



Survey and Documentation of Off-grid Renewable Energy Projects in the Six Geopolitical Zones of Nigeria*

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Introduction

Nigeria on the World Map





Introduction: Socio-Economic Indicators

Indicator	Remark
Capital	Abuja
Region	West Africa
Coordinates	8.0000° N, 10.0000° E
Total Area (km ²)	923,770
Population	200,963,599 (2019)
Rural Population (% of total population)	49 (2019)
GDP (current US\$)	448,120,428,858.77 (2019)
GDP Per Capita (current US\$)	2,229.86 (2019)
Access to Electricity (% of population)	56.50 (2020)



Introduction:

Mandate of the Energy Commission of Nigeria (ECN)

- The Energy Commission of Nigeria was established in 1979 with the primary legal mandate for strategic planning and co-ordination of national policies in the field of energy in all its ramifications for the country. The Commission is also mandated to amongst other functions:
 - Collate, analyze and publish information relating to the field of energy from all sources;
 - Give recommendations for sustainable exploitation of new sources of energy as and when considered necessary;



Introduction:

Mandate of the Energy Commission of Nigeria Cont'd.

- **Lay down guidelines** on the **utilization** of energy types for specific purposes and in a prescribed sequence;
- **Advise** Government of the Federation or the States on the **adequate funding of the energy sector** including research and development, production and distribution;
- **Serve as a centre** for **gathering and disseminating information** relating to national policy in the field of energy development;



Introduction:

Mandate of the Energy Commission of Nigeria Cont'd.

- **Liaise** with international organizations on **energy matters** such as the International Atomic Energy Agency (IAEA), the World Energy Council (WEC), the African Energy Commission (AFREC), the International Renewable Energy Agency (IRENA), etc.



Renewable Energy Resources in Nigeria

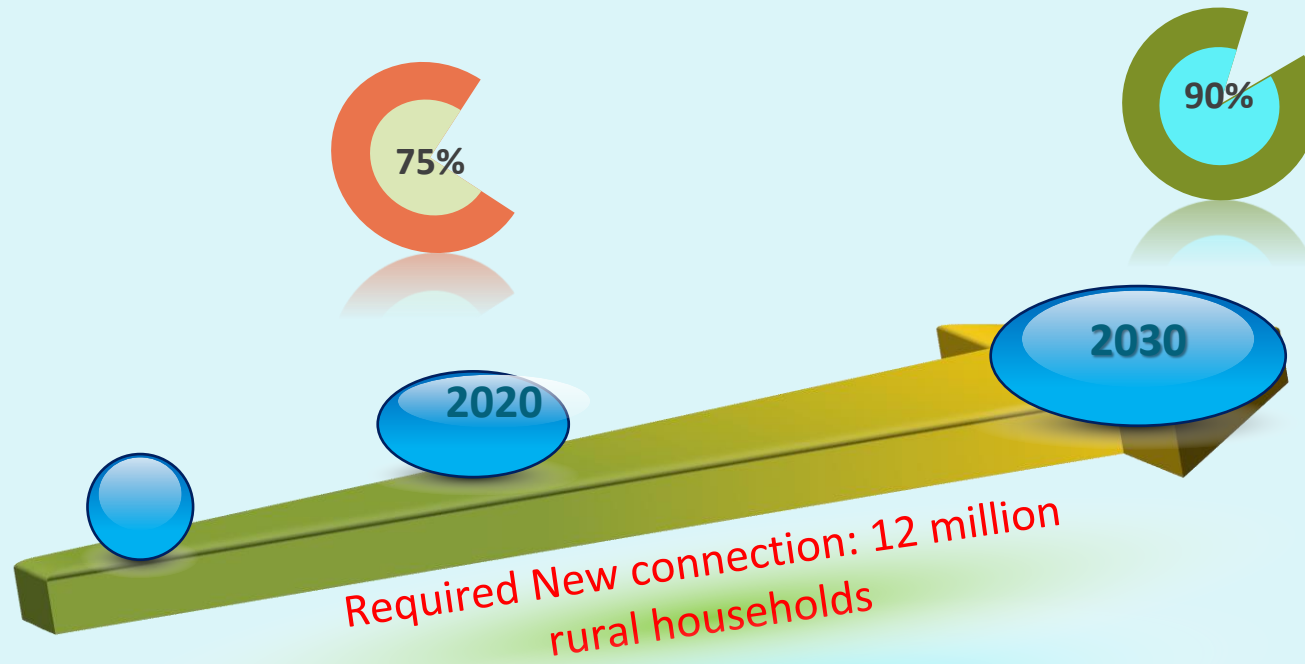


Energy Type	Resource Estimate
Hydro Power	23,400 MW
Small Hydro	3500MW
Solar Radiation	3.5 – 7.0 kWh/m ² -day
Wind Energy	2.0 – 4.0 m/s at 10m heights
Nuclear	(Not yet Quantified)
Biomass	144 million tones/yr plus 13million hectares of Fuelwood
Wave and Tidal Energy	(Not yet Quantified)
Geothermal Energy	(Not yet Quantified)



