Nigeria:
Preliminary fieldwork findings

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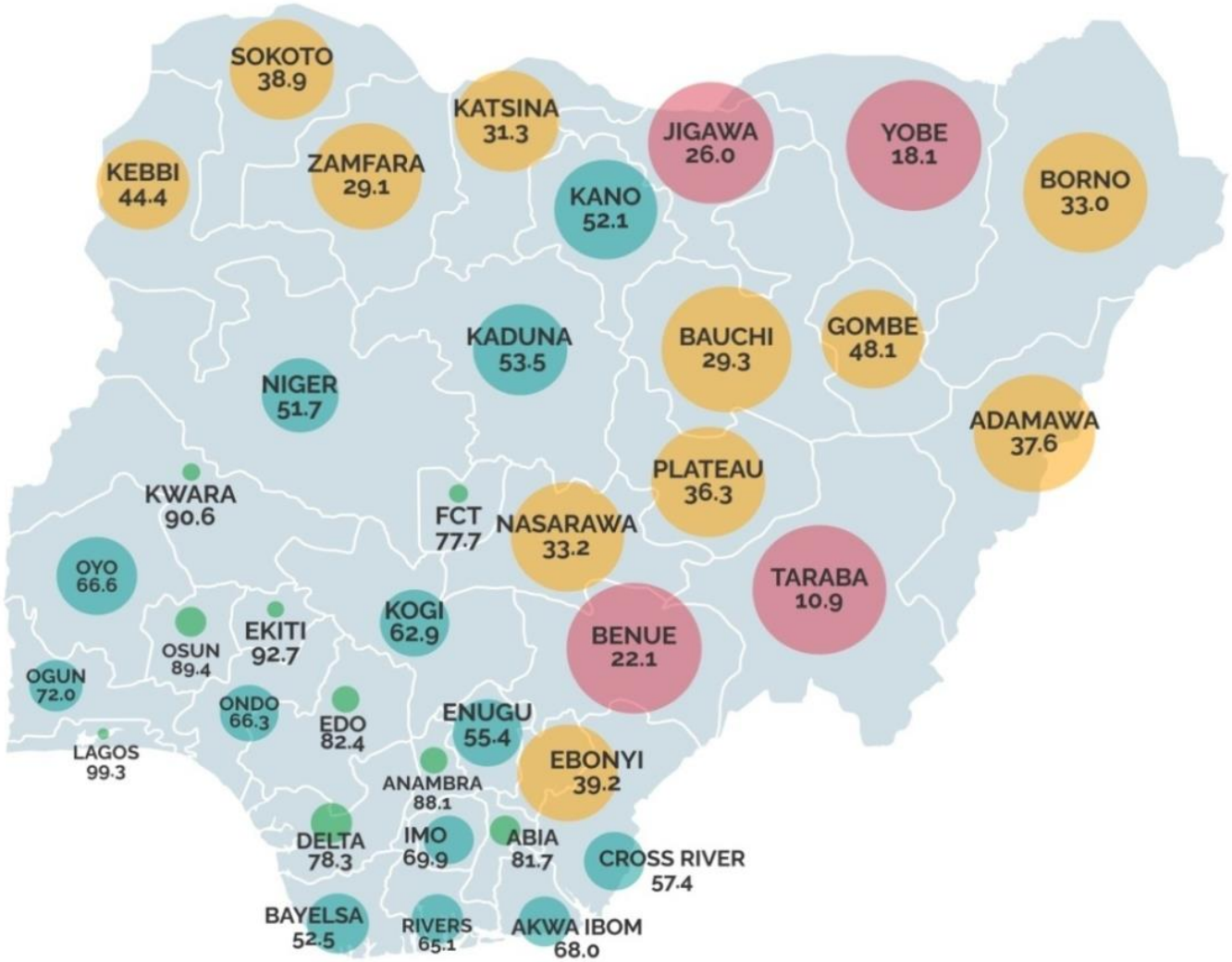
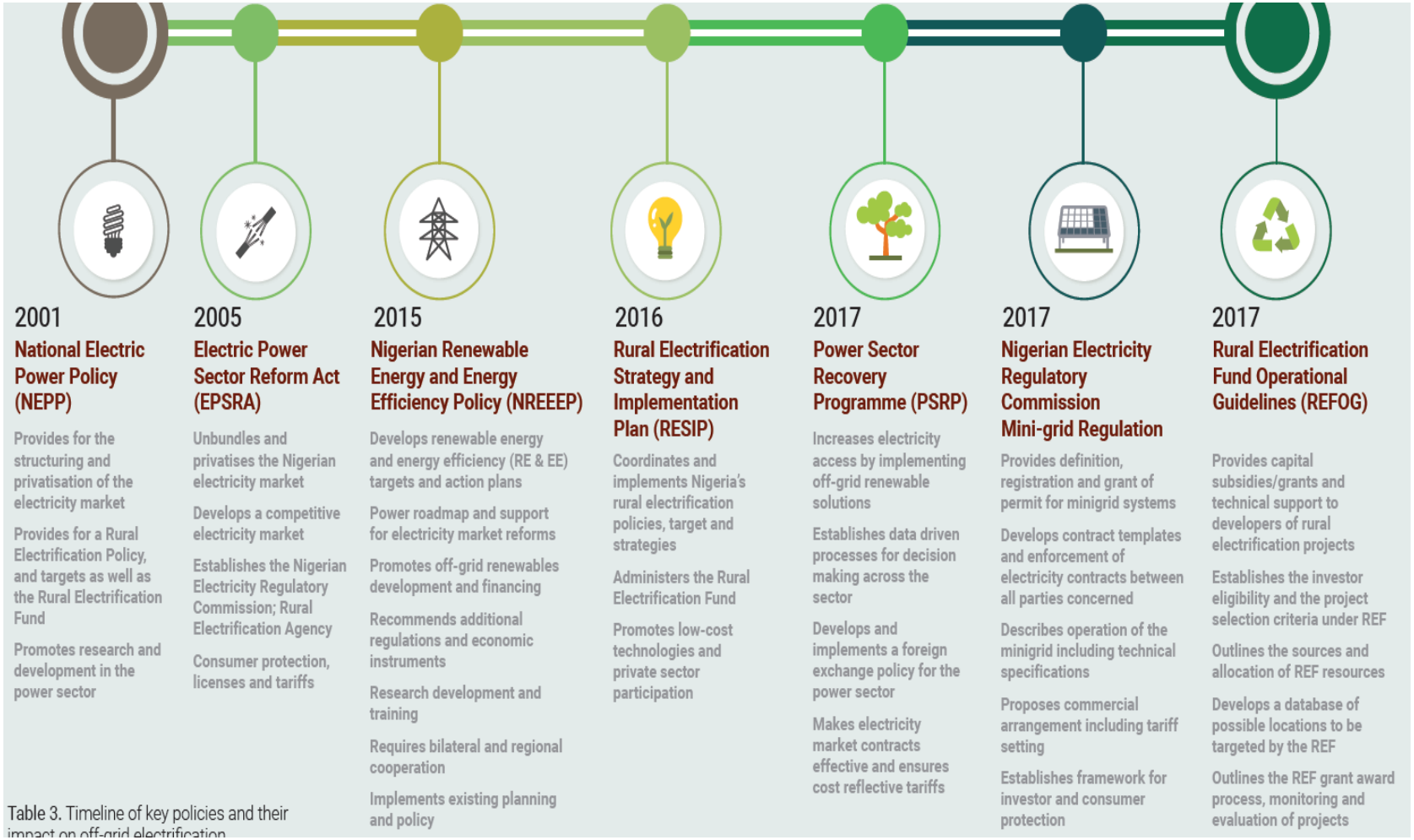
Nigeria: The energy deficit

