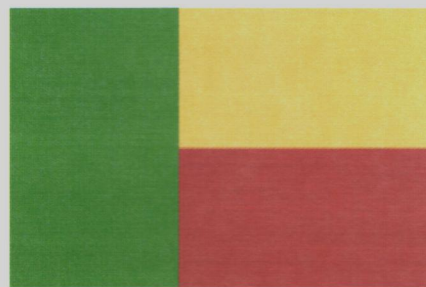


# Report on ISA Mission visit to Benin

1 -5 July 2019



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## Report of ISA Mission visit to Benin

**Visit duration: 1<sup>st</sup> to 5<sup>th</sup> July 2019**

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

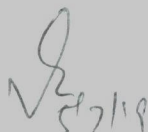
### **Introduction:**

THE INTERNATIONAL SOLAR ALLIANCE (hereinafter referred to as “ISA”) is a treaty based inter-governmental organization which was launched on 30<sup>th</sup> November 2015, in Paris, France during COP 21, 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. Benin is one of the founding Member Country of ISA.

ISA has been framing various Programmes supporting activities, in order to Scale up Solar Applications 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 visited Benin from 1<sup>st</sup> July 2019 to 5<sup>th</sup> July 2019. The objectives of the Mission Benin are: 1) To create awareness of ISA Programme and its activities among all the important Ministries/ Departments and other stakeholders in Benin under the guidance & coordination of Mr. Todeman Assan, the National Focal Point (NFP) of ISA in Benin 2) To carry out pre-feasibility studies for implementation of demand of 50,000 Number of Solar Water Pumping Systems. 3) To discuss and understand the demand submitted by Benin, after 31<sup>st</sup> Dec 2018, for Solar Rooftop and Solar Mini Grids. 4) Discuss regarding I-STAR center & capacity building of Benin in Solar Applications.

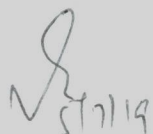
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Apart from the above, the ISA Mission wanted to understand the existing Energy scenario of Benin including Renewable Energy activities, Agriculture/ Irrigation Infrastructure and various policies/regulations in the Country which will help ISA to guide Benin to scale up Solar applications in the Country.

NFP Benin had prepared the schedule of the meetings with various concern officials and dignitaries of the Government of Benin. This schedule was based on the request letter from H E Upendra Tripathy, Director General of ISA to Hon'ble Minister of Energy, Benin. ISA Team held a preliminary meeting with NFP one day prior to the start of Mission i.e. on 30<sup>th</sup> June 2019, to discuss on objectives of the meetings and to suggest any suitable changes in schedule in accordance to Mission objectives. The schedule has been attached in Annexure-A. It was decided that in every meeting, ISA team shall brief the respective Department/Ministry/Organisation about ISA and its objectives in 10-15 mins. Rest of the meeting shall focus on role of respective ministries in solar programmes, present energy status in Benin, international competitive bidding for solar pumpsets, current status on demand collection for pumpsets etc. with respect to the role of the Ministry/Department/Organization.

Accordingly, Team held meetings with various Ministries/ Departments/ Organisations such as the Ministry of Energy, Ministry of Agriculture, Ministry of Planning and Development, the Members of a Unity in charge of Renewable Energy Development Policy in Bureau of Analysis and Investigation at the Presidential Office, ARE, ARESS, AISER, EU, GIZ, WB, EU, AFD, Electricity Regulator of Benin, the Indian private Solar Systems Integrators in solar electrification in Urban as well as Rural areas of Benin, the prospective STAR-Centers : SEME CITY, EPAC and ESMER. The organogram of Benin Energy Ministry in attached in Annexure-2.



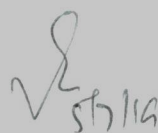

1<sup>st</sup> July 2019

- **The meeting on 1<sup>st</sup> July 19 was held with the officials of Ministry of Energy** chaired by Hon'ble Cabinet Director Mr. Armand S. Raoul Dakehoun. The full list of officials attended is mentioned in Annexure-3. In his opening remarks, he mentioned the following:
  - Benin is predominantly dependent on energy importation to meet its domestic needs. Benin has very low energy access in rural areas (~8%) and very low installed solar capacity. The country is over dependent on biomass to meet its energy requirements.
  - Presently the government has ambitious targets for implementation of solar projects in Benin. To enable this, the government is in the process of making the legal framework and existing policy is also being revised. Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and Economic Community of West African States (ECOWAS) are supporting Benin in making the enabling framework, under Energizing Development.
  - The government is focused to increase energy access to rural areas with solar penetration and so far 83 Solar Mini Grids with the capacity of 20 kW-40 kW have been installed (**Details required**). In 2017, some companies have installed 41 Solar PV systems and 71 Solar Water Pumping systems (Details required). Four Grid connected Solar PV projects have been planned with each 10 MW, 10 MW, 15 MW, 15 MW capacity, which tender is already lunched. Further, French Development Agency (AFD) & European Union (EU) has given financial support for construction of 25 MW in the eastern part of Benin (Details required). It was informed that Benin is planning to install 100 MW Grid connected Solar PV projects by 2021. There would four more Solar Power Plant of cumulative capacity of 50MW (15+15+10+10) at four locations in coming future.
  - He requested ISA to support drilling of 100 Nos. boreholes for installation of solar agricultural pumping systems. Further it was informed that Benin has joined the other programmes of ISA viz. Solar Mini Grids, Solar Rooftop and Solar E-mobility & storage programmes. Under Solar Rooftop program, Benin intends to install solar projects at their administrative buildings. He further requested ISA assistance in capacity building in solar applications.
- NFP gave a detailed presentation of present energy scenario in the country. The key aspects of the presentation are highlighted below (full presentation by NFP is attached as Annexure 4):

Energy Scenario in Benin:




