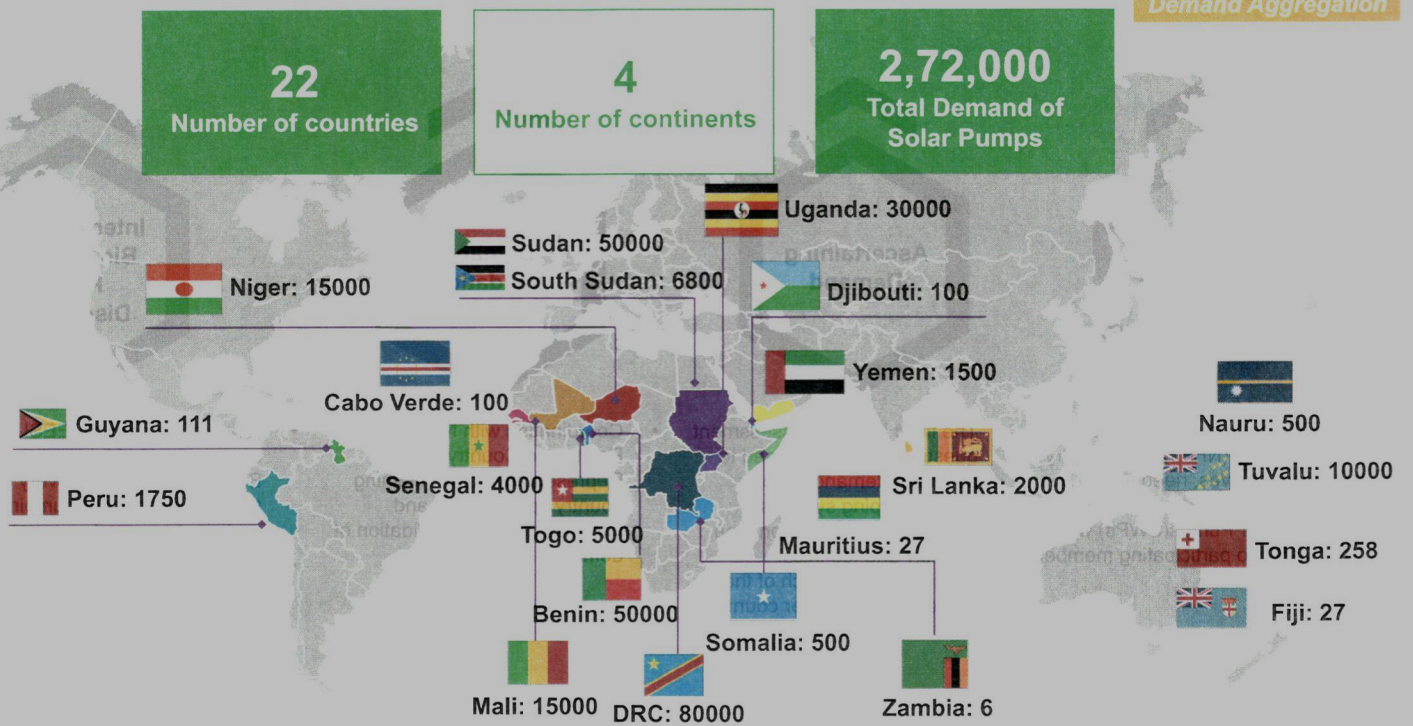
- Coordinating with National Focal Points and Country Representatives for obtaining country specific data and information and for validation of demand



- 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

Demand Aggregation



## Way Forward

Demand Aggregation

Activity	Status
Bid document uploaded on EESL/UNDP website	Done
Pre-bid meeting at ISA headquarters	Done
Incorporating clarifications/amendments; Issuance of revised bid document	Ongoing
Bid submission	To be done
Technical Bid Evaluation	To be done
Price Bid Opening	To be done

### 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 accordingly identify and tie up with suitable funding agency
- ✓ Entering into agreement with developers
- ✓ Facilitating implementation of solar pump sets in the country



