



REA'S STRATEGIC INTERVENTIONS:

ADOPTING A PROGRAMMATIC APPROACH TO DELIVER CAPITAL PROJECTS



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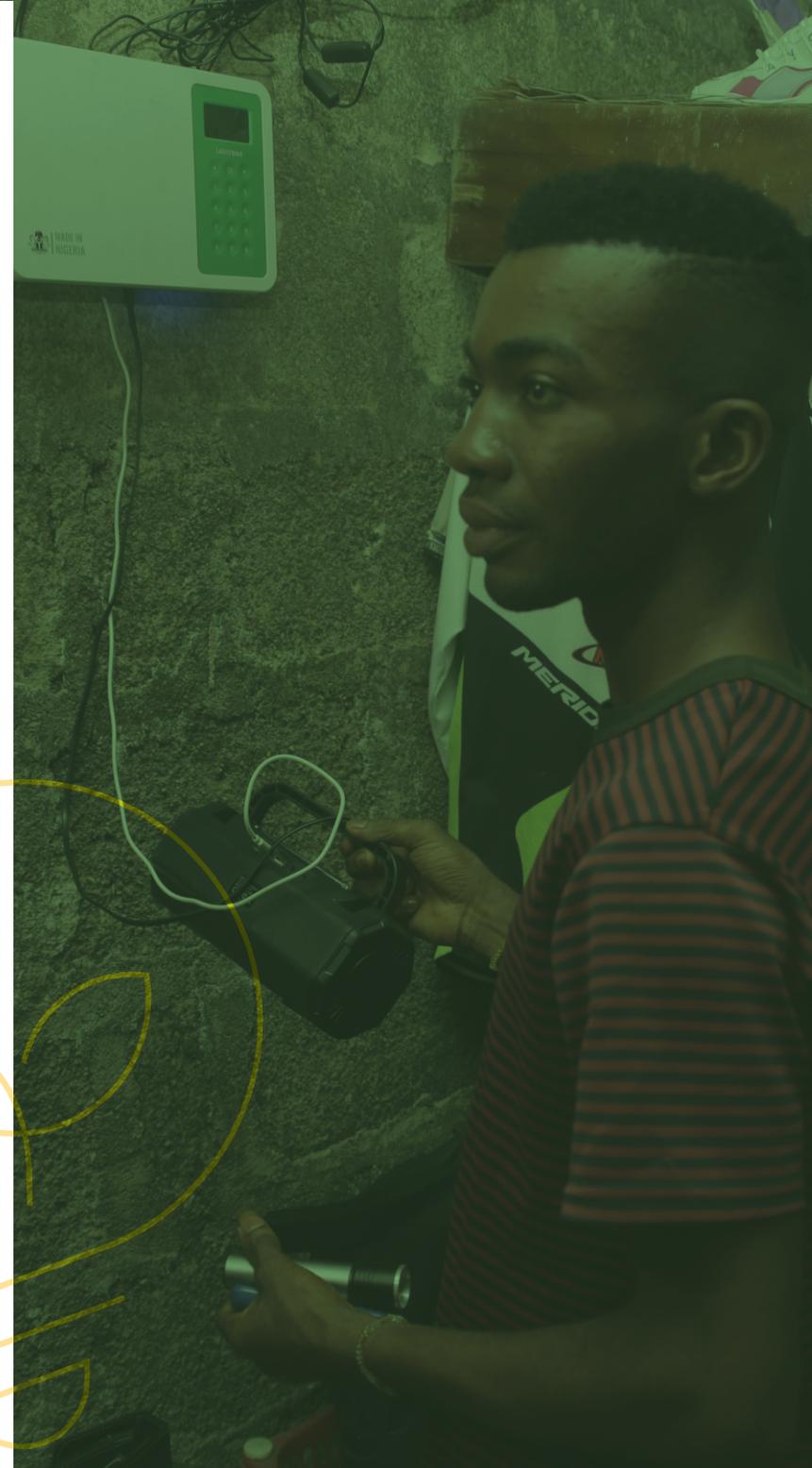
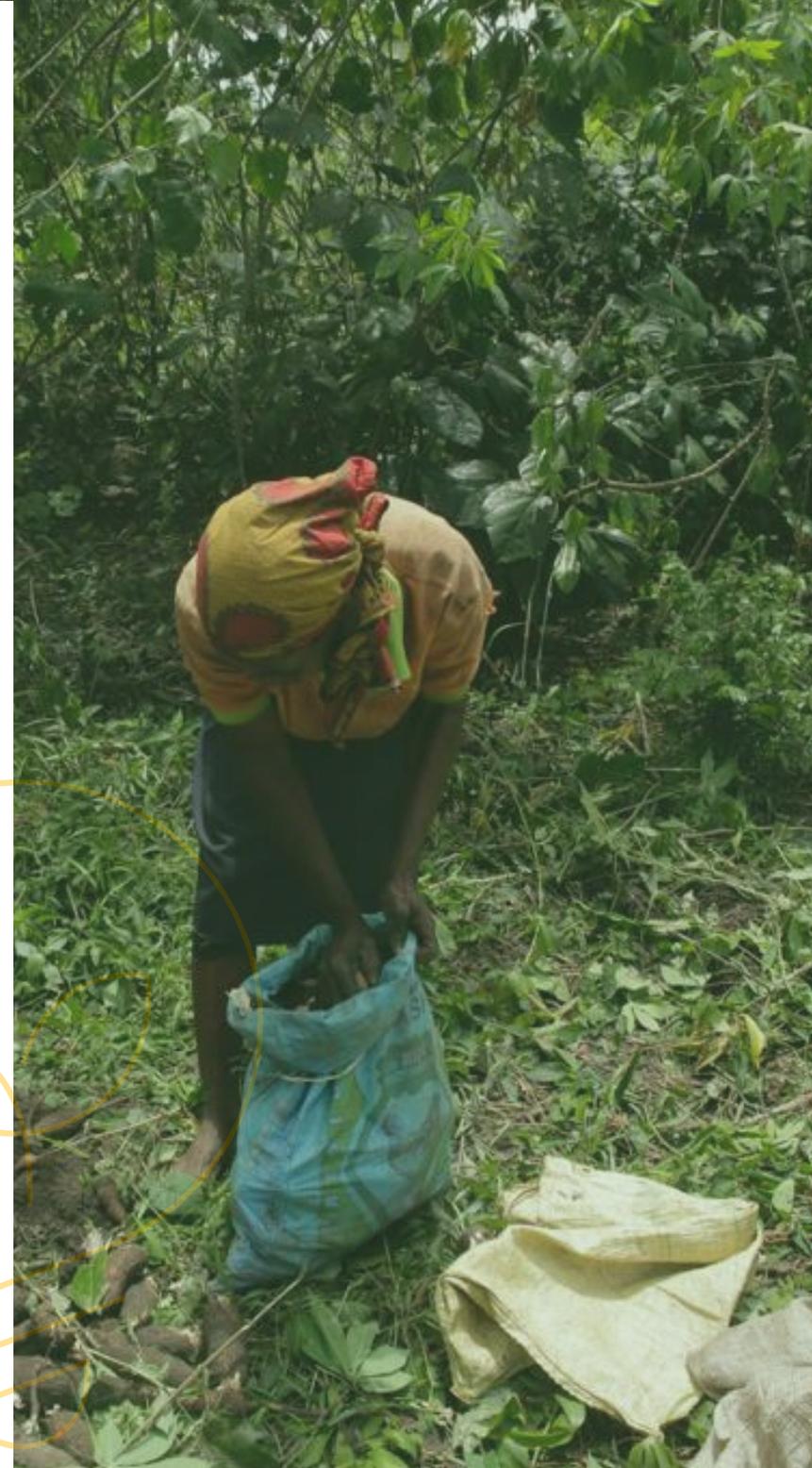


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EXECUTIVE SUMMARY



This report showcases the Rural Electrification Agency's (REA) strategic interventions for the year 2022, notably the Agency's implementation of a programmatic approach to deliver capital projects. It includes the preliminary needs assessment and implementation framework for the 2022 electrification programmes – the deployment of Solar Mini-Grids (High-Capacity Productive Use), Solar Water Pumps (Irrigation Schemes) and Solar Home Systems (Low-Capacity Productive Use) across the six geopolitical zones in the country. The report further discusses the baseline indicators, impact assessment, gender considerations, as well as the beneficiaries' and stakeholders' feedback from the three (3) programmes. A pathway to sustainability for the 2022 pilot programmes and an emphasis on the forthcoming programmatic budgeting exercise for the year 2023 were also included in the report.

Before the strategic interventions, some of the baseline conditions and challenges of the beneficiaries included access to electricity and water, petrol consumption patterns, security conditions, employment conditions, gender inclusivity and major crops produced. After the interventions, an assessment exercise was then conducted to determine the social, environmental, and economic impact on the livelihoods in the beneficiary communities. The exercise relied on primary data collection using questionnaire-based surveys. A methodology also adopted the SEforALL mini-grid emissions to estimate the carbon emissions and reductions.



Six (6) communities were equipped with a 100-kW solar mini-grid system. The systems were designed to prioritise productive users, including agro-processing businesses, homes, commercial users, as well as public spaces. Over 8,155 lives and 5,000 active farmers have been impacted with uninterrupted power supply and clean affordable water, translating to over 60 direct and indirect jobs created, improved security, increased productivity, improved healthcare, as well as the decommissioning of over 40 diesel and petrol gensets. Based on the current and future estimations, the reductions in carbon emissions were also encouraging.



1,392 irrigation solar pumps were distributed across the six geopolitical zones, reaching 1,300 male and 92 female beneficiaries, as well as about 200 farm clusters. Over 11,000 lives and 6,000 farmers (including about 810 female farmers) have been directly impacted. This impact has translated to the illumination of over 170 farms with Solar Street Lights (SSLs), the training of over 3,000 farmers on pump maintenance and new irrigation practices, and more importantly, costs (maintenance, fuel, etc.) savings. For the latter, the replacement of diesel-powered pumps with solar-powered pumps is expected to increase average revenues by N150,000 - N300,000. The feedback from beneficiaries were also positive.



