TECHNICALITIES IN EXECUTION OF 1 MEGAWATT INTERCONNECTED SOLAR MINI GRID

IN ODUMA COMMUNITY OF ALINRI LOCAL GOVERNMENT AREA OF ENUGU STATE – NIGERIA

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For

OMEGASON INTEGRATED ENERGY LIMITED

ODUMA COMMUNITY MINI GRID BENEFITS

- Building an interconnected mini-grid in Oduma community can bring significant economic advancements. Here's how it can positively impact the community

Access to Reliable Electricity

- Improved Livelihoods: Reliable access to electricity means businesses can operate beyond daylight hours, enabling them to be more productive and profitable. Entrepreneurs can start small businesses like, restaurants, or repair services that depend on electricity.
- Boost to Agriculture: With electricity, irrigation systems and processing units can be powered, increasing agricultural productivity. Farmers can use mechanized equipment and refrigerated storage for their products, reducing spoilage.

Job Creation

- Employment Opportunities: The construction and ongoing maintenance of mini-grids create jobs in the local communities. These jobs include technicians, electricians, and administrators who manage the system.
- New Enterprises: Entrepreneurs can tap into new markets, like solar-powered services or product manufacturing. For example, local artisans can use electric-powered tools to expand production.

Business Growth and New Markets

- Retail and Commercial Growth: Small businesses like shops, hair salons, or internet cafés can expand as they now have the power to operate at night, increasing their potential customer base and hours of operation.
- Technology and E-commerce: With a reliable power supply, businesses can use the internet, benefiting from e-commerce, mobile payments, and online training, which opens up new markets.

Education and Health Improvements

- Extended Learning Hours: Schools can remain open after sunset, offering more hours of study, especially for students who have to work on farms or help at home during daylight.
- Improved Healthcare: Medical facilities can use electricity for lighting, refrigeration (for vaccines and medications), and medical equipment, ensuring better healthcare services and outcomes.

Environmental Sustainability

- Renewable Energy Sources: Most mini-grids are based on renewable energy, like solar, reducing reliance on fossil fuels. This promotes environmental sustainability and reduces carbon footprints.
- Energy Independence: The community becomes less dependent on centralized grid systems or fuel-based generators, reducing the overall cost of energy and improving long-term sustainability.

Increased Economic Activities

- Community Empowerment: Local residents will be more empowered to participate in economic activities that were previously inaccessible due to a lack of electricity.
- Improved Infrastructure*: As mini-grids develop, they often lead to the improvement of local infrastructure, including roads, telecommunications, and water systems

Increased Property Values

- Higher Property Demand: Areas with access to electricity see a rise in property values as residents and businesses seek to live or operate in energy-enabled areas.
- Improved Quality of Life: With electricity, homes become more livable, enhancing residents' quality of life and promoting community stability.

Visualizing the Impact

- Electricity-Led Business Growth: Imagine a small local shop or restaurant staying open at night, serving customers, or an artisan using electric-powered tools to produce goods more efficiently. These businesses have the potential to grow and expand, providing economic benefits to the community.
- Agri-Tech: Farmers using electric-powered irrigation systems and processing equipment can increase their yield, preserve perishable goods like fruits and vegetables, and access wider markets.
- Energy Empowering Learning: Students in a classroom with lighting and access to electronic devices like computers and tablets, extending learning hours.
- Renewable Energy and Environment: Solar panels harnessing renewable energy, reduces reliance on diesel generators thereby promoting a cleaner environment.

BUSSINESSES THAT CAN BE IMPROVED IN ODUMA

1 MW INTERCONNECTED MINI GRID KANO

VS1

COMPREHENSIVE OVERVIEW AND SCOPE OF EXECUTION FOR AN INTERCONNECTED SOLAR MINI GRID

- This title and subtitle provides a clear indication of what this presentation will cover, including the technical aspects of designing and implementing a 1 MW interconnected Mini grid.
- The use of the term “Interconnected mini grid” implies that the system is to be connected with the main grid and can exchange energy with it as the case maybe.

