Global Off-Grid Solar FORUM & EXPO

22-24 January 2018,
HONG KONG

Hong Kong Convention and
Exhibition Centre

GOGLA

LIGHTING GLOBAL
Catalyzing markets for modern off-grid energy

AN INNOVATION OF WORLD BANK GROUP
THE WORLD BANK IFC International Finance Corporation

Platinum

ESMAP
Energy Sector Management Assistance Program

Gold

TOTAL
sun king.
d.light SOLAR
DFID

Silver

BBOXX
POWER AFRICA
A U.S. GOVERNMENT-LED PARTNERSHIP
UNCDF

Bronze

intertek
Total Quality. Assured.
mastercard.

Global Off-Grid Solar FORUM & EXPO

GOGLA LIGHTING GLOBAL WORLD BANK GROUP

A Peek into our Rural Customer Base

Insights for Innovation

Speakers

- **Moderator:** Kate Montgommery, Associate Director, Strategic Partnerships, Acumen

Speakers:

- Daniel Waldron, Consultant, CGAP / World Bank Group
- Richa Goyal, Sr Energy Analist, Lighting Global Quality Assurance Team
- Shazia Khan, CEO and C0-Founder, EcoEnergy Global LLC
- Samuel Muthoka, Country President, Ipsos Tanzania Ltd

Global Off-Grid Solar FORUM & EXPO

GOGLA LIGHTING GLOBAL WORLD BANK GROUP

Agenda

- **Introductions**
- **Customer Values and Preferences**
  - Richa
  - Daniel
- **Business Model development and strategy**
  - Samuel
  - Shazia
- **Final thoughts**

Insights from the The Energy Ladder Research, Uganda

Richa Goyal
Schatz Energy Research Center

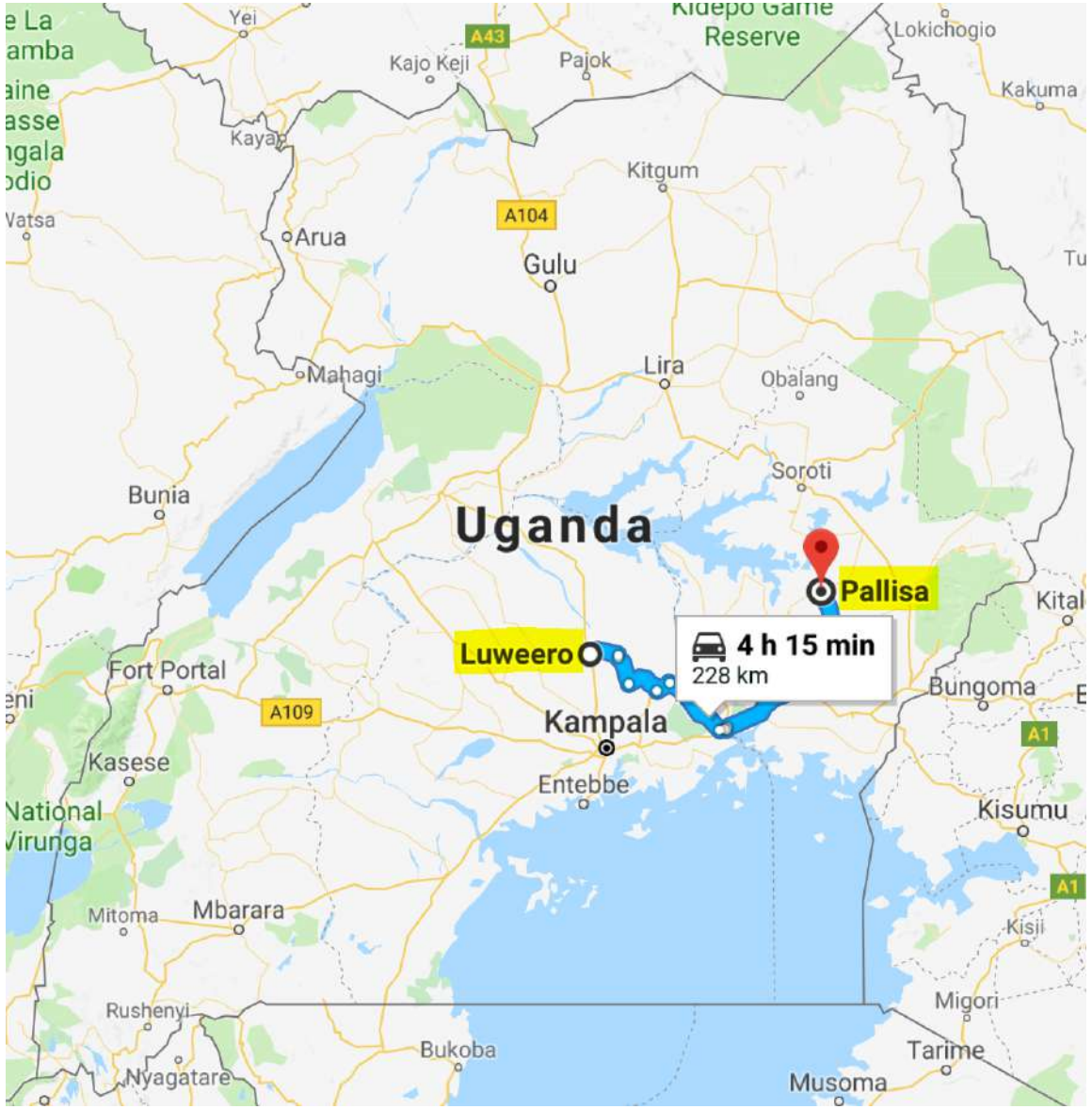
A Peek into our Rural Customer Base
Global off-Grid Solar Forum & Expo
January 23, 2018

SCHATZ ENERGY RESEARCH CENTER

UNCDF CLEANSTART

Contents

1. Set a quick context of the off-grid electricity situation in Uganda
2. Ways in which end-users adopt higher levels of solar energy access
3. Motivations for purchase
4. User preferences for subsequent purchases



Who were the respondents

Level 3: Large solar home system owners (162 respondents)

Level 2:
Small solar home system kit owners (166 respondents)

Level 1: Solar portable lamps(SPL) owners (226 respondents)

solar now

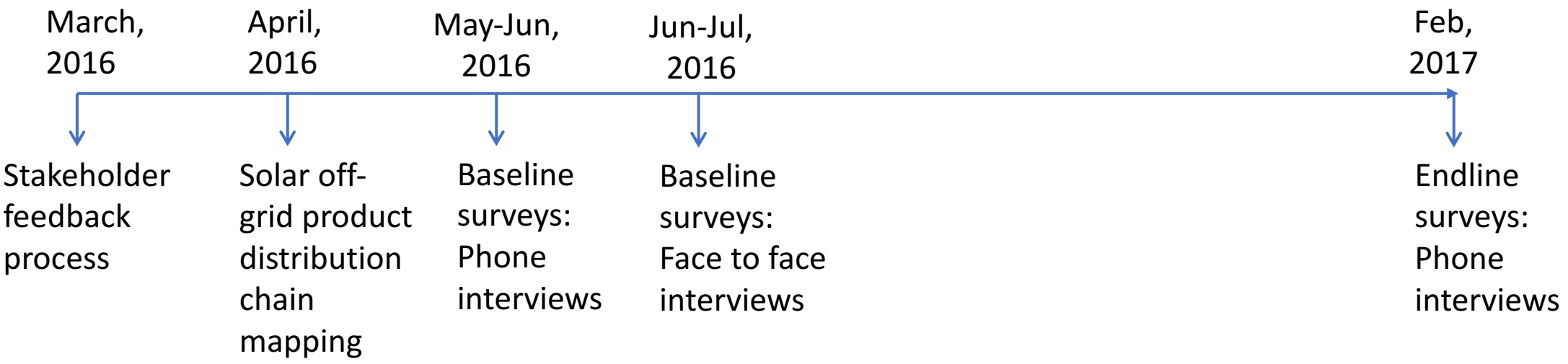
fenix intl

sunny money

sunking from Greenlight Planet

Constructing the notional solar energy ladder in the sampling plan

Research methods and timeline

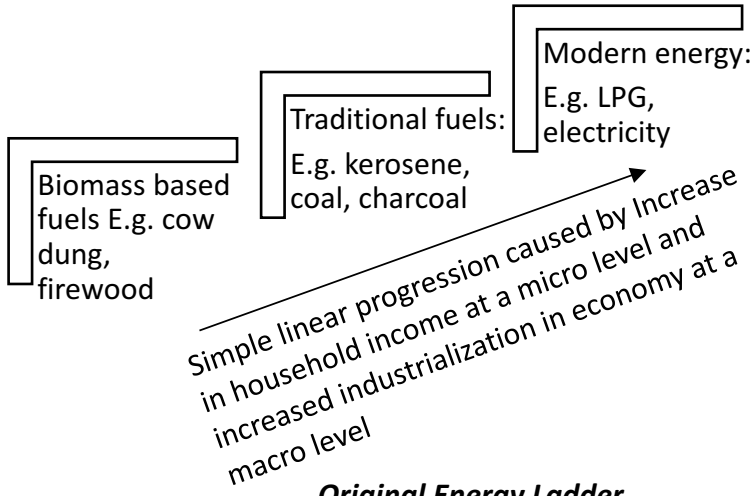


Key insights

1. We reject the solar energy ladder hypothesis. Low income households can leap to higher level of solar energy access directly if appropriate financing instruments is made available to them.
2. We observe mixed stacking and fuel switching behavior among users.
3. Fulfilling lighting energy demand by stacking lighting products, and buying components to expand existing system capacity are popular solar product purchases.
4. Direct marketing, referrals and demonstration effect, play a big role in sales.
5. Users prefer to avoid flexible financing for subsequent purchases.