- The country is in a situation of overdependence on traditional biomass and import of energy from the neighboring countries.
- The electricity access is quite low 32% at the national level with 59% in urban area and 8.3 % in rural areas.
- The percentage of renewable energy in the energy mix is still low at 1% with hydroelectricity and solar power.
- The NFP affirmed that International Solar Alliance is being seen as a great opportunity for Benin to develop solar energy. Based on the National Renewable Energy Plan, Benin aims at implementing solar mini grids to increase the electricity access in rural area and develop solar home lighting systems. The 5 year government plan known as PAG, include the following projects in the pipeline:
  - MCA Benin II: 50 MW (4 installations , 10, 10, 15, 15) solar plant connected to the grid
  - DEFISOL : 25 MW
  - PANA : several mini solar PV plants installations
  - Biomass electricity: 4MW (4 installations of 1MW each).
- To achieve the objectives defined in the national strategic plan, two main challenges have been emphasized by the NFP:
  - The sustainability of the projects
  - The access to affordable finance for quality equipment and innovative technologies. In 2017, World Bank published a study emphasizing the high cost of technologies in Africa compared to Asia.
- Besides the projects targeted in the PAG, Benin is developing other projects supported by different international partners such as AFD, GIZ, and Gol through Exim Bank LoC listed in the full presentation attached at Annexure 4.
- Benin is aware of the key role an incentive governance structure will play for scaling up solar energy and the country already has a favorable regulatory framework which needs nevertheless some improvements.
- **The institutional plan** is quite good. Many agencies are playing important role in the renewable energy sector. The agencies have been listed such as the Rural Electrification Agency, the Regulatory Authority, the Agency in charge of controlling the installations and equipment, the Distribution Agency.

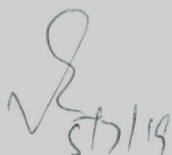



- **The regulatory framework** is also optimal: a renewable energy policy has been adopted in 2018 to regulate the off grid electrification. The policy which is under process of amendments, takes into account various aspects such as the access to the grid: the individuals have the possibility to inject into the grid and sell the self-production surplus to the national distribution agency; the tariff specification is also provided in the policy, as well as some incentive tax advantages and subsidies to encourage the companies to product electricity from renewable energies. But some aspects are still missing in the policy such as the development of standards for services, technical standards for quality issues.
- It was mentioned that Benin is looking for opportunity to increase solar contribution in their energy mix. The major challenges currently faced by Benin for scaling of solar applications are availability of low-cost financing, quality of equipment and technology. It was informed that Benin is planning to scale solar Mini Grids and Solar Home Systems. Benin is already part of Lome Declaration.
- Lomé Declaration is an initiative launched by 6 pilot countries including - Benin, Burkina Faso, Gabon, Mali, Niger and Togo - to accelerate the implementation of optimal collective regulatory obligations that will facilitate the aggregation and processing of funding requirements. This initiative is an answer to official statement for the establishment of a regulatory framework to leverage investments in projects that promote solar energy, made during the International Solar Alliance (ISA) Summit on March 11.
- One of the major challenges currently faced by Benin is high cost of solar projects. It was informed that World Bank (WB) has done a study in 2017 emphasizing the higher cost of solar projects in Africa compared to Asia. NFP requested ISA to assist in bringing down the cost of solar projects.
- It was informed that rural electrification agency is responsible for installation of Solar Mini Grids and Solar Rooftop projects. NFP mentioned that Electricity Regulator has brought out a tariff regulation policy for grid connected as well as off grid project on 18<sup>th</sup> September 2018. ISA assured for assistance for developing technical and service standards pertaining to solar application up on written request from Benin.
- Further NFP briefed to ISA about the Line of Credit (LoC) project for electrification of 550 social infrastructure projects. This project was approved under LoC in April 2018. It was

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informed that the Pre-Feasibility Report (PFR) has been prepared and send to ECOWAS Bank for Investment and Development (EBID) for their approval.

- It was informed that a project was planned for 3.5 Million people from 24 communities to support plantation of corn, maize, egg etc. by providing solar water pumping systems and solar lighting systems. The project is planned for execution in 3 phases viz. Installation of the solar system, Capacity Building and management of installations.
- A detailed presentation was given on ISA, objectives of the Mission and ISA Programmes by the Team. It was inquired about the status of three solar projects that are submitted to ISA for which \$ 1 Million fund is committed. ISA informed that aggregation of capacities for solar Rooftop and solar Mini Grids was concluded for Phase 1 by 31<sup>st</sup> December 2018. The requests received thereafter shall be taken in subsequent phases. However ISA requested NFP to submit details as per questionnaire circulated for solar Rooftop and solar Mini Grids at the earliest to assist in proper structuring of the projects.
- They requested further about the details of I-STAR Center and capacity building. It was explained by the Team that I-STAR Center is program of ISA with the objective to identify and empower institutions in each country which will be able to cater to the requirements of training and testing, R&D etc. in field of solar applications. Benin has submitted proposals for 3 I-STAR Centers identified for consideration under I-STAR Center programme.
- It was impressed upon that creation of Country level Task Force 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-Benin informed that the nominations of Country Representatives is in process and will inform ISA about the same at the earliest.
- During meetings held with various Ministries/Departments/ Agencies, Team impressed upon the solar potential in Benin 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. This awareness creation amongst different concern stakeholders will facilitate NFP Benin to channelize various internal assistance to furnish the data on their current status/plan and also seek the help required from ISA.





- A meeting held with officials of GIZ at their office in Cotonou, Benin.** The full list of officials attended is mentioned in Annexure-3. It was informed that GIZ was working in Benin from 2009 and is currently providing funding for Biomass and Cooking Stove programs along small solar Home Systems. It was informed that the funding for this program is by 6 countries viz. Germany, Norway, Sweden, Switzerland, United Kingdom and Netherlands. The first phase of program is completed and second phase started on 1<sup>st</sup> July 2019. The second phase is for approximately 3.5 years i.e. till end of 2022. As per the program framework, financial incentives are provided with objectives of promotion of Entrepreneurship and small companies for production of solar components. Further, it was informed that a tender has been issued and 20 companies have been selected under this program. The standards mentioned in Lighting Global Program are followed for this GIZ program. It was informed that the details of incentive scheme and list of companies selected will be shared shortly with ISA.

  
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- A brief overview of ISA, objectives of the Mission and ISA Programmes was given by the Team. During the discussion, ISA mentioned that both GIZ and ISA can work together for promotion of solar energy in Benin. GIZ can work with NFP for strengthening the activities of I-STAR Center. ISA requested GIZ to support Benin for solar Mini Grid projects. It was informed by GIZ personnel that the all the discussion happened with ISA shall be shared with Mr. Razven Sandru, Head of solar component of GIZ Benin so that the further details can be provided by ISA through email. The team visited the demonstration models of GIZ home lighting, cooking stoves etc.

