



RENEWABLE ENERGY IN AFRICA:

An opportunity in a time of crisis

Senegal

State of electricity

Senegal has relatively high levels of electricity access compared with the rest of West Africa, with 61% of the population connected to a reliable supply, and roughly 1.1 million households with no electricity access. In urban areas connection levels sit at 88% and 40% in the countryside.

In 2017, oil dominated the national energy supply, with the IEA estimating that it accounted for 53% of total primary energy supply by source, with coal supplying around 9%.¹ Biofuels and waste provided 37% of supply. Hydro, wind and solar sources powered 1% of the energy supply.

Most of the country's 864 MW of generating capacity involves the burning of heavy fuel oil.² A 110 MW of solar PV capacity has been installed since 2016, and a further 60 MW is under construction. A 159 MW wind farm is under construction. Senegal is planning a 125 MW coal power station (Sendou Coal Phase II project), and to exploit recently discovered gas reserves off its coast (starting in 2022). Thermal power stations, adapted to run on both diesel and gas (once it becomes available), are also planned to be built in the next few years. The country's generation capacity is forecast to reach 1.6 GW in 2030.³

Relevant energy policy for renewable energy

Senegal has set the target of universal access to electricity by 2025, with 20% renewable energy-generation capacity achieved by end-2017, and to meeting 15% of primary energy supply need from renewable sources (excluding biomass) by 2025. Senegal has a clean energy target and energy auctions, a framework for distributed energy, plus a partially unbundled and privatised power sector.³

At Senegal's Ministry of Finance request, the Global Green Growth Institute (GGGI) – a treaty-based inter-governmental organisation – and the AfDB launched a financing mechanism aimed at accelerating the development of renewable energy and energy efficiency projects. It is called the Renewable Energy and Energy Efficiency Fund (REEF) and it is a de-risking mechanism to attract local bank finance. The fund was set up to mobilise a total of USD 200 million over 24 months.⁴ GGGI is to provide the technical assistance for capacity building needs of the banks as well as the project developers and project promoters.⁵

Senegal's rural electrification program opens up the sector further to independent power producers for 25-year concessions, although slow development and a squeeze on profits is reported to have dampened interest after the initial six concession allocations. Smaller-scale concessions, named Electrification Rurale d'Initiative Locale (Locally Initiated Rural Electrification (ERIL)) are available to support local initiatives for electrification with subsidies on initial investments.

¹ <https://www.iea.org/statistics/>

² <https://www.usaid.gov/powerafrica/Senegal>

³ <http://global-climatescope.org/en/country/senegal/#/enabling-framework>

⁴ https://www.get-invest.eu/wp-content/uploads/2019/06/GETInvest-Market-Insights_SEN_PV_Guide_2019.pdf

⁵ <http://www.ipsnews.net/2018/06/building-west-africas-capacity-access-climate-funding/>



Senegal has a mini-grids regulatory framework based on a two-pronged approach that adopts both a top-down concession approach for large areas, and a bottom-up mini-concession approach for private entrepreneurs for ERIL projects. Overall, the top-down concession approach was considered a success, although it was described as a lengthy process with high transaction costs involved.

Analysts report that the country's 2025 target of 15% renewable energy in the energy mix is achievable. One industry expert's assessment is that this will be achieved by focusing on utility-scale solar tenders that increase electrification in urban areas.⁶

Renewable energy projects

Energy project development in Senegal is becoming increasingly vibrant with new stakeholders seeking opportunities to invest. Four solar projects totalling 100 MW have come online since 2017 and in 2018, Senegal's first utility-scale wind farm reached financial close. Lekela Power is providing equity for the project and debt is being provided by U.S. and Danish development banks.^{7, 8} In 2018, the Senegalese government launched a tender for 100 MW of solar projects with a combined storage capacity of 100 MW in the Diourbel, Koaack, and Fatick regions of the country.⁹ A further 158 MW is due to come from a wind farm planned at Taiba N'diaye, 80 km north-east of Dakar. This development is also undertaken by Lekela Power, a joint venture from Mainstream, the Irish renewables developer, and Actis, a UK private equity investor focused on the developing world. Like the Cap des Biches plant, the Taiba N'diaye wind farm is receiving support from the US Power Africa programme in the form of USD 250 million.¹⁰

In 2018, the World Bank Group's Scaling Solar programme supported a competitive auction to develop two utility-scale solar plants with a total capacity of 60 MW, awarding both projects to ENGIE/ MERIDIAM (French utility and infrastructure investor alliance) to produce solar power at the lowest prices to date in sub-Saharan Africa at the time (EUR 3.80 cents or USD 4.70 per kilowatt hour for the solar plant located in Kahone).¹¹

In August 2018, the German company GAUFF Engineering signed a EUR 120 million contract to plan and implement decentralised solar power supply for 300 villages in Senegal. The electrification of the villages includes a photovoltaic system including battery storage, LED street lights, and low-voltage lines for power distribution as well as private connections in each of the villages. Components and equipment are mainly from Germany, and local skilled staff are trained by GAUFF for the operation and maintenance of the plants. This development project is financed by KfW IPEX-Bank, a 100 % subsidiary of KfW, and implemented in cooperation with the German Society for international Cooperation (GIZ).¹² The graphs

⁶ <https://africanbusinessmagazine.com/region/west-africa/renewable-energy-powers-growth-in-senegal/>

