

Studying the Viability and Providing Recommendations to Support Distributed Solar PV in Urban Environments in Nigeria

Brainstorming Workshop

26 MAY 2021

Draft



Objective

Identify potential solutions to challenges that inhibit the penetration of Distributed Photovoltaics (DPV) in Lagos

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Welcome	13:00 - 13:10
Context and case for DPV in Lagos	13:10 - 13:20
Initial recommendations to accelerate DPV in Lagos	13:20 - 13:40
Breakouts: Brainstorm and refine recommendations	13:40 - 14:50
Next steps and closing remarks	14:50 - 15:00

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Ground rules/ Instructions

- Please share your details (name, org., email) in the chat window for tracking and follow-up
- Active contribution and participation in discussion is expected
- Breakout session: Click on popup screen that will appear asking you to join your breakout room
- You may send questions/comments anonymously to Sudhanshu Gupta directly in the chat window

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Organizers

- Lagos State Ministry of Energy and Mineral Resources (Honorable Commissioner - Olalere Odusote)
- World Bank (Ashish Khanna)
- BCG/Nextier Power (Tolu Oyekan)



Workshop participants

Federal Government

- Rural Electrification Agency
- Power Sector Working Group

Regulators

- NERC
- CBN
- NEMSA

Distribution Companies

- Eko Electricity Distribution Company
- Ikeja Electric

Companies in PV \value chain

- Daystar
- SolarCentric Technologies
- Prado Power
- Rubitec Solar
- Cross Boundary
- Engie
- Lumos
- PAS Solar (Bboxx)
- Auxano Solar
- Green Light Planet

Financiers

- Commercial banks
 - Sterling Bank
 - FCMB
- Microfinance banks
 - LAPO Microfinance Bank
 - Grooming Centre
- Others
 - All-On Energy

Associations

- Renewable Energy Association of Nigeria
- Manufacturers Association of Nigeria (MAN)

Residential representatives

- Magodo Residents Association

C&I representatives

- Friesland-Campina
- Union bank

Donors/Others

- AfDB
- UNIDO
- FCDO
- USAID
- Power Africa Team
- AfD
- GIZ
- EEAS
- JICA

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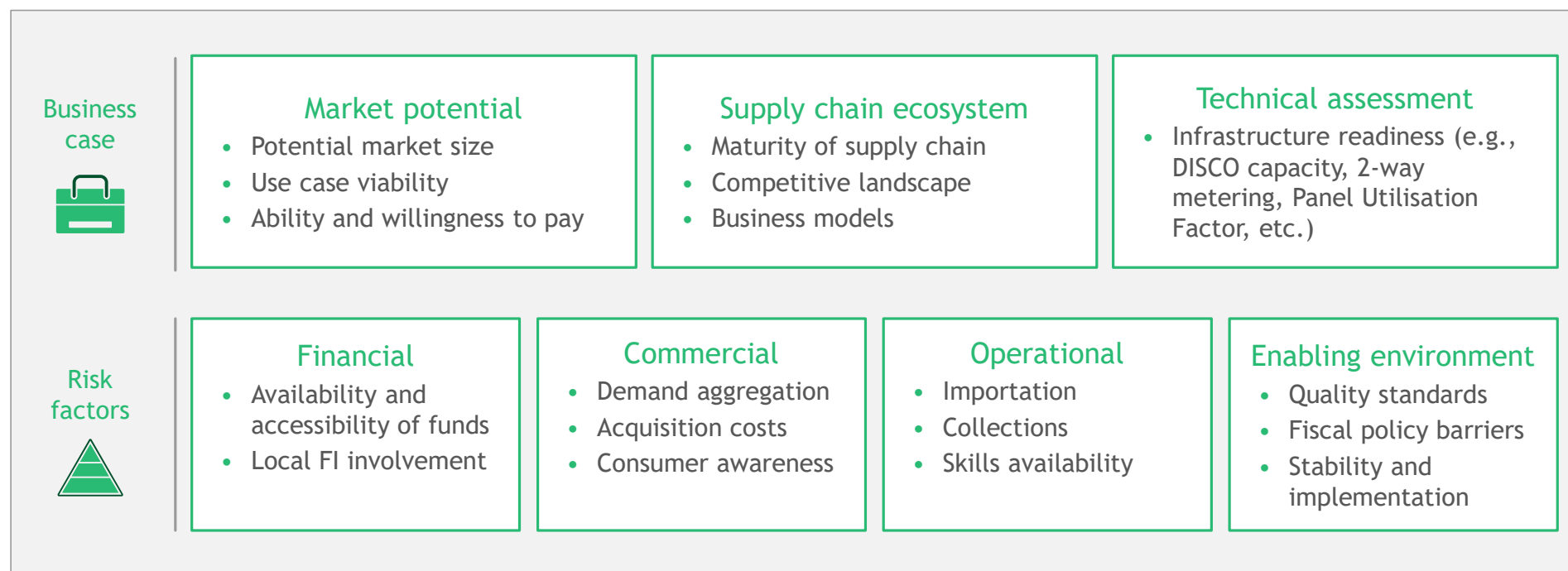


