



TECHNO-ECONOMIC ANALYSIS OF A SUITABLE BUSINESS MODEL FOR A ROOFTOP SOLAR PV PROJECT

(CASE STUDY OF ACCRA, GHANA)

Presented by:

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AIM OF PROJECT

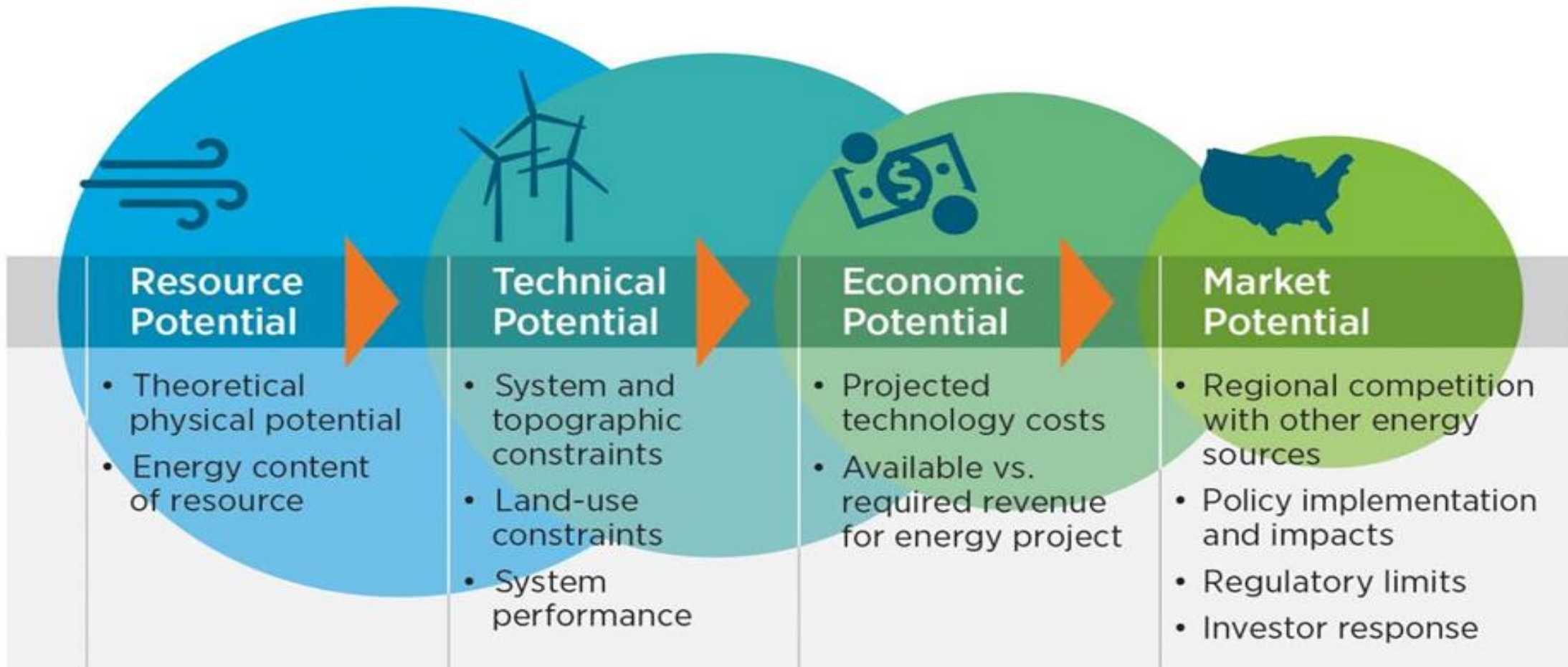
To investigate the technical and economic potential feasibility of RSPV deployment for Accra

Main Questions

1. What is the total technical rooftop solar potential for the metropolitan city of Accra?
2. What is the economic feasibility of the deployment of a *suitable business model* for RSPV in Accra?