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2<sup>nd</sup> July 2019

- **A meeting was organized with agencies executing rural distribution network projects** under Line of Credit (LoC) Programme of India at rural electrification office, Cotonou, Benin.
- Representatives of following companies have attended the meeting:
  - Jaguar Overseas Limited
  - Angelique International Limited
- The full list of officials attended is mentioned in Annexure-3. The following information was given by the agencies:
- Angelique International Limited has been working in Benin since 2010. They had executed establishment complete distribution network including erection of transformers in rural villages. The LoC project was conducted in 2 phases. Phase 1 involved electrification of 58 villages and is started in 2010 and completed in 2013. In this Phase 1 of the project, Angelique International Limited was awarded work of \$ 4.72 Mn to electrify 28 villages. The scope of the work for Phase 1 includes giving service connections to households also besides establishment of distribution network in rural areas.
- In Phase 2 of rural electrification, Angelique International Limited was awarded a contract in 2014 for 19 villages at a cost of \$4.68 mn. The work was completed and project handover was done in June 2019.
- Similarly Jaguar Overseas Limited also executed one lot each in Phase 1 and Phase 2.
- The scope of the work mandates procurement of at least 85% of the materials from India and rest locally. The materials are received through Cotonou Port and are taken to respective locations through inland transportation. The work at site was executed through sub-contractors.
- It was mentioned by both the companies that they haven't faced much difficulties for execution of project at the site. However they mentioned about challenges faced due to difference in specifications between Indian & French standards and also that it takes long time for opening of LC to enable supply of materials.
- PMC consultant was fixed by EXIM bank in phase 1, however, in phase 2 it is fixed by Benin government. Further it was mentioned that for the projects already executed till date, the

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customs duties and taxes were exempted by Benin government whereas for the upcoming projects, the cost includes taxes and duties levied due to Change in Law in Benin.

- A brief overview of ISA, objectives of the Mission and ISA Programmes was given by the Team. ISA Team updated them on international competitive bid for solar water pumping systems and urged them to explore possibilities for submission of bid through their head office in Delhi.



- **A meeting was held with the one of the proposed I-STAR Centers-M/S. SEME City.** The full list of officials attended is mentioned in Annexure-3. A brief overview of ISA, objectives of the Mission and ISA Programmes was given by the Team. Further a presentation was made on I-STAR Center Programme of ISA. It was informed by ISA that this institute was considered to propose as I-STAR Center for Benin by NFP.
- A presentation on SEME City was given by Mr. Ebo Sacramento. The full presentation was enclosed as Annexure 5. During the presentation it was informed that this center has been set by Government of Benin with an objective to provide Training, promote Innovation & Research and encourage Entrepreneurship for sustainable development of Benin. The institute targets employment for 190,000 people of which 40% are women and 1/3<sup>rd</sup> are entrepreneurs. It was informed that the institution also caters to the requirement of neighboring countries in the region. The institute has been giving trainings in various skill development areas such as computer etc.




- The institute is also planning to build a campus in 200 hectare area land which is about 45 km from Cotonou with target completion by early 2021. It was mentioned that so far they have not done any specific activities related to solar however they have collaboration with organization Hauts-de-France for solar related programmes. They have expressed their interest to take up promote solar related activities in association with ISA.



- **A visit was made to head office of ARESS, a solar company based out of Benin.** The full list of officials attended is mentioned in Annexure-3. A brief overview of ISA, objectives of the Mission and ISA Programmes was given by the Team. After that, Mr. Sinsin Leonide M, owner of the company gave a detailed presentation on their activities. During the presentation it was informed that the company was established in 2012 and is working extensively in the field of solar applications. It was mentioned that apart from Benin, they have presence in Togo, Burkina Faso and Niger.
- The main focus of the company is on giving quality and sustainable products to the consumers. A total of 50 full time employees have been engaged in the company. They also have 100 distributors in various locations in the country and their solar home systems varies from 1 kW to 50 kW. They carry out various activities like supply, distribution and installations of solar systems besides consultations at Pay As You Go trainings. They cater to rural as well as urban markets. They have sold more than 30,000 solar home systems and installed approximately 1 MW of solar capacity in Benin. Apart from that, they have also given services for verification of technical compliance during installation of 3 solar Mini Grids in Togo (2 projects of 100 kW and 1 project of 250 kW installation). It was informed that the company complies with standards of Lighting Global and IEC.






- They also shared their experience in Pay As You Go business model implemented for Off-Grid solar projects in Benin. A live demonstration Pay As You Go was shown. In this model, the home systems installed by ARESS are upto 5 kW for more than 20000 people with total capacity of approximately 400 kW. In this model, about 15%-40% of the cost of the system is borne by consumers. The balance cost of the system is recovered through a tariff charged on the consumers in a period of 1-3 years depending on the profile of the consumer. The customers need to tariff as prepaid in order to avail the energy from these systems.
- These systems are monitored remotely through an online application and the application captures real time data on the energy flow and other technical parameters such as voltage, current and commercial parameters regarding bill status etc. The customers can also raise any issues on the operation of the system through this application which will be attended immediately through various partners across the country. In the event of non-payment of the tariff, certain penalty mechanisms have been built in the system and in the event of non-payment for 3 months, the systems are taken away from such consumers. This model has been working for the last 2 years and the default by the consumers is less than 7%. Further it was mentioned that this business model is working on following 4 pillars:
  - Strong technical solution
  - Integration with data
  - Relationship with consumer
  - Telephone company for payment

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- It was concluded that this model is working well in Benin which can be replicated in other countries also.



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3<sup>rd</sup> July 2019

- **A meeting was held at University of Abomey, Calavi (UAC).** The Government of Benin has recommended EPAC, which is part of the UAC for consideration under I-STAR Center programme. The Team was taken for visit to two labs viz.
  - Laboratory for Renewable Energy which is attached to Master’s Programme and
  - Energy efficiency testing laboratory for lamps.
- It was informed during the visit that Renewable Energy lab is used for demonstration and simulation of solar panel performance, battery system and wind generator simulator for practical sessions in Master’s Programme in Renewable Energy. This Master’s programme was introduced in year 2010 and every year 25 students are enrolled in the course. The equipment was purchased through cooperation from Belgium government. It was mentioned that to get enrolled in the Master’s programme, it is mandatory for the students to complete one-year experience after they graduate for the Bachelor.