2,046 Solar Home Systems (SHS) were deployed across the six geopolitical zones, reaching and connecting 1,972 homes, 5 primary healthcare centres, 10 schools, 22 religious centres and 7 offices. Over 10,000 lives and 5,000 students have been directly impacted by uninterrupted electricity, translating to over 350 direct and indirect jobs created, improved healthcare, as well as improved trading and domestic activities among the women. The feedback from beneficiaries were also positive.



Key gender-based observations were that women in the beneficiary communities will have more access to technology, health and food quality/quantity. Over 3,000 women that are involved in trading, tailoring, braiding and other productive domestic activities are expected to increase their profit margin by at least 30% due to the improved lighting conditions from the SHS. The provision of solar pumps to farm clusters will also enable female farmers to increase their yields and profits.



The strategic interventions received notable feedback from key stakeholders in the Power and Agriculture sectors, including the Honourable Minister of Power, Honourable Minister of State for Power, Managing Director/Chief Executive Officer, Rural Electrification Agency, Executive Director, Technical Services, Rural Electrification Agency, National Coordinator, National FADAMA Development Project, Permanent Secretary, Ministry of Agriculture and Rural Development, and many others.



To ensure the long-term sustainability of these projects, an implementation plan for Operation and Maintenance (O&M) procedures has been established. The Agency also intends to leverage on its Rural Electricity Users Cooperative Societies (REUCS) initiative to engage and sensitise the beneficiary communities, and also, facilitate long-term community ownership.

The Agency's implementation of a programmatic approach to deliver capital projects was a success. The electrification programmes were widely accepted in the beneficiary communities. Beneficiaries consisting of mainly farmers, households, women and youths have been deeply impacted from a social, environmental, and economic standpoint. The beneficiaries also showed their appreciation to the Federal Government for the interventions in their communities. There was an unwavering optimism from the beneficiary communities that these efforts will also be extended to other communities, in need of similar interventions.

BACKGROUND

The Rural Electrification Agency (REA) is a parastatal under the Federal Ministry of Power (FMP), established to implement the Rural Electrification Strategy and Plan of the government.

While the Agency has existed since 2006, achieving its mandate was hampered by several factors, including interdictions and a lack of strategic direction for the first ten years of its existence.

SIGNIFICANT IMPROVEMENTS: 2017-2020

A new Board and Management were inaugurated in 2017, which began a cultural reset of the Agency. However, rural electrification targets remained unmet due to prevailing institutional and sectoral challenges.

Since 2020, the Executive Management and Board have ensured that efforts to successfully deliver electrification projects are properly aligned to improve livelihoods in rural communities in a sustainable and impactful manner.

These efforts have translated to electrification programmes through its Nigeria Electrification Project, Energizing Education Programme (EEP), Rural Electrification Fund (REF), Energizing Economies Initiative (EEI), Solar Power Naija (SPN), and many other programmes, with a specific focus on energy resources that supports the energy transition policy.



THE JOURNEY SO FAR: IMPACTING LIVES THROUGH STRATEGIC INTERVENTIONS

In a quest to impact livelihoods in rural communities, the current leadership have embarked on key strategic interventions, notably:

Key Transformation and Reforms



Build and strengthen capacity to successfully facilitate rural electrification projects



Position the Agency on track to meet realistic targets in rural electrification



Review and align the Agency's vision, mission and mandate accordingly with current policy statements – the Rural Electrification Policy (REP), Rural Electrification Strategy and Implementation Plan (RESIP), Energy Transition Plan (ETP), etc.



Develop robust Standard Operating Procedures, as well as a Performance Measurement, Monitoring and Evaluation Framework

Aligning Interventions with FGN Initiatives

The Federal Government of Nigeria (FGN) also plans to improve access to electricity in rural areas, while also stimulating growth and development.

The 2017 Economic Recovery and Growth Plan (ERGP) is focused on restoring growth, investing in people, and building a globally competitive economy.

Amid the coronavirus (COVID-19) pandemic, the FGN launched the Economic Sustainability Plan (ESP) initiative to support the country's economic recovery

REA's electrification programmes have leveraged on several FGN initiatives to:



Achieve set objectives and impact



Fulfil the ERGP/ESP tenets



Improve livelihoods in rural areas



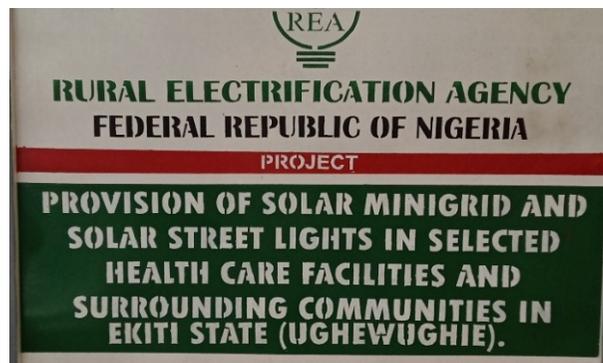
Stimulate economic growth and development



Align with the FGN's priorities and Medium-Term National Development Plan's (MTNDP) objectives.

Response To The Covid-19 Pandemic

- ✓ Amid the coronavirus (COVID-19) pandemic, the Federal Government of Nigeria (FGN) launched the Economic Sustainability Plan (ESP) initiative to support the country's economic recovery through several interventions, including electrification programmes.
- ✓ Through these electrification programmes, health centres, unity schools and communities were strengthened with reliable power to deal with health cases, as well as provide a conducive environment for quality education and standard of living.
- ✓ The Agency (on behalf of the FGN) deployed solar projects in primary healthcare centres, unity schools and households in vulnerable off-grid communities across the country.
- ✓ The agency remains keen on evaluating the social impact and sustainability levels and documenting lessons learned through a continuous collaborative effort.



Review and Harmonisation of the Agency's Technical Standards

To ensure standards in the implementation of REA projects, the Agency held a workshop on Technical Standards for all REA projects on 21st April 2021. The workshop enabled the Agency to engage and sensitise contractors, private developers, as well as other key stakeholders. The harmonised technical standards were presented to critical stakeholders for their feedback.

The Agency finalised the technical standards document for the adoption and implementation of sustainable projects. Since adoption, the quality of project delivery has significantly improved.

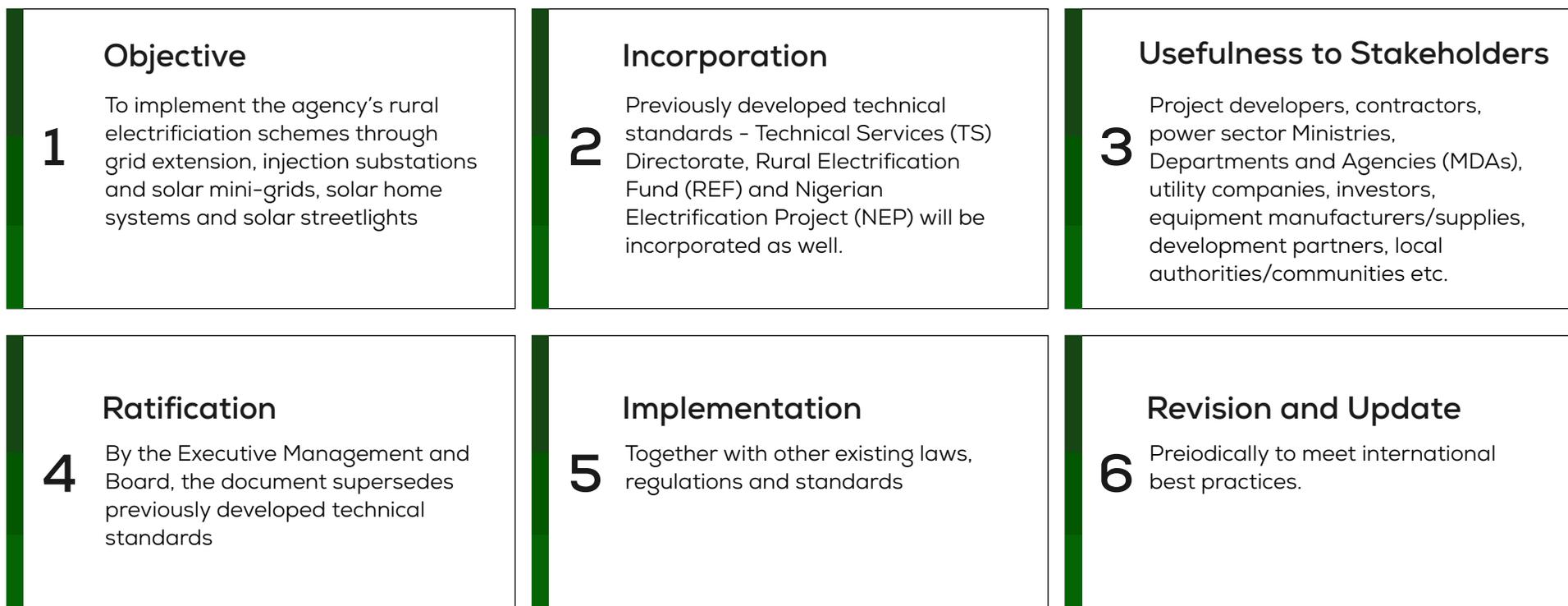


FIG 1: REA'S HARMONISED TECHNICAL STANDARDS: PATHWAY TO SUSTAINABILITY

Impact Summary (2020 - 2022)

In the last decade, REA has implemented over 2,000 electrification projects, impacting the lives of an estimated 5,000,000 Nigerians across the country. The total installed capacity, under the capital projects, is estimated at over 600 MW - equivalent to over 1,000,000 connections.