- 55.4% of households have access to grid electricity; about 23% actually receive power from the grid
- About 33 outages per month – Africa's highest
- Electricity consumption per capita one of the lowest in Africa and lowest among peer countries
- Renewables make up less than 1% of total power generated
- 2.5m connections/year 2020 to 2030 required to close access gap
- Approximately 250,000 new off-grid systems required annually

Electricity access by state



Mini grids: Regulatory context



2001
National Electric Power Policy (NEPP)

Provides for the structuring and privatisation of the electricity market

Provides for a Rural Electrification Policy, and targets as well as the Rural Electrification Fund

Promotes research and development in the power sector

2005
Electric Power Sector Reform Act (EPSRA)

Unbundles and privatises the Nigerian electricity market

Develops a competitive electricity market

Establishes the Nigerian Electricity Regulatory Commission; Rural Electrification Agency

Consumer protection, licenses and tariffs

2015
Nigerian Renewable Energy and Energy Efficiency Policy (NREEEP)

Develops renewable energy and energy efficiency (RE & EE) targets and action plans

Power roadmap and support for electricity market reforms

Promotes off-grid renewables development and financing

Recommends additional regulations and economic instruments

Research development and training

Requires bilateral and regional cooperation

Implements existing planning and policy

2016
Rural Electrification Strategy and Implementation Plan (RESIP)

Coordinates and implements Nigeria's rural electrification policies, target and strategies

Administers the Rural Electrification Fund

Promotes low-cost technologies and private sector participation

2017
Power Sector Recovery Programme (PSRP)

Increases electricity access by implementing off-grid renewable solutions

Establishes data driven processes for decision making across the sector

Develops and implements a foreign exchange policy for the power sector

Makes electricity market contracts effective and ensures cost reflective tariffs

2017
Nigerian Electricity Regulatory Commission Mini-grid Regulation

Provides definition, registration and grant of permit for minigrid systems

Develops contract templates and enforcement of electricity contracts between all parties concerned

Describes operation of the minigrid including technical specifications

Proposes commercial arrangement including tariff setting

Establishes framework for investor and consumer protection

2017
Rural Electrification Fund Operational Guidelines (REFOG)

Provides capital subsidies/grants and technical support to developers of rural electrification projects

Establishes the investor eligibility and the project selection criteria under REF

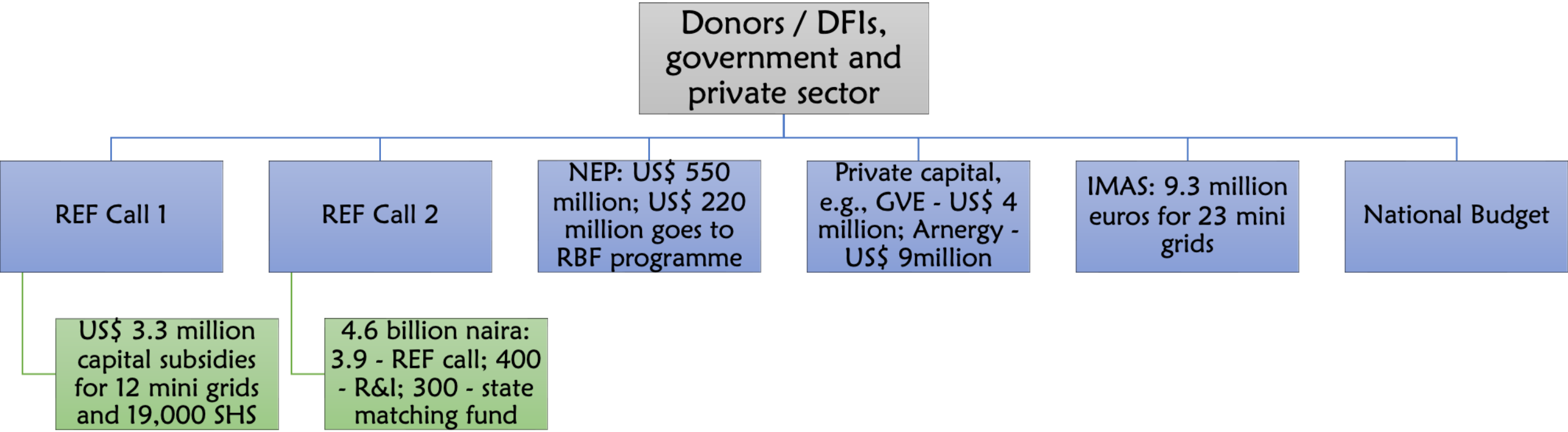
Outlines the sources and allocation of REF resources