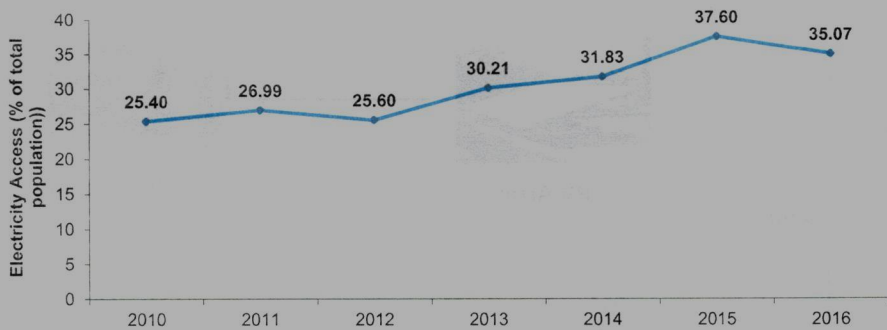


# Impact of Solar water pumps

# Country Snapshot- Mali

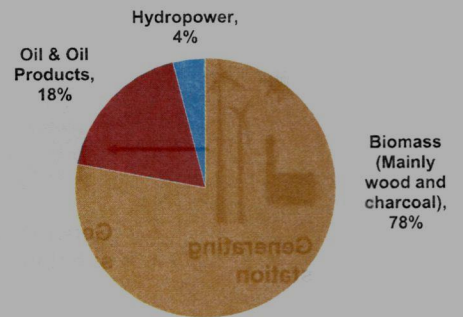
## Impact of SWP

The access to electricity in Mali is increasing, albeit slowly



Source: World Bank

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

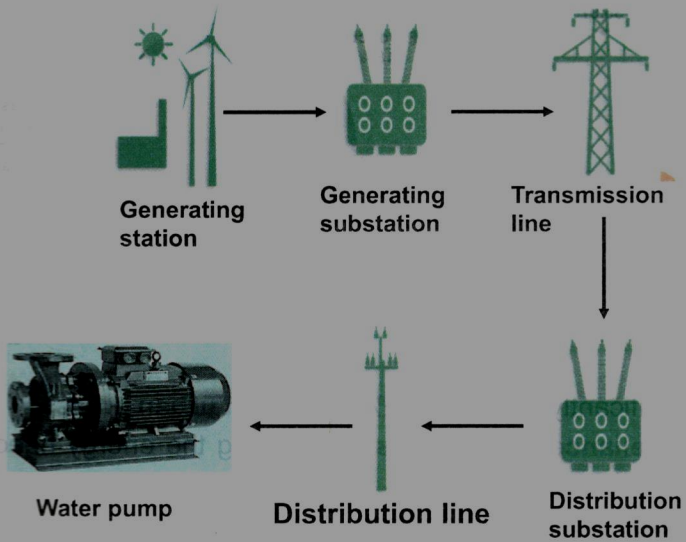


Source: Energypedia

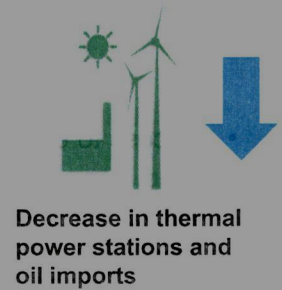
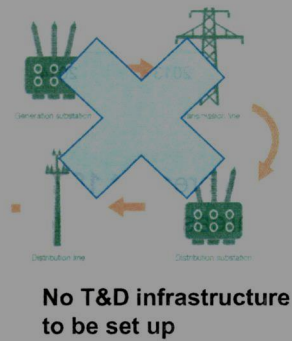
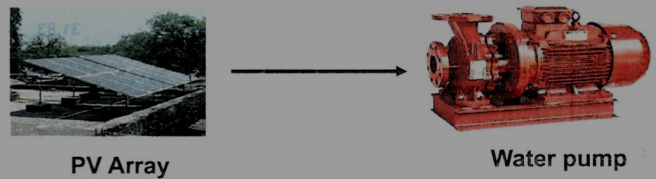
- Access to electricity in the rural areas at **18%** which is significantly less than **83% access in urban areas**
- **Grid unavailability** in rural areas has led to increasing **reliance on biomass** for meeting the energy needs- **Rapid deforestation**
- Farmers depend on **rain fed irrigation**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