Slide 8

VS1 Vitalis Silver, 09/04/2025

1 MEGAWATT INTERCONNECTED MINI GRID SYSTEM

A 1 MW Interconnected Mini Grid system is a decentralized power generation system that provides electricity to a local community or village and is connected to the main grid.

COMPONENTS

- Solar Panels
- Mounting Structures
- Inverters
- Battery Bank
- Charge Controllers
- Distribution Lines
- Grid Connection
- Smart Metres

SOLAR PANEL SELECTION

High Efficiency solar panels are selected for 1 MW interconnected solar Mini grid system

Specifications

- Module efficiency : 18-20%
- Power Output : 300-350 Wp
- Voltage: 24-48 V
- Current: 10-15 A

*index

Wp = Wattage Peak

A = Ampere

V = Voltage

MOUNTING STRCTURES

Description

Galvanized Steel or aluminum mounting structures are used to secure the solar panels.

Types

- Fixed Tilt
- Adjustable Tilt
- Tracking System

MOUNTING STRUCTURES

INVERTER SELECTION

High Efficiency inverters are selected to convert DC power from the solar panels to AC power and synchronize with the main grid.

SPECIFICATIONS

- Efficiency : 95-98%
- Power Output : 1 MW
- Voltage : 415
- Frequency : 50 Hz

BATTERY BANK

A deep cycle battery bank is used to store excess energy generated during the day and provide backup power during grid outages.

SPECIFICATIONS

Capacity : 500 – 1000 kWh

Voltage : 48 V

Dept of Discharge(DOD) : 80%

CHARGE CONTROLLERS

MPPT Charge controllers are used to optimize energy harvesting from the solar panels.