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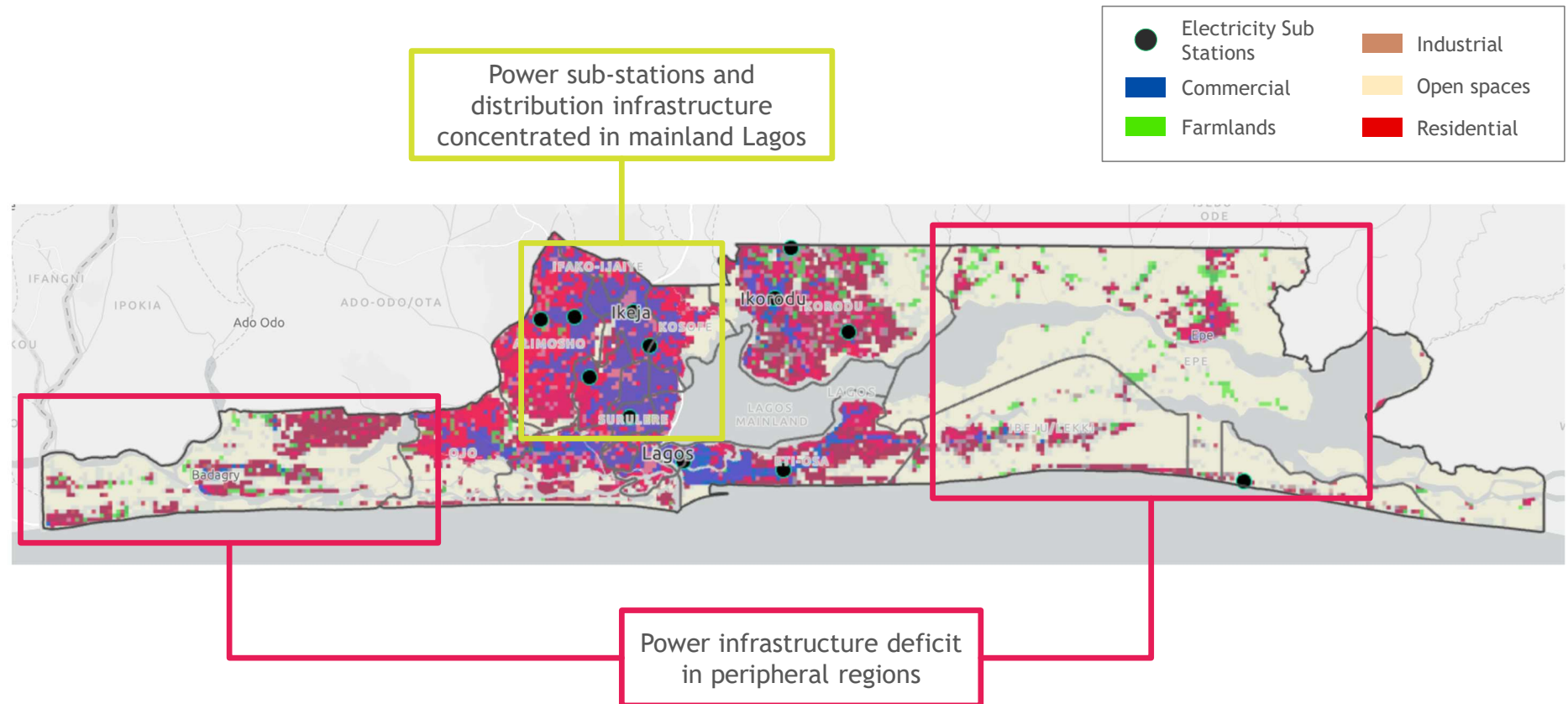
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Analysis focused on identifying the business case for DPV in Lagos and identifying the risks to be mitigated



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Observed that most of population of Lagos (est. 95%+) are close to grid infrastructure; gaps primarily in low-population areas of Epe and Badagry