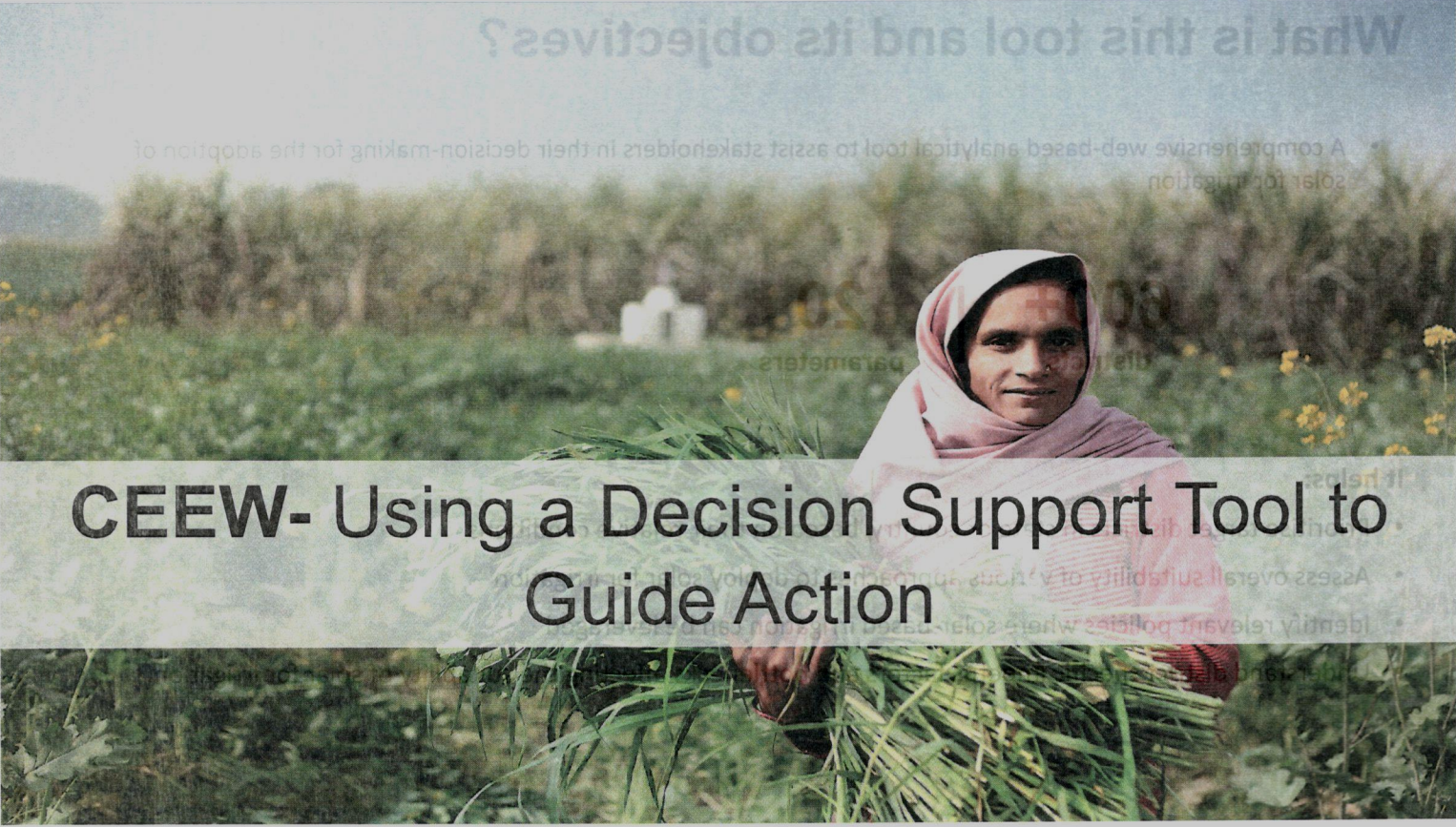
# Advantages to Mali with SSAU

## Present scenario



## With Off-Grid Solar pumpsets





# 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

[rajeevgyani@isolaralliance.org](mailto:rajeevgyani@isolaralliance.org)

+91-9425 5037 42

## Criteria used for calculating overall score

Criteria and Parameters	 Inadequate access to affordable and reliable irrigation
	 Economic viability of solar pumps
	 Purchasing capacity of farmers
	 Access and subscription to institutional credit
	 Farmers' attitude towards adoption of new technologies

Annexure 6e

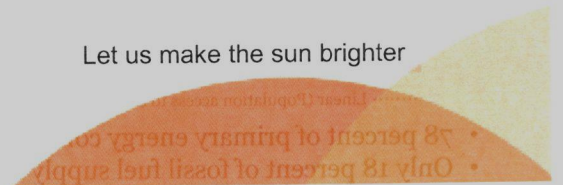
# Scaling of Rooftop Solar Programme in ISA Countries:

A presentation by International Solar  
Alliance Secretariat



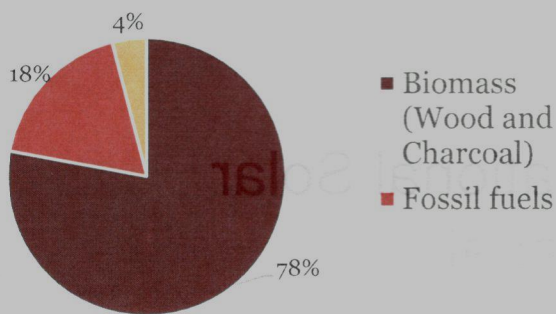
Bamako, Mali  
18.06.2019

Let us make the sun brighter

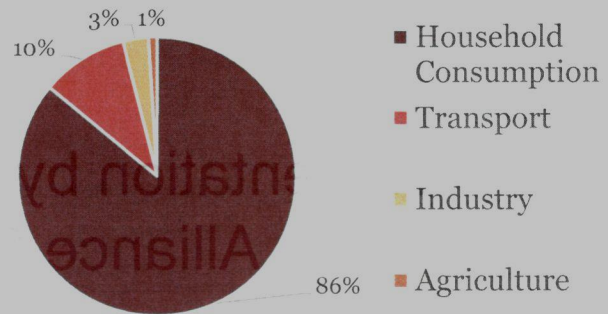


## Energy Scenario in Mali

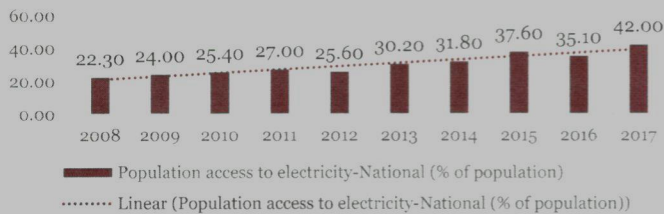
Primary Energy Supply in (%)



Primary Energy Consumption in %



Population access to electricity-National (% of population)



Electricity final consumption per capita (KWh)

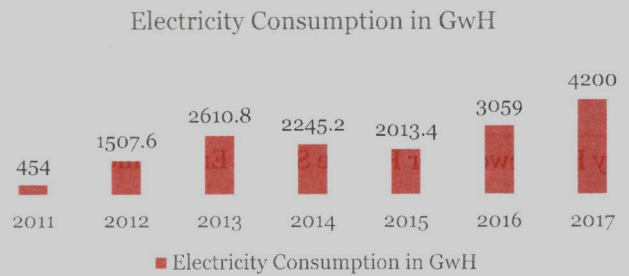
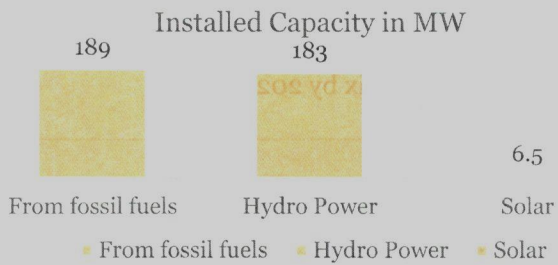
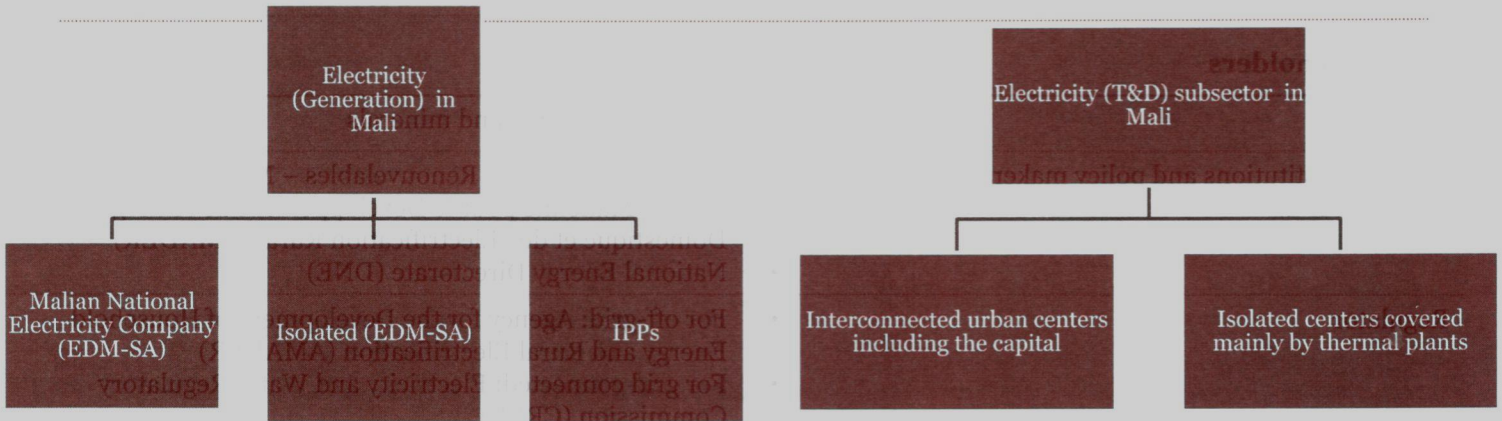