Solar product adoption patterns

Solar Energy Ladder?



Original Energy Ladder

The energy ladder hypothesis was adapted into a hypothetical construct of a 'solar' energy ladder

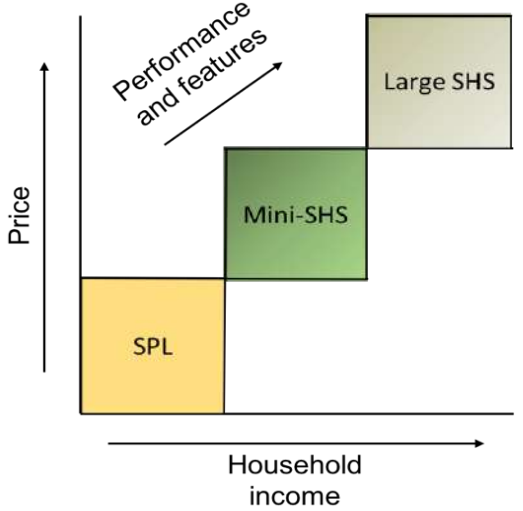
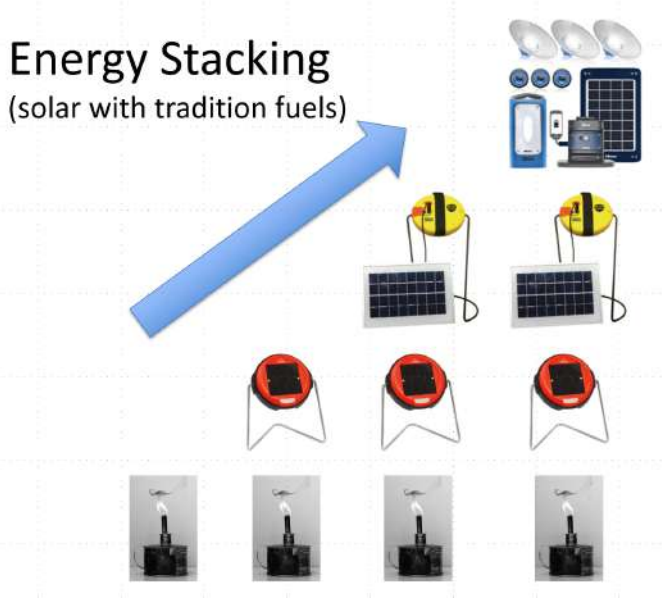
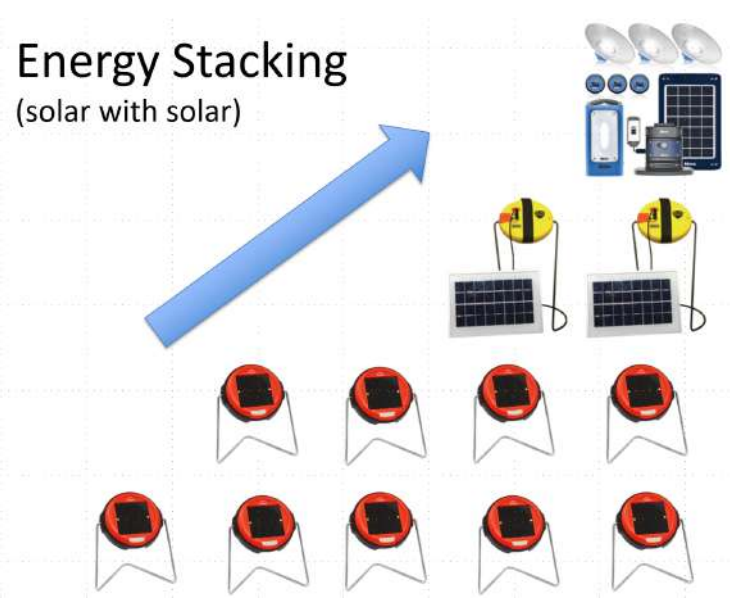


Diagram showing the conceptual solar energy ladder

Energy stacking?



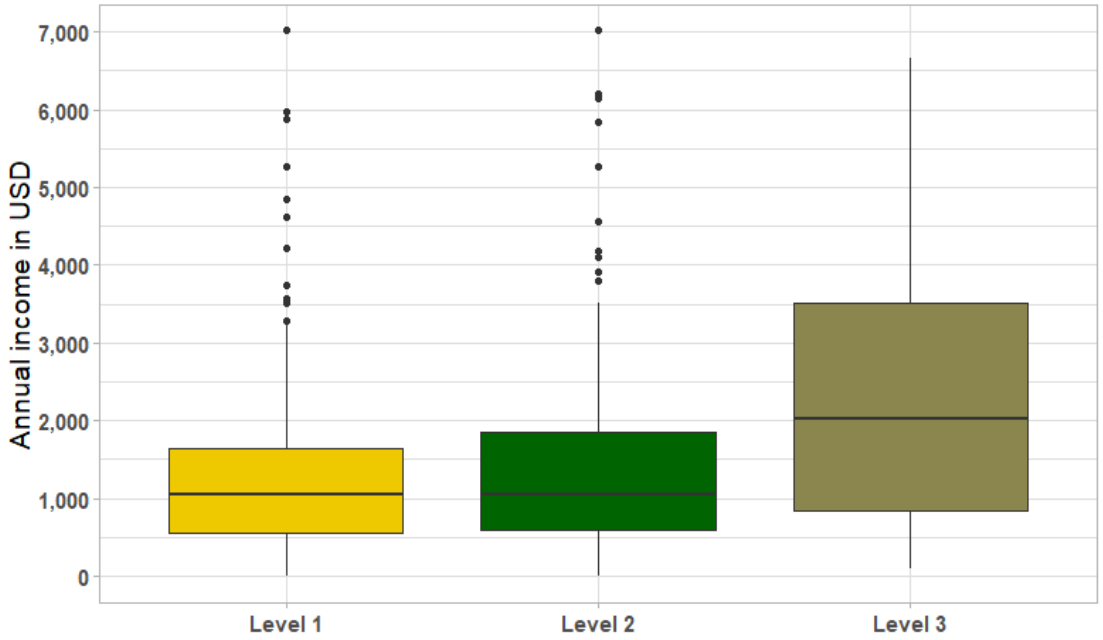


Solar energy ladder hypothesis does not hold!

Percentage of respondents that purchased a solar product for the first time in the year 2015

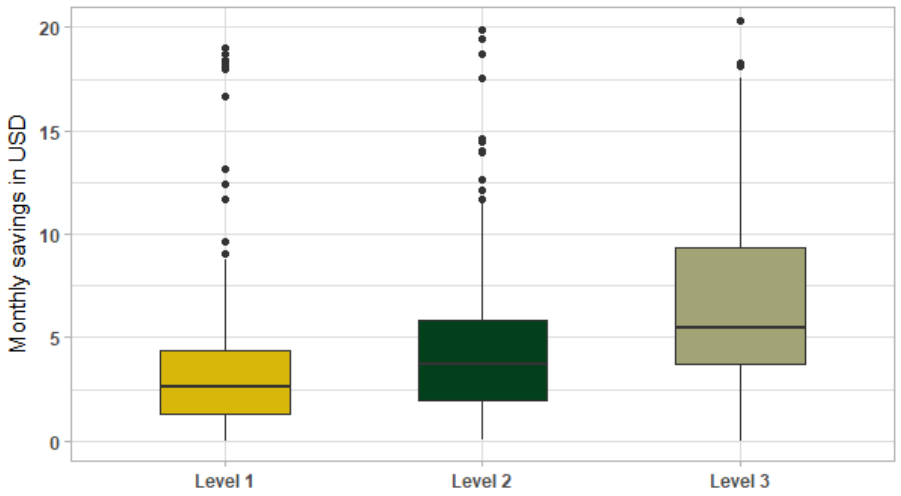
	Respondents that bought their first product in 2015	Total respondents	%
Level 1	221	226	98%
Level 2	163	166	98%
Level 3	150	162	93%

Annual income in USD of respondents across different levels of solar energy access