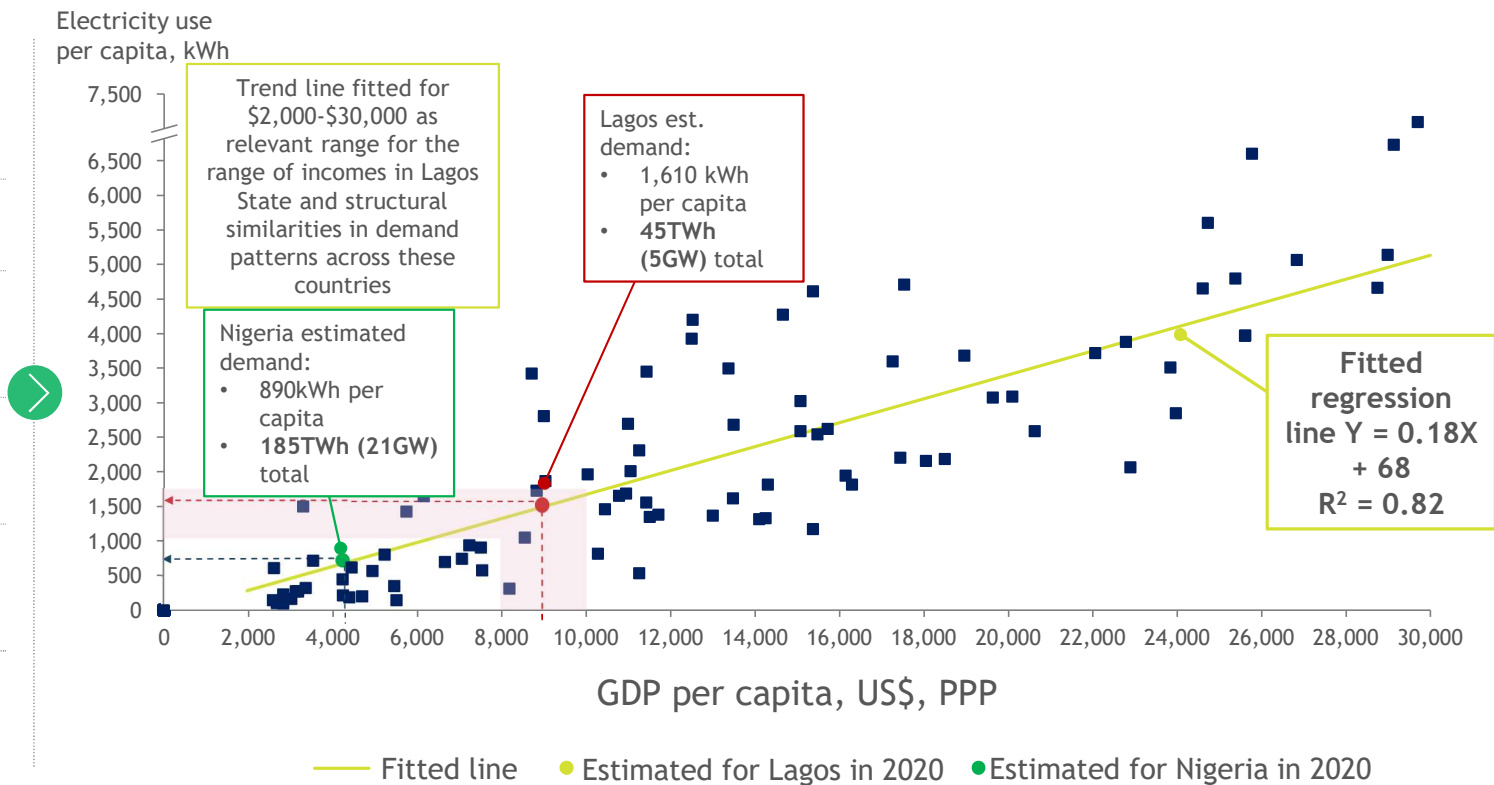


Source: BCG Gamma Geospatial Analysis, Transmission Company of Nigeria Distribution Map

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Demand: We estimate that unconstrained electricity demand in Lagos State is currently ~40-50TWh (~5-6GW) of electricity annually

	2020	
Estimates	Nigeria	Lagos
Population size (million)	209	25 - 30
Total GDP US\$, PPP	\$1130 billion	\$250 billion
GDP per capita, US\$, PPP	\$5,400	\$9,400