- 78 percent of primary energy comes from Biomass
- Only 18 percent of fossil fuel supply from domestic sources, heavily dependent on imports

**Overall Access to Electricity 42%**

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

## Electricity subsector in Mali



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

## *Electricity subsector in Mali*

### Key Stakeholders

Ministry	<ul style="list-style-type: none"> <li>Ministry of energy and minerals</li> </ul>
National institutions and policy makers	<ul style="list-style-type: none"> <li>Agence des Energies Renouvelables – Mali(AER)</li> <li>Agence Malienne pour le Développement de l’Energie Domestique et de l’Electrification Rural (AMADER)</li> <li>National Energy Directorate (DNE)</li> </ul>
Regulator	<ul style="list-style-type: none"> <li>For off-grid: Agency for the Development of Household Energy and Rural Electrification (AMADER)</li> <li>For grid connected: Electricity and Water Regulatory Commission (CREE)</li> </ul>
Governing Policy	<ul style="list-style-type: none"> <li>National Energy Policy (NEP)</li> </ul>
RE policy	<ul style="list-style-type: none"> <li>National Renewable Energy Development Strategy adopted in 2006 (10% of the energy mix by 2020)</li> </ul>
Policy Framework for Private Sector Engagement	<ul style="list-style-type: none"> <li>Rural Electrification Fund</li> <li>National Industrial Development Policy</li> <li>Public Private Partnership Framework</li> <li>Investment Promotion Council of Mali (API-Mali)</li> </ul>

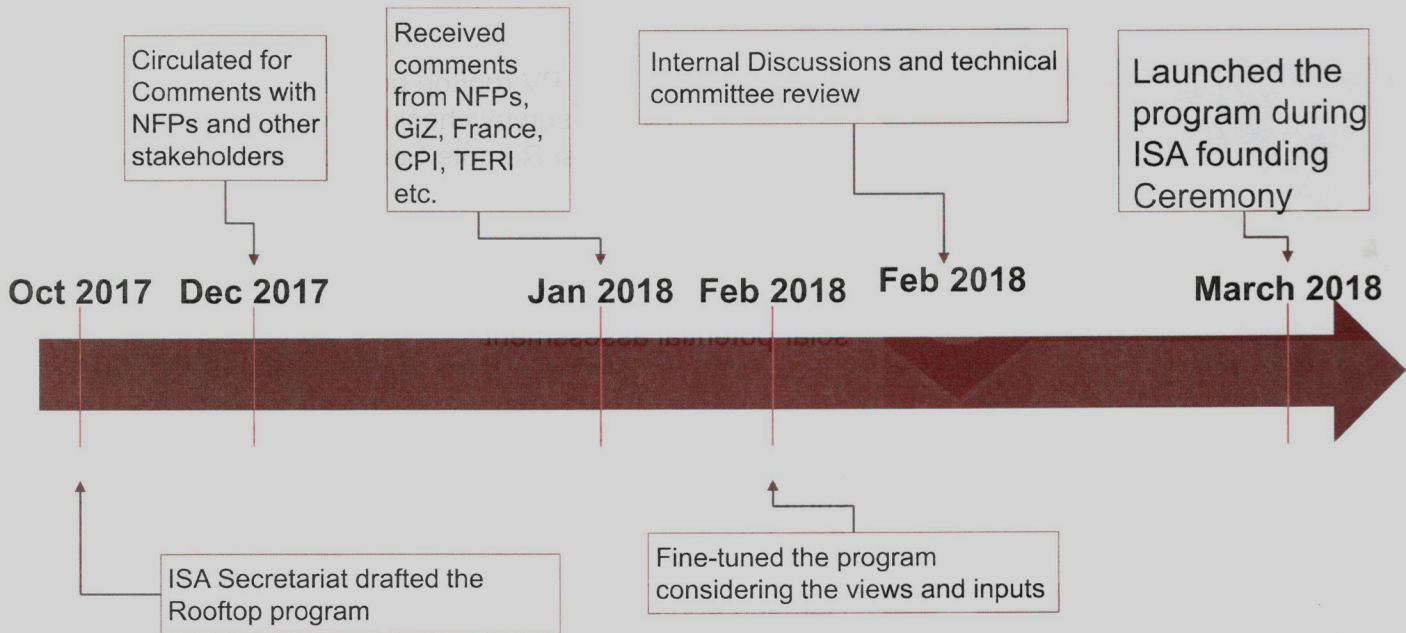
## Mapping ISA's services for the promotion of solar in countries of the African sub-continent



