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WORKSHOP ON RENEWABLE ENERGY PROJECT PLANNING & FINANCE FOR SENEGALESE ENERGY STAKEHOLDERS

TECHNICAL EXPERTS EXCHANGE BEST PRACTICES ON RENEWABLE ENERGY INTEGRATION

DAKAR, SENEGAL – Supported by the U.S. Agency for International Development (USAID), participants representing various agencies within the Senegalese energy sector took part in a four-day workshop on renewable energy project planning and finance. Topics discussed include: renewable energy policy implementation, grid management/optimization for renewables, and best practices for standard Power Purchase Agreements (PPA). Participants ranged from international attorneys, energy investors and engineers to local government officials. The workshop was conducted by the U.S. Energy Association (USEA) as part of the Power Africa initiative.



Participants gathered in Dakar, Senegal for a four-day workshop aimed at promoting Senegal's renewable energy sector.

ENERGY SECTOR REFORM IN SENEGAL

Senegal is actively pursuing reform policies in the energy sector with a strong focus on promoting renewable energy. Senegal aims to achieve the electrification rate of 50% in rural areas, 96% urban areas, and 70% of national level by 2017. The current energy policy is reflected in the *Lettre de Développement du Secteur de l'Énergie*, a government strategy document building on lessons learned from previous energy policies over the period 2005-2012. The emphasis on renewable energy has resulted in the adoption of various legislatures such as the renewable energy law from 2010, which provides for a feed-in tariff. In 2015, the National Agency for Renewable Energies (ANER) was established.

PRIMARY WORKSHOP OBJECTIVES

Workshop participants had the opportunity to exchange best practices with international industry experts in integrating large amounts of variable renewable energy to the grid. Many audience members also exchanged ideas and feedback on how Senegal can meet its renewable energy targets. The participants also identified areas of collaboration between Senegal and other international utilities on grid integration of renewable energy. The workshop was conducted to allow the management of Senelec and the Ministry of Energy to review some of the following topics:

- Principles of wind/solar projects
- Renewable energy grid integration studies and role in planning
- Risk assessment and determination
- Practices to increase balancing resources (flexible generation, storage, and demand response)
- Implementation of a public-private partnership projects
- Power purchase agreements and negotiations

SUMMARY OF KEY ISSUES/DISCUSSIONS

The following were some of the key topics addressed in the four-day workshop:

1. Renewable Energy Integration Planning

Audience members expressed a desire to learn about how to combat intermittency and load shedding. These were arguably two of the biggest concerns as utilities struggle with the combination of managing growing distribution needs and introducing renewable energy unto the grid.

Dr. Alma Cota, Project Engineer, from the National Rural Electric Cooperative Association International Ltd., shared some insights from her experience with rural electrification in Liberia. While she addressed the importance of creating budgets around the upfront investment costs – as they are normally higher than conventional energy – she also explained the importance of creating legal institutional frameworks to support renewable energy projects.

International experts from Morocco, Liberia, and France presented three different types of case studies during their presentations on implementing wind and solar projects. Mr. Adil Khamis, Strategy & Business Development Director, Nareva Holding, shed light on his experiences on his role in implementing Africa's largest wind farm to date, Tarfaya Wind Farm (301 MW) in Morocco. Similarly, both Morocco and Senegal have abundant renewable energy resources. Just as in Senegal, Morocco dealt with some of the same challenges such as: heavy dependence on imports, fragile legal and institutional framework, and an unstable transmission grid. During his case study presentation, he explained the entire process from development and