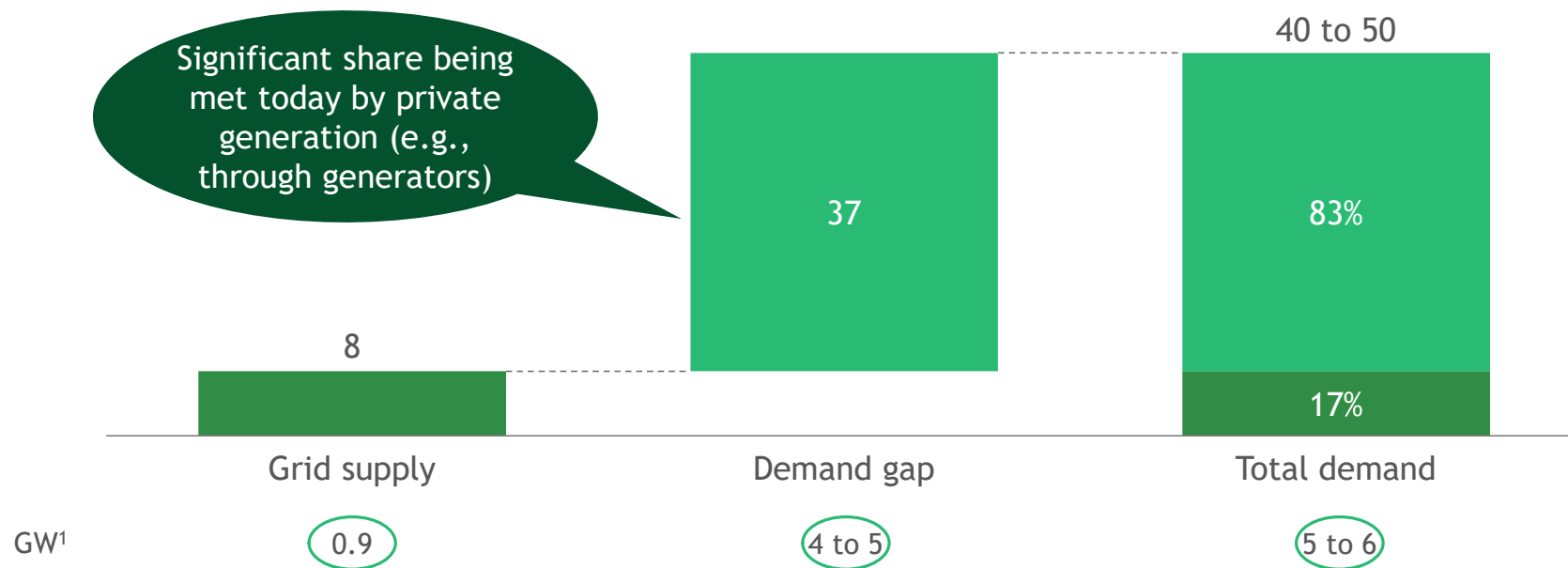


Note: Electricity use per capita reflect unconstrained electricity demand forecast for the given GDP per capita US\$, PPP
 Source: Lagos Bureau of Statistics; World Bank; Consultants; Consultant Analysis

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Although most of the population of Lagos are close to grid infrastructure, electricity supply from the grid is insufficient to meet demand

Estimated gap between unconstrained demand and grid supply in Lagos state - 2020 TWh



1. Gigawatt equivalent of electricity service assuming 100% capacity factor

Source: Lagos State Ministry of Energy & Mineral Resources; Lagos Bureau of Statistics; Presidential Power Initiative; NERC; EKEDC Performance Improvement Plan; IKEDC Performance Improvement Plan; Power Africa Nigeria Power Sector Program; Consultant Analysis

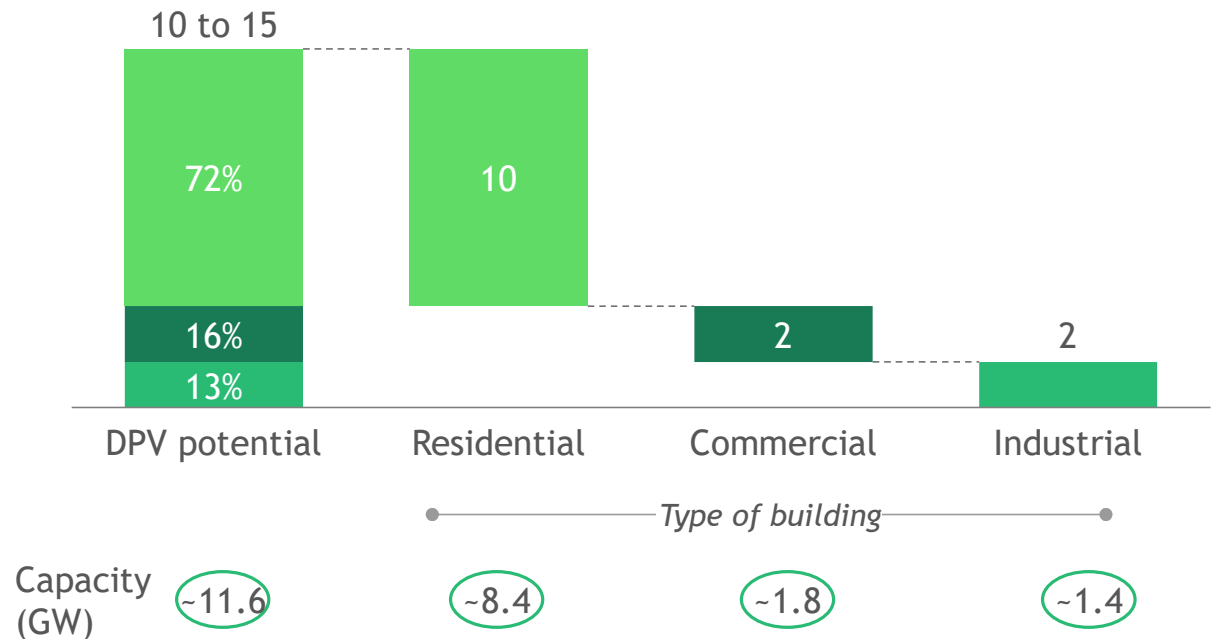
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Geospatial estimates (ESMAP) suggest DPV with potential to supply 10 - 15TWh of power needs

Approach for geospatial assessment

- 1 Estimate total rooftop area from satellite imagery
- 2 Classify rooftops based on Google Map labels
- 3 Estimate generation potential of rooftop based on roof tilt and local irradiation levels

DPV generation potential by building type in Lagos (TWh/yr)