CAPITAL PROJECTS - LAST THREE YEARS (2020 - 2022)

45.89bn
Total Projects Cost

1,375
Number of Projects

GRID IMPACT

 **238.40MW**
Grid Installed Capacity

 **476.80K**
No. of Households affected

 **2.38M**
No. of people affected

 **19.11bn**
Project Cost

MINIGRID IMPACT

 **0.64MW**
Minigrid Size

67
No. Minigrids

 **657.14**
No. of Households affected (Minigrid)

 **3.29K**
No. of People affected (Minigrid)

 **6.35bn**
Project Cost

SHS IMPACT

 **556**
No of SHS

 **2780**
No. of People affected (SHS)

 **1.03BN**
Project Cost

SOLAR STREETLIGHT IMPACT

 **557.50**
Distance of Solar streetlights covered (KM)

 **17.96bn**
Project Cost

A CASE FOR PROGRAMMATIC BUDGETING

Previously, the Agency's capital projects, appropriated in the national budget, were stand-alone and rarely grouped into programmes (of projects) that are targeted at sectors of the economy.

To resolve, the Agency birthed a strategic initiative to improve livelihoods, specifically in rural communities, through programmes targeted at providing electricity for productive use in healthcare centres, markets, schools, agriculture, etc., in a sustainable and impactful manner.

About the Programmatic Budgeting



Plan and identify electrification programmes; internalise programmes into the national budgeting process.



Unlock the economic activities in rural communities.



Align with the FGN priorities, REA strategic priorities and Medium Term National Development Plan's (MTNDP) strategic objectives to provide adequate justifications



Deviate from subsidized electricity consumption to "productive use"



Provide Impactful electrification solutions (Solar Home Systems, Mini-Grids, Solar Street Lights, Solar Pumps, etc) for Agro Processing, Irrigation and other prourposes.



2022 PROGRAMMATIC BUDGETING: NEEDS ASSESSMENT AND IMPLEMENTATION FRAMEWORK

BASELINE NEEDS ASSESSMENT

This section explains the previous conditions of the beneficiaries before the intervention.



ELECTRICITY CONDITIONS

Electricity from the national grid is present in 97 of the communities out of +300 where the REA projects were deployed. In the communities where electricity is present, people can't afford it.

- More than 5000 students in these communities have no light in their classrooms.
- Over 500 patients that go to hospitals in some of these communities were treated with torchlights and lamps in operation rooms due to unstable light.
- Over a thousand beneficiaries were not making much profit doing business at home because they had no electricity, relying on only 9 hours of sunlight to manage their business and prepare inventory for the next day.



PETROL CONSUMPTION PATTERNS FOR AGRICULTURAL PRACTICES

There are 786 diesel/petrol pumps and 206 electric pumps used within these beneficiary clusters in the 6 six geopolitical regions. Every year, each diesel/petrol pump consumes more than 1000 litres of fuel worth between N320,000 - N700,000 for small-scale farmers.

- The transportation cost of diesel/petrol to crop fields is difficult, and the supply can be inconsistent. The farmers rely heavily on middlemen, who charge higher diesel/petrol prices during the peak irrigation season and drive these farmers into financial challenges.
- The water pumps have high maintenance costs and have regular breakdown issues. About 400 surveyed beneficiaries complained about their diesel/petrol pumps frequently breaking down.



SECURITY CONDITIONS IN THE MARKETPLACE AND FARMLANDS

A total of 150 community leaders were surveyed. 103 community leaders reported frequent theft cases in school areas and marketplaces at night. These community leaders have also reported multiple kidnaps. About 40 of them said cases of kidnap mostly happen near the farmlands. At night, these communities are in total darkness. These areas have high crime rates because you cannot identify the robbers.



EMPLOYMENT AND GENDER INCLUSIVITY

A general pattern in their agricultural practice is that men assume responsibilities linked to technology use, whereas women provide manual labour. Each cluster has approximately 30 farmers. They have less than 4-5 female farmers working in each cluster. In these communities, most women engage in domestic activities at home, e.g., trading, tailoring, braiding, henna business, laundry business, spice-making business, etc.



TABLE 1: BASELINE CONDITIONS IN THE COMMUNITIES

This section explains the previous conditions of the beneficiaries before the intervention.

REGION	OCCUPATION	ELECTRICITY ACCESS STATUS	WATER ACCESS	MAJOR CROPS PRODUCED
North-Central	Farming, civil service, trading, production, livestock, and hospitality	Grid is not present in most rural communities; battery torchlights and kerosene lamps used	Rain, stream, well, borehole	Rice, grains, onion, vegetable, cassava
North-East	Farming, trading, livestock	National grid present, most homes not connected, unstable supply	River, dam, reservoir, rain, borehole	Grains, vegetables, pepper
North-West	Farming, hospitality, trading, livestock, and mining	Grid absent in most parts of the communities, lanterns used for essential lighting	Tube well, rain, borehole, steam	Tomato, pepper, onion
South-East	Farming, wholesale business, trading, fishing, milling	Electrified, but most of these communities rely heavily on generators due to a lack of electricity.	River, boreholes, and Fadama reservoir	Rice, cassava, maize, yam
South-South	Farming, trading, weaving, oil milling, and fishing	Power is epileptic, unreliable, and expensive even when some communities are connected to the national grid while others are not.	Water is obtained from seasonal streams of about 2-5km from the Community	Rice, cassava, pepper, palm tree, and fruited pumpkin
South-West	Farming, retail business, fishing, teaching, milling	The majority of the communities are electrified, but the problem of vandalism and theft of transformers reduces consistency in electricity	Boreholes within the communities and streams	Maize, vegetables, palm tree, cocoa,

IMPLEMENTATION FRAMEWORK

Project Overview and Methodology

Impact monitoring and assessment of projects is an annual exercise. The exercise assists in gauging the ground-level impact of activities undertaken by REA projects and provides useful information for devising suitable future strategies. Therefore, it is considered important to measure the programme's impacts over the years in terms of achieving the goals of income and livelihood generation, environmental conservation, and sustaining natural resources

The Objective of the Exercise

The Main Objectives Of The Exercise Include:



Impact Assessment (Social, Environmental, And Economic)



Independent Verification Of The Delivery Of The Equipment



Supervision Of Contractors' Training Exercises For Project Beneficiaries

Methodology

The team relied on primary data collection using questionnaire-based surveys. The methodology used for the exercise is as follows:

1. Survey of a stratified sample through a questionnaire after field testing
2. Vetting of data by the Project team (collect, collate, clean, and analyse information with respect to finalised parameters and indicators as per the survey questionnaire)
3. Validation of information with periodic reports from Regional Coordination Units (RCUs) for further inputs and information
4. Focus Group Discussion (FGD) for further review and qualitative validation of the findings
5. Inputs from partners before finalisation
6. Finalisation of the report.

Carbon Emission Methodology (Mini-Grid)

The evaluation adopted the SEforALL mini-grid emissions methodology to calculate the carbon emission rate.

The SEforALL mini-grid emissions tool considers two types of fossil fuel generators: those used previously by households and businesses before the mini-grid was installed, referred to in the tool as "Diesel/petrol generator (previous source)" and diesel generators installed as a back-up power source for the new mini-grids, which is referred to as "Diesel/petrol generator (mini-grid)".

For both generator types (diesel and petrol generators), the tool assumes that every litre of diesel produces 2.69 kg of CO₂ and the density of diesel as 0.85 kg/litre, while for the petrol generator type, the tool assumes that every litre of petrol produces 1.7 kg of CO₂. The evaluation utilised the above mentioned assumption to calculate the potential carbon emission rate in each community. Thus, to calculate the CO₂ emission rate, we multiplied the total amount of CO₂ emitted by the generator (for each generator) per litre of petrol/diesel consumed with the total number of litres of diesel/petrol the generator consumes weekly, after which we then aggregated the results for each generator to get the total number of CO₂ emission.

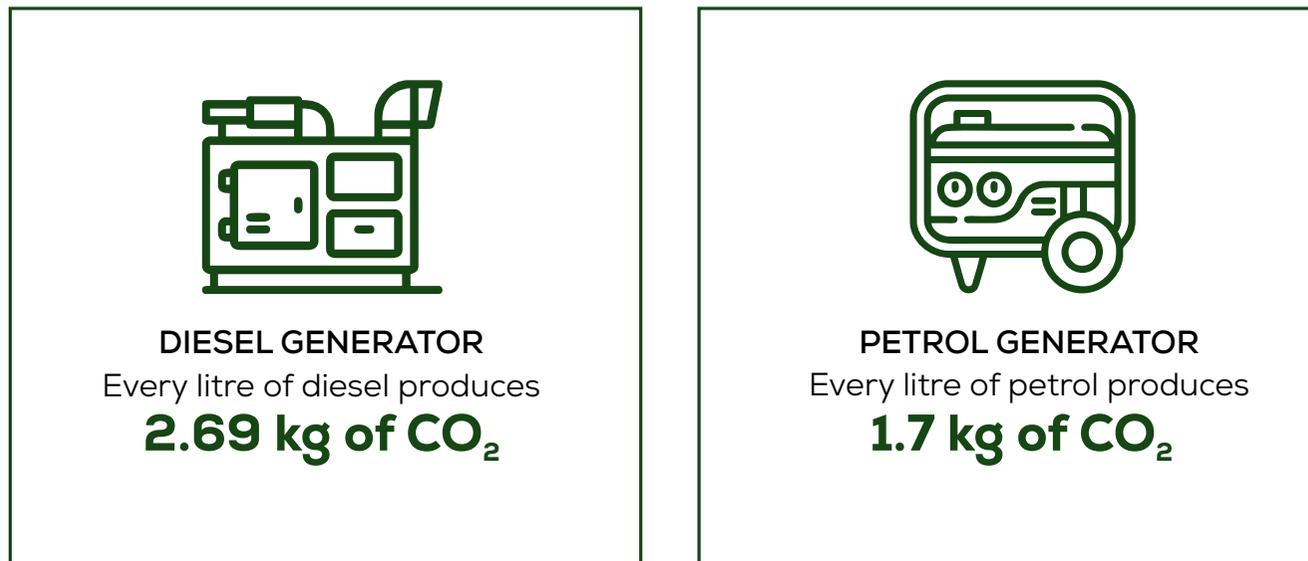


FIG 2: CARBON EMISSION METHODOLOGY (MINI-GRID)