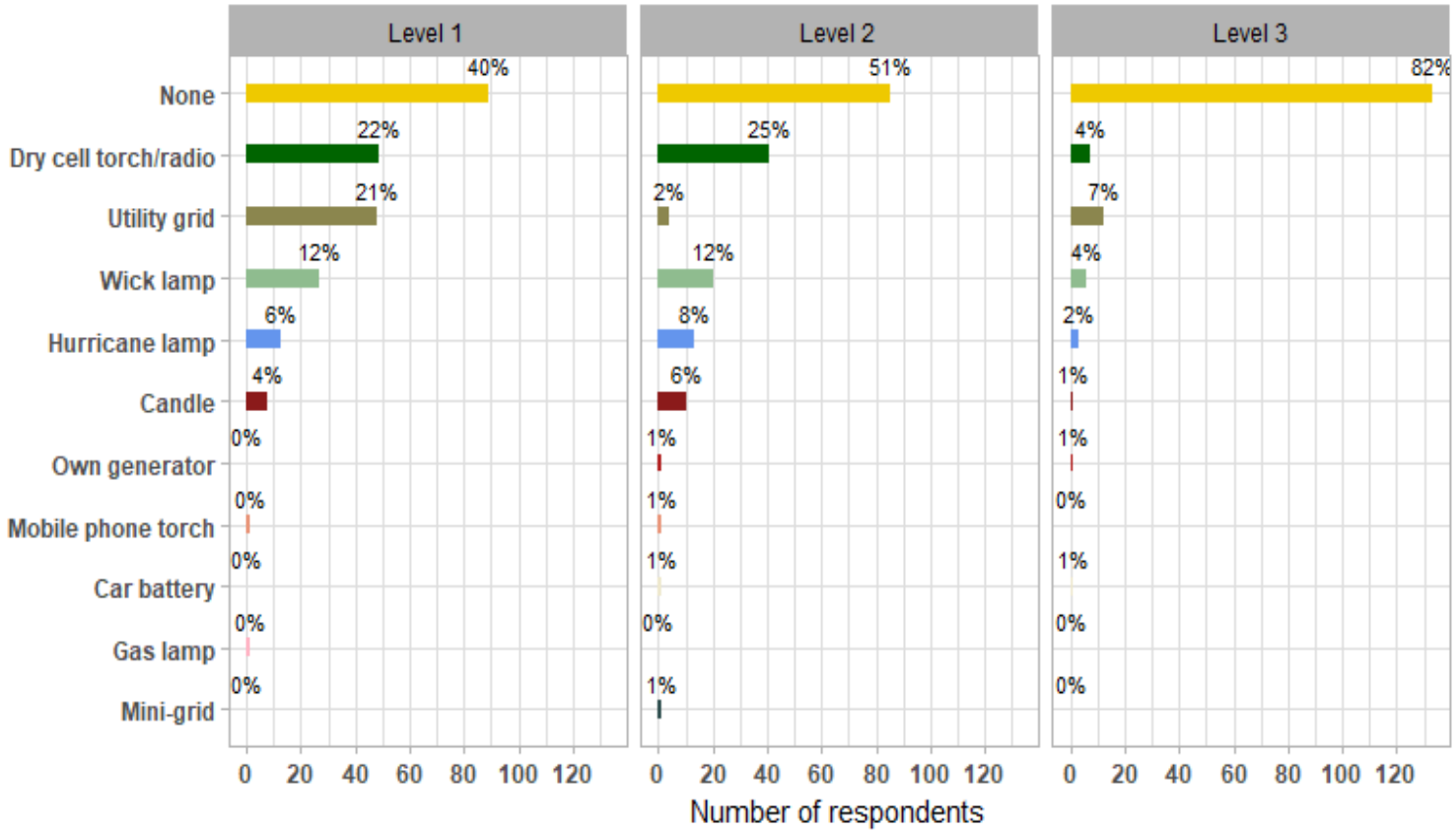


Use of solar and traditional fuels show a mixed stacking and fuel switching behavior

Savings in energy spending on status-quo fuels



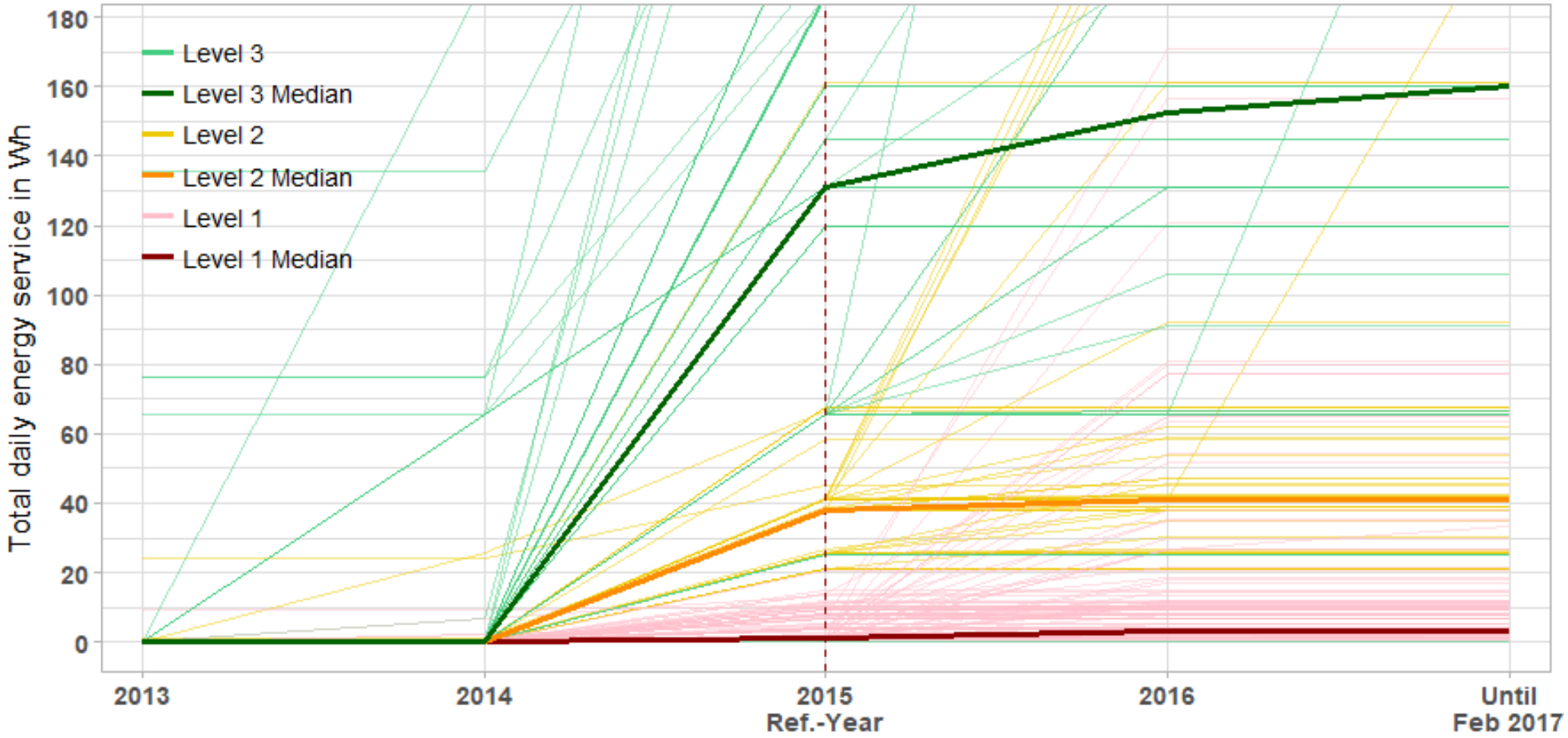
Respondents' use of non-solar energy fuels and technologies



Plot shows within-level percentage. E.g. 40% Level 1 respondents stopped using status-quo fuels and technologies and shifted to solar off-grid product(s). Respondents can use more than one status-quo fuels and technologies.

Within-solar product stacking - solar off-grid energy adoption trends over time

Individual trends lines for daily energy use in Wh across all solar systems owned by respondents



Note: Graph has been zoomed to optimize graphing area. Some outliers have been excluded. Some Level 3 respondents have daily energy service exceeding 400 Wh.