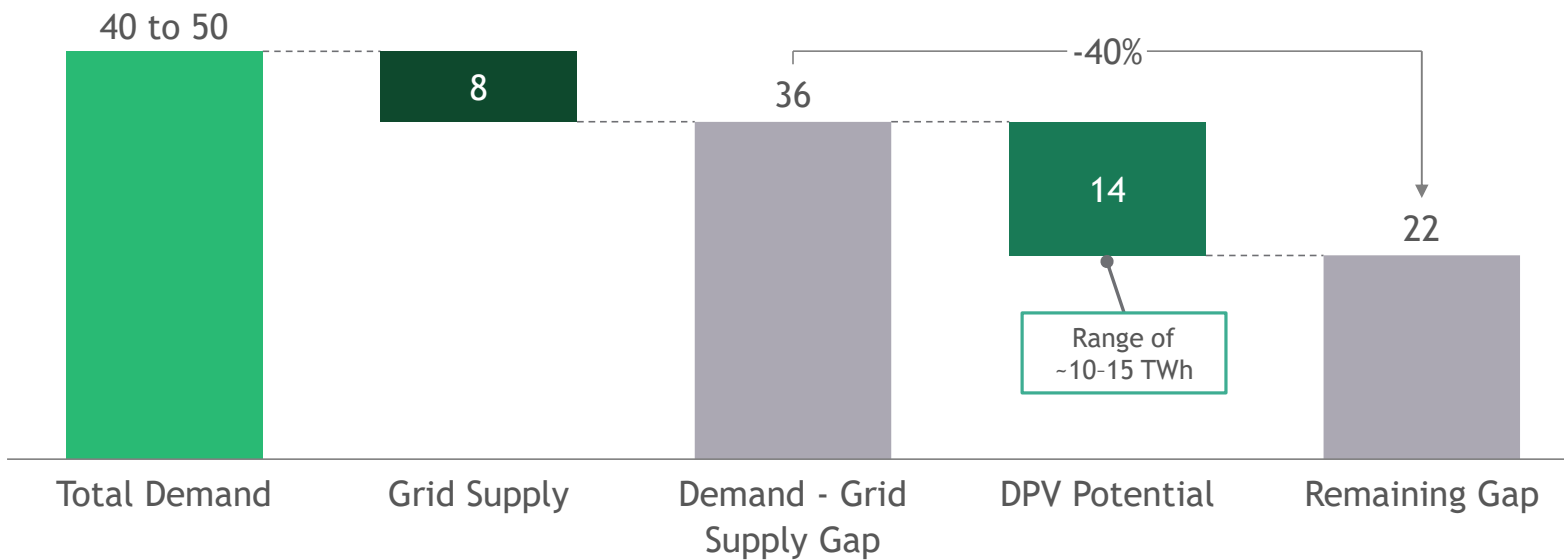


1. Initial estimate by World Bank ESMAP study across 11 LGAs (=9TWh) was scaled up to include the other 9 LGAs in Lagos, based on land area
 Source: World Bank ESMAP Lagos Rooftop Geospatial Study; Consultant Analysis

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Given potential, case exist to include DPV within power mix in Lagos

Illustration showing DPV potential based on 2020 electricity demand (TWh)



Source: Lagos State Ministry of Energy & Mineral Resources; Lagos Bureau of Statistics; Presidential Power Initiative; NERC; EKEDC Performance Improvement Plan; IKEDC Performance Improvement Plan; Power Africa Nigeria Power Sector Program; World Bank ESMAP Lagos Rooftop Geospatial Study; Consultant Analysis

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Several challenges would need to be mitigated to realize the DPV potential



Financing

- **Quantity:** Insufficient availability of low-cost financing
- **Process:** Difficulty in accessing and delays in disbursement of concessional funds
- **Participation:** Limited involvement of local FIs due to data availability & market understanding issues



Commercial

- Lack of centralized demand aggregation to create scale (to reduce acquisition cost) for viable use cases, and ownership to drive adoption
- Limited consumer awareness on benefits/potential of solar products



Operational

- Insufficient availability of skilled human resources and data
- Complex importation process driving costs up
- Payment collection inefficiencies
- Underdeveloped segments of value chain (e.g., manufacturing, end of life)



Enabling environment

- Insufficient enforcement
 - Quality standards resulting in presence of low-quality products in the market
 - Fiscal policies (e.g., duty and tax exemptions)

Stakeholders needed for resolution

Commercial Banks, LASG, DFIs

Associations, DisCos, DFIs, LASG, Developers

Associations, LASG, DFIs, Financial Institutions¹, Customs, Developers

LASG, REAN, SON, DFIs

1. Includes commercial banks, Micro-finance Banks, FinTechs; Source: Stakeholder consultations, Consultant Analysis

Any quick
questions?






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Financing: Starting list of recommendations (I/II)

Theme	Recommendation	Rationale	Stakeholder(s)
Availability and accessibility 	A1 Facilitate the development of Distributed Solar PV focused equity funds to enable development of DPV focused ventures	<ul style="list-style-type: none"> • \$1.5B financing shortfall • Insufficient availability of patient capital • Expensive local currency debt (>20% interest rate) • Only 29% of investment in DPV is from private capital (\$65M) 	<ul style="list-style-type: none"> • DFIs • Lagos State Govt.
	A2 Create a Green Fund (e.g., from levies on carbon intensive activities, direct budget allocation) which can be used to support DPV enabling activities. (e.g. capex subsidy, collateral support, etc)	<ul style="list-style-type: none"> • Make funds available to cover a certain percentage of \$1.5B funding gap (e.g., De-risk solar projects, catalyze additional funding etc.) <ul style="list-style-type: none"> - Collateral of up to 150% of borrowed amount 	<ul style="list-style-type: none"> • Lagos State Govt. • FIRS/LIRS
	A3 Create a one stop shop to support PV developers in navigating issues around accessing current funds	<ul style="list-style-type: none"> • <\$2m of \$350m available funding disbursed as grants in ~2 years; • Developers complain about challenges in meeting requirements 	<ul style="list-style-type: none"> • REAN • Lagos State Govt