⁷ <http://global-climatescope.org/results/SN#clean-energy-investment>

⁸ <http://www.mondaq.com/x/693588/Energy+Law/Energy+In+Senegal+QA>

⁹ <https://www.pv-magazine.com/2018/01/17/senegal-commissions-another-30-mw-solar-park/>

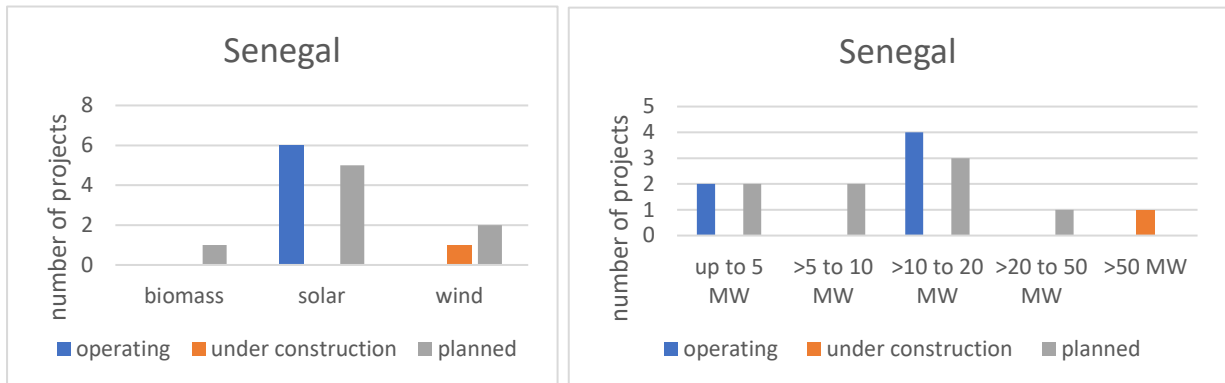
¹⁰ <https://www.usaid.gov/powerafrica/senegal-power-africa-transactions>

¹¹ <https://www.esi-africa.com/senegal-scaling-solar-tender-scraps-last-record/>

¹² [\[\[https://www.gauff.net/en/news/articles/article/elektrifizierung-fuer-300-dorfer-im-senegal.html\]\]](https://www.gauff.net/en/news/articles/article/elektrifizierung-fuer-300-dorfer-im-senegal.html)



below show the types of renewable energy projects being implemented at different stages, with most plans for solar.



Distribution of renewable energy projects in Senegal by technology and scale, by stage of development ('operating', 'under construction', or 'planned'). Source: Authors' estimates from African Energy Live database, September 2019.

Off-grid

In Senegal, mini-grids are considered alongside main grid connections for particular concession areas, dependent on economic drivers, and also for more remote areas outside the concession areas as a quick fix or interim solution.¹³

Hybrid mini-grids include the PERACOD/ERSEN mini-grid (solar-diesel)¹⁴ and the Sine Moussa Abdou ERIL licence/concession mini-grid (wind-solar-diesel).¹⁵ There are reportedly many other mini-grid projects that are not recognised or contracted by the government.¹⁶ The market for small-scale solar home systems is also growing in Senegal, with a number of local and foreign players selling products via distributors in rural areas.¹⁷

One consumer awareness activity that has proven very successful is a 'library of solar lights' offered in 58 rural schools serving low-income populations. Students were able to 'check-out' the lamps for a nominal fee and take them home for the night for self-demonstration. This project reported that 35% of families in the project area purchased a lamp after borrowing a unit, while typical uptake in the region stands at about 10%.¹⁸

Senegal has the highest number of clean energy mini-grids (142) in the region with a total installed capacity of 1.3 MW in 2016 (46 PV only, 95 PV-diesel, 1 PV-wind-diesel). Capacities are within the range from 2.25 kWp to 4.8 MW. Senegal has low off-grid wind capacity (5 kW in 2016).¹⁹

The high level of off-grid development in Senegal is seen as evidence that, in cases of high capital investments, subsidising the capital cost of projects will positively impact the scaling up.

¹³ <http://documents.worldbank.org/curated/en/576111512382257544/pdf/121824-ESM-GhanaESMAPGhanaTechnicalReportDECclean-PUBLIC.pdf>

¹⁴ https://energypedia.info/images/6/61/Rural_Electrification_Senegal_ERSEN_Project_Factsheet.pdf

¹⁵ http://www.ren21.net/Portals/0/documents/Resources/MGT/MinigridPolicyToolkit_Sep2014_EN.pdf

¹⁶ <https://www.dalberg.com/system/files/2017-08/off-grid%20policy.pdf>

¹⁷ <http://global-climatescope.org/en/country/senegal/#/enabling-framework>

¹⁸ <https://www.lightingafrica.org/country/senegal/>

¹⁹ http://www.ecreee.org/sites/default/files/mapping_and_assessment_of_existing_clean_energy_mini-grid_experiences_in_west_africa_ecreee.pdf



Off-grid product prices in Senegal are relatively high, largely due to a 25% import tax and 18% VAT. These high prices reportedly drive the market toward cheaper and inferior quality products. It is not known whether the life cycle costs of higher cost products would represent a savings over the alternatives. Bad experiences with inferior products are said to undermine consumer confidence in the off-grid sector in general. Similarly, retailers are reluctant to stock solar lanterns due to the high up-front costs.

Visit the report webpage at <https://350africa.org/renewable-energy-report>.