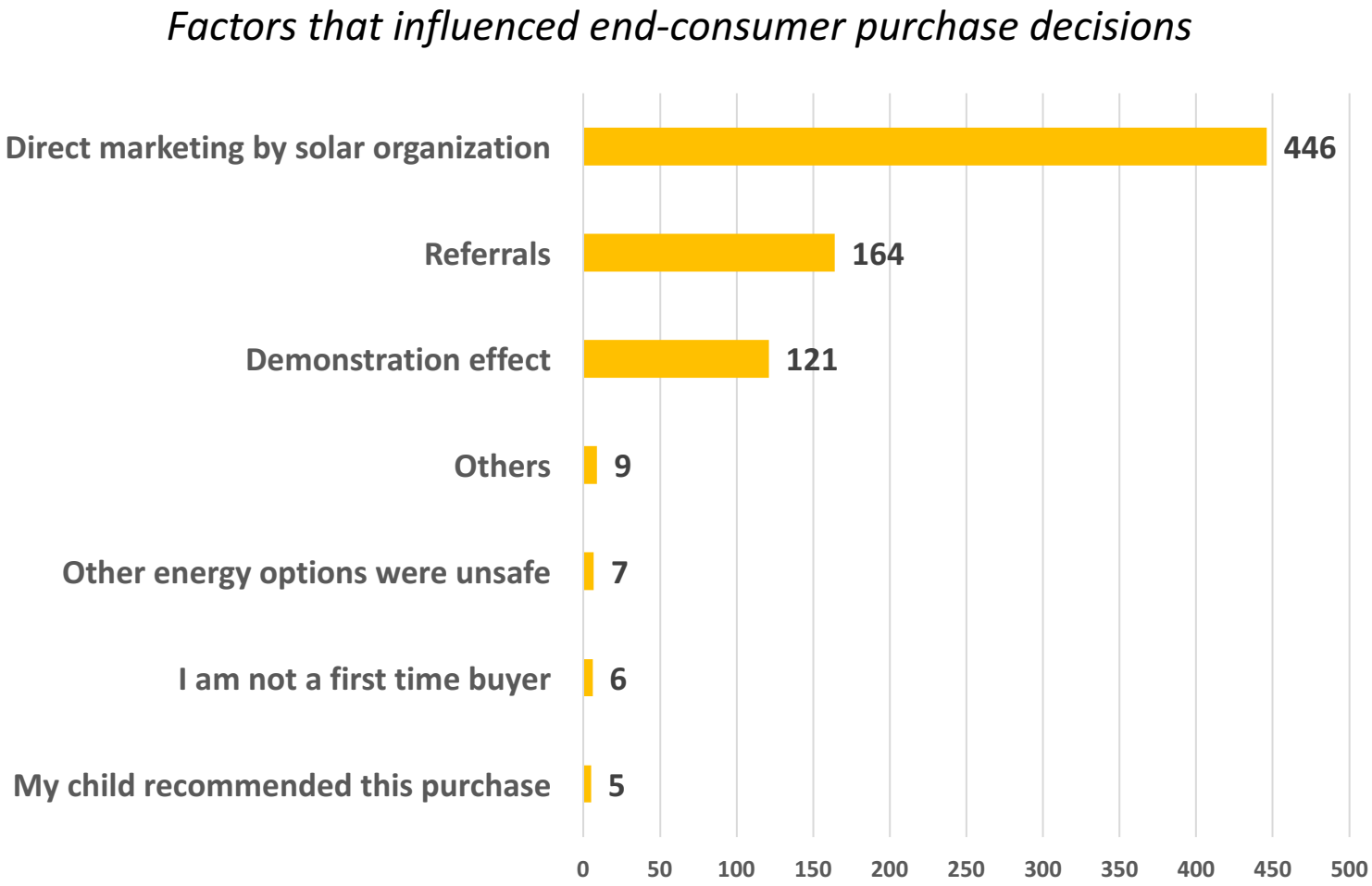
Within-solar product stacking – who bought what

Popular solar energy products bought by subsequent purchasers (respondents that bought at least one other solar energy product between baseline (May-Jun, 2015) and endline (Feb, 2017) surveys.

Level of solar energy access	Overall actual purchasers	Systems with lights	Overall actual adoption rate	Light adoption rate	Components bought to expand current solar system	System expansion rate
Level 1	44	40	22%	91%	0	0%
Level 2	26	15	18%	58%	6	23%
Level 3	22	9	15%	41%	3	14%
Total	92	64	18%	70%	9	10%

Motivations for purchase

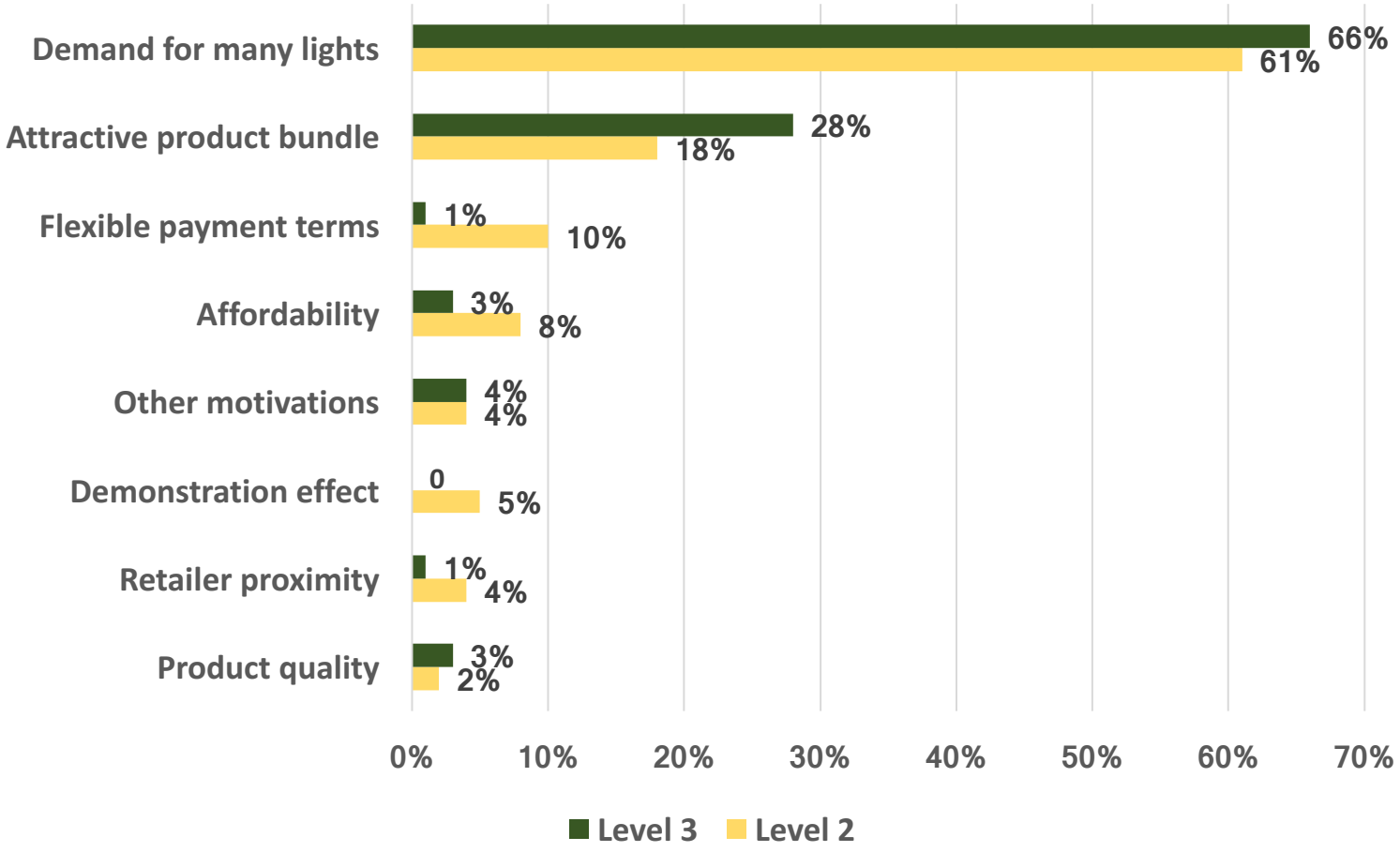
Key prior experiences or information that influenced users to purchase each of the solar products they own



Note: Respondents could report more than one influencing factor.

Motivations for purchasing a solar home system as the first solar product

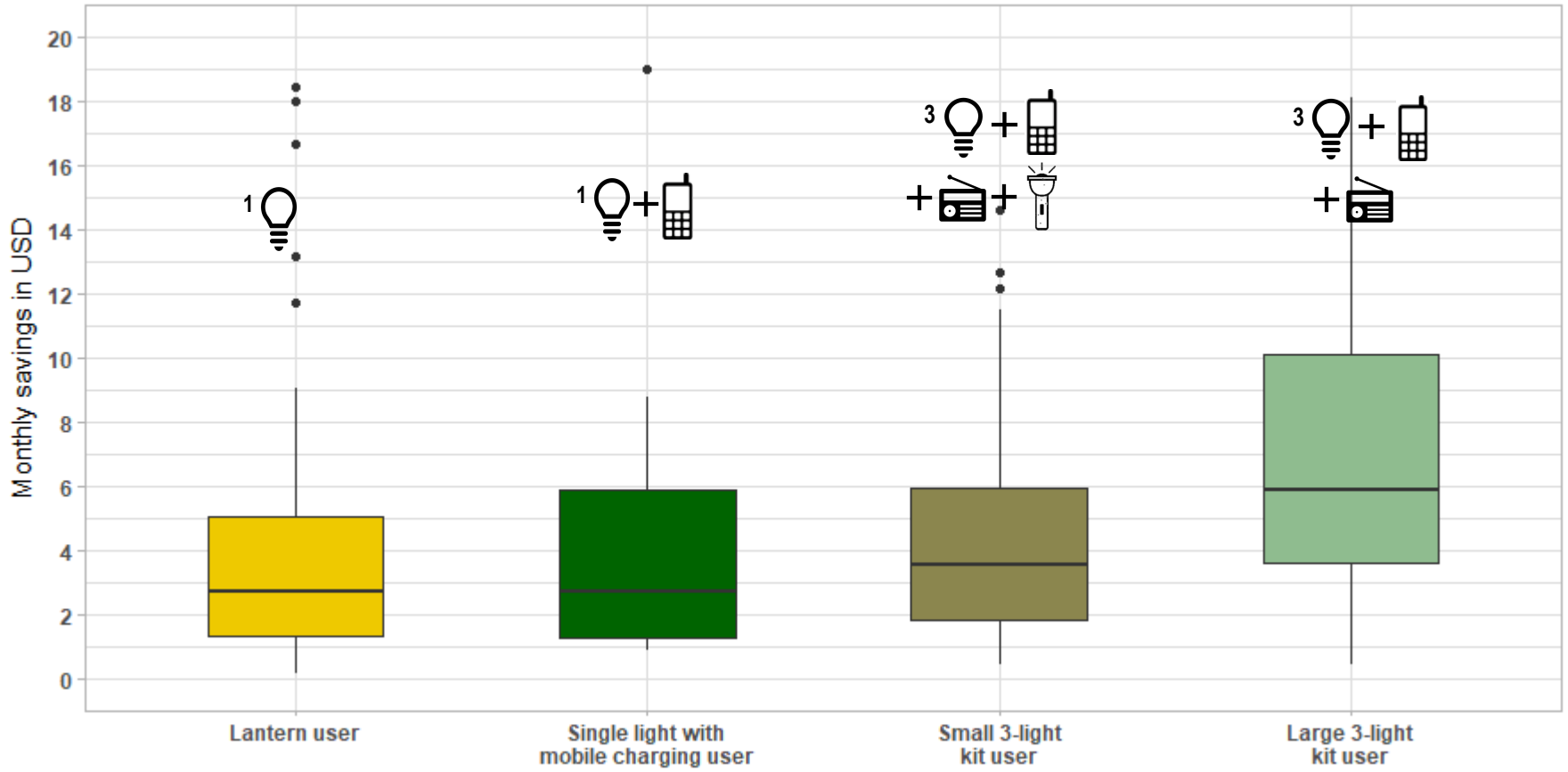
Reasons why Level 2 and Level 3 respondents bought a solar home system in their first product purchase