Financing: Starting list of recommendations (II/II)

Theme	Recommendation	Rationale	Stakeholder(s)
Availability and accessibility 	A4 Work with existing programmes to refine funding application review and disbursement processes (e.g., NEP, Solar Power Naija etc.) to improve cycle time to <3 months	<ul style="list-style-type: none"> Complaints about delays in application and disbursement processing time (e.g., >9 months for disbursement) 	<ul style="list-style-type: none"> REA REAN DFIs
	A5 Train PV developers to meet the requirements of existing programs/funds (e.g., to develop quality applications, meeting technical standards etc.)	<ul style="list-style-type: none"> Local developers struggle to meet requirements of current programs/funds (e.g., applications re-submitted up to 4 times before approval) 	<ul style="list-style-type: none"> REA REAN DFIs
Local FI Involvement 	A6 Structure and channel donor-led Naira-denominated debt financing through commercial banks and provide technical assistance to banks to support establishment of DPV desks, prepare/assess transactions, etc.	<ul style="list-style-type: none"> Banks have limited understanding on how to assess solar projects risk (only 2 banks identified currently actively involved in this space) 	<ul style="list-style-type: none"> Commercial Banks DFIs

Commercial: Starting list of recommendations



Theme	Recommendation	Rationale	Stakeholder(s)
Consumer awareness 	B1 Introduce policy for minimum/target amount of DPV in state's energy mix and preferential domestic procurement rules that prioritize local developers	<ul style="list-style-type: none"> Insufficient offtake guarantee creating uncertainty for PV developers 	<ul style="list-style-type: none"> Lagos State Govt. DFIs
	B2 Deploy DPV in anchor loads like high visible public areas/facilities (e.g., healthcare centres, schools, public buildings, schools, land near airport runways, stadiums, lagoons etc.) to demonstrate the potential of solar and create first-hand visibility on its benefits	<ul style="list-style-type: none"> Consumers have low confidence in, and awareness of the potential and benefits of solar 	<ul style="list-style-type: none"> Lagos State Govt. PV Developers C&I customers
	B3 Partner with marketing/media companies, distribution companies, community/religious leaders etc. to include DPV in awareness campaigns and mass communications		<ul style="list-style-type: none"> Lagos State Govt. PV Developers DisCos

Operational: Starting list of recommendations (I/II)


Theme	Recommendation	Rationale	Stakeholder(s)
Skilled resource availability 	C1 Develop training curriculum and provide standardized training programs focused on key skills required across the value chain ² (manufacturing to decommissioning) through vocational institutions and academies (e.g., Lagos Energy Academy)	<ul style="list-style-type: none"> Limited capabilities and availability of skilled human resources across value chain which can be a limiting factor as DPV is accelerated 	<ul style="list-style-type: none"> Lagos State Govt. DFIs REAN DisCos¹
Importation process 	C2 Create a help desk to provide clarity on custom duty exemptions and support PV developers navigate importation process in a timely manner	<ul style="list-style-type: none"> Cumbersome and unclear importation process for solar products resulting in high landing cost (e.g., disagreements with customs on which HS code is relevant to DPV systems due to product definition overlaps) 	<ul style="list-style-type: none"> REAN MAN

1. For Grid Tied PV' 2. Training can be provided to Small and medium businesses (who can participate in different segments of DPV value chain) can be initial targets for this skill building program. Source: Stakeholder Consultations, Consultant Analysis


Operational: Starting list of recommendations (II/II)

Theme	Recommendation	Rationale	Stakeholder(s)
Data availability and knowledge sharing 	C3 Create a publicly available repository of market data, project pipeline, executed projects, LCOE toolkit, where developers and investors can access reliable, up to date data on viable market/customer segments in Lagos, to aid decision making	<ul style="list-style-type: none"> Limited data availability for stakeholders in ecosystem creating lack of confidence in DPV projects/ market 	<ul style="list-style-type: none"> DFI REAN Lagos State Govt. PV Developers
Collections 	C4 Create partnerships with existing agent networks (e.g. financial services agents network) to leverage existing agent-infrastructure for collections and minimize the need for overhead to support collections C5 Create partnerships between developers, commercial banks/fintechs to develop payment platforms to minimize overheads for collection	<ul style="list-style-type: none"> Inefficiencies in collection of payment from customers (e.g., Businesses need to send agents to collect payments from customers) 	<ul style="list-style-type: none"> Comm. Banks PV Developers DisCos