Specifications

Efficiency : 99%

Input Voltage : 24 -48 V

Output Voltage : 48 V

*Index

MPPT : Maximum power point Tracking

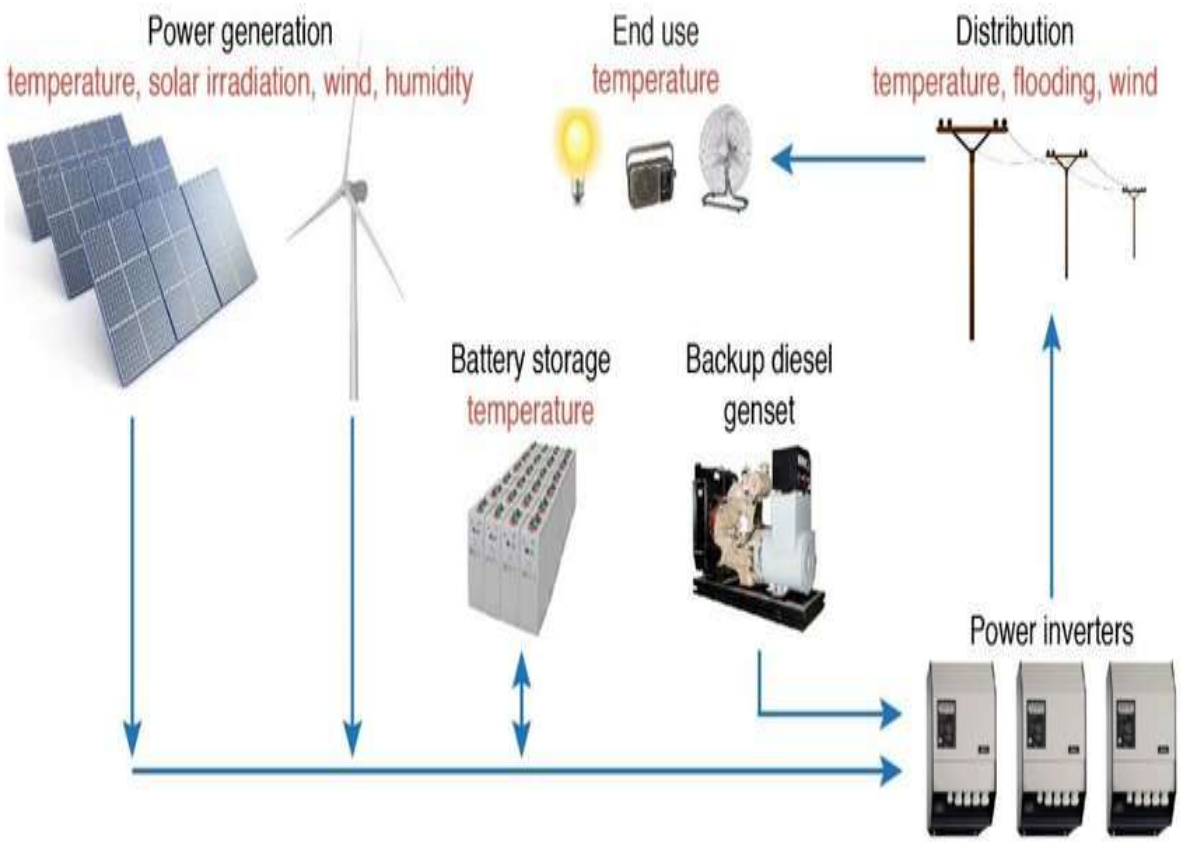
DISTRIBUTION LINES

Underground or overhead distribution lines are used to transmit power from the interconnected mini grid to the load center and main grid as the case may be.

Specifications

Voltage : 415 Volts

Current : 1000 Ampere



TARIFFS, BILLING AND SMART METRES

In accordance with NERC standard tariffs plans, the billing will be calculated by a smart meter that will be connected to every beneficiary.

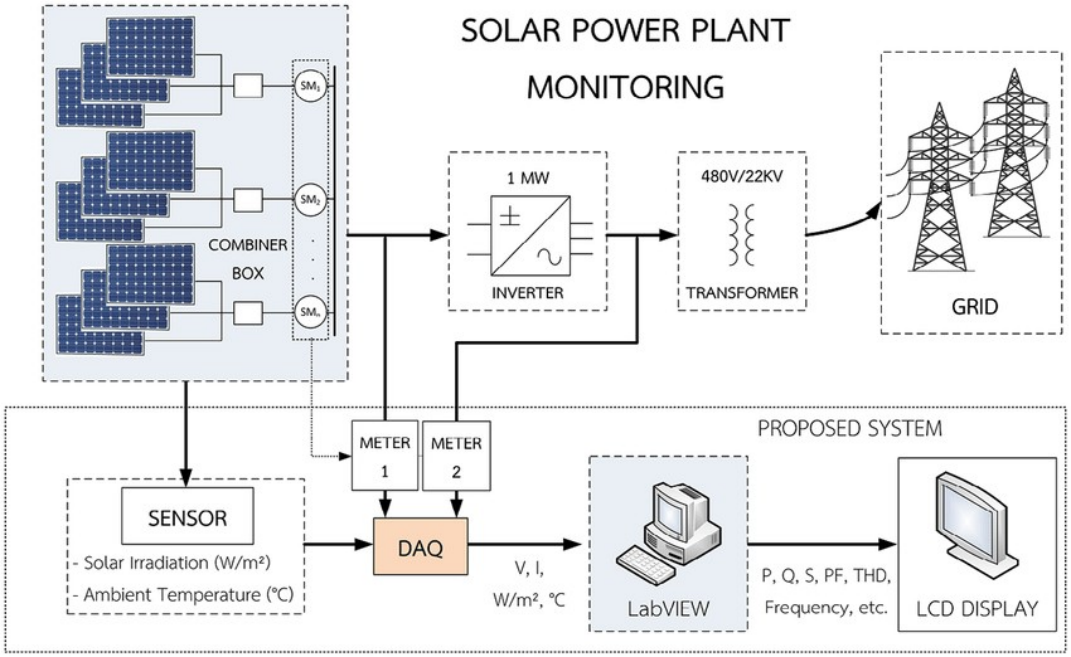
- NERC Standard Tariffs Plans: Compliance with regulatory standards
- Smart Meter Connection: Accurate billing calculation for every beneficiary
- Automated Billing: Efficient and reliable billing process

MONITORING AND CONTROL

A SCADA (supervisory control and data acquisition) system is used to monitor and control the interconnected mini grid.