Note: Graph reports within level percentages. E.g. 66% Level 3 respondents bought a big system because they had demand for many lights. Respondents could report more than one motivation.

Is motivation for purchase an economic one? - Net present value (NPV) analysis for typical customers

Graph shows monthly savings for typical customers of each level of solar energy access



Level 1 typical users

Level 2 typical users

Level 3 typical users

Is motivation for purchase an economic one? - Net present value (NPV) analysis for typical customers cont.

Results of a net present value analysis

Solar Product Adopted in 2015	Level of solar energy access	Solar scenario description		NPV over two years in 2015 money	Break-even period if less than 2 years	Comments
		Payment method for solar product	Median monthly savings due to avoided spending on status-quo fuels			
Simple lantern	Level 1	Complete upfront payment of $10	$2.76	$ 56.84	4 months	Almost 5.7x benefit over two years
Single light with mobile charging		Complete upfront payment of $24.2	$2.76	$ 40.62	10 months	Almost 1.6x benefit over two years
Small 3-light kit (10 W solar module)	Level 2	Complete upfront payment of ~$196	$3.61	-$151.66	N/A	There is net cash outflow during the analysis period (2 years).
		PAYG payment plan: Down payment: $18; Monthly payment: ~$10; Repayment period: 18 months	$3.61	-$127.85	N/A	
Large 3-light SHS with TV (50 W solar module)	Level 3	Complete upfront payment of ~$546	$5.25	-$541.43	N/A	There is substantial net cash outflow during the analysis period (2 years).
		Micro-credit payment plan: Down payment: ~$117; Monthly payment: ~$28.50; Repayment period: 24 months	$5.25	-$735.39	N/A	

Preferences for subsequent purchases

Users' preferences for subsequent purchase of energy product(s): Summary

This Table summarizes some of the key highlights from the 'subsequent purchase analysis'

Key metrics	Level 1	Level 2	Level 3
Preference for upfront payment using personal savings	98%	97%	95%
Dealer stickiness	24%	74%	73%
Preference to purchase from a different 'known' dealer	9%	2%	4%
Preference for PAYG as financing method	0%	0%	0%
Preference to purchase non-solar energy products or take utility grid connection	<1%	<1%	0%

Acknowledgements

- **The research benefitted from the following organizations and individuals**

- UNCDF CleanStart Team: Hee Sung Kim, Robin Gravesteijn & Vincent Wierda

- Research advisory board: Kat Harrison, Acumen & Michael Nique, GSMA

- Fieldwork implementing agency: CIRCODU

During Baseline survey, Energy Ladder Research
Image by Richa Goyal, taken during Baseline Survey fieldwork, 17 May – 2 June, 2016

Research contacts:

Richa Goyal
richa.goyal@Humboldt.edu
&
Dr. Arne Jacobson
arne.jacobson@Humboldt.edu

Escaping Darkness: Consumer Value in PAYGo Solar

Daniel Waldron

January 23, 2018

"…everyone likes light. It is important, especially at night. You can't stay in darkness!"

Tanzanian PAYGo user

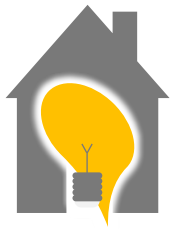
CGAP fibr mastercard foundation

Context

Motivation

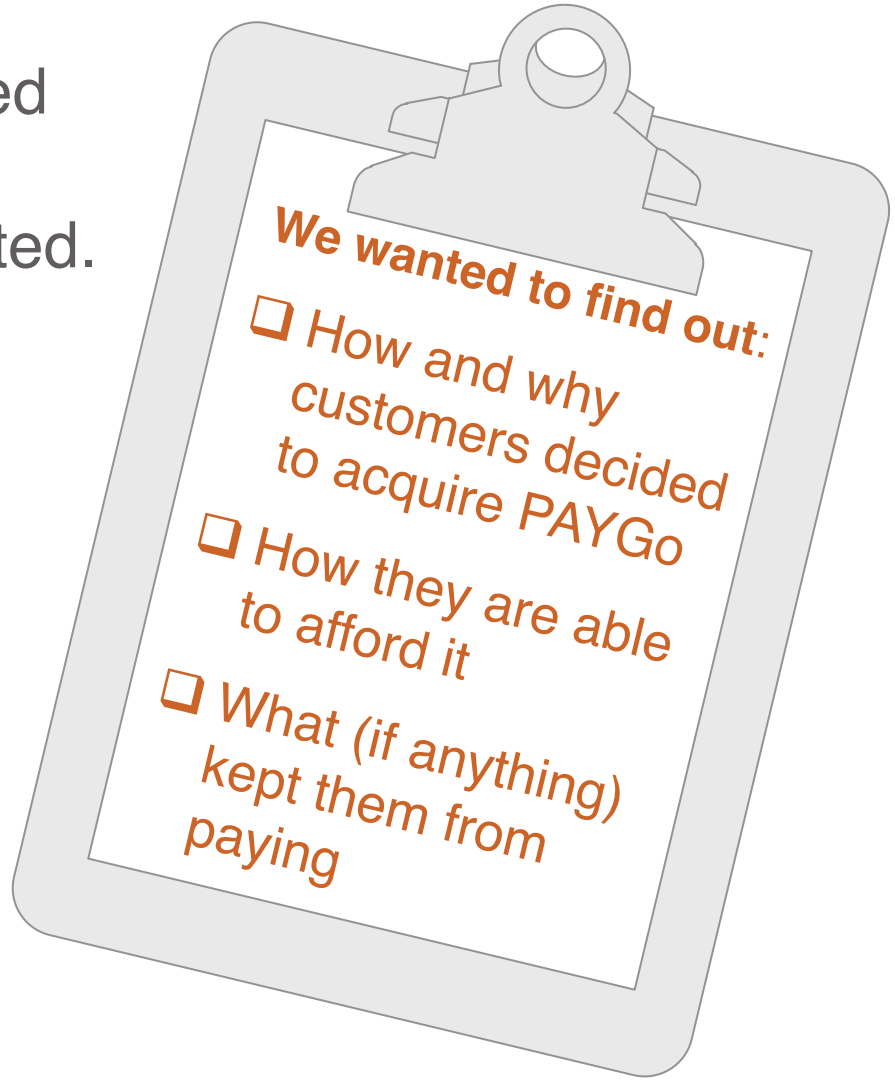
PAYGo sector has emphasized user net savings, but the story appears more complicated.

Median household spending in the Kenya Financial Diaries



$2.54
per month
on energy in total

There was a need to better understand household financial dynamics



CGAP fibr mastercard foundation

http://fsdkenya.org/blog/beyond-the-pricetag-the-real-benefits-of-off-grid-solar-2/

© CGAP 2017

We interviewed 138 rural households in Kenya, Tanzania, Ghana and Cote d'Ivoire

We worked with four providers who graciously helped us to identify low-income and/or struggling customers, and then allowed us to speak directly with their customers

ZOLA OFF-GRID-ELECTRIC

PEG

M-KOPA SOLAR

BBOXX

CGAP fibr mastercard foundation

© CGAP 2017

Results

PAYGo providers allow customers to invest in transforming their own lifestyles

Users adopted PAYGo solar to escape darkness	*"Even before saying [I have solar], when a visitor comes here, he says, 'Hey you've got solar!' and it makes me so happy."*
Literally, they wanted better, cleaner lighting	*"We were used to the tin lamp but now when I see how the solar lights the house, I wonder how we used to survive before…."*
Figuratively, they wanted to be connected	*"I like the solar because it gives me access to information. That's it."*

© CGAP 2017

“I have light, my friends can [charge their phones] and that is development.”

