Modelling the Sustainability of Solar PV Mini Grid Solutions for the Rural Off Grid areas in Nigeria

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INTRODUCTION:

NINGERIA - Overview

- Population of 130 million - 80 million without electricity access - mainly in rural off grid areas
- GDP: $ 111 billion
- GDP per Capita: $ 1,242 (toward $ 10,285)
- Meanwhile, around 82% live on less than $ 2 / day
- Resource rich in oil and gas - 8th largest reserve of oil and natural gas in the world

PROBLEM STATEMENT - THE POLICY VOID - THE GIFT AND THE CURSE

In Nigeria, the activities around energy provision less than 10kW is largely unregulated. Therefore, the kW space faces a lack of consistency on the assumed causal linkage between provision of energy services and economic development. This gap can be conceptualised as a dynamic behaviour over time that creates conflicting outcomes for both the provider and users which might not match what was intended.

This study presents an understanding of the dynamic and complicated processes of the actors and decision-making processes within off grid rural contexts for solar PV mini grids by looking at the co-evolution of the technological innovation system (FIS) and the common pool resource (IDP) issues within the geographical context has been shaped about the existing governance actors and produced certain outcomes

CONCEPTUAL FRAMEWORK - Illustrating Innovation systems and common pool resource interactions

Research Question

- What are the systemic alignments or conflicts on the provision of renewable technology with the current rural energy landscape?

Objectives

1. To investigate the interfaces between rural energy provision and common pool resource factors with respect to decentralised electrification solutions

2. To determine the effect of the technical network on the motivation of actors within the rural energy landscape to sustain the growth or continued use of technology.

FINDINGS

CONCLUSIONS

In summary, the balancing loops are dominant because the providers hold the gatekeeping powers of the management of the infrastructure, they have a monopoly on any modifications in the use and operation of the mini grid infrastructure which is way beyond their design and finance responsibilities thereby driving unsustainable outcomes.

This shows that over time, the capacity to cooperate by the users will wane due to asymmetry on the information around the economic capabilities.

If the sustainability of this institutional delivery method is to be achieved, there needs to be a recognition of the user following the following:

i. ‘what can change’ in terms of adverse selection by lowering transaction and capacity costs driving the imbalance on the benefits accruing just to the providers of the mini grid infrastructure

ii. ‘also can change’ in terms of moral hazard outcomes by growing the affinity of users through bridging the gap between the mutual and cognizer norms of the providers and users driving the information asymmetry which is preventing the niche markets from emerging. Therefore, what this perspective suggests is that the stock of users will continue to grow and ensure a governance towards sustainable outcomes that if both the adverse selection and moral hazard outcomes