Features

- Real-time Monitoring
- Data Logging
- Alarm Systems
- Remote Control

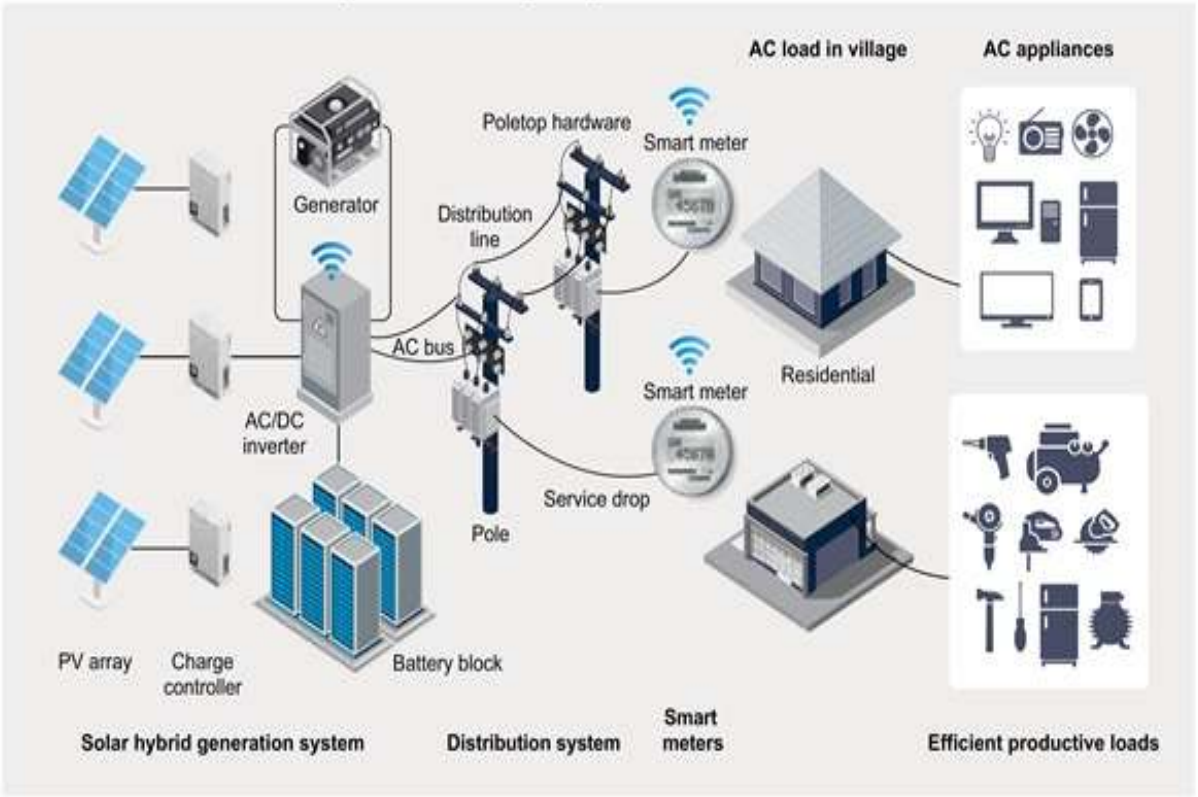


SAFETY AND PROTECTION

Safety and protection measures are implemented to ensure safe operation of the interconnected mini grid.

Features

- Over Current Protection
- Overvoltage Protection
- Grounding and Bounding
- Lighting Protection



Note: AC = alternating current; DC = direct current; PV = photovoltaic.

MAINTENANCE AND REPAIR

Regular maintenance and repair are essential to ensure optimal performance and extended lifespan of the interconnected mini grid.

Schedule

- Monthly Inspections
- Weekly washing of panels to ensure clear and unobstructed access to sunlight
- Quarterly Cleaning and maintenance
- Annual Testing and Replacement of components

ENVIRONMENTAL IMPACT

The interconnected mini grid is designed to minimize environmental impact and provide sustainable source of energy.