Develops a database of possible locations to be targeted by the REF

Outlines the REF grant award process, monitoring and evaluation of projects

Table 3. Timeline of key policies and their impact on off-grid electrification

Mini grids: Financing



SIGMA research questions

- Which business models have succeeded to deliver financially and technical sustainable mini grids to Nigeria?
- Who and what have been the key beneficiaries of mini grids in Nigeria, and in what way?
- Who drives and hinders the proliferation and the speed of adoption of mini grids in Nigeria?
- What governance, regulatory and policy frameworks for decentralised electricity provision exist in Nigeria?

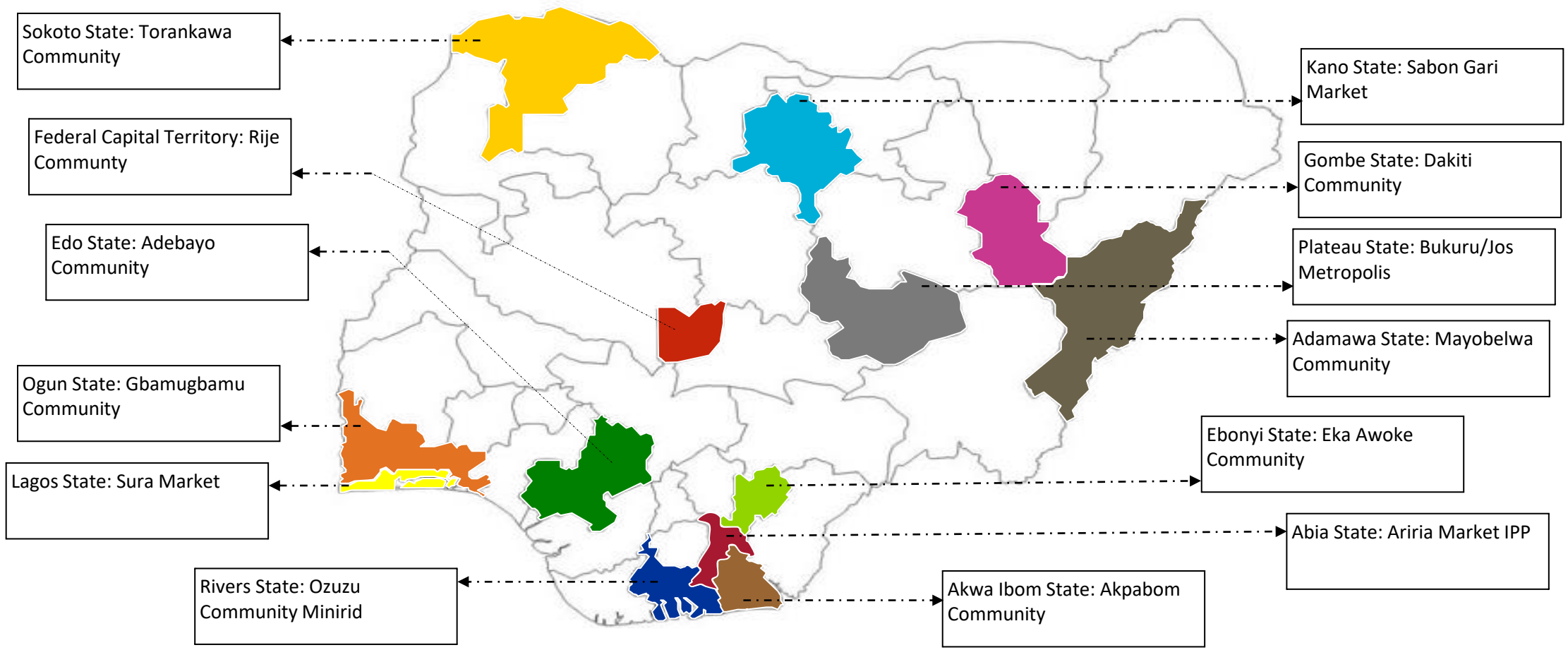
Key informant interviews

Institution/Organisation	Position of Interviewee	Gender
• Energy Commission of Nigeria	• Managing Director	• Male
• Nigerian Electricity Regulatory Commission	• Deputy General Manger, Research	• Male
• Ministry of Power	• Chief Electrical Engineer; Chief Engineer Renewables (x2)	• Male
• Rubitec Solar Nigeria Limited	• Operations Manager	• Male
• GVE Projects Nigeria Limited	• Operations Officer	• Male
• Gen Sustainability Solutions	• Managing Director	• Male
• Havenhill Synergy Limited	• Managing Director	• Male
• Abuja Electricity Distribution Company	• Head, Regulatory Affairs	• Female
• Benin Electricity Distribution Company	• Head, Regulatory Affairs	• Male
• Ibadan Electricity Distribution Company	• Head, Regulatory Affairs	• Male
• Nayo Tropical Nigeria Limited	• Managing Director	• Male
• Heinrich Boell Foundation	• Programme Manager	• Male

Mini grid site selection