- Energy efficiency lab is used for testing and labeling of lamps based on energy efficiency ratings. This is mandated by energy efficiency policy of the country. It was informed that IFDD (the Francophonie’s Institute for Sustainable Development) is supporting the Lab to access to testing equipment for fridges.

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- A detailed discussion was held with various faculties/officers of the University. The full list of officials attended is mentioned in Annexure-3. A brief overview of ISA, objectives of the Mission and ISA Programmes was given by the Team. Further, ISA briefed about I-STAR Center programme and capabilities to be built up in the country for training, testing, research, innovation and standardization of specifications in the field of solar applications.
- The institute informed that they require various testing equipment in order to develop the facilities for solar applications and they requested ISA assistance for the same. It was informed by ISA that they may give written request through NFP for augmentation of facilities in the institute. ISA also informed that Benin has requested for supply and installation of 50,000 Nos. solar water pumping systems as international competitive bid for 272,000 Nos. solar water pumping systems floated by ISA. It was further elaborated that the scope of the tender includes training of 5 technicians for every 100 pumpsets. In case Benin accepts the price discovered through the bid and places LoA to the selected supplier, the institute can tie up with the supplier for carrying out the training of technicians for solar agricultural pumpsets. It is generally found that the institute has sufficient infrastructure. Further, the institute also expressed interest in installing solar rooftop in their building to meet their energy consumption requirements.

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- **A meeting was held with Association of Interpersonals, Specialists of Renewable Energy, Benin (AISER-Benin)** chaired by Dr. Faustin Dahito, President, AISER-Benin. He informed that they are already aware of activities of ISA and appreciated its contribution in field of solar applications. He also informed that people nominated by the association has been trained in ITEC programme held at NISE campus in Gwal Pahari, India. The meeting was attended by office bearers of AIBER-Benin. The full list of officials attended is mentioned in Annexure-3.
- During the meeting it was informed that AISER-Benin was incorporated in year 2011. They have been giving various recommendation to Government of Benin for scaling of solar in the country. They are in constant dialogue with various institution like MCA, EU, GIZ, EPAC, GOGLA etc. The 67 members of AISER-Benin are engaged in areas of supply, installation and providing other services for solar projects. They further mentioned that though the solar projects started in country more than 20 years ago, the major focus from government is only for the last 3 years. Further they mentioned that the Renewable Energy policy is under revision. With government target of having 100 MW installed solar capacity by 2021, many large MNCs may come into country for setting up grid scale solar PV projects. The association details that such companies should constructively engage with smaller companies which are already established in Benin.
- They mentioned that there are certain challenges faced by industry in terms of affordability of the people in the rural areas for opting for solar based systems. Further, it was mentioned that the government has fixed tariff of 73 CFA which is not found to be a viable business proposition for solar projects. Therefore they will take up the matter with Government of Benin. Currently in many of the villages, kerosene is widely used for the lighting purpose. It was informed that people in rural areas spend approximately 7000




CFA per month for use of kerosene as lighting source. During the discussion, ISA suggested that AISER-Benin should take up with government to devise a scheme where rural areas are provided with solar power for less than 7000 CFA per month there by encouraging people to move to solar power from kerosene.



- **A meeting was held with officials of Agricultural Ministry at their office.** The full list of officials attended is mentioned in Annexure-3. A brief overview of ISA, objectives of the Mission and ISA Programmes was given by the Team. Further, ISA Team gave detailed presentation on Solar water pumping programme followed by in-depth discussion on international competitive bid for 272,000 solar water pumping systems floated by EESL on behalf of ISA. Based on presentation detailed discussion was held with various officers. ISA also informed that the price exploratory bid issued by ISA has provisions for various pumpset sizes, different pumpset type and applications. ISA requested Agricultural Ministry to look into the details of the bid floated by EESL so that they can decide the way forward for implementing solar water pumping programme in Benin.
- It was informed by NFP that the questionnaire forwarded by ISA was already shared with Agricultural Ministry. It was informed by the officials of Agricultural Ministry that on ground study is yet to be carried out for solar agricultural pumpset requirement and they will make detailed assessment and inform their requirements to ISA through NFP. It was also informed that a strategy planning for implementation has been formulated and the same shall be shared with ISA shortly. It was also informed that proposal for gardening “PADMAR” has been made for which the funding is required.






- **A meeting was held with Mr. Vonjy Rakotondramanana, Senior Energy Specialist in World Bank at their office in Cotonou.** The full list of officials attended is mentioned in Annexure-3. A brief overview of ISA, objectives of the Mission and ISA Programmes was given by the Team. He informed that some of the multilateral funding agencies like Millennium Challenge Corporation (MCC), AFD, EU are already providing support to Benin for implementation of solar projects.
- He informed that so far World Bank has been supporting capacity building under Lighting Africa programme. He further informed that Regional Off-Grid Electrification project (ROGEP) programme for the electrification of 19 Nos. Western African countries including Benin has been recently approved by World Bank. Under this programme, they would provide technical assistance as well as project funding for implementation of solar Mini Grids, solar Rooftops and solar agricultural pumpsets programmes. The funding for these projects is routed through West African Development Bank (BOAD) and Ecowas Centre for Renewable Energy and Energy Efficiency (ECREEE) is the implementation agency. He further informed the details regarding ROGEP programme including details of Benin shall be shared through a mail shortly. He also informed that they have been extending funding for augmentation of grid connectivity in the country and the details shall be shared with ISA.

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- **A meeting was held with members of Bureau of Analysis of Investigation.** The full list of officials attended is mentioned in Annexure-3. A brief overview of ISA, objectives of the Mission and ISA Programmes was given by the Team. It was informed by the team that as part of Government Action Programme, a renewable action plan was made in 2016 with focus on off-grid applications. As part of this renewable action plan, solar capacity addition of 95 MW and Biomass capacity addition of 15 MW was targeted by 2021.
- Government of Benin is process of preparing Renewable Energy Development Policy in lines with National Development Plan 2018. This Policy shall be valid upto 2025 with aim to increase electricity access along with increased share of Renewables in energy mix. This policy focuses on developing framework for grid connected solar applications.
- It was suggested by ISA that separate policy with emphasis on solar should be looked into by Benin while finalizing the Renewable Energy Development Policy to accelerate solar capacity additions and address the issue of energy access with environmental considerations. Further it was informed that the draft Renewable Energy Development Policy shall be shared with ISA shortly.