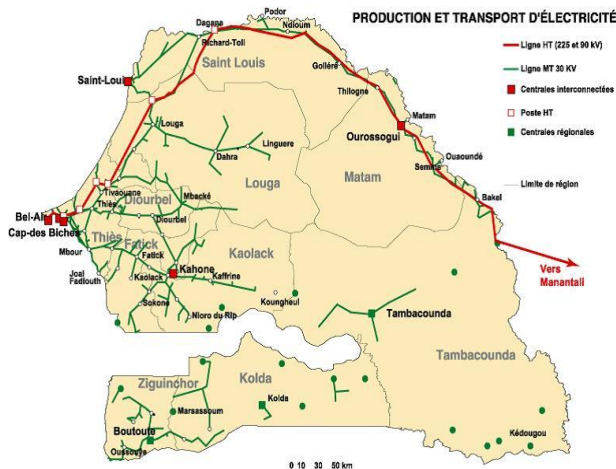


Figure 1 – Senelec's transmission grid. Senelec and the Ministry of Energy aim to improve energy access for their rural citizens by 2017.

financing to completion, testing, and commissioning. He strongly advised that the utility should require a maintenance clause in all investor contracts once the plant has been commissioned.

The afternoon sessions explored the technical aspects of renewable energy integration. Mr. Robert “Bob” Staton, Control Center Manager, of U.S. based Xcel Energy, discussed the operational challenges when dealing with variable resources, such as solar and wind energy. After speaking with some of the Senelec representatives, he recommended that the utility invest into an Area Control Error (ACE) system, which is a type of balancing mechanism for a multi-area power system. Bob explained that ACE is the difference between scheduled and actual electrical generation with a control area on the power grid, taking frequency bias into account.

Bob explained that by incorporating ACE, Senelec would be able to deal with any likely load-frequency control problems.

2. Implementation Methodology for Solar and Wind Projects

A presentation by Issa Dione, Director of Large Generation Projects, Senelec reported that the technical and non-technical electricity losses amount to about 485 GAWh or 20% of the energy passing through the network. He also noted that the production of electricity is 90% hydrocarbons (HFO and diesel). The significant dependence on biomass, specifically wood and charcoal, has also negatively impacted the country’s economy. With >30% of the generation capacity provided by IPPs, Senelec is aiming to diversify generation with coal-fired and gas base-load to enable broad adoption of renewables. During Issa Dione’s presentation, he shared information regarding the current status of energy investments for their current power projects, such as 52 MW Taiba wind farm, the PPA has been signed and is the project is under development. Dione discussed the desire to implement bankable PPAs as well as PPPs.

RESULTS & RECOMMENDATIONS

All conference participants were divided into one of 4 groups where they reflected at the end of each day on the topics presented. Below is a sample of their results and recommendations:

1. Group 1: Members of this group noted that the greatest benefit of this workshop was learning more about the environmental benefits of renewable energy integration. They outlined a few challenges such as: dealing with Senegal’s large grid and managing demand response. They recommended the following: improving grid flexibility, installing smart meters, and the use of fossil fuels in their baseload.
2. Group 2: Members of this group noted that the greatest benefit of this workshop was learning about how to promote more PPPs. They sought more information on how to create viable funding mechanisms for financing RE projects.
3. Group 3: Members of this group noted that the greatest benefit of this workshop was learning about the importance of IPPs, particularly in isolated areas. Members of this group noted that while some progress is being done to decrease to cost of energy in urban areas; for areas that are not directly connected to the grid, the cost of producing energy on site is very expensive.
4. Group 4: Members of this group noted that the greatest benefit of this workshop was Tuesday’s session on learning about cost analysis, particularly for installing solar panels.

SPEAKERS

Dr. Alma Cota, Project Engineer, National Rural Electric Cooperative Association International Ltd.

Claude Mubaya, Technical Solutions Director, GE Grid Solutions

Adil Khamis, Strategy & Business Development Director, Nareva Holding

Robert Staton, Control Center Manager, Xcel Energy

Sebastien Wagemans, Sales & Business Development Director, Tractebel Engineering

Gearold Knowles, Partner, Schiff Hardin

Antoine Haddad, Allen Overy

PARTICIPATING ORGANIZATIONS

Senelec

Ministry of Energy

Rural Electrification Agency of Senegal

Ministry of Finance