“One of Ghana’s paramount constraints to economic growth is the unreliable and inadequate supply of electric power”—USAID, 2015

Types of Solar Energy Potentials



Technical Potential Estimation

STEP 1

Useful Rooftop Area
Estimation for Accra

*Suitable RSPV Area for Accra
 $\cong 22.5\text{km}^2$*

STEP 2

Solar Power/Energy
Potential Estimation

*Power Potential = 2.56 GW
(80% of national installed
capacity 2015)*

*Energy Potential = 5,026 GWh
(43% of national supply 2015)*

Accra's Solar Power Potential is more than the nameplate capacity of all these plants combined:

1. Akosombo Hydro Power Plant
2. Bui Hydro Power Plant
3. Kpong Hydro Power Plant
4. Takoradi Power Company (TAPCO)
5. Takoradi Int. Company (TICO)
6. Takoradi T3
7. Tema Thermal Plant 1
8. Tema Thermal Plant 2

Total Capacity = 2.53 GW

BUSINESS MODEL SELECTION (FiT & Retail)

(HYBRID SOLAR ROOF RENTAL & SOLAR PPA)

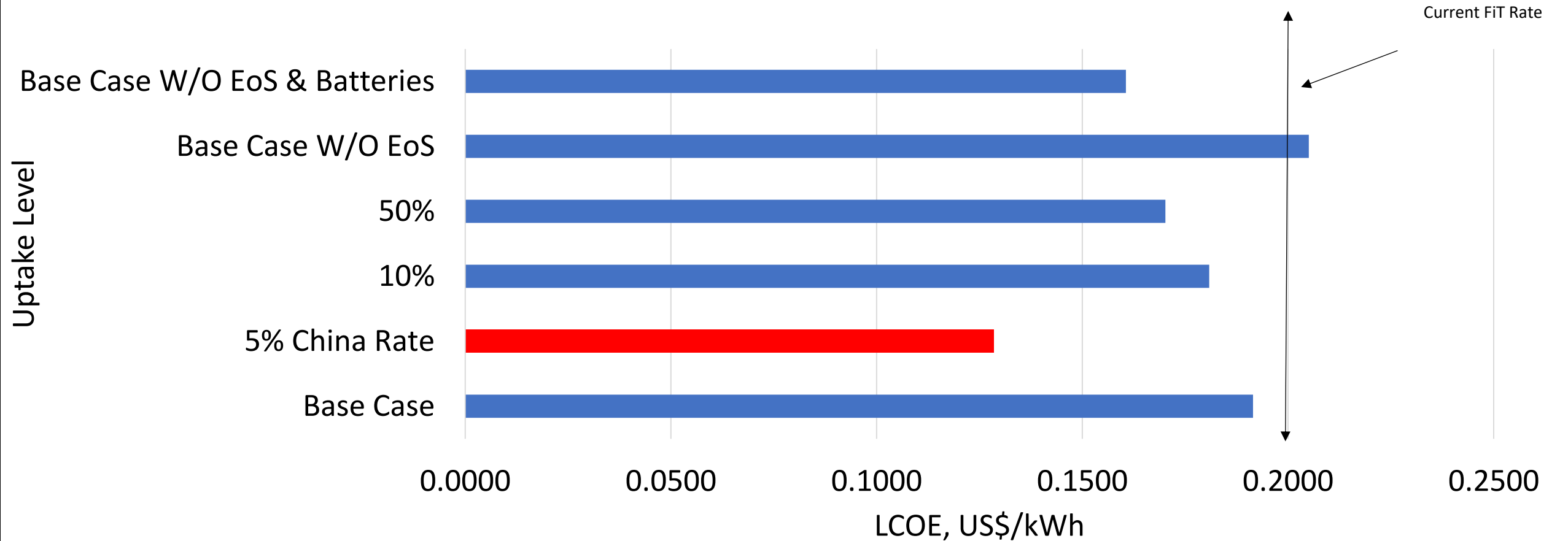
SOLAR ROOF RENTAL		SOLAR PPA		SOLAR LEASING		COMMUNITY SOLAR	
FiT		FiT/Retail		Lease Fees		FiT/Net Metering	
Tariff Category	Tariff Band (kWh)	PURC Approved Rates (US cents/kWh)	LCOE Solar PV with Batteries (US cents/kWh)	Savings (US cents/kWh)	LCOE Solar PV without Batteries (US cents/kWh)		
1 st Tier	0-50	8.67	22.41	-13.74	16.30		
2 nd Tier	51-300	17.40	22.41	-5.01	16.30		
3 rd Tier	300-600	22.58	22.41	0.17	16.30		
4 th Tier	600+	25.09	22.41	2.68	16.30		

COMMERCIAL TARIFFS

1 st Tier	0-300	25.01	22.41	2.60	16.30		
2 nd Tier	300-600	26.61	22.41	4.20	16.30		
3 rd Tier	600+	41.99	22.41	19.58	16.30		

ECONOMIC ANALYSIS (LCOE Approach)

LCOE for Different Scenarios of Solar Uptake



PROJECT PROFITABILITY (NPV, IRR, PAYBACK)