We cannot overstate the importance of consumer finance, of being able to pay over time

“[Paying in installments] is very important, because if they asked us to pay [all at] once it will not be possible as we cannot afford it.”

Users felt that PAYGo providers had placed trust in them, and valued that relationship

“You can be given something but the way you are talked to will either make you want to pay for it or not. They have good language and are not abusive.”

© CGAP 2017

“[The solar] is good even if it is more expensive.”

For most, a PAYGo acquisition had not resulted in savings during the loan.

Interviewer: “*Do you think [your solar home system] has saved you money?*”
Respondent: “*I cannot compare because I used little money to buy kerosene. [Solar] is much better than using [the kerosene] lamp.*”

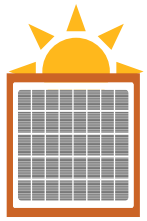
Few households were struggling to pay; customers reduced consumption, tapped savings, and used the flexibility of PAYGo

“What I have done is, when we cook rice during the day we eat half for both lunch and supper. That is how we economize. If the solar had affected our life so much, I would have told them to come and take it away.”

© CGAP 2017

These results are consistent with other findings

"Kerosene purchases… decreased by 47 to 49 rupees per month… there were no consistent effects on savings"
– Aklin et al, 2017

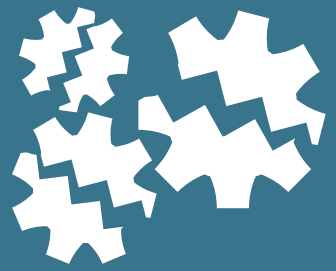


"it's not always the case that customers make savings. Families can spend more for energy after purchasing a more powerful SHS during the repayment period"
– Acumen, 2017

"For solar home systems… the payback period may be longer or there may not be a net reduction in lighting expenditure. However, the direct financial comparison between electric and kerosene lighting does not consider the qualitative difference in lighting."
—SE4All, 2017

CGAP fibr mastercard foundation

© CGAP 2017



"[My wife] refused, saying [the solar] will give us problems. I called customer care anyway…"

Across all markets, it was men who made the decision to acquire solar, often against the initial protests of their wives

Interviewer: *"Did you come home and consult with your wife?"*
Respondent: *"I made a mistake and decided to buy it right there and when I came home I told her, 'Look! I have got solar and they have said we pay $0.53 daily!' But it has not been easy!"*

Recurrent payments often came out of women's budgets

"When [she] wants to go to the market, instead of taking a motorbike, she prefers to walk so that we can use that money to pay for solar."

© CGAP 2017

“It is not as we had agreed on in the written contract.”

PAYGo products are complex, leaving customers vulnerable to misunderstandings or misrepresentations.

“I was supposed to pay $31.59 as deposit and $0.57 daily. But [the agent] only said [to pay] $22.73…Now I am wondering if the documents were inaccurate.”

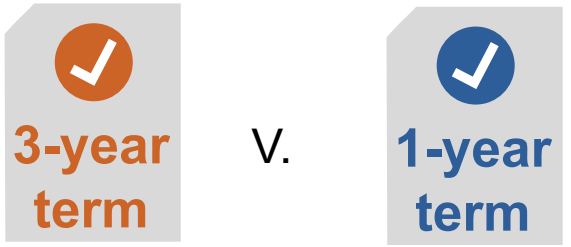
***Interviewer**: “What does [the solar company] say in the text message when you make payment?”*
***Respondent**: “They state the amount that has been paid so far but not the balance.”*

“There was a paper signed, but I did not read because I don’t know how to read English.”

© CGAP 2017


High Level
Takeaways

Longer tenors are not necessarily the best way to reach low-income customers



Daily cost of energy	Ability to offer larger products affordably	Default risk*	Cost of capital*	Time to upgrade, offer other services
3-year term	3-year term	1-year term	1-year term	1-year term
Lower	Greater	Lower	Lower	Shorter

*Ultimately feeds into customer costs

© CGAP 2017

Who are we reaching? And why does it matter?

It is possible to go down-market, but it will not happen without strategic planning and long-term effort

The value here is in long-term relationships. You have to be kind, and you have to be transparent

Understand what behaviors build trust, and emphasize those at every opportunity

CGAP fibr mastercard foundation

© CGAP 2017

“The solar has benefits, and there is a saying that everything good is worth the price.”

Ghanaian PAYGo customer

Thank You!

Questions?

CGAP fibr mastercard foundation


THE GOVERNMENT
OF THE GRAND DUCHY OF LUXEMBOURG


mastercard
foundation


Norad


European
Investment
Bank


npm
platform for
inclusive finance


Federal Ministry
for Economic Cooperation
and Development


UKaid
from the British people


IFC
International
Finance Corporation


Michael & Susan Dell
FOUNDATION


UNCDF


Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra
Swiss Agency for Development
and Cooperation SDC


UNDP


BILL & MELINDA
GATES foundation


USAID
FROM THE AMERICAN PEOPLE


IFAD
Investing in rural people


Sida


FORDFOUNDATION


IDB
Inter-American
Development Bank


MetLifeFoundation


Ministry of Foreign Affairs of the
Netherlands


giz


UDENRIGSMINISTERIET
MINISTRY OF FOREIGN AFFAIRS OF DENMARK


THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP


Global Affairs
Canada


OMIN
Fondo Multilateral de Inversiones
Miembro del Grupo BID


AFD


KFW


OMIDYAR NETWORK™


Australian Government
Department of Foreign Affairs and Trade


FMO
Entrepreneurial
Development
Bank


Citi Foundation
citi

Global Off-Grid Solar FORUM & EXPO

GOGLA LIGHTING GLOBAL WORLD BANK GROUP

First round of discussions

Global Off-Grid Solar
FORUM & EXPO

A Peek into our Rural Customers

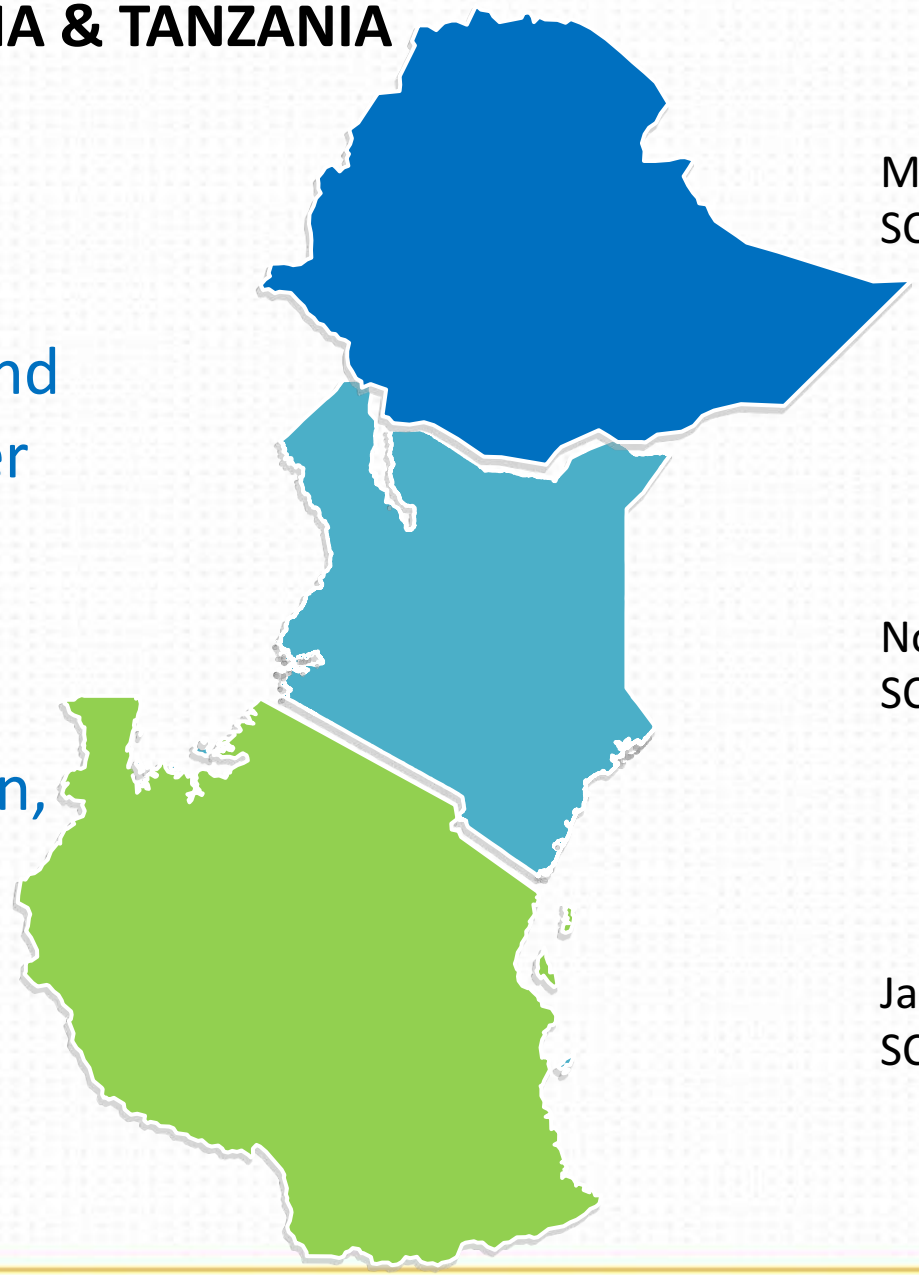
A Deep-dive of Ethiopia, Kenya and Tanzania Markets in Africa