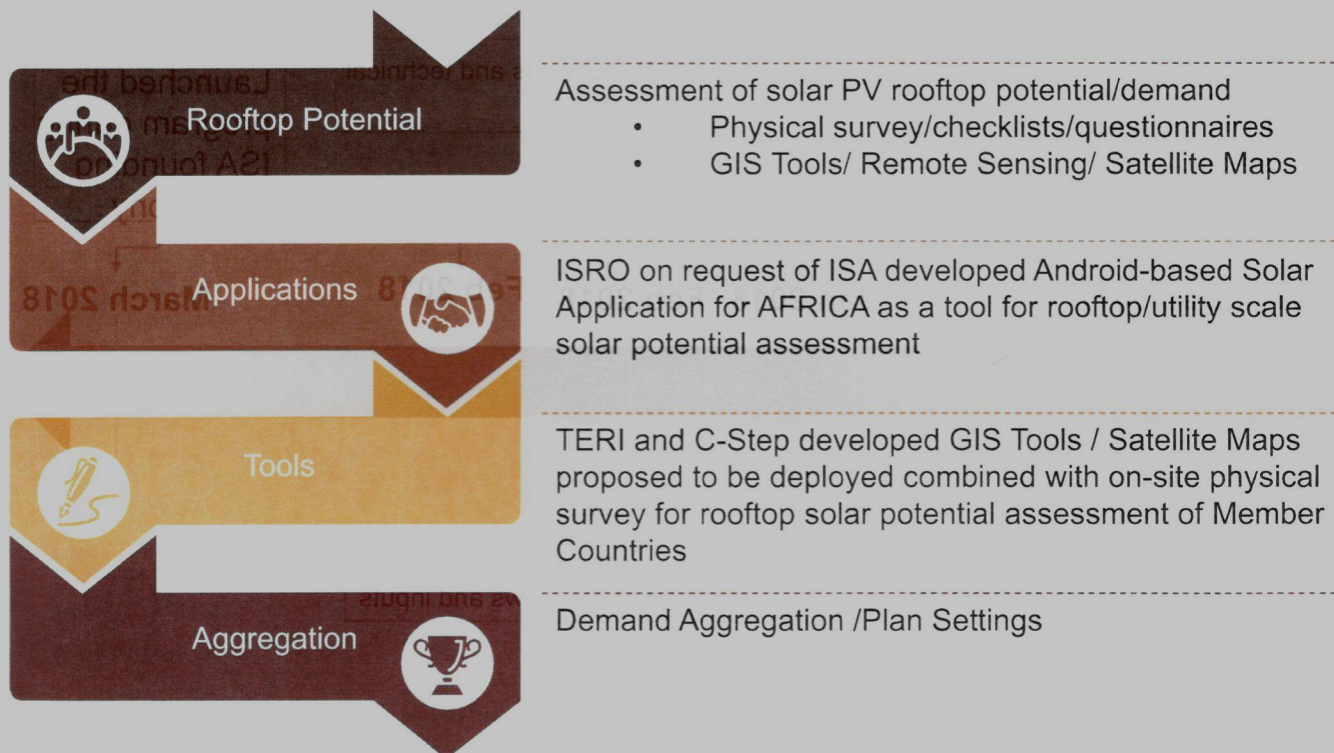
# ***ISA Program: Scaling Solar PV Rooftop***



## Background of the program



## Action Plan and Activities for Implementation



## 1 GW+ solar PV rooftop potential/demand received from ISA member countries

S No	Member Country	Rooftop Projects		
		Government buildings	Industrial complexes	Commercial complexes
1	Cape Verde	1.39 MW (94 projects)	1.15 MW (29 projects)	2 MW (100 projects)
2	Democratic Republic of Congo	253.2 MW (2532 Rooftops)	506.4 MW (2532 Rooftops)	253.2 MW (2532 Rooftops)
3	Cuba	0.004 MW (3 projects)	0.0068 MW (5 Projects)	-
4	Guinea	1 MW (9 Projects)	-	-
5	Malawi	2.65 MW (85 projects)	-	-
6	Nauru	1.2 MW (5 Projects)	-	1 MW (5 Projects)
7	Sudan	4.365 MW (16 projects)	-	-
8	Tonga	0.5 MW (2 projects)	0.3 MW (1 projects)	0.2 MW (3 projects)
9	Tuvalu	5 MW	-	-
10	Guinea-Bissau (Prospective member country)	4.5 MW (4 projects)	1.5 MW (3 projects)	0.5 MW (2 projects)
11	Zambia (Prospective member country)	1.5 MW	-	-

Parameter	Aggregation capacity
Solar Rooftop systems (Govt. Buildings)	275.30 MW
Solar Rooftop systems (Industrial complexes)	509.35 MW
Solar Rooftop systems (Commercial complexes)	256.90 MW