Introduction:

National Electrification Targets of Nigeria



Required Capacity addition: 8,000MW

Required Investment: US\$11 billion

With 30% RE target in the National Energy Mix



Objectives of the Off-grid RE Projects Survey

The survey has the following objectives:

- To assess the **installed capacities** of all Renewable Energy (RE) projects in the country.
- To assess the **generation capacities** of all RE projects in the country.
- To investigate the **levels of penetration** of RE technologies in the country.



Objectives of the Off-grid RE Projects Survey

Cont'd.

- To identify the **locations** of the RE projects in the country.
- To ascertain the **level of investment** on RE technologies in the country.
- To determine the **operation and maintenance** costs of installed RE projects in the country.
- To establish **public awareness** on RE technologies in the country.



Methodology for the Off-grid RE Projects Survey

The procedures adopted in undertaking the survey were as follows:

- Preliminary meeting with the ECN - **Renewable Energy Department**
- Design and drafting of survey **questionnaires**
- Meeting with relevant stakeholders to **validate the draft questionnaires.**
- **Training** of the survey enumerators
- Preliminary survey of targeted areas **for profiling.**



Methodology for the Off-grid RE Projects Survey

Cont'd.

- Second meeting of stakeholders to consider **preliminary survey report**.
- **Administering of the questionnaires** in the field for the main survey.
- **Collation of data** and information
- **Data analysis**/processing
- Writing of the **survey report**
- Final stakeholders meeting to **consider the main survey report**
- Printing of the survey report in hard copy



Samples Selection and Profiling Techniques

- Due to the fact that, it is **rarely possible** to collect data on **every** Renewable Energy **Project** in the six Geopolitical Zones of the country,
- the **enumeration areas were carefully profiled** and
- the **samples** were selected using **probability sampling technique** which allowed for making **statistical inferences** about the whole populations (all RE projects and the people in the country).



Samples Selection and Profiling Techniques Cont'd.

- All Local Government Headquarters and some selected towns and villages were profiled for the survey. A total of 1,500 to 3500 people were profiled and targeted as respondents to be administered the questionnaires in each Local Government Area in the country depending on its population and land size.



Scope of the Off-grid RE Projects Survey

- Due to time and budgetary constraints, the survey programme was conducted as an annual project in **phases** with each phase covering **four states** of the federation.
- The survey involves renewable energy data collection from **primary** sources directly from communities, towns and villages, and **secondary** renewable energy data from private and government institutions.



Statistics of Some Off-grid RE Projects in Nigeria

S/No	State	Project Site	Technology	Capacity (KW)	Sponsor
1	Kano	BUK Old Campus	Solar PV	1000	DFID
2	Kano	BUK New Campus	Solar Hybrid	7100	REA
3	Sokoto	Toronkawa	Solar Hybrid	60	FMP
4	Niger	Rokoto	Solar Hybrid	64	REA/REF
5	Ebony	Alex Ekweme Univ.	Solar Hybrid	2800	REA
6	Bayalsa	Akipele & Oloibiri	Solar Hybrid	136.64	REA
7	Kaduna	ABU- Samaru Camp.	Solar PV	10000	NGEP
8	Oyo	University of Ibadan	Solar PV	10000	NGEP
9	Kaduna	Gnami & Pakau	Solar PV	90	FMW
10	Anambr a	Onono-Anam	Solar PV	25	BoI-UNDP



Statistics of Some Off-grid RE Projects in Nigeria Cont'd.

S/No	State	Project Site	Technology	Capacity (KW)	Sponsor
11	Cross-River	Ikot Ekepene	Solar PV	16	REA
12	Cross-River	Onyen-Okpan	Solar PV	200	REA
13	Ogun	Mokoloki	Solar PV	80	REA
14	Ogun	Okun-Owa	Solar PV	1800	REA
15	Kaduna	Kaduna	Solar PV	24	NGEP
16	Niger	Tungan Jika	Solar PV	100	NESP
17	Plateau	Angwan Rini	Solar PV	50	GVE
18	Niger	Bisenti	Solar PV	37	BoI-UNDP
19	C/River	Umon Island	Solar PV	50	CREDC
20	Sokoto	Kurdula Community	Solar	80	EU/GIZ/FG



Statistics of Some Off-grid RE Projects in Nigeria Cont'd.