Features

- Renewable energy source (solar)
- Energy efficiency measures
- Reduced greenhouse gas emissions
- The use of solar energy as a renewable energy source reduces reliance on fossil fuels and minimizes greenhouse gas emissions.
- Energy efficiency measures are implemented to minimize energy losses and optimize energy use.
- The reduction in greenhouse gas emissions contributes to a more sustainable and environmentally friendly energy solution.

ECONOMIC BENEFITS

The interconnected mini grid provides economic benefits to the local community and supports economic development.

Features

- Job creation
- Increased economic activity
- Reduced energy costs

ECONOMIC BENEFITS

FINANCIAL CAPABILTY

Our company has a strong financial foundation by collaboration with our mother company At-Thawri Multi Services Limited, and we are confident in our ability to handle the project's financial requirements.

Financial Overview

Our company has a stable financial position, with a strong track record of managing large-scale projects. We have a robust financial planning and management system in place, which enables us to accurately forecast and manage our financial resources.

Funding Sources

We have multiple funding sources available to support the project,

- Internal Funds: We have sufficient internal funds to cover the initial project costs, including design, procurement, and construction.
- Bank Guarantee: Our bank has provided a letter of intent, expressing their willingness to provide financial assistance to our company in the form of loans or guarantees, if needed.
- Equity and Debt Financing: We have established relationships with investors and lenders, which provides us with access to additional funding sources, if required.

- Bank Assurance :We have obtained a letter of assurance from our bank, which confirms their commitment to providing financial support to our company, if needed. The letter states that our bank is willing to provide financial assistance in the form of loans or guarantees, up to a specified amount, to support the project's financial requirements.

FINANCIAL CAPABILTY

Financial Projections :

We will prepare detailed financial projections for the project, which demonstrate our ability to manage the project's financial requirements. Our projections include:

- Capital Expenditure: We will estimate the total capital expenditure required for the project, including design, procurement, construction, and commissioning.
- Operating Costs: We will estimate the operating costs for the project, including maintenance, repairs, and energy production costs.
- Revenue Projections: We will prepare revenue projections based on the project's expected energy output and tariff rates in accordance to NERC tariffs.

In conclusion, our company has a strong financial capability to handle the 1 MW interconnected mini grid project.

We have a stable financial position, multiple funding sources, and a bank assurance that confirms our bank's commitment to providing financial support, if needed. We are confident that our financial resources and planning will enable us to successfully build and operate the project.

Supporting Documents

We are pleased to provide the following supporting documents:

- Bank Letter of Assurance: A letter from our bank, confirming their commitment to providing financial support to our company, if needed.

BANK REFRENCE

FCMB

FIRST CITY MONUMENT BANK
A MEMBER OF FCMB GROUP PLC

April 23, 2025

The Managing Director,
Enugu Electricity Distribution
Company.
Plot 1 Zik's Avenue Enugu,
Enugu State.

Dear Sir/Madam,

LETTER OF REFERENCE: ONYGASON INTEGRATED ENERGY SERVICES LIMITED - 2010019749

We write to introduce the above named who is a customer of FCMB Limited.

They maintain a corporate current account with our bank, which has been satisfactorily operated since July [illegible] 2024.

SIR / DR. MARCELLIUS NWOKO is one of the signatories to the account.

Kindly extend to him the necessary assistance he requires.

The above information is however given to you in strict confidence and without any responsibility on the part of the bank or any of its officers.

Yours faithfully,
for: FIRST CITY MONUMENT BANK LIMITED

THERESA NNOLI
Customer Service Manager

JOSHUA AMUTA
Branch Manager

GARDEN AVENUE PAUSU BRANCH, 45, Garden Avenue, GRA, Enugu State, Nigeria. Tel: [illegible]
www.fcmb.com | customerservice@fcmb.com

ROAD MAP TO ACTUALIZING 1 MW INTERCONNECTED SOLAR MINI GRID IN ODUMA COMMUNITY

CONCLUSION

The interconnected mini grid is a reliable, efficient, and sustainable energy solution that provides economic benefits and minimizes environmental impact.

Future Plans

- Expansion of the system
- Integration with other renewable energy sources
- Continued monitoring, evaluation and maintenance
- Future plans are outlined, including expansion of the system, integration with other renewable energy sources, and continued monitoring and maintenance.