2022 PILOT PROGRAMMES



SOLAR MINI-GRID
(High-capacity productive use)



**SOLAR WATER
PUMPS**
(Irrigation Schemes)



**SOLAR HOME
SYSTEMS**
(Low capacity productive use)

SOLAR MINI-GRIDS (HIGH-CAPACITY PRODUCTIVE USE)

GEOGRAPHICAL DISTRIBUTION

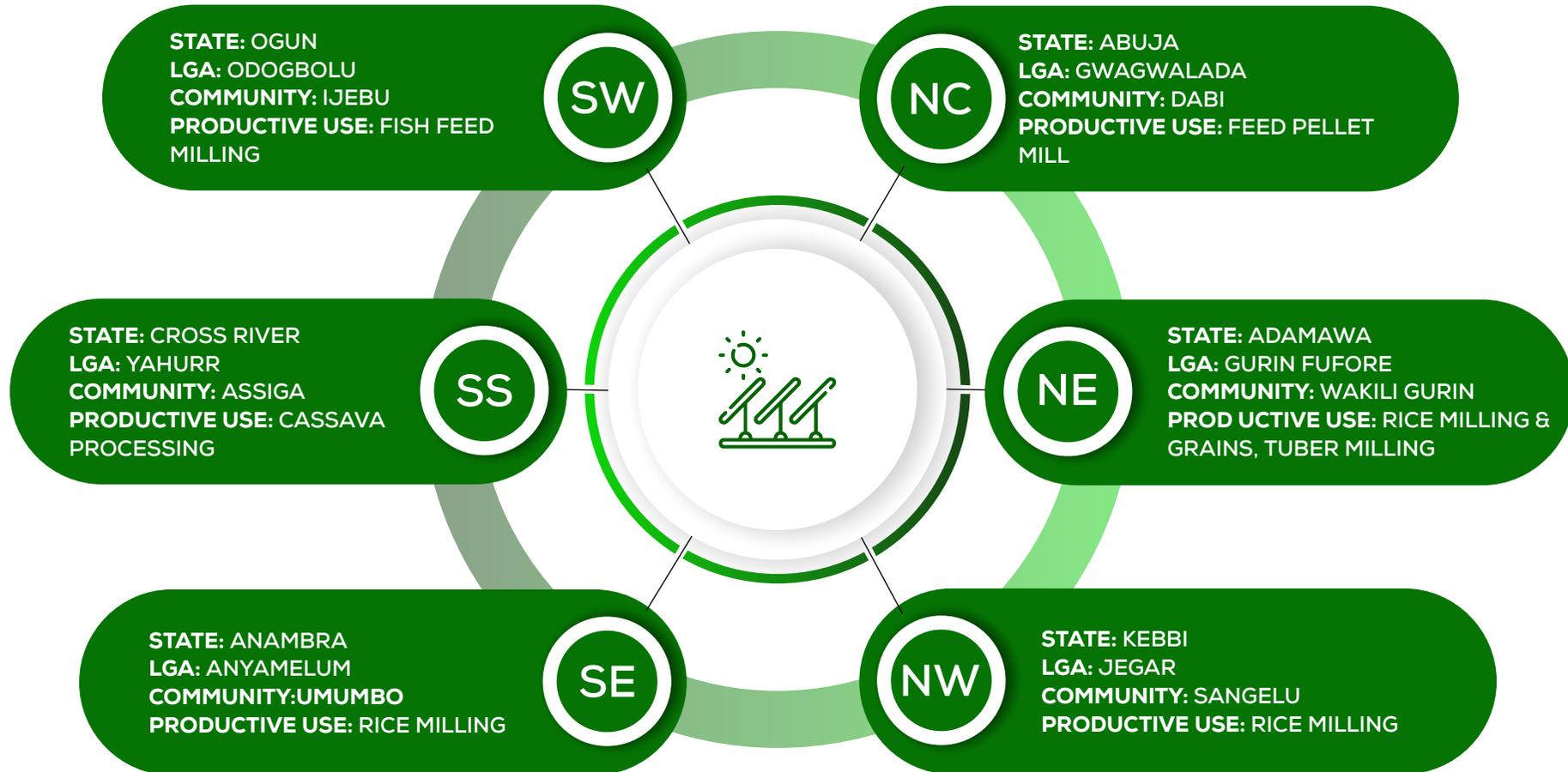


FIG 3: SOLAR MINI-GRID

SPECIFICATION: PV Generator, Energy storage, Inverter/convertor accessories and stacking equipment, Automatic voltage regulator.

OBJECTIVE INDICATORS

The initiative was created by the REA to encourage productive activities in unprivileged communities. 6 communities were equipped with a 100 kW solar mini-grid system, which was designed to prioritise productive users, particularly, agro-processing businesses, with homes, commercial users, and public spaces also being connected in some cases. The project has reached final stages and has achieved key milestones

TABLE 2: MINI-GRID USER CATEGORY

USER CATEGORY	CONNECTION TO GRID	NUMBER OF USERS
Residential Users	16 Homes	128
Commercial Users	27 Businesses	27
Productive Users	17 Agro-Processing Centres (Rice Milling & Grains, Tuber Milling, Feed Pellet Mill, Fish Feed milling, Cassava and Palm oil mill)	5017
Borehole Users	2 Community Boreholes	1300
Institutional User	3 Institutions	1700

OVERALL IMPACT ASSESSMENT FOR MINI-GRID ON THE BENEFICIARIES



8,155+

lives impacted in total



5,000+

active farmers and commercial business people to have uninterrupted power supply which will allow them to have more productive hours of work.



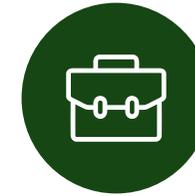
1,300+

community members who have access to clean affordable water



40+

diesel and petrol generators to be decommissioned



61+

direct and indirect jobs created

The mini-grid operates on solar energy, a clean and renewable energy source that significantly reduces the carbon footprint and has a reduced impact on the environment compared to conventional energy sources such as diesel or fossil fuels. The adoption of solar energy not only reduces air pollution, but also helps to mitigate water pollution and land degradation associated with the extraction and processing of fossil fuels.

The installation of the mini-grid would facilitate the decommissioning of 40 generators in four of the communities. Specifically, 2 diesel generators in Adamawa, 4 diesel generators and 26 petrol generators in the Federal Capital Territory (FCT), 6 diesel generators in Kebbi State, and 2 diesel generators in Ogun State have been reported to have been decommissioned. However, it is important to note that the solar-powered mini-grids installed in the six communities have been equipped with 100 kVA diesel generators as backup power during prolonged periods of heavy rainfall. These periods are typically characterized by limited sunlight, requiring the use of the backup generators to maintain the charge of the batteries. As such, it is essential to acknowledge that the operation of these generators may result in the emission of greenhouse gasses into the environment. The assessment therefore assessed the carbon emissions reduction potential of the mini-grid systems.

The evaluation of the carbon emissions reduction potential of the mini-grid system was based on the SEforALL mini-grid emissions methodology. This methodology considers that 2.69 kg of CO₂ are produced per liter of diesel consumed by a diesel generator, and 1.7 kg of CO₂ per liter of petrol consumed by a petrol generator.

TABLE 3: CARBON EMISSIONS PRODUCED BY COMBUSTION ENGINES

	Adamawa	Ogun	Kebbi	FCT	Cross river	Anambra
Average liters of diesel consumed by a diesel generator (weekly)	45 liters	105 liters	66 liters	25 liters	-	-
Average liters of petrol consumed by a petrol generator (weekly)	-	-	-	15 litres	-	-
Number of Diesel Generator to be decommissioned	2	2	6	4	-	-
Number of petrol generator decommissioned	-	-	-	26	-	-
Estimated CO ₂ emissions for diesel generator (weekly)	242.1kg	564.9kg	1,065.24kg	269kg	-	-
Estimated CO ₂ emissions for petrol generator (weekly)	-	-	-	663kg	-	-
Annual Estimated reduced CO ₂ emissions	12,589.2kg	29,374.8kg	53,392.48kg	48,464kg	-	-

Now, with the deployment of the Solar Mini-Grid in all the six geopolitical regions:

In less than a year, we shall definitely witness a huge reduction of carbon emissions in these communities as a result of replacement of fossil fuel energy for renewable energy sources like the solar mini-grid. Currently, the annual estimated reduced CO₂ emission is 143,820.40kg. Final connections are being made in Cross River and Anambra State.

By next year, we will witness more reduction in CO2 after the completion of the project in the remaining two states.

The mini-grid will significantly impact the communities, especially as it provides them access to clean and reliable electricity. Some of the social impacts/benefits of the mini-grids and street lights include:



Access to Clean Water: The integration of community boreholes into mini-grids has a profound social impact on rural communities. During recent field visits, it was observed that a community borehole in Adamawa and one in Cross River State have been connected to the mini-grid. The result is increased access to clean water, a vital resource for many rural communities.

Typically, these communities rely on boreholes as their primary source of water, but these sources often lack connection to the electricity grid, making it challenging to pump water. The connection of these boreholes to the mini-grid, powered by renewable energy sources, ensures a dependable supply of clean water for the community and the social benefit of having access to clean water cannot be overemphasized as it greatly improves the quality of life for community members.



Improved Safety: Access to street lighting has improved public safety, as well-lit areas are known to reduce crime rates and promote a sense of security. With access to street lighting, people are able to move around their communities more safely, even at night.



Increased Productivity: Mini-grids provide reliable electricity to homes and businesses in these communities, allowing the community members to work and study into the night. As reported by the community members during the FGD in Dobi community in the FCT, their children are now able to study at night as a result of the street lighting. This increases productivity, as people can use electricity to power tools and machines, which enhances their ability to earn a living.