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4<sup>th</sup> July 2019

- **A meeting was held at ESMER, a prospective STAR-Center in Benin.** ESMER has been nominated by the NFP as one of the prospective STAR-Center in Benin. ESMER is a private engineering and higher school in renewable energies created in 2015. The activities developed include training and R&D in the energy sector.
- It was informed that the objectives of ESMER creation were:
  - To face the lack of qualified engineers and technicians in West Africa
  - Enhance the practical training potential on renewable energies in the Continent
  - Ensure the energy transition in the Continent.
- The team from ESMER presented the details of their training programme and the activities of ESMER Academy as an incubator center for the promotion and for scaling up energy projects. The full presentation was attached as Annexure 6. It was informed that ESMER is the first incubator center launched in Benin and operating in the region, for entrepreneurs in energy sector. They intervene in renewable energies, energy efficiency and electrical networks sectors.
- ESMER has two main vocations: the first one is to develop trainings and the second is to develop standards / testing / certification facilities. They have the objective to extend their activities across the ECOWAS region by welcoming students from abroad as well as foreign professors. ESMER has been recognized by ECREEE as a training center and has also been short listed by ECREEE with 3 other institutes, to become the standards and certification center for Benin. Only one of the short listed institutes will get the certification from ECREEE.
- The training programs include Bachelor and Master degrees and have two main visions, one is to facilitate for the students the access in the professional market by developing both theoretical and practical skills and the second mission is to promote gender balance in the renewable energy and engineering fields by developing fellowship programs and providing financial support from their partners to women entrepreneurs. The CEO of ESMER shall submit to ISA Team a list detailing the needs of the Center.






- **A meeting was held with the Minister for Planning and Development, Benin.** H.E. Mr Abdoulaye Bio Tshane, Senior Minister of Planning and Development, welcomed ISA Team in his office for a courtesy visit. A general presentation about International Solar Alliance activities and programmes was given to him. ISA suggested to have separate Solar Policy for Benin as Solar Energy will take a big leap in the Energy Scenario of Benin and needs focus planning.
- The Hon’ble Minister recalled the important potential of Benin in the solar energy sector and informed about the ongoing projects which have been detailed above. He also informed about a project carried by the Government to solarize government buildings such as the Ministry of Planning and Development to reduce their energy consumption.
- Regarding the ISA solar water pumping programme, the Minister emphasized the necessity of providing sustainable training facilities in the programme and assist Benin in enhancing the development of skills and capabilities of the local manpower for the general use of solar pumps. Hon’ble Minister also mentioned that he has taken a note of the suggestion of ISA for separate Solar Policy and he will put a word with Hon’ble Energy Minister on this issue.
- To conclude the discussions, a verbal invitation has been addressed to the Minister for the upcoming ISA events such as the Re-Invest scheduled on October / November 2019, on the sidelines of the 2<sup>nd</sup> ISA General Assembly and the Sun World to be held in Peru. The Minister expressed a great desire to attend these important events.

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- **A visit was made to Solar Mini Grid project installed at village Setto, which was about 150 kms. away from Cotonou, consisting of 40 kW Solar PV project with battery based storage system (~ 625 kWh capacity). This project is owned by ABERME and hence their team also accompanied to the field visit. The Solar Mini Grid is currently feeding 23 households in the village and another 20 household are going to be added to this Solar Mini Grid project. The feasibility study was conducted by Solaris Engineering and the project is funded by West African economic and monetary union. It was informed that the feasibility report prepared for the project shall be shared with ISA shortly (**Details required**).**
- It is observed that the solar PV installation has been done with good engineering practices. The battery energy storage system is made of Gel technology. The output of solar PV plant/Battery is directly fed to houses at 220 Volts without any step-up transformer.
- It was informed that consumers need to pay one time installation charges of 50,000 CFA for access to solar power. The households consume power in Pay As you Go model wherein they pay upfront tariff of 110 CFA/kWh for consumption of power.
- ISA Team also made visit to a house using solar power generated by this Mini Grid. The household is using 3 Watt lamps for illumination and demonstrated the prepaid machine that highlights the balance energy left for consumption.
- Upon interactions with officials at site, it was found that solar and battery are having higher capacities for the current consumption and hence it is suggested to increase the load through the economic activity in the village to optimally utilize the solar plant and battery storage system.

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5<sup>th</sup> July 2019

- **A meeting was held with Delegation of European Union officials in their office.** The full list of officials attended is mentioned in Annexure-3. A brief overview of ISA, objectives of the Mission and ISA Programmes was given by the Team. It was informed that they are currently working in areas of Energy, Agriculture, Governance and Justice in Benin. EU has earmarked 100 Million Euros for Energy sector development in Benin. EU is working with West African Power Pool, a cooperation of the national electricity companies in Western Africa, for improving transmission infrastructure in these nations.
- EU has signed an agreement with Government of Benin for financing Energy Sector Actors Capacity Building Project (RECASEB). The project is intended at establishment of a political, strategic and institutional framework to implement reforms for development of the sector in the long term. EU in association with AFD is also assisting Government of Benin for diversification, rehabilitation and extension of distribution infrastructure. Further, EU in association with AFD is assisting government of Benin in setting up 25 MW of Grid connected Solar PV project. The construction of the project is likely to start in early 2021.
- EU has also an External Investment Plan initiative in 2017 to attract more investment from businesses and private investors in African countries. It was informed that Renewable Energy is one of the focus sectors for this initiative.
- EU is working with selected universities and colleges of Benin to provide training in the field of renewable energy. It was suggested by ISA Team that EU can assist government of Benin in capacity building and setting up of standards at I-STAR Center of Benin. It was also suggested that EU can provide Technical Assistance to Government of Benin for detailed analysis of solar water irrigation pumpsets requirements of Benin.
- In Agricultural sector, EU is assisting government of Benin in implementation of National Strategy and has conducted Technical Assistance to study present agricultural markets and payment mechanisms in Benin.