S/No	State	Project Site	Technology	Capacity (KW)	Sponsor
21	Niger	Gulu General Hosp.	Solar PV	48	Niger State
22	Edo	Obayantor Mini-Grid Project	Solar PV	37	BoI-UNDP
23	Kaduna	Dokan Karji	Solar	34	REA/REF
24	Abuja	Kigbe Community	Solar PV	20	USADF
25	Bauchi	Gololo	Solar PV	10	ACOB L&T
26	Bauchi	Ningi, Bayan Fada	Solar PV	7.5	ACOB L&T
27	Rivers	Ihuama Community	Solar PV	16	ACOB L&T
28	Kaduna	Kaduna	Solar PV	16	ACOB L&T
29	Delta	Oghriaghene	Solar PV	30	ACOB L&T
30	Kaduna	Charwa/Chukun	Solar PV	24	BoI-UNDP



Statistics of Some Off-grid RE Projects in Nigeria Cont'd.

S/No	State	Project Site	Technology	Capacity (KW)	Sponsor
31	Osun	Idi-ATa	Solar PV	24	BoI-UNDP
32	Gombe	Kolwa	Solar PV	24	BoI-UNDP
33	Kebbi	Kare-Dadin Kowa	Solar PV	98.8	REA
34	Kogi	Ajakuta	Solar PV	80	REA/REF
35	Abuja	Univ. Teaching Hosp.	Solar Hybrid	53.1	REA
36	Lagos	NCDC C Health Laboratory	Solar Hybrid		REA
37	Ogun	128- Bed Ikenne Isolation Centre	Solar Hybrid	20	REA
38	Ogun	100-Bed Isolation Centre Iberekodo	Solar Hybrid	10	REA
39	Enugu	Enugu Isolation Centre	Solar Hybrid	18	GVE
40	Rivers	Rivers Isolation Centre	Solar Hybrid	30	GVE



Statistics of Some Off-grid RE Projects in Nigeria Cont'd.

S/No	State	Project Site	Technology	Capacity (KW)	Sponsor
41	Lagos	COVID-19 Isolation & Treatment Center	Solar Hybrid	10	Luminus/ All On
42	Ogun	Gbamu-Gbamu	Solar PV	80	Rubitec Solar
43	Gombe	Akko	Solar Hybrid	85	REA
44	Gombe	Kolwa	Solar Hybrid	341,600	REA
45	Kebbi	Kebbi	Solar Hybrid	50	
46	Bauchi	Shira	Solar Hybrid	17.5kW	REA
47	Gombe	Kaltungo	Solar PV	37.8kW	BoI-UNDP
48	Gombe	Balanga-Kolaku	Solar PV	46.8 kW	BoI-UNDP
49	Gombe	Billiri-Ayaba	Solar PV	17.55 kW	BoI-UNDP
50	Gombe	Gombe	Solar PV	28.5 kW	BoI-UNDP



Statistics of Some Off-grid RE Projects in Nigeria Cont'd.

S/No	State	Project Site	Technology	Capacity (KW)	Sponsor
50	Kebbi	Arewa LG	Solar Hybrid	90	REA/REF
52	Awa-Ibom	Onna	Solar Hybrid	100	REA/REF
53	Oyo	Itesiwaju	Solar Hybrid	100	REA/REF
54	Ebonyi	Ikwo	Solar Hybrid	100	REA/REF
55	Ebonyi	Onicha	Solar Hybrid	66	REA/REF
56	Ebonyi	Onicha	Solar Hybrid	33	REA/REF
57	Niger	Paiko	Solar Hybrid	40	REA/REF
58	Ogun	Ijebu East	Solar Hybrid	100	REA/REF
59	Edo	Ovia South	Solar Hybrid	100	REA/REF
60	Taraba	Sarkin Kudu, Ibi LGA	Solar Hybrid	91	REA/REF



Statistics of Some Off-grid RE Projects in Nigeria Cont'd.

S/No	State	Project Site	Technology	Capacity (KW)	Sponsor
61	Katsina	Bambami village in Batagarawa	Solar Hybrid	30	REA/REF
62	Akwa Ibom	Mbo LGA	SHS	27.4	REA/REF
63	Katsina	Dursinma LGA	SHS	19.5	REA/REF
64	Plateau	Mangu LGA	SHS	30	REA/REF
65	Kaduna	Zangon Kataf LGA	SHS	45.4	REA/REF
66	Benue	Vandeikya LGA	SHS	30	REA/REF
67	Kogi	Adavi LGA	SHS	20	REA/REF
68	C/River	Boki LGA	SHS	7.7	REA/REF
69	FCT	Alu-mamagi & Nuku villages	SHS	4.5	REA/REF
70	Ogun	Ogun	SHS	28.9	REA/REF



Statistics of Some Off-grid RE Projects in Nigeria Cont'd.