Enabling Environment: Starting list of recommendations

Theme	Recommendation	Rationale	Stakeholder(s)
Quality standards 	D1 Enforce International Electrotechnical Commission (IEC) / Lighting Global quality standards and stricter monitoring of quality of solar products sold in the market place by Standards Organisation of Nigeria (SON)	<ul style="list-style-type: none"> To reduce presence of low-quality products in the market and make it a level playing field 	<ul style="list-style-type: none"> Lagos State Govt. DFIs SON REAN
	D2 Launch state wide awareness campaigns targeted at informing customers on how to identify quality solar systems (SON certified/IEC certified/Lighting Global certified)	<ul style="list-style-type: none"> To increase awareness on quality standards and improve consumer protection 	<ul style="list-style-type: none"> Lagos State Govt. DFIs SON REAN
	D3 Create a publicly accessible repository of verified DPV suppliers	<ul style="list-style-type: none"> Lagos State Govt. DFIs SON 	

Cross Cutting recommendation: Create new entity focused on accelerating growth of DPV

Theme	Recommendation	Rationale	Stakeholder(s)
Ownership, demand aggregation, payment risk mitigation 	<p>CC Create new entity (or strengthen existing entity) focused on accelerating growth of DPV in Lagos through the development of ecosystem for the most viable use cases (starting with C&I and public sector customers), supported by policy and financial risk guarantees. Specifically, the entity will be focused on:</p> <ul style="list-style-type: none"> • Creating awareness and uptake for solar in various customer segments, creating retail outlet (for SHS) • Aggregating demand for solar products from viable use case segments in Lagos • Connecting PV developers with financiers and customers • Providing a single point of contact for end to end implementation of solar systems (i.e. Connecting customers with qualified developers/installers) • Mitigating payment risk by signing of tripartite agreements /PPA with (1) Entity (to give payment guarantee to developer), (2) developer (for capex and opex) and (3) customer (provide rooftop and production) 	<ul style="list-style-type: none"> • Supply chain is currently fragmented and so is demand and financing, therefore a programmatic approach is required to ensure success of business models and customer participation • No ownership around driving growth of DPV in Lagos at scale • Similar model implemented in similar countries like Bangladesh, India etc. • Discos don't seem to have a conflict as either these customers are not served or their excess production can be feed-in to grid • This will strengthen "Make in Nigeria" and provide opportunity to small and medium scale businesses 	<ul style="list-style-type: none"> • Lagos State Government • DFIs • Private sector companies • DisCos • Financial Institutions/ Investors • Associations (REAN, MAN etc.) • Vocational Institutions • PV Developers

Breakout groups



70 minutes

Objectives

- Identify solution gaps for unaddressed challenges
- Discuss what role you/other stakeholders can play
- Discuss bottlenecks to implementation

Breakout room 1

Finance & Enabling environment

Customers

- Magodo Residents Association
- Manufacturers Association of Nigeria (MAN)

DPV Supply Chain Players

- Eko Electricity Distribution Company
- Auxano Solar
- SolarCentric Technologies
- Prado Power
- Rubitec Solar
- Daystar

Donors/DFIs

- AfDB
- USAID/Power Africa
- AfD
- EEAS

Enabling Agencies

- Sterling Bank
- FCMB
- Grooming Centre
- All-On
- LAPO Microfinance Bank

Government

- CBN
- Rural Electrification Agency
- MEMR working group 1
- NERC
- NEMSA

Breakout room 2

Commercial & Operational

Customers

- Friesland-Campina
- Union Bank

DPV Supply Chain Players

- Ikeja Electricity Distribution Company
- Lumos
- PAS Solar (Bboxx)
- Green Light Planet
- Engie

Enabling Agencies

- Renewable Energy Association of Nigeria
- Cross Boundary Energy

Government

- Power Sector Working Group
- MEMR working group 2

Donors/DFIs

- GIZ
- DFID/FCDO
- JICA
- UNIDO

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Any quick
questions?