- **A meeting was held with Electricity Regulator of Benin, Authority for Regulation of Electricity (ARE), chaired by Mr. Gbedonougbo Claude Gbaguidi, President of ARE.** The full list of officials attended is mentioned in Annexure-3. A brief presentation was given on ARE. ARE was set up in 2009 through a Decree by Government of Benin to take care of public interest, provide quality power and regulate cost of power supply.
- It was informed that individuals can set up solar rooftop systems upto 500 kW by making a self- declaration to ARE. For setting up solar rooftop systems with greater than 500 kW capacity, the consumer needs to get prior approval from ARE. The consumer is allowed to inject upto 50% of the energy into the grid for which the compensation is not yet finalized. A study is being conducted by ECREEE to understand the dynamics of energy injection into grid from solar rooftop systems.
- A brief overview of ISA, objectives of the Mission and ISA Programmes was given by the Team. ISA suggested ARE to create separate policy for Solar in order to promote solar deployment across the country. ISA Team stressed to ARE the importance of regulations for implementation and promotion of grid connected solar rooftop systems. Based on experience gained in rolling of grid connected solar projects, ISA Team assured to provide assistance to the Electricity Regulator, upon written request through NFP to ISA, in drafting policies/regulations for promotion of solar projects in Benin.






- **A meeting was held with French Development Agency (AFD) at their office.** A brief overview of ISA, objectives of the Mission and ISA Programmes was given by the Team. It was mentioned that their technical department is in Paris and a team is working based out of Benin. AFD mentioned that they have been supporting Benin for last 20 years and assisting Benin in association with EU for last 3 years. They have been supporting Government of Benin for policy and regulatory frameworks and in last 3 years, solar capacity additions are happening at faster pace in Benin due to strong political will.
- AFD has been co-financing with EU 25 MW Solar PV project in Benin. (AFD funding of 50 Million Euros as a low interest loan and EU 10 Million Euros as a grant). Presently the bidding process for the selection of contracting agency is in progress and is planned to commence the work in 2020.
- Further, AFD is also supporting 3 projects for augmentation of distribution network which will enable energy access from Grid to additional ~ 1 Million people of Benin. It was also mentioned that there should be synergy and integration among regional grids which will avoid any gap in country wise capacity additions.






- **A concluding meeting was held with Hon’ble Energy Minister, H E Mr. Dona Jean-Claude Houssou at his office.** Hon’ble Minister conveyed his regards for ISA Mission visit to Benin. NFP-Benin gave a brief update of the Mission visit and meetings held so far. Hon’ble Minister appreciated the meetings conducted with ISA Team and assured that the suggestions and recommendations to be provided by ISA shall be acted upon by Benin.
- ISA Team thanked on behalf of H E Mr. Upendra Tripathy, Director General ISA, for extending invitation for visit of ISA Expert Team to Benin. ISA Team appreciated the efforts being taken Government of Benin for acceleration of solar projects and reinforced the importance of having separate solar policy or dedicated chapter to solar energy as part of existing Renewable Energy Policy. It was also suggested to have common solar policy for all ECOWAS countries due to common power transmission network, similar geographical and economic conditions.
- Further ISA Team updated Hon’ble Minister on ISA Programmes and International Competitive Bid invited by ISA for price discovery of 272,000 solar irrigation pumping systems. Team appreciated Government of Benin’s Energy efficiency initiatives and highlighted that solar installations and energy efficiency measures should go hand in hand for benefit of the country. **It was suggested to Hon’ble Minister that the payment for energy injected into Grid from Solar Rooftop systems can be equal to the power purchase cost incurred by Benin currently to make it attractive to solar rooftop developers.**




- It was suggested to Hon'ble Minister that it is beneficial to Benin to set up to set up large solar projects in association with neighboring countries in solar park model where solar projects can be set up in one location with common infrastructure. This will benefit all participating countries in terms of lower cost of generation due to economies of scale, faster implementation, better grid management, and improved quality of power.
- ISA Team on behalf of H E Mr. Upendra Tripathy, Director General ISA, extended invitation for participation in RE-Invest to be held in India from 30<sup>th</sup> October 2019 to 2<sup>nd</sup> November 2019 and SUN WORLD to be held in Lima, Peru scheduled from 12<sup>th</sup>-14<sup>th</sup> November 2019.



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A concluding session was held on 5<sup>th</sup> July in the office of the National Focal Point Benin. The sum up of the five days meetings and visit was presented to the NFP-Benin. The recommendations of the ISA Expert Team visit to Benin has been attached as Annexure I.



ISA shall update Benin about the outcome of the International Competitive Bid for Price Discovery of the Solar Water Pumping Systems, which is under process through EESL. ISA shall also share with NFP Benin about the best practices of Solar Rooftop Regulations and Policies. ISA suggested to develop separate section for Solar Energy based programmes in prevailing RE Policy so as to give more emphasis on solar programmes.

**Team conveyed thanks to Hon’ble Energy Minister, all the officials of the Government of Benin, NFP-Benin and his team for tirelessly extending the hospitalities, Coordination and Guidance through-out the entire Mission duration of Team visit to Benin.**

With this report, Following presentations are also attached as Annexures. These presentations were used by Team for purpose of creating awareness about ISA and its activities:

- Annexure 7 a- General presentation on ISA
- Annexure 7 b- Presentation on Scaling Solar Application for Agricultural Use
- Annexure 7 c- Presentation on Scaling Solar Rooftops
- Annexure 7 d- Presentation on I-STAR Center




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

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

ISA request NFP-Benin to share the desired information through these formats, at the earliest.