## *Next steps*

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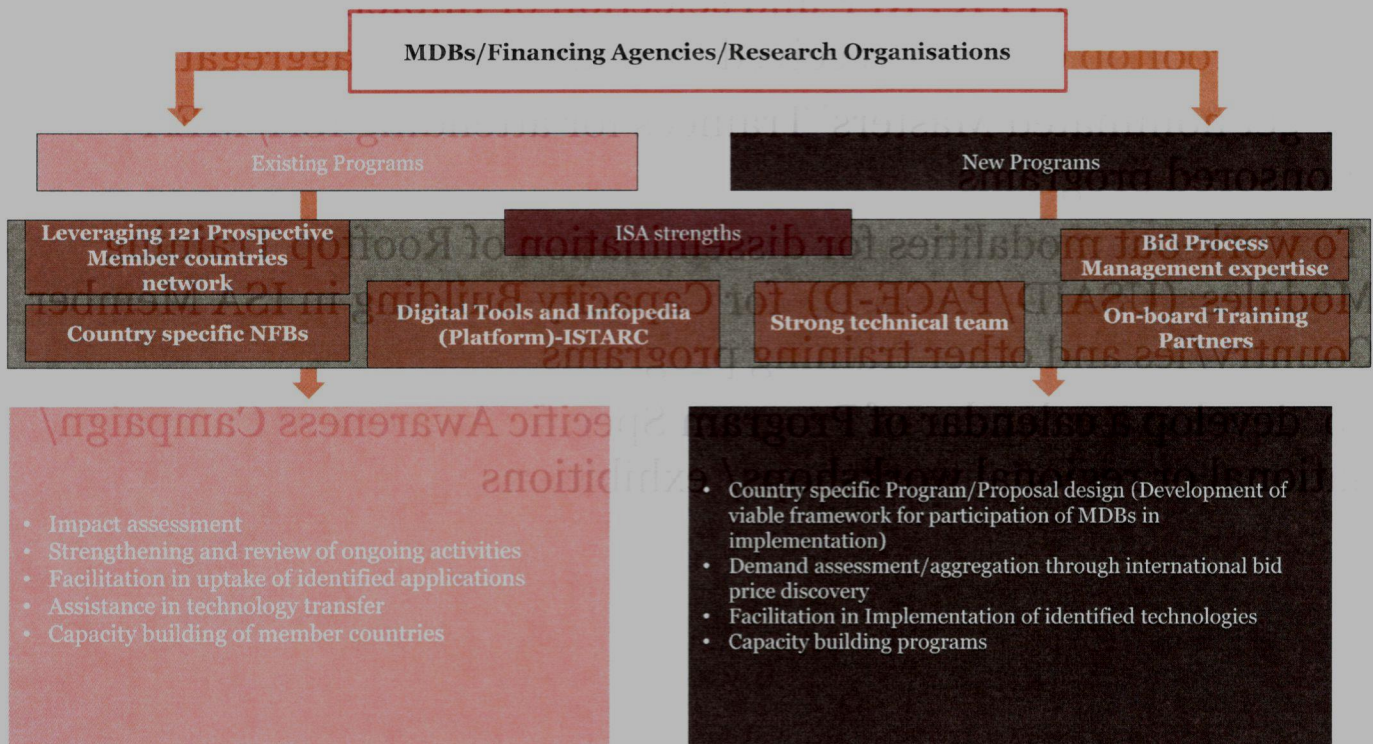
- Respective member countries to be identified a nodal person for the Program: “Scaling Rooftop Solar” for coordinated efforts with ISA
- To adopt a progressive solar rooftop policy and “Net Metering” Process in harmony with other member countries/groups for rapid scale-up
- To initiate physical assessment 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



## ***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 28<sup>th</sup> June 19 PMC on swish challenge basis**
- **PMC finalization is expected in July 2019**

**Thank you**

**Rajeev Gyani**

Additional Director (Programme)

[rajeevgyani@isolaralliance.org](mailto:rajeevgyani@isolaralliance.org)

**Ramesh Kumar Kuruppath**

Additional Director (Programme/Projects)

[remeshkumar@isolaralliance.org](mailto:remeshkumar@isolaralliance.org)

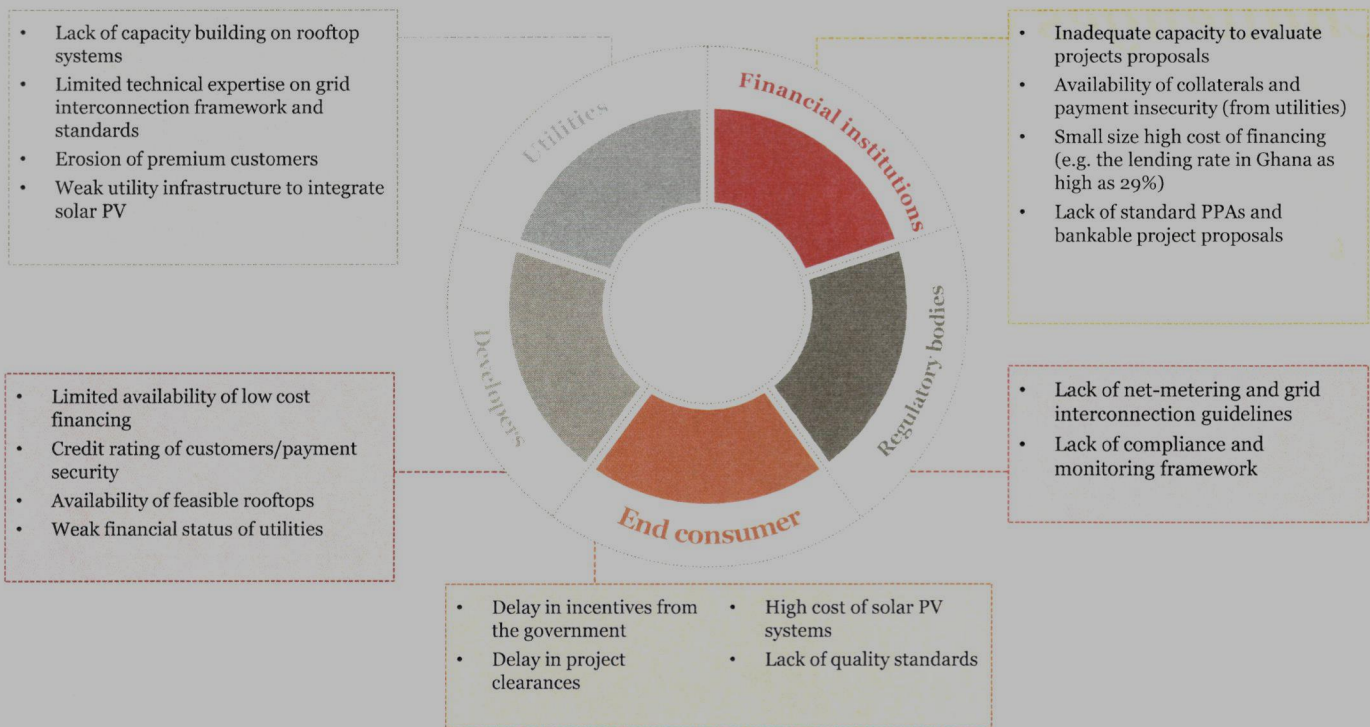




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# *Challenges and Way forward*