Improved Healthcare: in Dobi community, one of the primary healthcare facilities is connected to the mini-grid. With access to electricity, this facility can now have access to essential healthcare equipment, such as refrigerators for storing vaccines and other equipment for providing medical care, as well as increase their hours of operation thereby resulting in improved access to medical care by community members.



Improved Quality of Life: Access to electricity and street lighting not only improves beneficiaries livelihoods, but it has also enhanced their quality of life. For example, with access to electricity, families connected can enjoy modern conveniences, such as watching television, using fans, and refrigerating food.



SOLAR WATER PUMPS (IRRIGATION SCHEMES)

GEOGRAPHICAL DISTRIBUTION

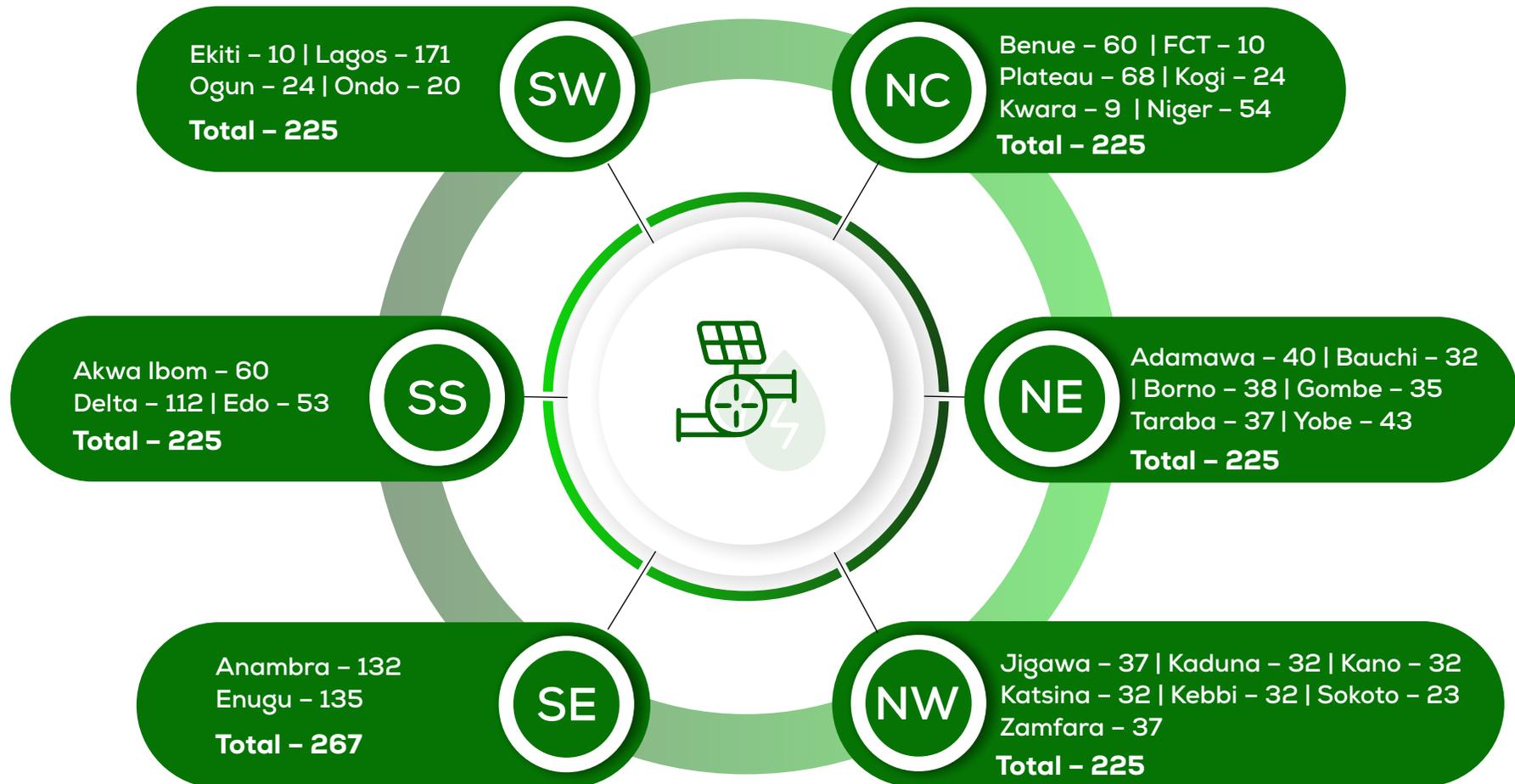


FIG 4: SOLAR PUMPS

SPECIFICATION: All-in-one solar water pumping systems with flywheel, RPM range not less than 50-100rpm. That 0.5 litres per sec flow; at a 1-metre lift 3,600 litres/hr or 6 metres lift of 2,500 litres/hr with 120W panels and a 10-year warranty (Tier 2 (normal capacity 50Wp, Daily Capacity 200Wh, PV module type: 30W Polycrystalline silicon panels, battery: Lithium Ion 11.1v/1400mAh).

SOLAR STREET LIGHTS

GEOGRAPHICAL DISTRIBUTION

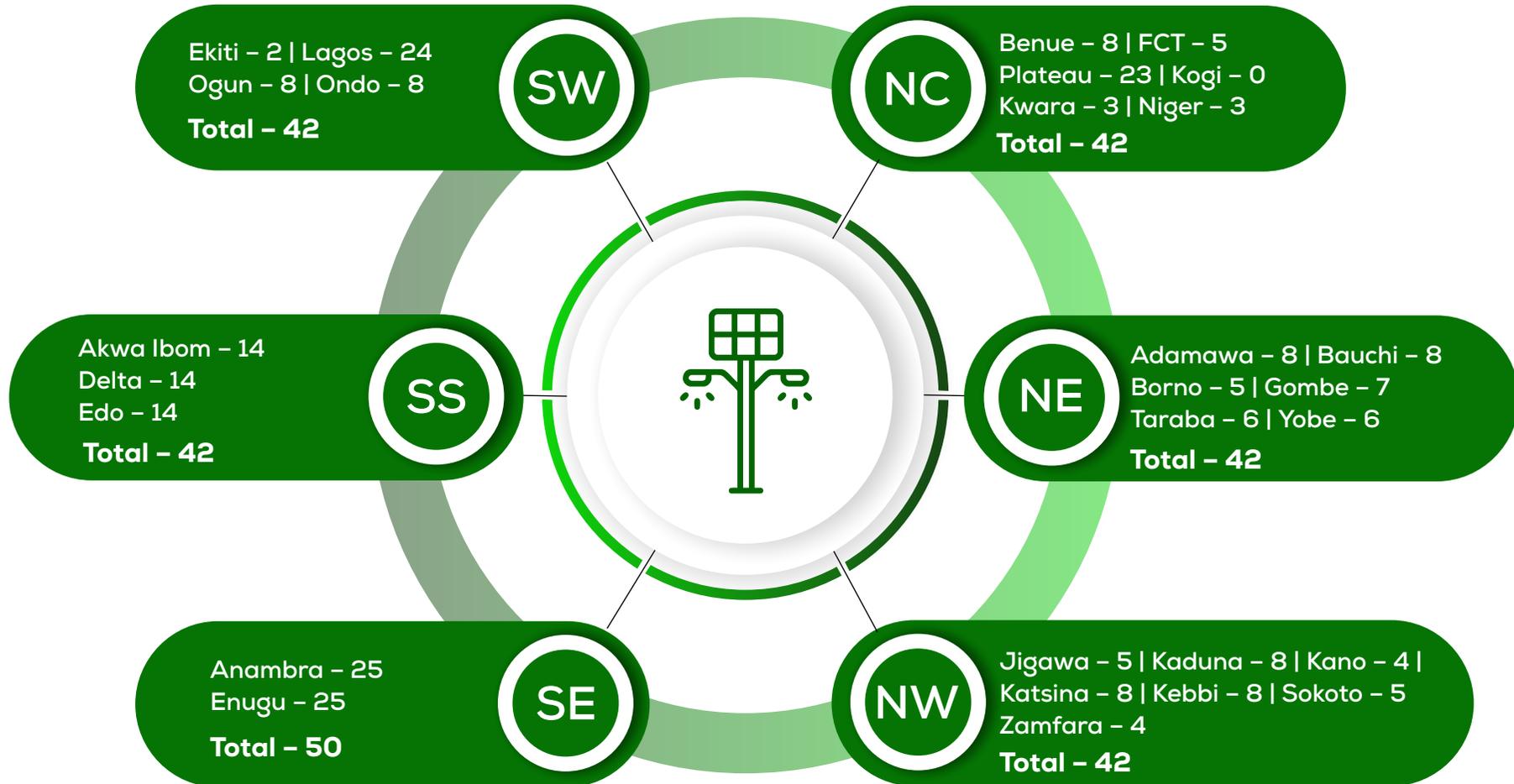


FIG 5: SOLAR STREET LIGHTS (DISTRIBUTED IN SOLAR PUMPS AREAS)

SPECIFICATIONS: 50Wp battery, 300-350Wh, NiMH/LiFePO4, Charge Time 4-6 HRS, Discharge Time 3-5 rainy days, Luminous Flux 6000-6600 Lumens, Luminosity-100-164 Lumens/Watt

OBJECTIVE INDICATOR

The project has reached its final stages and has achieved key milestones. A total of 1,392 solar pumps have been distributed, 1,300 Male beneficiaries and 92 female beneficiaries. There are 203 agricultural farm clusters that received SPIP so far. Each of those clusters have about 30 farmers.



6,000+
farmers

will benefit directly from farm clusters and are expected to increase their yield and profit margins after the first year



810+
female farmers

will benefit directly from farm clusters



3,000+
farmers

were trained on pump maintenance and new techniques of irrigation using solar water pumps



200+
farm clusters

across the 6 geo-political zones received solar water pumps for irrigation



170+
farms

have been illuminated with street lights for safety.