Place: Cotonou, Benin

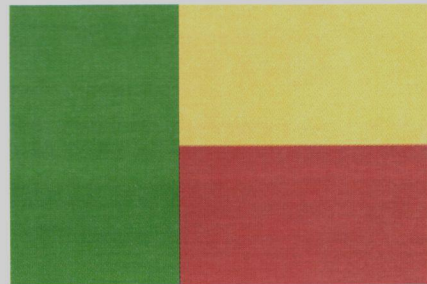
Date: 5<sup>th</sup> July 2019

Rajeev Gyani

National Focal Point Coordinator of ISA

Todeman Assan

National Focal Point of ISA for Benin





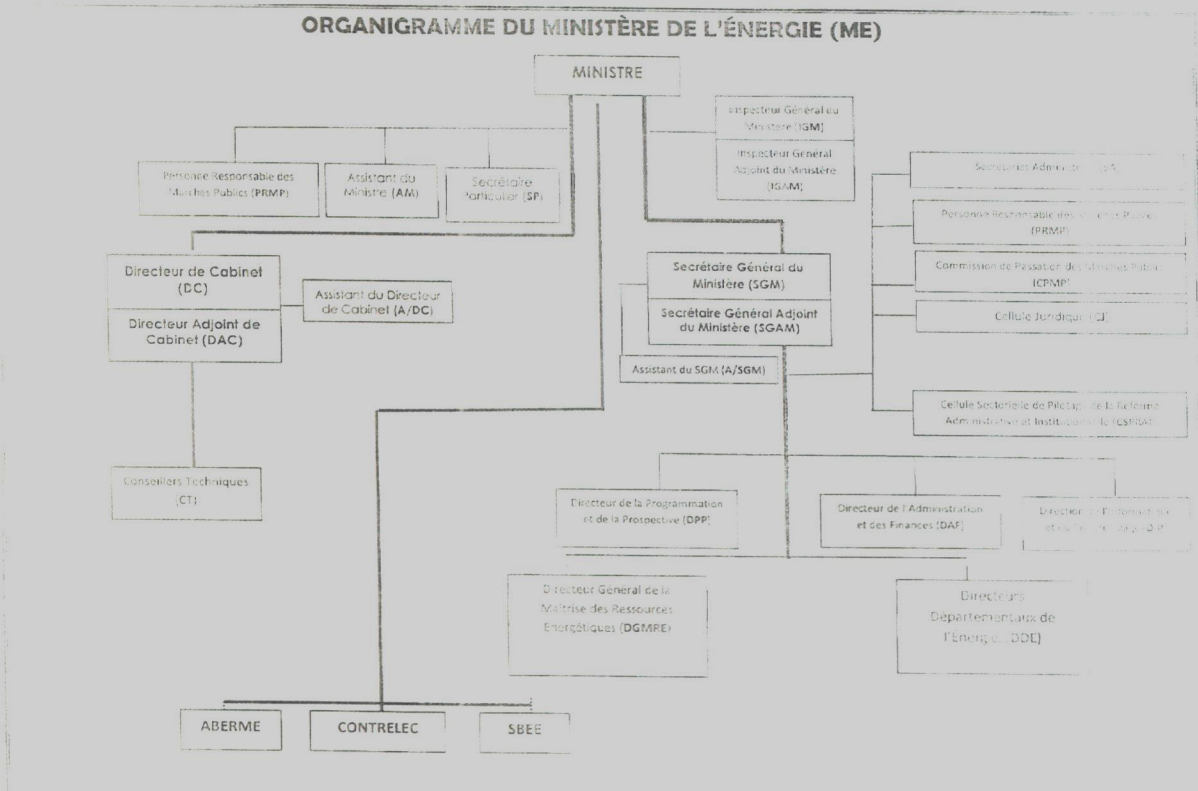
**Annexure-1: ISA Expert Team (Team)**

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.	Ambassador Ali Illiassou	Ambassador (Event)	International Solar Alliance
4.	Ms. Aissatou Sonko	Consultant (IR)	International Solar Alliance
5.	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 Benin**



Annexure-3, 4, 5, 6, 7: Please refer enclosure

Annexure-A, B, C, D: Please refer enclosure

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## Template for Joining ISA Programmes

To  
 The Secretariat, International Solar Alliance  
 Surya Bhavan, National Institute of Solar Energy Campus,  
 Gwal Pahari, Faridabad-Gurugram Road, Gurugram - 122 003, India  
 Tel : +91 124 2853077; Fax: +91 124 2853073  
 E-Mail: rajeevgyani@isolaralliance.org  
 Website: www.isolaralliance.org

### Declaration

I ASSAN FLINSO (Name of the officer) focal point for BENIN (name of the Country) here by inform Secretariat of International Solar Alliance that my country joins the following programmes of ISA:

- |  |                                     |
|--|-------------------------------------|
| 1. Scaling Solar Applications for Agricultural Use | <input checked="" type="checkbox"/> |
| 2. Affordable Finance at Scale                     | <input checked="" type="checkbox"/> |
| 3. Scaling Solar Mini Grids                        | <input checked="" type="checkbox"/> |
| 4. Scaling Rooftop Solar                           | <input checked="" type="checkbox"/> |
| 5. Scaling Solar E-Mobility & Storage              | <input checked="" type="checkbox"/> |

(To be  (marked) in case if agreed to join)

I understand the following benefits will accrue to our country.

- (A) We can benefit from the aggregation of demand and issuance of global tender by ISA through a professional agency which may result in substantial reduction in cost.
- (B) Our officers can participate in the joint training programmes towards capacity building under the programme.
- (C) We can access the *Infopedia* of ISA which provides:
- (i) A platform of interaction by policy makers from 121 countries.
  - (ii) More than 1000 videos on best practices in solar applications stored in the cloud.
  - (iii) A country counter where our country can upload our policies to attract investment in solar space from outside.
  - (iv) Access to soft-loans from various member countries who might have earmarked a fixed percentage (%) of such loans for ISA programmes.

ISA Secretariat is requested to update its list of NFPs in the web page of ISA

(even in case of there is no change of NFP details; please fill and submit)

Name	ASSAN T. FLINSO
Designation	Director of Renewable Energy
E-Mail Address	to demand: assan@gmail.com
Telephone (Work)	+229 97 958973
Telephone (Mobile)	+229 97 958973
Whatsapp number	+ 229 97 958973
Fax number	-
Postal address for communication	

Signature :

Date: 05.07.2019

N.B. : This form, after being filled up, should be emailed to IT section at email: [raj@isolaralliance.org](mailto:raj@isolaralliance.org) with a copy to ISA NFP Coordinator at [rajeevgyani@isolaralliance.org](mailto:rajeevgyani@isolaralliance.org)

Secretariat  
ISA

## Annexure I

### Executive Summary:

During the period 30.06.19 to 05.07.19 the Team held meeting with various Ministries, Government Agencies, Solar supplier, Solar Association etc. along with the National Focal Point, Benin Mr Todeman ASSAN.