## Key Challenges for Rooftop Solar penetration



## 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

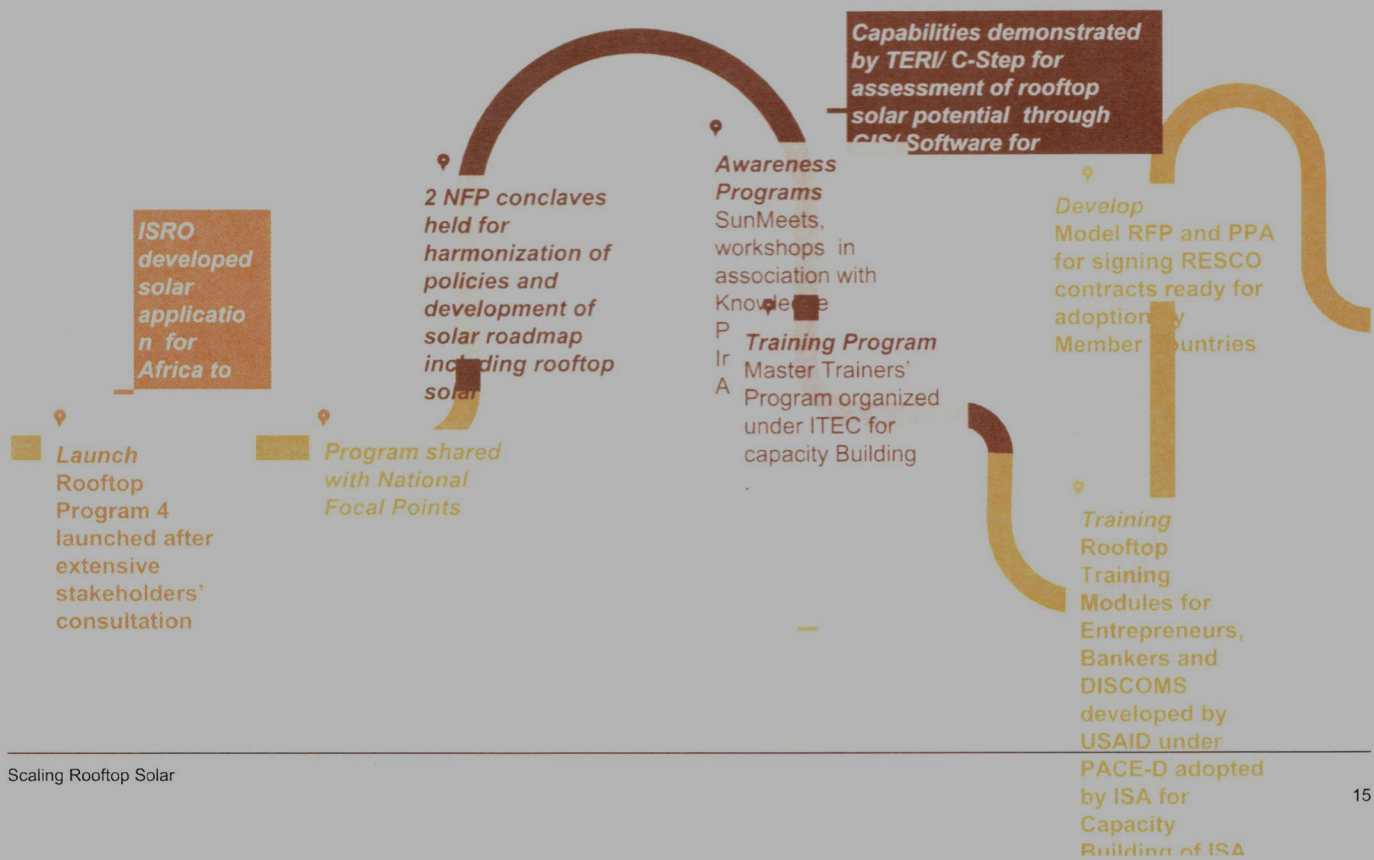
### Capacity Building Programs

- 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



# **ISA Programme on Scaling Solar Mini Grids:**

***A presentation by International Solar Alliance***



Bamako, Mali  
18.06.2019

Let us make the sun brighter



## ISA's Programme – Scaling Solar Mini-Grids



- “**Scaling Solar Mini Grids**” (SSMG) was launched on 24<sup>th</sup> May, 2017 during 52<sup>nd</sup> 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





## Mini-Grids Demand Aggregation



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

S No:	Member Country	Demand Aggregation (Capacity in MW <sub>p</sub> )
1	Democratic Republic of Congo	10400
2	Cuba	0.0094
3	Guyana	1.634
4	Malawi	2.8
5	Sri Lanka	3.73
6	Sudan	46.042
7	Tonga	1.008
8	Guinea-Bissau	5
9	Zimbabwe (Prospective Country)	2.5
<i>Total</i>		<i>10462.72 MW<sub>p</sub></i>