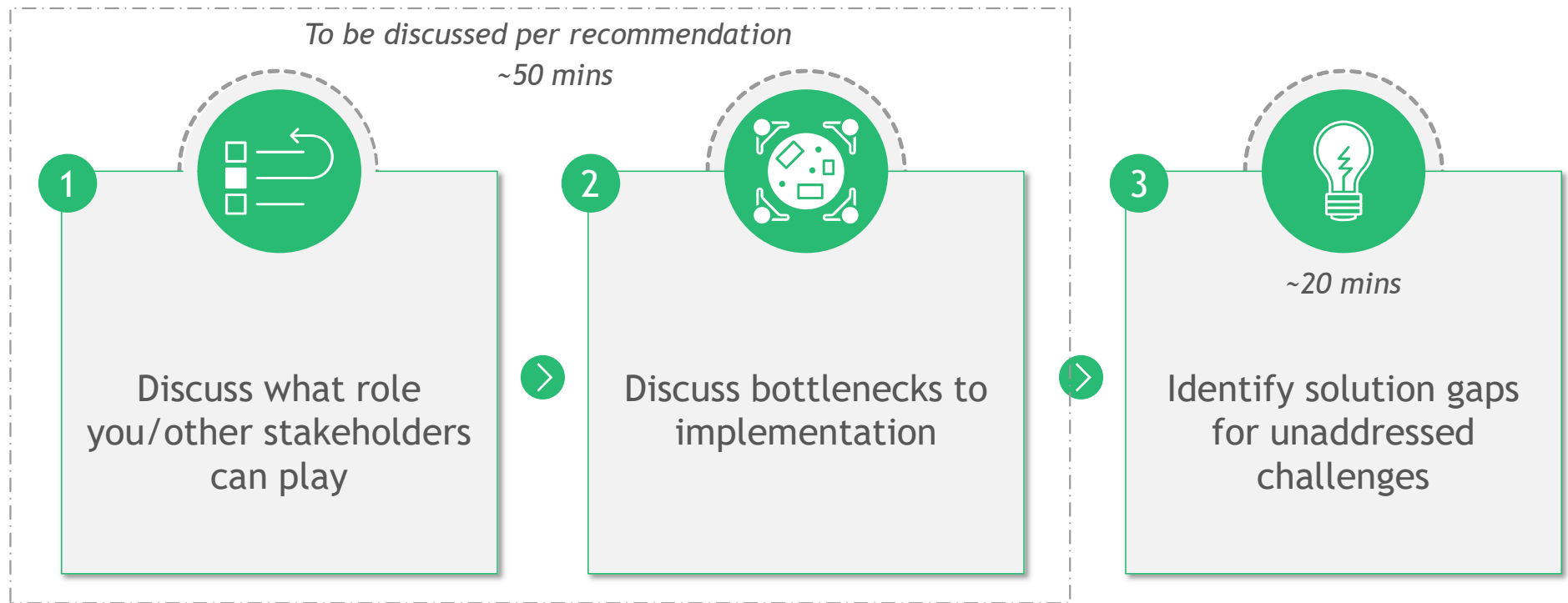


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Three components to develop recommendations



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Breakout Room 1: Recommendations for Financing and Enabling Environment challenges

Please open up the list of challenges on page 12

Proposed Recommendations

- A1** Facilitate the development of Distributed Solar PV focused funds (in local currency) to enable development of DPV focused ventures
- A2** Create a Green Fund (e.g., from levies on carbon emitting industries, DG set manufacturers etc as well as direct budget allocation) which can be used to support DPV enabling activities
- A3** Create a one stop shop to support PV developers in navigating issues around accessing current funds
- A4** Work with existing programmes to refine funding application review and disbursement processes (e.g., NEP, Solar Power Naija etc.) to improve cycle time to <3 months
- A5** Train PV developers to meet the requirements of existing programs/funds (e.g., to develop quality applications, meeting technical standards etc.)
- A6** Develop a DPV financing playbook for commercial banks (including guide to setup DPV desk, templates of bankable project docs. etc.) focused on how to effectively assess risks related to DPV projects
- CC** Create new entity (or strengthen existing entity) focused on accelerating growth of DPV in Lagos through the development of ecosystem for the most viable use cases (starting with C&I and public sector customers), supported by policy and financial risk guarantees.
- D1** Enforce International Electrotechnical Commission (IEC) / Lighting Global quality standards and stricter monitoring of quality of solar products sold in the market place by Standards Organisation of Nigeria (SON)
- D2** Launch state wide awareness campaigns targeted at informing customers on how to identify quality solar systems (SON certified/IEC certified/Lighting Global certified)
- D3** Create a publicly accessible repository of verified DPV suppliers
- B1** Introduce policy for minimum/target amount of DPV in state's energy mix and preferential domestic procurement rules that prioritize local developers

● Cross Cutting
 ● Financing
 ● Enabling Environment
 ● Commercial

Draft

Breakout Room 2: Recommendations for Commercial and Operational challenges

Please open up the list of challenges on page 12

Proposed Recommendations

- C1** Develop training curriculum and provide standardized training programs focused on key skills required across the value chain (manufacturing to decommissioning) through vocational institutions and academies
- C2** Create a help desk to provide clarity on custom duty exemptions, process streamlining and support PV developers through timely importation process
- C3** Create a publicly available repository of market data, project pipeline and executed projects where developers and investors can access reliable, up to date data on viable market/ customer segments in Lagos
- C4** Create partnerships with existing agent networks and minimize the need for overhead to support collections
- C5** Create partnerships between developers, commercial banks/fintechs to develop payment platforms to minimize overheads for collection
- CC** Create new entity (or strengthen existing entity) focused on accelerating growth of DPV in Lagos through the development of ecosystem for the most viable use cases (starting with C&I and public sector customers), supported by policy and financial risk guarantees.
- B1** Introduce policy for minimum/target amount of DPV in state's energy mix and preferential domestic procurement rules that prioritize local developers
- B2** Start deployment of DPV in anchor loads like high visible public areas/facilities to demonstrate the potential of solar and create first-hand visibility on its benefit
- B3** Partner with marketing/media companies, distribution companies, community/religious leaders to include DPV in awareness campaigns and mass communications

● Cross Cutting
 ● Commercial
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Next steps

- Integrate feedback on recommendations
- Detail out recommendations through continued stakeholder engagement
- Schedule 2nd workshop (*in ~2 weeks*) to conclude on path forward for Lagos state

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