Summary of the important discussions, observations and recommendations are as follows:

- As per the current energy scenario, about 32% of the population have access to electricity. In urban area 43 % population and in rural area 92 % of population does not have access to electricity.
- The country is predominantly dependent on Biomass for meeting primary energy need. The electricity is generated mainly from Thermal sources and Hydro Energy. However, the country is dependent on import of Power and 69 % is imported from other Countries i.e. Nigeria, Ghana, and Cote d'Ivoire.
- Per capita consumption is 110 kWh/year.
- Contribution of Solar Power in energy mix is very minor (0.52%) and the contribution from RE sources including hydro, it is only about 1%
- It is noted that there is greater awareness and the interest in the part of Government of Benin to promote solar Energy in the country.
- The country has a National Renewable Energy Policy made in 2018 and the focus of the policy is on Solar Mini grids.
- 83 solar mini grids with capacity ranging between 20 KW and 40 KW has been installed.
- As per National target set in 2016, a capacity addition of 100 MW has been targeted by 2021
- With the Joint Financial support of AFD (50 Million Euro) and from EU (10 Million Grant), a 25 MW grid Connected Solar Project is in the pipeline. The Project construction work expected to start in 2020. 4 more Grid connected Solar Projects in 4 locations totaling 50 MW (15,15,10,10) has been planned
- Benin had requested for 50,000 Solar Pumps for Agriculture for demand aggregation. During the discussions with Agricultural Ministry, it is noted that the details regarding location, type of Pump required, Financing model etc. is yet to be worked out by the Ministry.
- Benin had submitted proposal for consideration of ISA for ISA STAR Centre under capacity building programme. Visits were made to all the three proposed STAR Centers. It is generally found that all the 3 centers i.e. EPAC under University of Abomey Calavi 2) Seme City and 3) ESMER, have certain relevant infrastructure and facilities. However, all these centers need to develop capacities for Testing Equipment, R&D facilities and capacity building on Technology development and Innovations.
- It is noted that many of multi-lateral institutions like World Bank, European Union, AFD, MCA, ECOWAS are supporting Benin through Technical Assistance as well as Project funding
- World Bank has been supporting Benin for Electrical network augmentation. Recently the Bank approved ROGEP (Regional Off grid Electrification Programme) to promote private sector funding in off grid solutions in 19 Countries in west African Region and Benin is one of them.

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- Apart from promotion of Bio gas Stoves, GIZ has been supporting the Solar sector market development in the Country through an incentive scheme for private entrepreneurs for small systems for home lighting. The specifications are prescribed through Lighting Global Programme.
- During the interaction with some of the Contracting Agencies working under LOC Projects in rural electrification work mentioned that there are no logistics issues in land transportation and installation work at site. However, they mentioned that some time delays occurred due to Specifications followed in India and French specifications followed in Benin
- During the interaction with association of Solar Suppliers/System Integrators, it was noted that there are 69 members in the association. The Agencies are engaged in Import of Solar and associated equipment's, installation, O&M activities of Solar Systems and products They mentioned that they are quality conscious and are ensuring quality in implementation of projects. They mentioned that the Government is in the process of making policy changes to enable large scale Solar Projects by IPPs in the Country. This will pave the way for larger Companies to come to Benin. They wanted that such Companies should collaborate so that smaller companies also benefit from such policy changes.

**Recommendations:**

- Benin is in the process of focusing on accelerated Solar capacity addition to address the issues of Energy access, Environmental protection and Energy security. The existing Renewable energy policy is being revised which also envisages promotion of Private investment in Grid connected Solar Projects. However, It is suggested that a separate policy on Solar or a separate section on Solar will enable faster capacity addition in Solar. Reason being that Solar Technology is evolving technology and has special feature to fit into all the demands of the required project in most customized manner. Targets for different categories of Solar Off Grid and Grid Connected Solar Power Plants can be developed with specific time bound monitorable targets so that it can occupy upto at least 20% of share in Energy Scenario of the Country
- Presently, there is a regulation on Grid connected Projects including Solar Grid connected Rooftop. However, there is detailed procedures to be followed by the Rooftop owners like Connectivity norms, Metering system, Tariff for extra power injected into the system etc. As a result, the Rooftop installations are not taking place. It is recommended that the present regulation may be revised with above mentioned provisions. The compensation for extra power injected can be paid at the same rate at which the Distribution utility purchases the Power from Generation Companies. Further, Rooftop installations may be taken up in some of the Public institutions immediately so that the relevant stakeholders can understand the bottlenecks which can be suitably incorporated subsequently in the regulations.
- Since the Power network is being managed commonly among the countries in the region, it is recommended that a uniform Solar Policy & relevant Regulations may be worked out on the ECOWAS level so that there are no gaps in integration with the grid.
- Installation of Solar Pumps for agriculture has large potential in Benin. The Country needs to work out the strategy in respect of locations, soil data, Pumping size, financing models etc. These inputs are necessary for making it bankable so that funding will be easier. Further, it is expected that the outcome of Price Discovery International Competitive Bid being carried out

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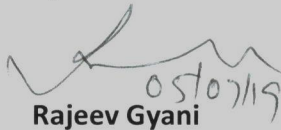


by ISA for Solar Agricultural Pumps will be finalized by August 2019 and the Country specific rates for various categories of Pumps will be informed to Benin. The same may be examined and if acceptable Benin may enter into contract with the selected Bidders. In case this bid will give benchmark price for Benin.

- It will be beneficial to implement large Grid connected Projects in Solar Park model where there can be multiple Solar Projects in a single area with common infrastructure which will cater the Solar Power to cluster of Countries. This will give distinct advantage of Power management, low tariff due to scaling, faster implementation and Quality of Power. A model agreement for sharing of Solar Power for a cluster of countries, developed by ISA is enclosed with this report which may be examined by Benin.
- It is also suggested to undertake the Energy Efficiency measure before implementation of Solar projects
- It is also suggested that incentives may be provided in form of exemption of taxes and duties on solar products and their components for at least five years, if not provided as of now.
- Benin has joined all the ISA programmes and has submitted the duly filled prescribed format to Team.
- Recommendations about the ISA STAR Centres Team visited will be discussed with the concerned Director and forwarded to NFP for further necessary action.
- ISA requests Benin for ratification of the Amended ISA Framework Agreement.
- ISA congratulates Benin to have 9 Master Trainers trained through ITECH Programme and two Mid-Career Engineers selected under Fellowship Scheme for the year 2019 batch.
- ISA also suggests to recommend the users of Air Conditioning Systems of Benin to keep the default temperature setting between 23-25 degree centigrade. This step will save electrical power being wasted.
- Benin requests technical assistance from the ISA for the establishment of a regulation on the electricity production by the installation of rooftop. To support this, ISA shall also share with NFP Benin about the best practices of Solar Rooftop Regulations and Policies.

**Place: Cotonou, Benin**

**Date: 5<sup>th</sup> July 2019**



Rajeev Gyani

**National Focal Point Coordinator of ISA**



Todeman Assan

**National Focal Point of ISA for Benin**