## 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.





# Key consideration for a successful solar mini-grid programme



Focus	DESCRIPTION
Policy	<ul style="list-style-type: none"> <li>• Current policies encourage grid extension and deter mini-grids by not providing long term clarity.</li> <li>• Subsidy such as capital subsidies, are aimed at short-term performance –                             <ul style="list-style-type: none"> <li>• highly rely on EPC cum short term O&amp;M model</li> </ul> </li> <li>• Policy to provide long term clarity and performance based incentive for driving sustainable models</li> </ul>
Regulation	<ul style="list-style-type: none"> <li>• Competition with main grid ? Need clarity on operation of mini-grids with areas with existing grid access</li> <li>• Regulation to support policy on aspects related to framework for integration with main grid</li> </ul>
Institutional	<ul style="list-style-type: none"> <li>• Lack of institutional capacity - many state-level agencies lack capacity to properly address rural electrification</li> <li>• Distribution, most of the times, not involved in solar mini-grid project allocation and contracting</li> </ul>



## Key consideration for a successful solar mini-grid programme



Focus	DESCRIPTION
Technical	<ul style="list-style-type: none"><li>• Solar energy intermittent in nature - Energy storage technology is expensive and can increase the cost of mini-grid projects – right sizing can reduce cost</li><li>• Hybrid mini-grids add complexity and cost to the system – O&amp;M is more complex</li><li>• Anchor loads increase commercial viability – good to have better mix</li><li>• Technicians training at a local level to handle preventative maintenance</li></ul>
Financing	<ul style="list-style-type: none"><li>• Private developers have tapped developmental bank loans or venture capital funds or CSR funds</li><li>• Mini-grids considered transition solutions either due to their lack of an anchor customer or grid connection.</li><li>• Lack of financially sustainable business models, plus banks' preference to lend to large projects especially those that are grid connected.</li></ul>

## Key consideration for a successful solar mini-grid programme

Focus	DESCRIPTION
Market	<ul style="list-style-type: none"> <li>• Customer engagement :Engaging with, acquiring and retaining paying customers is often a challenge</li> <li>• Need to ensure adequate demand and long term sustainability fro attracting good players</li> <li>• Formation of Village level communities assisted in some models (WBREDA Sunderban)</li> </ul>
Technological interventions	<ul style="list-style-type: none"> <li>• IT based solutions to reduce operation cost – bill payment, metering</li> <li>• Involvement of local entrepreneurs for retailing energy credits</li> </ul>

## Challenges to be addressed



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

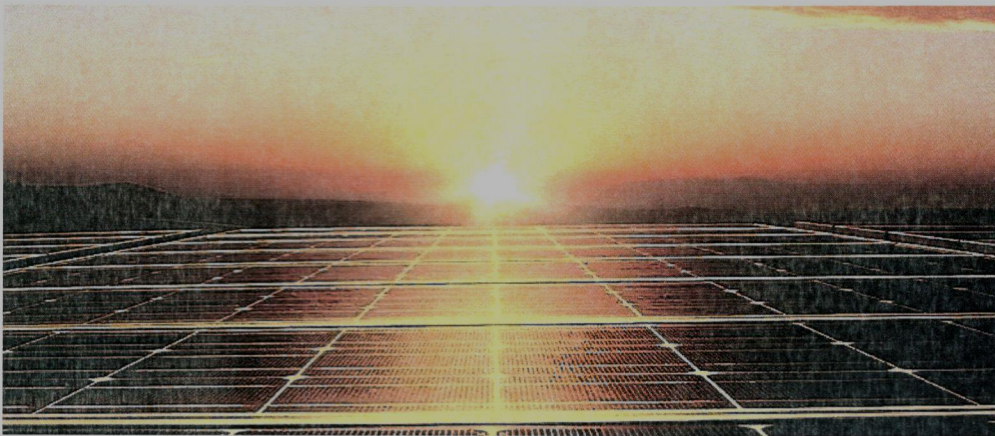


## Way Forward

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- 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](http://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?

**SECRETARIAT  
INTERNATIONAL SOLAR ALLIANCE  
GURUGRAM  
INDIA**

**INFORMATION SHEET FOR IMPLEMENTING ROOFTOP SOLAR**

**A) GENERAL DATA**

SR.NO.	INFORMATION SOUGHT FROM MEMBER COUNTRY	DETAILS
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  Any Financial/Fiscal incentives for promoting Rooftop Solar like custom duty/VAT/Income tax exemptions or Accelerated depreciation etc.	
6	Net Metering policy and Grid Integration Regulation for Solar Rooftop*	
7	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	
8	Whether there is any Regulated Benchmark cost of Rooftop Solar PV system?	
9	Is there any Feed in Tariff for Rooftop solar? If yes, please share details	
10	Indicative list of Local supplier/EPC companies with contact details	
12	List of financing agencies (Banks and other institutions active in the country)	
13	List of skill development/training programs if any?	

Name & Signature

Dated:

**B) SITE SPECIFIC DATA:**

SR.NO.	INFORMATION SOUGHT	DETAILS
1	List of Buildings identified for Rooftop solar (category wise) (Government/Industrial/Commercial/Institutional)	
2	Name, address and contact details of each Building/ site owner	
3	Clear shadow free area available for Rooftop installation in each building(In Sq.Meter)	
4	Present source of electricity(grid, DG set, solar etc)	
5	Connected load and voltage level	
6	Annual average electricity consumption in MU (month wise)	
7	Overall energy consumption per year in MU of each identified building: 1. From electricity grid ----- 2. From back up options like DG set-----	
8	Type of roof structure  <ul style="list-style-type: none"> <li>• RCC</li> <li>• Asbestos</li> <li>• Tin shed</li> <li>• Others (Please specify)</li> </ul> Orientation and tilt of the roof: 1. Flat roof 2. Slant	



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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