11,000+
lives

have been impacted through this initiative



OVERALL IMPACT ASSESSMENT OF THE SOLAR-POWERED IRRIGATION PUMPS ON THE BENEFICIARIES

A total of 60 representative farmers currently using their solar pumps within the target communities of the 6 geopolitical zones were surveyed. We were able to narrow down the most recurrent answer patterns from the sample size and select a few farmers representing both North and South for the analysis displayed in the table below.

TABLE 4: FORECAST FOR FARMERS (BEFORE AND AFTER INTERVENTION)

Farmers Profit Statement	Beneficiary Farmer (Honda Pumping Machine)	Beneficiary Farmer (Using Solar -Powered Pump)
Type of crops	Tomatoes	Tomatoes
Size of land irrigated	1/2	1 Hectare
Type of irrigation	Flood	Flood
Total quantity harvested (kg) (3 months)	800kg	1,200kg
Package size for selling	35kg (N17,500)	35kg (N17,500)
Yield Change	-	50%
Price per kg	N500/kg	N500/kg
Total Revenue	N385,000	N595,000
Diesel price Farmer 1 (5Lt Fuel Tank)	N350 (N1750)	
Diesel Cost (3 Months) (Irrigates land 8 times a month)	N42,000	
Servicing And Maintenance (3 months)	N30,000	N3,000
Total Operating Cost	N72,000	N3,000
Gross Profit	N313,000	N595,000
Increase In Profit Margin	-	90.1%

This result implies that replacing the diesel-powered system with a solar pump system to perform the same average amount of irrigation output and utilisation rate per hectare of land per year, can save a farmer so much costs and increase profits by an average of N150,000 - N300,000 (from fuel savings and other maintenance).



FEEDBACK FROM BENEFICIARIES

Some of the remarks made by the direct beneficiaries of the Solar-Powered Irrigation Pumps (SPIP) are captured here.



MOHAMMED ZUBAIRU MAN

A rice farmer, is the Chairman of Ikon Allan Group in Makan area of Lafiagi, a community in Edu LGA of Kwara State, North Central Nigeria.

“We express satisfaction and appreciation to the government over the free solar water pumps they gave to our farmers’ cluster. However, we will request the Agency (REA) to grant us panels of higher capacity and improved water discharge to enhance and boost our production” - Mohammed

“I am a full time farmer and FUG Head of Iguomo 1 farmers' cluster here in Edo State. As a group, we are gladdened by this gesture of the REA to delve into aid for farmers through these solar pumps to enable an all-year-round farming. We were worn out by the cost of fuelling and maintaining our diesel and petrol pumps. I hope the Ministry of Agriculture will take a cue from this to provide equipment to enable us increase our production capacity”. -Ijeoma



IJEOMA BOLA-AMEN

A female rice farmer in Iguomo community in Ovia South-West LGA of Edo State, South Southern Nigeria.

SOLAR HOME SYSTEMS (LOW-CAPACITY PRODUCTIVE USE)

GEOGRAPHICAL DISTRIBUTION

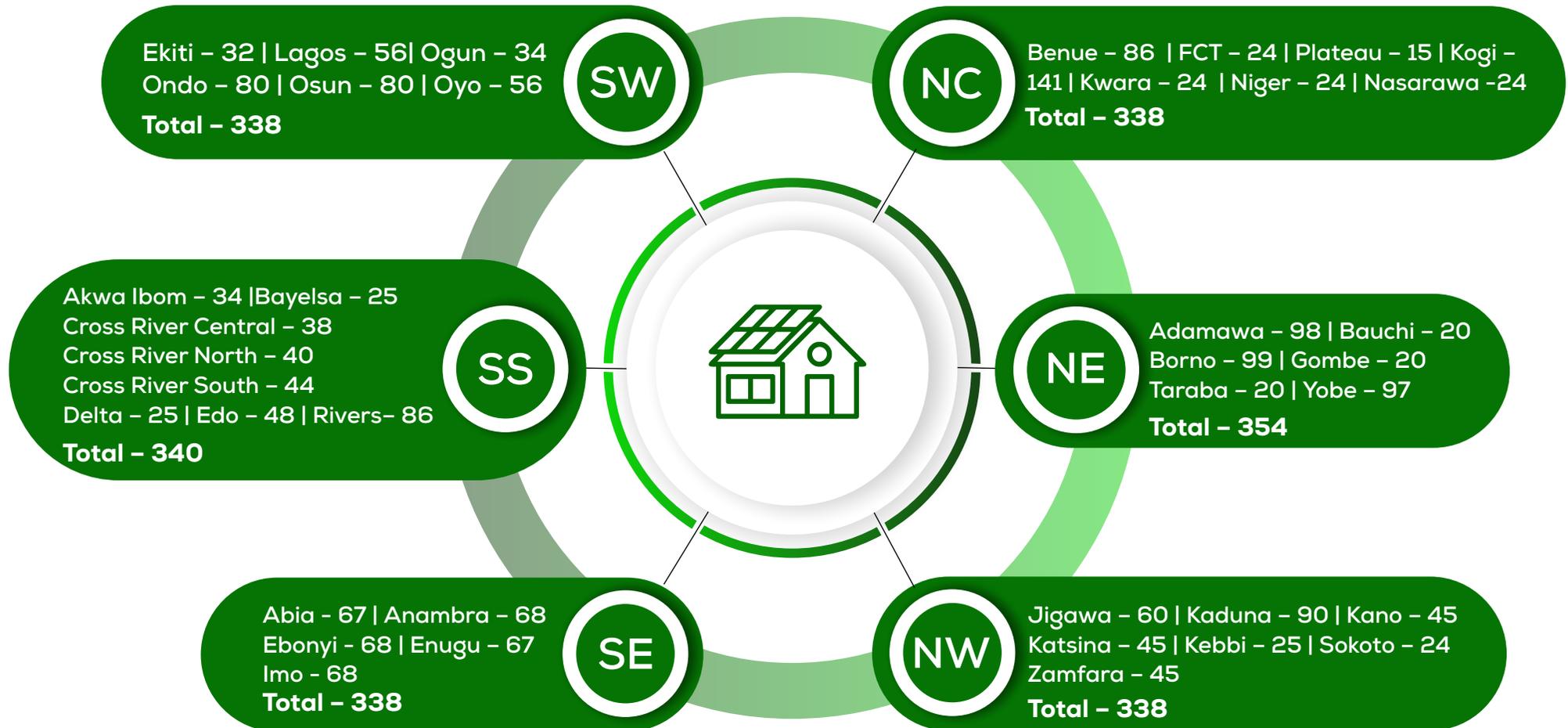


FIG 6: SOLAR HOME SYSTEMS

Mostly issued to households as beneficiaries, not really based on gender consideration.

SPECIFICATION: "ALL-IN-ONE SHS" – Tier 2 (Normal Capacity 30W, Daily Capacity 200Wh, PV module type: 50W Polycrystalline silicon panels, Battery: Lithium Ion 11.1V/1400mAH)

GEOGRAPHICAL DISTRIBUTION

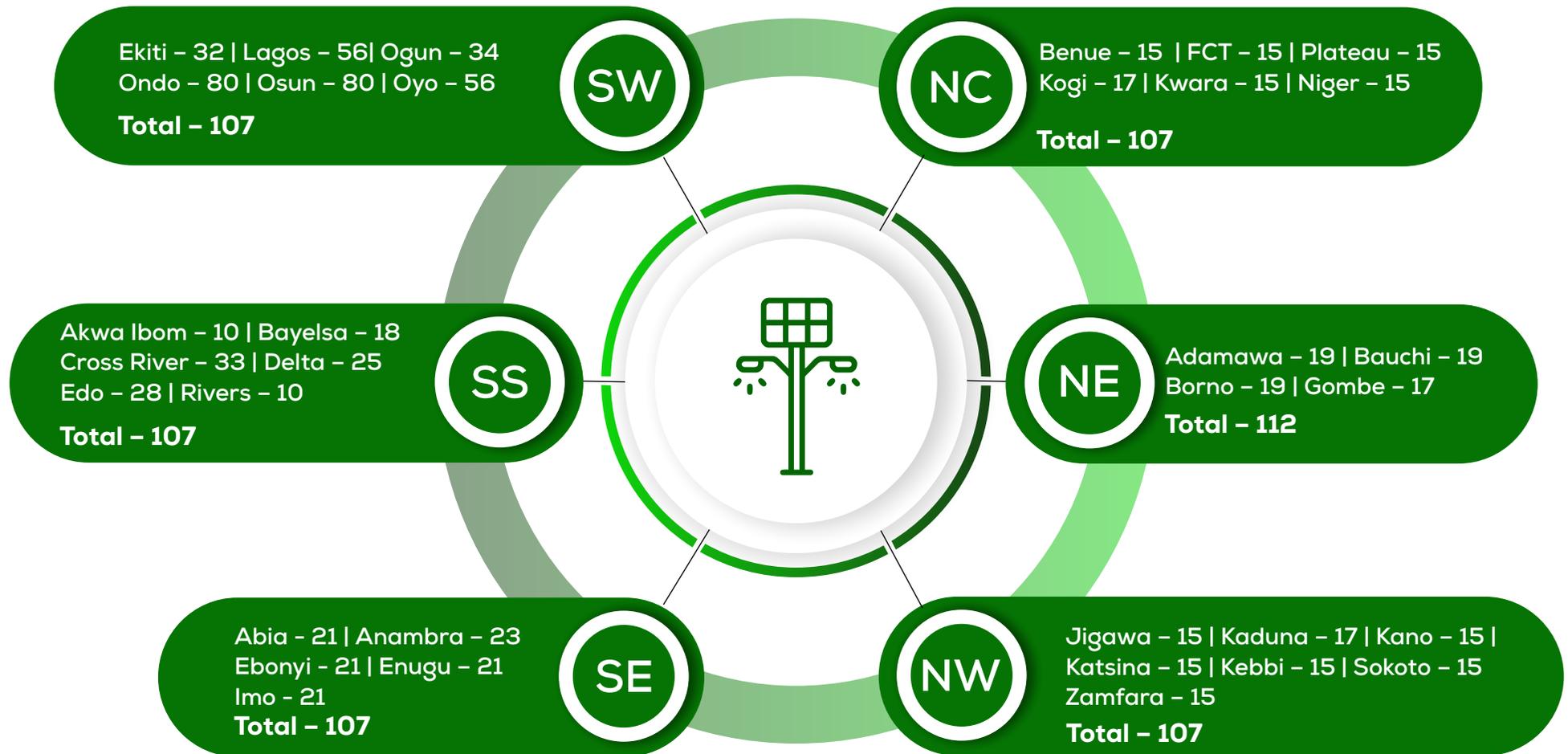


FIG 7: SOLAR STREET LIGHTS
(DISTRIBUTED IN SOLAR HOME SYSTEMS AREAS)