Uptake	NPV, US\$ million	IRR	Payback, years
<i>Based on Ghana WACC</i>			
Base Case (2% Uptake)	4.08	22%	4.2
10% Uptake	45.88	25%	3.7
50% Uptake	356.94	28%	3.3
Base Case w/o EOS	-2.43	19%	4.7
Base Case w/o EOS & Batteries	18.88	34%	2.9
<i>Based on China WACC</i>			
Base Case (2% Uptake)	82.79	22%	4.2
10% Uptake	455.28	25%	3.7
50% Uptake	2,483.34	28%	3.3

ANSWERS TO MAIN QUESTIONS

TECHNICAL POTENTIAL

2.56 GW AC Capacity and 5026 GWh of Energy Potential for Accra

BUSINESS MODEL

Solar Roof Rental and Solar PPA Model

ECONOMIC POTENTIAL

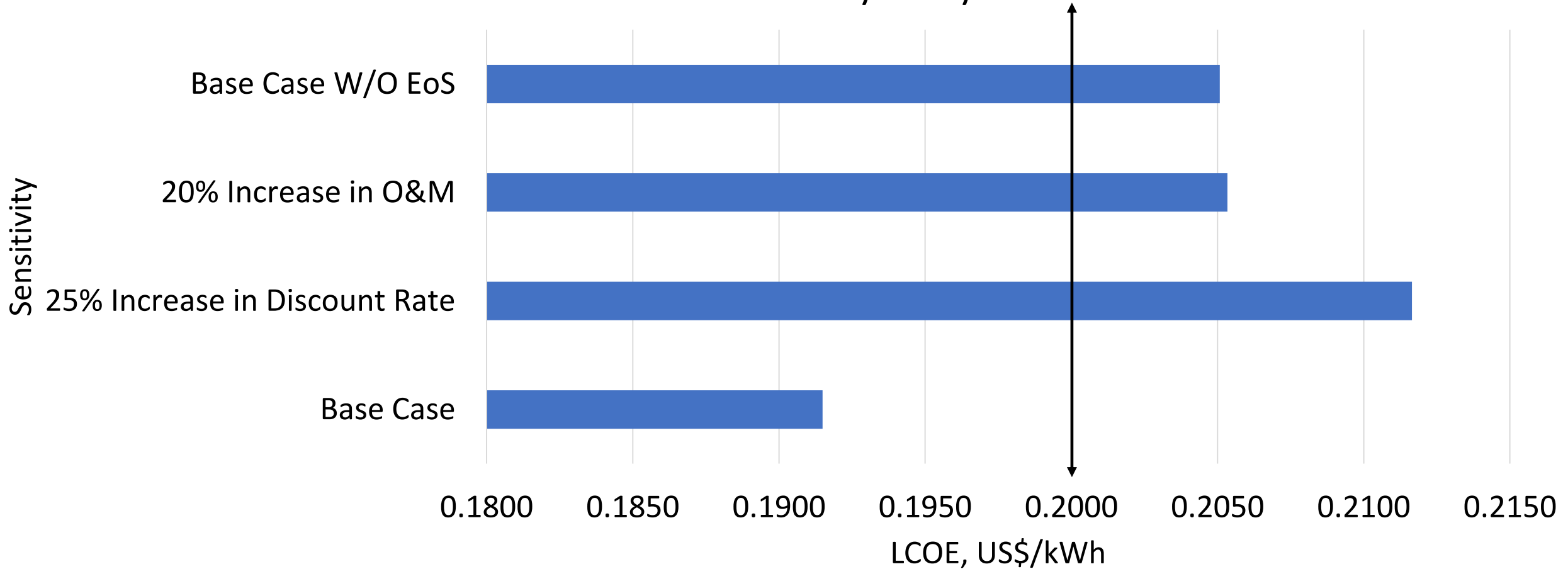
@ 2% Technical Potential Uptake, NPV= 4 US\$m, IRR=22%, Payback=4.2 years

RSPV PROJECT FEASIBILITY

MODESTLY FEASIBLE.....WHY?

SENSITIVITY ANALYSIS

Base Case Sensitivity Analysis



RECOMMENDATIONS

- ❖ Detailed MARKET POTENTIAL analysis be conducted to study all the barriers to project implementation before any attempt at project development
- ❖ Implementation should start with RSPV pilots utilizing the business model to accrue benefits of direct solar PPA to high-end tariff commercial users before a scale-up
- ❖ Public-private partnerships are strongly suggested to help smoothen deployment
- ❖ International funding should be sought due to the prohibitive cost of local finance in Ghana

THANK YOU

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