Presenter: Samuel Muthoka
Ipsos Tanzania

LA STUDIES IN KENYA, ETHIOPIA & TANZANIA

Commissioned by the World bank group, The LA research projects in Kenya, Ethiopia and Tanzania have happened over the last two years

Main objective was to understand trade penetration, deep-dive in trader and consumer dynamics

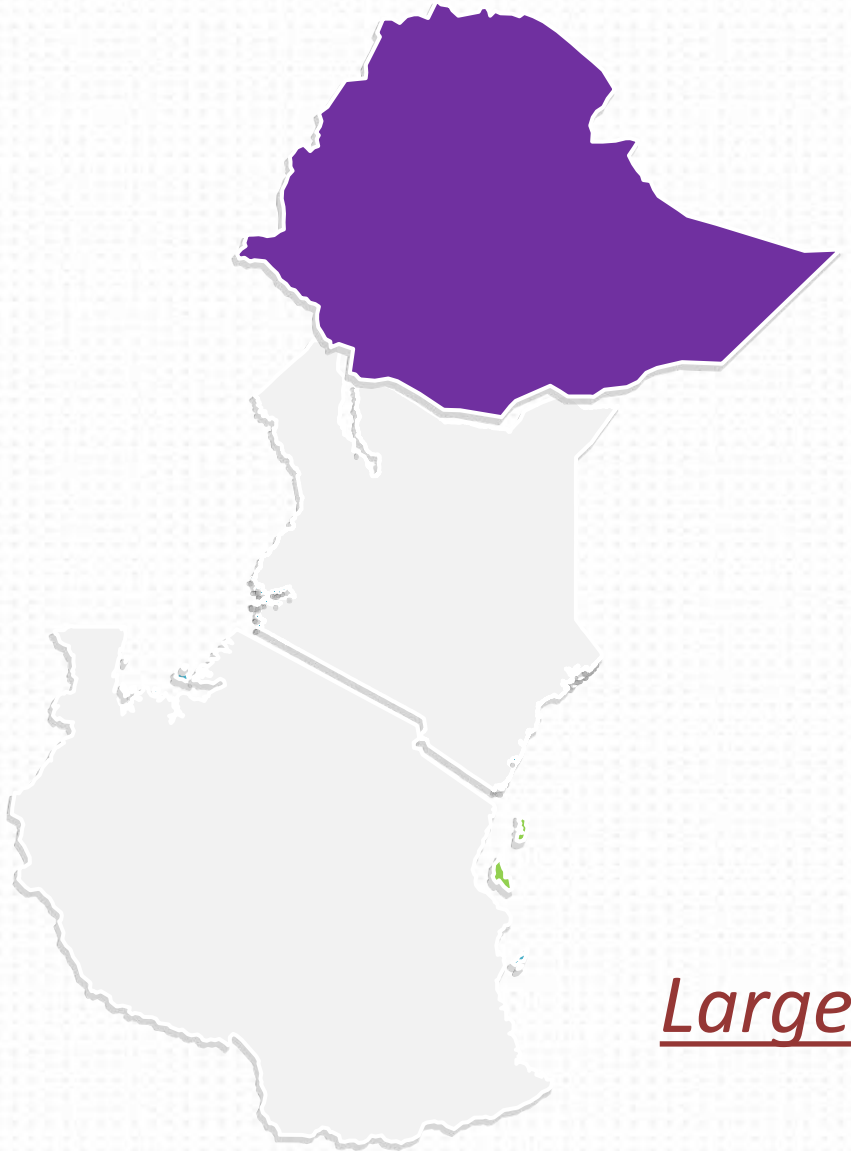


March - Aug 2016
SCOPE: 8,167 outlets

Nov 2015 –April 2016
SCOPE: 29,832 outlets

Jan – December 2017
SCOPE: 9,512 outlets

KEY INDICATORS: ETHIOPIA

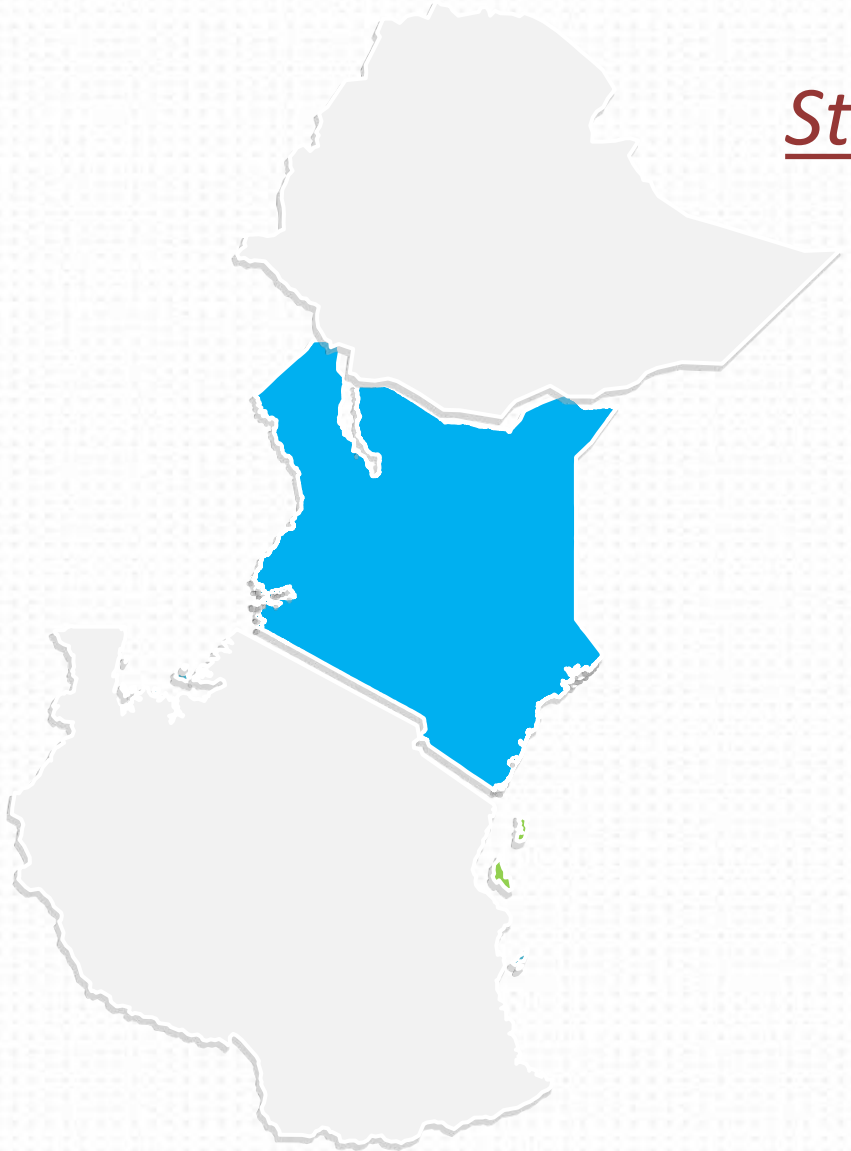


- **56 Million** – *Target consumer Market (15+)*
- **76% -** *Have primary level education and below*
- **59% -** *Seasonal income through agriculture and menial work*
- **44%** *- Mobile phone penetration (79% of population have access to mobile)*
- ***<20%*** *- connected to grid electricity*

- ***5%*** *- Trade channel penetration for Solar lighting products*
  - ***79%*** *of these outlets pushing Lanterns, 35% pushing Home Kits*
- *Lanterns: 335 Brands in the formal trade market*
  - *11% LA Associates, 89% non associates.*
- *Home Kits: 308 brands in the informal market*
  - *8% - LA Associates, 92% non-associates*