Nigeria is a vast federation with more than 200 million people, 36 states and 774 local government areas. The country is structured into 6 geo-political zones: south east, south-south, south west, north east, north-central and north west. Infrastructural development in the country tries to accommodate this division in such a way that all geopolitical zones are treated fairly.

Geographical spread



Sites by technology and zone

Mini-grid site	Technology	Geographical Zone
Akpabom	Solar Hybrid	South South
Eka Awoke	Solar Hybrid	South East
Ozuzu	Solar Hybrid	South South
Ariaria Market	Fossil	South East
Sura Market	Solar Hybrid	South West
Gbamugbamu	Solar Hybrid	South West
Adebayo	Solar Hybrid	South South
Rije	Biogas	North Central
Bukuru	Hydro	North Central
Dakiti	Solar PV	North East
Torankawa	Solar Hybrid	North West
Mayobelwa	Solar PV	North East
Sabon Gari Market	Solar PV	North West

Community FGDs and interviews

Community	FGDs		Household interviews		Productive user interviews		Social user interviews	Total
	Men	Women	Men	Women	Men	Women		
Eka Awoke	7	6	8	2	2	2	-	**27**
Ozuzu	7	-	8	2	4	-	-	**21**
Ariaria Market	-	-			6	-	-	**6**
Sura Market	-	-	-	-	6	1	-	**7**
Gbamu Gbamu	3	-	-	3	8	5	3	**22**
Adebayo	13	1	5	4	4	1	1	**29**
Rije	10	1	3	6	1	-		**21**
Bukuru	-	-	4	2	3	1	-	**10**
Dakiti	11	-	8	-	2	10	-	**31**
Torankawa	6	-	7	-	3	-	-	**16**
Mayobelwa	7	-	9	-	1	-	-	**17**
Sabon Gari Market	5	-	-	-	10	-	-	**15**
Akpabom	9	-	8	2	2	1	1	**23**
Total	**78**	**8**	**60**	**21**	**52**	**21**	**5**	**245**

Governance and political economy

1. The political context

- Short-term thinking prevails among ‘political juggernauts’, corresponding to the election cycle
- However, political will also helps get projects implemented locally; retrospectively applying technical site selection criteria is recognised as a way forward

2. The institutional context

- Restrictions on mini-grid size and location need to be reviewed
- Legislative inconsistencies pose a challenge to this:

  '…instead of having a review of the Power Sector Reform Act 2005, which is long overdue... I think what is even at the National Assembly now is a bill to create a commission for renewable energy or something which is at variance with the law.' - FMPower
- The media is not as informed about the sector as it needs to be

3. Regulatory enablers and barriers

- FMPower nominally in charge of policy coordination; however, there is a lot of subversion
- A central data management system exists to aid coordination; however, it is missing key information from stakeholders
- The 2017 NERC regulation has several enabling provisions; however, many of them need to be 'tested' and adapted

  '…the size of the mini-grid [is] a challenge because there are some places which are very viable but the capacity you need is beyond 1MW… And if you want to do interconnected mini grid, what confidence do you have in the DisCos being loyal to the agreement you have?' – Private sector consultant

4. Investment enablers and barriers

- USD 550 million credit facility from the World Bank/AfDB enabled subsidisation of local developers
- Subsidies have had mixed results with regard to market development
- The profit motive may discourage transparency
- Care should be taken not to overregulate a nascent market:

  '…even before the mini-grid regulation, some small-scale developers took advantage of the opportunity they had… by the time you come with the mini-grid regulation where you now begin to introduce some other concepts that might be a bit strange…' - FMPower

Financial sustainability

1. Ownership models

- The government has up to a 50% stake in most projects; 100% in others
- Counterpart funding and performance-based grants provided by the government, but ownership rests with private developers in many cases
- The government is seeking concession arrangements for projects under community management
- The consensus is for investment and ownership to go solely to the private sector

2. Cost recovery

- Effective metering systems limit financial losses for private developers
- The emphasis on lucrative productive-use customers is still largely theoretical, mainly due to low agricultural output and the persistence of traditional agro processing methods
- More successful developers have not only targeted productive use of energy but also increased agricultural productivity

3. Long-term viability

- Good site selection remains the key predictor of long-term viability; however, it is not a sufficient condition for success
- In none of the cases do collections seem to cover operating costs; however, government grants presume a gestation period of at least 6 years
- Mini-grid sizing has turned out to be overly optimistic in some cases and too conservative in others
- High interest rates and a rapidly devaluing currency long-term planning

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Technical sustainability

1. Operations and maintenance

- There is very little local capacity for O&M, sometimes leading to preventable outages
- Local power committees exist in some cases but are largely ignored and/or ineffective
- A heavy reliance on imports can hamper real-time responsiveness by developers
- Local vending arrangements are unsatisfactory in many cases

2. Affordability and reliability

- Connection fees represent a significant investment for many users
- Tariffs are up to 5x higher than the grid in some cases
- Reliability of supply generally declines with the age of the installation, conflicting with the high expectations developed at the onset
- The nexus between reliability and affordability (in terms of stated WTP) suggests that many are willing to trade off the latter for the former

Inclusivity

1. Stakeholder engagement

- There is poor synergy between various sectors (e.g., energy, agric, finance) and levels of government (federal, state, local)
- Feedback mechanisms between public and private sector actors are weak or non-existent
- Public-private-community relations put the latter in a default ‘opt-out’ position

2. Community engagement

- Communities are typically enthusiastic about mini grid opportunities – they often facilitate land acquisition and other aspects of implementation
- However, the process of engagement is often riddled with communication gaps, leading to untenable conclusions on both sides
- Most communities have weak ties to private developers/contractors, even when the latter have a local presence

3. Gender and social inclusion

- Women were involved in decision making and construction to varying degrees across the sites
- Access (often paid for by men) may reduce women's drudgery in relation to energy for lighting (e.g., kerosene purchases), but not for cooking
- Productive use benefits seem smaller for women than men
- Social outcomes – e.g. in health and security – can be obscured by the emphasis on maximising productive use

Limitations and next steps

- Access to certain elite key informants, in particular donors and DFIs, remains a challenge
- The research team is working on securing interviews with informants in key institutions, especially the EU and GIZ
- It was difficult to triangulate some developer claims due to their exercise of proprietary rights over certain mini-grid sites
- The research team will organise a national stakeholder workshop to disseminate and validate preliminary findings