S/No	State	Project Site	Technology	Capacity (KW)	Sponsor
71	Abia	Abia	SHS	21	REA/REF
72	Yobe/Borno	Pami, Damboa, Densheirk, Gasua	SHS	25.6	REA/REF
873	Ogun	Idi Aba village	SHS	30	REA/REF
74	Ebonyi	Okposi District,	SHS	30	REA/REF
75	Gombe	Gombe	SHS	28.5	REA/REF
76	FCT	Kuje	Biogas		REA/REF
77	Bayalsa	Bayalsa	Biogas	20 KVA	ECN
78	FCT	Bwari	Solar PV	15	ECN
79	Taraba	Tunga Dam	Hydropower	400	UNIDO
80	Enugu	Enugu	Hydropower	30	UNIDO



S/No	State	Project Site	Technology	Capacity (KW)	Sponsor
81	Bauchi	Bauchi	Hydropower	150	UNIDO
82	Plateau	Plateau	Hydropower	26	NESCO
83	36 States & the FCT	All the 774 LGAs	Stand alone Streetlights	11,583	ECN
84	36 States & the FCT	Selected LGAs	Solar PV mini grid/SHS	816	ECN
85	36 States & the FCT	All the 774 LGAs	Solar PV Water Pumping Systems	1,242	ECN
86	36 States & the FCT	Selected LGAs	Wind Turbines	69.5	ECN
			Total	391,837.09	



The Opportunity for Off Grid Electrification in Nigeria



Nigeria is the **biggest and most attractive off-grid opportunity in Africa**, and one of the best locations in the world for mini-grids and solar home systems.

- Nigeria has the largest economy in Sub-Saharan Africa (**GDP of \$448 billion**), has over **200 million people**, and a flourishing economy (CAGR of 15% since 2000).



The Opportunity for Off Grid Electrification in Nigeria Cont'd.

- A **significant** amount of the **economy** is powered largely by **small-scale generators (10–15 kW)** and almost **50% of the population** have limited or **no access** to the grid.
- As a result Nigerians and their **businesses spend** almost **\$14 billion** (₦ 5 trillion) **annually** on inefficient generation that is expensive (\$0.40/kWh or ₦140/kWh or more), of poor quality, noisy, and polluting.



The Opportunity for Off Grid Electrification in Nigeria Cont'd.

- Developing **off-grid alternatives** to complement the grid **creates a \$9.2B/year (₦3.2T/year) market opportunity** for minigrids and solar home systems that will save \$4.4B/year (₦1.5T/year) for Nigerian homes and businesses.
- There is a large **potential for scaling—installing 10,000 minigrids of 100 kW each can occur by 2023** and only meet 30% of anticipated demand.



The Opportunity for Off Grid Electrification in Nigeria Cont'd.

- Getting **off-grid solutions** to scale and commercial viability in Nigeria will **unlock an enormous market opportunity in Sub-Saharan Africa** across **350 million people** in countries with smaller demand and/or less-robust economies.
- Nigeria has developed the **Nigerian off-grid power market**, and the **Off-Grid Electrification Strategy** which is part of the Power Sector Recovery Programme (PSRP).



Challenges of RE Survey in Nigeria

- Policy, Regulatory and Institutional challenges.
- Inadequate **skilled personnel** for off-grid data collection and analysis.
- Inadequately **funding** by government for regular off-grid surveys.
- **Reluctance of respondents to release information** for fears of taxation and security concern.



Challenges of RE Survey in Nigeria



Cont'd.

- **Movement restrictions** of personnel in the field for off grid data collection exercises in some areas due to security reasons.
- **Poor participation of the private sector** in off-grid surveys.
- **Poor financing** of off-grid data collection projects by **Banks** and other Financial Institutions.
- Inadequate **public awareness** of the importance of off-grid data.



Recommendation

- Management of energy statistics in the country should be **decentralised** to enable effective and accurate energy data development and dissemination.
- **Adequate Budgetary allocations and Grants** should be provided by the government and the private sector to facilitate energy data Survey.
- Concerted efforts must be made by the Government and the Private sector to develop both **Human and Institutional capacities** for effective energy data survey.



Recommendation Cont'd.

- There should be **strong collaboration and synergy** between **Government Institutions, Private Sector** and the **Development Partners** for information sharing and adequate funding of energy survey activities.



Thank you for
listening!