SPECIFICATIONS: 50Wp battery, 300-350Wh, NiMH/LiFePO4, CHARGE TIME-4-6 HRS, Discharge Time 3-5 rainy days, Luminous Flux 6000-6600 Lumens, Luminosity-100-164 Lumens/Watt

OBJECTIVE INDICATORS

The initiative was created by the REA to improve lightning in unprivileged communities. The project has reached the final stage and has achieved key milestones. Out of 2046 solar home systems deployed by REA, there has been 1972 successful home connection, 5 connections at primary health centres, 10 connections at schools, 22 connections at religious centres and 7 connections at offices.

OVERALL IMPACT ASSESSMENT OF THE SOLAR HOME SYSTEMS ON THE BENEFICIARIES



3,715+

Individuals involved in Trading

3,715+ individuals involved in trading and other domestic activities at home will have at least a 30% increase in profit margin. They can now operate 14 hours due to improved lighting at home (Previously relying on torches and lamps). About 80% of the people that are into these domestic activities at home are women.



5,000+

Students have access to constant light

5,000+ Students will have access to constant light for their studies at home and at school



500+

Public Staff will get uninterrupted light

500+ Public staff working at schools, hospitals and religious centres will have uninterrupted light to work conveniently and efficiently.



200+

neighbourhoods illuminated

200+ neighbourhoods and marketplaces have been illuminated with streetlights



350+

jobs created

350+ Jobs have been created in maintenance and security.



10,000+

people impacted

10,000+ Lives impacted

FEEDBACK FROM BENEFICIARIES

Some of the remarks made by the direct beneficiaries of the Solar Home Systems (SHS) are captured here.



MOHAMMED IYA SARDAUNA

Village Head of Binkola, a community in Mayo-Belwa LGA of Adamawa State, North Eastern Nigeria.

“Our children are now able to read at night, and are performing better in school. Families are able to stay awake and together longer. We are happy”. -Mohammed

“It is wonderful that the Federal Government remembered me and came to my aid, being an aged widow. The light is very helpful because my teenage grandchildren living with me are able to read their books at night”. -Patience



DNS (MRS) PATIENCE SOWUNMI

A retiree and widow, in Akoka, a community in Shomolu LGA of Lagos State, South Western Nigeria.



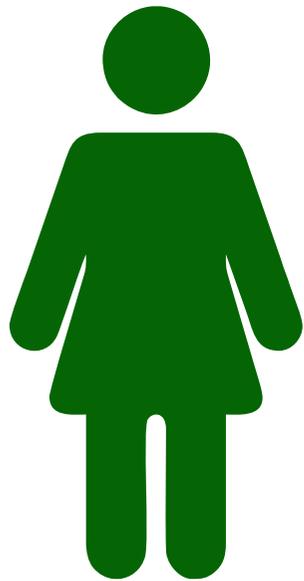
ERIC OGOCHUKWU ONUA

Engineer, the Youth Leader of Amoli, a community in Awgu LGA of Enugu State, South Eastern Nigeria.

“Before this solar light was distributed for us in this community, we lived in darkness at night and had difficulty charging our phones and electrical appliances. With the solar facilities now, we no longer fear darkness and I can press my phone as much as I want. No money was required from me at any point, and I have 16 hours of power supply daily.” -Eric

GENDER CONSIDERATION

Some of the key gender-based observations have been summarised below:



3,000+

women living in homes that have been connected with Solar Home Systems, that are involved in trading, tailoring, braiding and other domestic activities will have at least 30% increase in profit margin as they are able to operate 14 hours due to improved lighting at home (Previously having access to only 8 hours of light).

810+

female farmers will benefit directly from farm clusters. The provision of solar pumps to these farm clusters will enable them to increase their yields and profits at the same level as the male beneficiaries.

RESULTS



Food Quality: Women have access to more quantity of food with better quality, where there has been a clear disadvantage before.

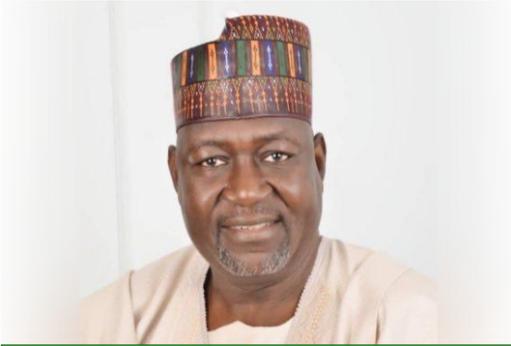


Health: In most studied projects, less than 10% of women could afford medications and pay for hospital treatment. After this intervention, more than 50% of women in these communities will be able to spend more money on medicine and treatment at hospitals.



Use of Technology: A general pattern in agricultural practices that we observed at the start of the project is that men handle responsibilities that are linked to the use of technology due to the high cost of operation, but with the help of the solar pump, more than 800 women will have the same opportunity when it comes to operating the pumps on their farmlands with little to no cost.

STAKEHOLDERS' FEEDBACK



HIS EXCELLENCY, ENGR. ABUBAKAR D. ALIYU,
Honorable Minister Of Power

“ The REA continues to blaze the trail in the implementation of innovative approaches to realising the Federal Government’s vision and targets for energy access. The adoption of a programmatic approach to the delivery of capital projects that is centred on inter-agency collaboration will maximise the social impact of Federal Government interventions. This is highly commendable and a reference point for effective policy implementation. ”

“ Tasked with such a critical mandate, there is a need to strengthen the pillars of service delivery continuously. Accordingly, the Agency is undertaking a series of reforms to enhance the workforce, improve the institutional systems, and pursue innovative programming strategies. ”



HIS EXCELLENCY, GODDY JEDY-AGBA
Honorable Minister of State for Power



AHMAD SALIHIJO AHMAD,
Managing Director/Chief Executive Officer, Rural Electrification Agency

“ Previously, the Agency proposed a framework to internalise planned electrification programmes into the national budgeting process, highlighting funding sources and partnerships, and designing an integrated approach to ensure that the ERGP/ESP targets are fulfilled. Sequel to the approval and inclusion in the year 2022 budget, the Agency intends to implement the framework to improve livelihoods, specifically in rural communities, through programmes targeted at providing electricity for productive use in healthcare centres, markets, schools, agriculture, etc. The framework, underpinned by the MoU between both parties, is expected to be implemented in a sustainable and impactful manner, while also addressing one of the Agency's strategic objectives – to promote electricity consumption for “productive use in the country. ”

STAKEHOLDERS' FEEDBACK

“ The MoU will ensure timely communication and cooperation during the implementation stage of the programme, including support (where applicable) in conducting field surveys, monitoring/supervision and impact assessments. Subsequently, this agro-energy programme, as well as other proposed programmes under the framework, will be implemented to demonstrate opportunities for the private sector. And based on the lessons learned, viable agriculture-energy solutions and business models can be adopted and scaled commercially. ”



MR ABDURRAHMAN BALARABE
National Coordinator, National FADAMA Development Project (NFDP)

“ The MoU will mutually benefit both the REA and FADAMA. Both parties are keen to unlock the economic potential in agrarian communities, through the provision of electricity solutions for agro-processing and irrigation schemes. ”



BARKA SAJOU
Executive Director, Technical Services, Rural Electrification Agency (REA)

“ In his welcome address, he noted that the programme was initiated to provide electricity for productive use and also to unlock economic potential activities in rural and agrarian communities. Obayemi said that the solar pumps would be distributed to 14 vegetable farmers association already identified in the State. He added that the donations without doubt would support all year-round vegetable farming in Lagos State and reduce greenhouse gas emissions. He noted that it would also increase productivity, income and food security. ”



MR ADE OBAYEMI
Lagos State Project Coordinator of FADAMA



HON. STEPHEN IDEHENRE
Edo State Commissioner for Agriculture and Food Security

“ To buttress this fact, the Edo State Commissioner for Agriculture and Food Security, **Hon. Stephen Idehenre**, during the equipment distribution, said that “it is the Edo State Government's desire to ensure round the year food production, hence, the need for the Solar-Powered Irrigation Pumps that will help improve production geared towards smart farming and food availability”. ”

STAKEHOLDERS' FEEDBACK



It is my singular honour to acknowledge and state the impact of your benevolence gesture to the teaming farmers in the state.

STAKEHOLDERS' FEEDBACK



The program has been a huge success and has yielded positive results. The selected farmer groups and farms in 27 States of the Federation benefited from the procured and distributed One Thousand Three and Ninety-Two (1,392) and the installation of Two Hundred and Sixty (260) solar streetlights.

