

Going the Distance: Off-Grid Lighting Market Dynamics in Papua New Guinea

PNG Update Forum 2019 - UPNG Campus - 2019

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LIGHTING PACIFIC
Catalyzing markets for modern off-grid energy
P A P U A N E W G U I N E A



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Discussion points

- **PNG off-grid access**

- ✓ Highlights from the Off-Grid Market Dynamics Report 2019
- ✓ SWOT of PNG's Off-Grid sector: What do we know about PNG's unique situation?

- **Mainstreaming off-grid electrification**

- ✓ Defining Electrification
- ✓ Building blocks

ABOUT LIGHTING PAPUA NEW GUINEA

A market transformation program to support the development of a market for quality verified off-grid products in PNG. Part of the Lighting Global network of programs.

In operation since 2014. Key pillars of activity include:

- Market Intelligence
- Business linkages
- Consumer Awareness
- Business model development



The program works with quality verified products that meet Lighting Global Quality Standards. There are over 150 such products.

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Off-Grid Market Dynamics – Key Highlights

The Market

- Market size for lighting solutions – USD 259 million (addressable market 1.35 million HHs)
- Significant reduction of kerosene usage, but strong prevalence of battery based flashlights/lanterns
- 68 percent growth YoY of solar lighting products (2012 – 2017) from a 2 percent base; penetration of solar lighting products is at approx. 60 percent
- PNG's market share of quality verified products is estimated at 17.5 percent, with the rest generic products
- Over 90 percent of the products are considered 'pico' products, the market for plug and play solar home systems is still developing; additionally there is growing interest in larger productive uses

Off-Grid Market Dynamics – Key Highlights (2)

Demand Side

- Stark difference in Product satisfaction levels between QV and Generic (63% vs 25%)
- Although QV products come with a Warranty many owners are not aware of this (62% of QV owners)
- Prices of QV products are higher than Generic (approx. 30%) but the lifetime of QV products is longer
- Purchasing ability: Good at pico but constrained at larger systems (SHS ++)



Off-Grid Market Dynamics – Key Highlights (3)

Supply Side

- Most purchases happen in 'lot shops' (42 percent), a phenomenon that has accelerated in the last few years
- QV products are purchased from more recognized retailers and distribution points
- Availability of the products (convenience) is a key factor
- Shipping to PNG is expensive, but clearance processes are considered to be smooth and robust
- QV products would typically ship to Port Moresby and then be distributed. This is changing as the market expands



Off-Grid Market Dynamics – Highlights (4)

Continuing to grow the market for quality-verified off-grid solar products:

- Continue to promote the 'quality-verified product' message to all stakeholders
- Deepen and broaden distribution partnerships, and explore ways to increase mid and last mile presence
- Prepare for the upgrade and replacement market
- Target strategic sales locations, partners and timing

SWOT of PNG's Off-Grid sector: What do we know about PNG's unique situation?

Strengths	Areas for improvement
<ul style="list-style-type: none"> ▪ Awareness and acceptance of modern off-grid energy solutions ▪ Excluded population have taken a first step ▪ ~5% of household income spent on energy services ▪ Easipay (for on-grid population) ▪ Largest market in the Pacific 	<ul style="list-style-type: none"> ▪ Need to develop a clear pathway to off-grid electrification (Definition, Policy, Institutions) ▪ Role of public and private sector ▪ Standards for Off-grid electrification ▪ Addressing the financing/bankability gap
Opportunities	Threats
<ul style="list-style-type: none"> ▪ Adoption of Multi Tier Framework for defining Energy Access ▪ Attract private sector to play a dominant role in off-grid electrification by structuring bankable projects ▪ Explore synergies with other sectors e.g. telecom, agribusiness (anchor clients) ▪ Leverage income generating initiatives / productive use of power in off-grid areas 	<ul style="list-style-type: none"> ▪ Need to ensure the growth of a responsible, cohesive market (market spoilage) ▪ Need to match public sector delivery / institutional capacity with private sector activity ▪ Not all off-grid opportunities will be bankable

Mainstreaming off-grid electrification: Defining 'Electrification'

KEY SOLUTIONS TO PROVIDING ACCESS TO ELECTRICITY

World Bank's Multi-Tier Framework (MTF) definition of electricity access

MAIN GRID



✓ Tier 5 - Unrestricted continuous service

MINI GRIDS



✓ Tier 4 - Service capable of supporting refrigeration

✓ Tier 3 - Formal grid connection with limited service

OFF GRID SOLUTIONS



✓ Tier 2 - Ability to run a few small appliances

✓ Tier 1 - Basic lighting and charging

Mainstreaming off-grid electrification

Multi-tier Matrix for Access to Household Electricity Supply

		TIER 0	TIER 1	TIER 2	TIER 3	TIER 4	TIER 5	
ATTRIBUTES	1. Capacity	Power ¹		Very Low Power Min 3 W	Low Power Min 50 W	Medium Power Min 200 W	High Power Min 800 W	Very High Power Min 2 kW
		AND Daily Capacity		Min 12 Wh	Min 200 Wh	Min 1.0 kWh	Min 3.4 kWh	Min 8.2 kWh
		OR Services		Lighting of 1,000 lmhrs per day and phone charging	Electrical lighting, air circulation, television, and phone charging are possible			
	2. Duration	Hours per day		Min 4 hrs	Min 4 hrs	Min 8 hrs	Min 16 hrs	Min 23 hrs
		Hours per evening		Min 1 hrs	Min 2 hrs	Min 3 hrs	Min 4 hrs	Min 4 hrs
	3. Reliability						Max 14 disruptions per week	Max 3 disruptions per week of total duration < 2 hours
	4. Quality						Voltage problems do not affect the use of desired appliances	
	5. Affordability					Cost of a standard consumption package of 365 kWh per annum is less than 5% of household income		
	6. Legality						Bill is paid to the utility, prepaid card seller, or authorized representative	
	7. Health and Safety						Absence of past accidents and perception of high risk in the future	

¹ The minimum power capacity ratings in watts are indicative, particularly for Tier 1 and Tier 2, as the efficiency of end-user appliances is critical to determining the real level of capacity, and thus the type of electricity services that can be performed.

Thank You
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Questions for Panel

General (for all panelists)

- What does 'electrification' mean for PNG (target 70% by 2030)
- Do we have the right policies and institutions to drive off-grid electrification at scale
- What will be the role of public and private sector
- What role can multilaterals/bilaterals play in supporting PNG achieve its off-grid target
- What will be the role of non-govt/ academia / community in the off-grid sector

Carolyn

- Off-grid electrification could see the emergence of small utilities managing mini-grids. What would be her advice for such operators?
- Are there synergies to be exploited between on-grid and off-grid electrification efforts

Mark

- Is financing a key constraint or lack of bankable projects?
- What can be done to accelerate mobile money penetration and can PAYG be a catalyst for the same (win-win for banks and energy companies)

Questions for Panel

Lesieli

- Key learnings from PAYG project
- To what extent can two energy products (LPG and Solar) leverage each other's unique strengths to expand electricity access and LPG
- What is stopping Origin from expanding its PAYG operations and what would be key asks for PAYG operators in PNG to scale their operations