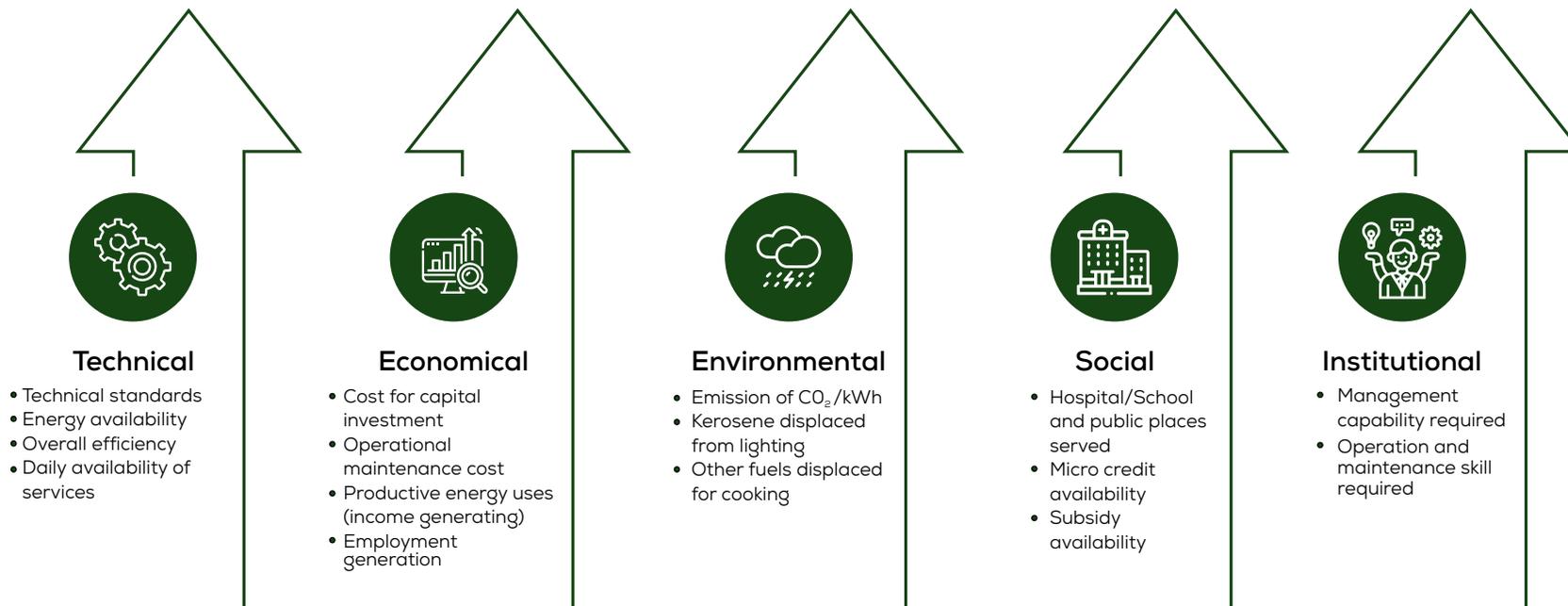
This attests to your readiness and willingness to partner with lined MDAs to implement the electrification programme targeted at agriculture,

PATHWAY TO SUSTAINABILITY

To ensure long-term sustainability of these projects, there is a need to plan and implement Operation and Maintenance (O&M) procedures, including the following:

- ➔ Plan, develop and implement an O&M framework to recover ONLY variable costs and sustain the mini-grid.
- ➔ Engage and sensitise the community to set up Rural Electricity Users Cooperative Societies (REUCS)/Farmers' Cooperatives and facilitate long-term community ownership
- ➔ The engagement and sensitisation will focus on community ownership, productive/efficient use of electricity, as well as the provision of O&M services.
- ➔ Subsequently, a tripartite agreement will be established and executed between the Agency, Contractor and the Community to provide sustainable operation and maintenance (O&M) services, specifically for the mini-grid projects

5 Pillars to Sustainable Deployment of Projects



OBSERVATIONS AND LESSONS LEARNED

Classifications are made below of the observations and lessons learned recorded by the team during the various trips to the field:

Economic

- ➔ Excitement was shown by the beneficiary farmers of the Solar-Powered Irrigation Pumps (SPIP) because it was their first access to such technology that could help them save cost and improve their productivity and, invariably, livelihood.
- ➔ To generate employment, increase productivity, sustainability practice, and tackle food insecurity, some beneficiaries of the SPIP have expanded their farmlands and farming activities to accommodate more varieties of crops as well as an all-year-round farming.
- ➔ To guarantee and promote food security, many of the beneficiaries of the SPIP had mounted their solar water pumps on their farmlands immediately the dry season began.
- ➔ The Solar Street Lights (SSL) installed on the beneficiaries' farmlands enable them to work longer on the farm with better output and economic improvement.
- ➔ Some beneficiaries' homes were visited for inspection of the installations of the Solar Home Systems (SHS) and their workings. They confirmed that the solar energy had started to favourably impact their family, social and economic lives.
- ➔ SHS's panels and inverters of some beneficiaries were installed at home but extended the bulb connections to their business areas (kiosks/shops) around their homes.
- ➔ Beneficiaries confirmed that they are now doing better in business than before they received the solar energies in their business areas. They stay longer and transact better with more profits.
- ➔ Some beneficiaries had their solar light installed in their homes and converted parts of the house lighted up for commercial use, thus improving their homes and economic-base. For example, the team saw weaving, plaiting and sewing activities ongoing in some of their living rooms and bedrooms.

Social

- ➔ Some communities that have no access to the national grid are now able to charge their phones with the SHS.
- ➔ Many homes are lit up and illuminated at night for the first time.
- ➔ The rural dwellers are able to cluster around the Solar Street Lights (SSL) in their communities at night to discuss issues of communal importance.
- ➔ Families now spend longer hours awake and together talking and bonding.
- ➔ The beneficiaries are kept companied, get educated, informed and entertained through the radio set disbursed with the SHS.

OBSERVATIONS AND LESSONS LEARNED

Environmental

- ➔ As a result of the SPIP gifted to the farmers by the REA, many of them have abandoned their combustion engines because of the unfriendly nature of those equipment to the atmosphere and the soil.

General Observations

- ➔ The communities received the team well in their homes. They pride themselves on their facilities. The beneficiaries were happy and thankful to the Federal Government for remembering and giving them the Solar Home Systems
- ➔ The communities were pleased with the government's effort at reaching the grassroots.
- ➔ The communities and the beneficiaries took the delivery of their equipment and are connected.
- ➔ Some of the beneficiaries had not used their Solar-Powered Irrigation Pumps, and the team assisted by going with some of them to their farmlands to train on how the system works.
- ➔ The pumps were delivered to farmers' clusters, and the farmers decided to select and distribute them to active members with good financial and administrative records
- ➔ They showed huge appreciation and were so happy that the government knew about their existence and delivered the equipment to them and even sent another team to confirm if the equipment had been delivered to them.
- ➔ The Solar Home Systems were delivered and distributed to the beneficiaries who needed them most in the community. Those who were in possession of the National ID Card, divisions and sections in the communities, placements of the individuals in the community, and so on, were some of the criteria for selection.

Lessons Learned

- ➔ A few of the Solar Home Systems beneficiaries complained that their systems started malfunctioning shortly after installation. Some had been resolved before the inspection, while the inspection team advised others to procure new bulbs from the open market to replace the worn ones.
- ➔ There was no mechanical malfunctioning complaint recorded on the Solar Pumps. However, the farmers were worried that the discharge capacity of the Solar Pump is 1 inch as against their previous combustion engines being 3 inches.

PROGRAMMATIC BUDGETING FOR THE YEAR 2023 & BEYOND: CATALYSING PRIVATE CAPITAL THROUGH PUBLIC FUNDING

For the year 2023 Capital Appropriation, the Agency is proposing a similar framework for its programmatic budgeting process, including



Internalising planned electrification programmes into the national budgeting process



Highlighting funding sources and partnerships



Designing a programmatic approach to ensure that the ERGP/ESP tenets and targets are fulfilled. Ultimately, it is expected that livelihoods, specifically in rural communities, will be impacted through programmes that provide electricity for productive use in healthcare centres, markets, schools, agriculture, etc., in a sustainable and impactful manner.

The proposed programmes for the year 2023 include the following:



Deployment of solar mini-grids solution for productive agro in the NC, NE, NW, SE, SS & SW zones



Provision of solar systems for energising security in the NC, NE, NW, SE, SS & SW states



Provision of solar home systems for indigent communities within the NC, NE, NW, SE, SS & SW).

Programme Expectations



Learning-by-Doing – Gather lessons learned for 2022 and implement projects better.



Leverage on successful projects to create more opportunities for the private sector.



Align with the private sector to pilot and scale viable projects.



Unlock private capital through public funding.

Sustainable Mini-Grids under Capital Appropriation



Objective: To provide a long-term and sustainable operation and management plan for REA's capital projects, specifically mini-grids.



Operational Guidelines: Provide Information on the processes required to plan, develop and pilot O&M models for mini-grid projects under capital appropriation.



Implementation: Collaboration between REA and key stakeholders (O & M Contractor, REUCS and the community)



Anchor-focused Mini-grids: Hospitals and primary health care centres, agriculture and agro-allied industries, water boards, government and teaching hospitals, government research institutes, educational establishments etc

CONCLUSION AND RECOMMENDATIONS

The strategic interventions, implemented by REA, emphasize the positive impact that clean energy access can have on local businesses and adjoining communities. The intervention has not only improved the quality of life for residents through clean and reliable electricity, but it has also provided a platform for economic growth and job creation, further contributing to the overall development of the communities.

The impact assessment played a pivotal role in addressing challenges, such as inaccessible technology, electricity and water; gender inclusion; overreliance on petrol and diesel, etc. This assessment is important in improving the outcome and impact of future interventions.

The electrification programmes, and projects alike, were a success, with wide acceptance in the beneficiary communities. Beneficiaries consisting of mainly farmers, households, women and youths were deeply impacted from a social, environmental, and economic standpoint.

The beneficiaries showed their appreciation to the Federal Government for the interventions in their communities. There was also a firm optimism from the beneficiary communities that these efforts will also be extended to other communities, in need of similar interventions.

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