Large market, developing trade networks, itinerant distribution, COUNTERFEIT

KEY INDICATORS: KENYA

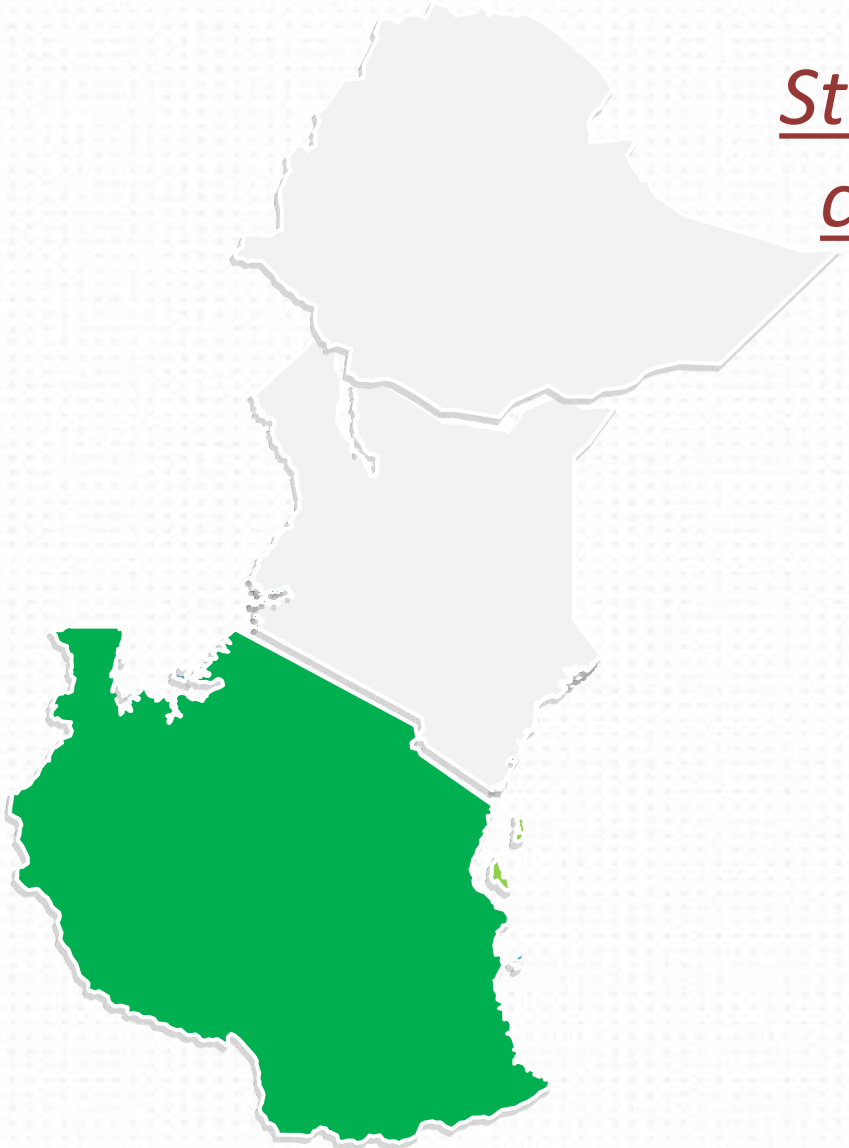


Strong standards, higher consumer awareness

- **25 Million** – *Target consumer Market (16+)*
- **60% -** *Primary level education and below*
- **50% -** *Seasonal income through agriculture and menial work*
- **31% -** *Education most important goal in life*
- **30%** *- Rely on social networks for coping mechanisms*
- **95%** *- Have access to mobile telephony at HH level*

- ***21%*** *- Trade Channel penetration for Solar lighting solutions*
  - *79% of these channels pushing Lanterns, 37% pushing Home kits*
- *Solar lanterns: 150 brands in the formal market*
  - *54% - LA Associate brands, 46% - Non-associate brands*
- *Home Kits: 59 Brands in the formal trade market*
  - *48% - LA Associate brands, 52% - Non associate brands*

KEY INDICATORS: TANZANIA



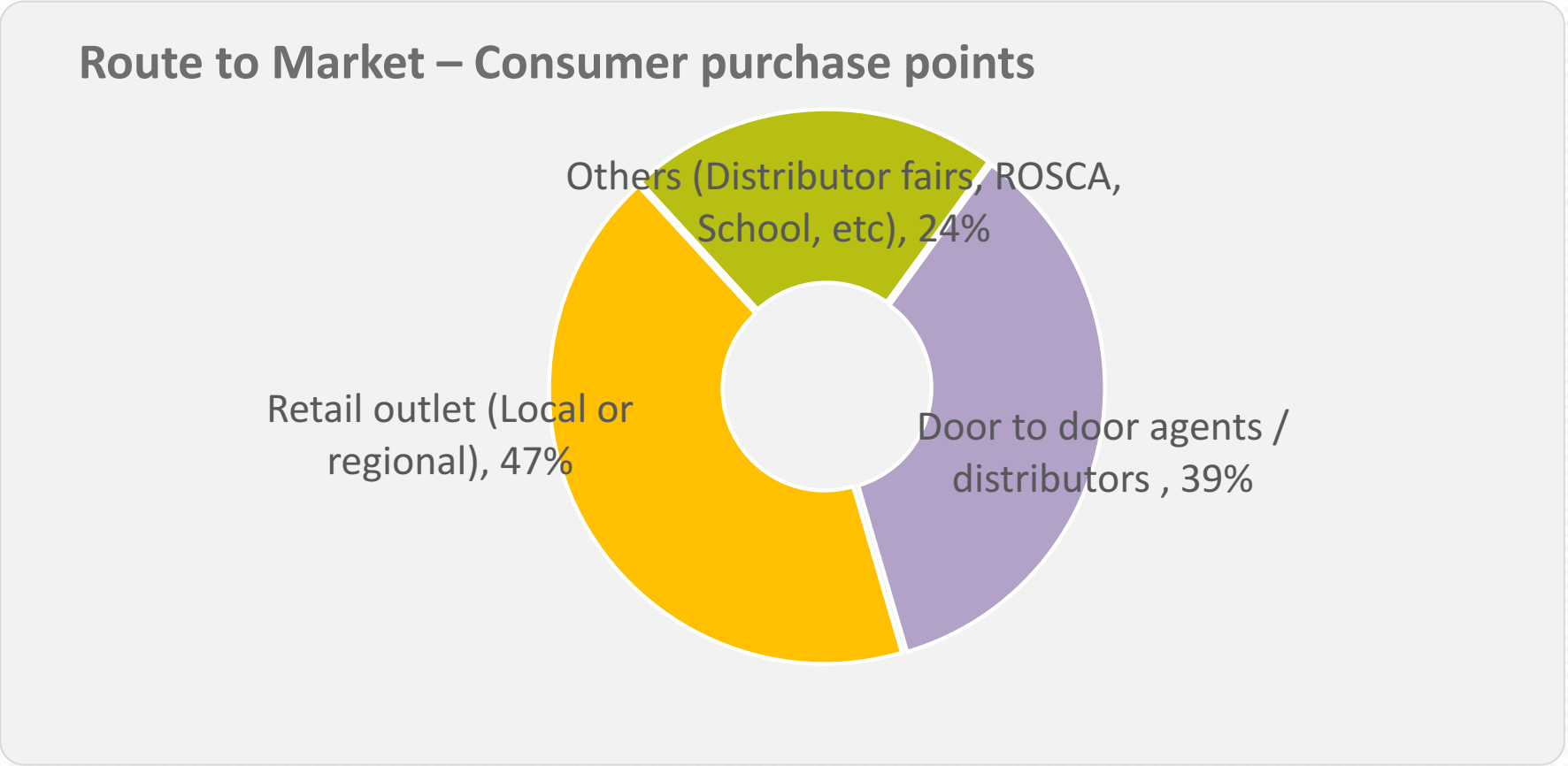
Strong distribution networks, drive for higher capacity systems, challenge of counterfeits

- **29 Million** – *Target consumer Market (16+)*
- **79% -** *Have primary level education and below*
- **60% -** *Seasonal income through agriculture and menial work*
- **31% -** *Health and education*
- **56%** *- Cut down on spending as a coping mechanisms, 40% rely on social networks*
- **95%** *- Have access to mobile telephony at HH level*
- *46% - Access to Grid Electricity*

- *14% - Trade Channel penetration for Solar lighting solutions*
  - *79% of these outlets pushing Lanterns, 35% pushing Home Kits*
- *Lanterns: 148 Brands in the formal market*
  - *17% - LA Associates brands, 83% - non-associates brands*
- *Home Kits: 70 Brands in the formal trade market*
  - *44% LA Associates brands 56 % - non-associates brands*

CONSUMER ACCESS IS HOWEVER MULTI-FACETED

Informal access is significantly higher than mainstream trade access – and more driven by home kits than lanterns – through credit. This is explained by thriving social networks and seasonality of income, which agents leverage on



NON-TRADE CHANNELS RELY ON RURAL ECONOMY AND TRUST TO PUSH THEIR BRANDS

Market Approach
- Door to door selling
- Target both urban and rural areas

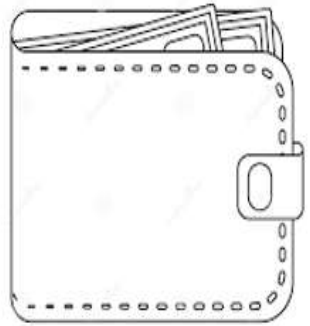
Volumes Moved
- Agents move about 12-40 units per month depending on the size of the unit and demand

Main Products Moved
- Majority move the solar kits
- Kits with TV are said to be of higher demand
- Solar lanterns have the least demand

Agent Payment
- Agents are paid on commission based on the units that they push

Stock Movement
- Agents move around with stock
- Stock is taken from the main office /branch
- Agents cater for their own transport

Customers Payment Modules
- Credit facilities are accepted where by a down payment is done and later on monthly/weekly/daily instalments are paid within 2-3 years
- Cash is also accepted and is a bit cheaper compared to buying on credit



LANTERNS MORE POPULAR AMONG KENYA CONSUMERS (88% Lanterns, 12% Solar Kits), SOLAR HOME KITS MORE POPULAR AMONG TANZANIA CONSUMERS

A deep dive in Tanzania Consumers

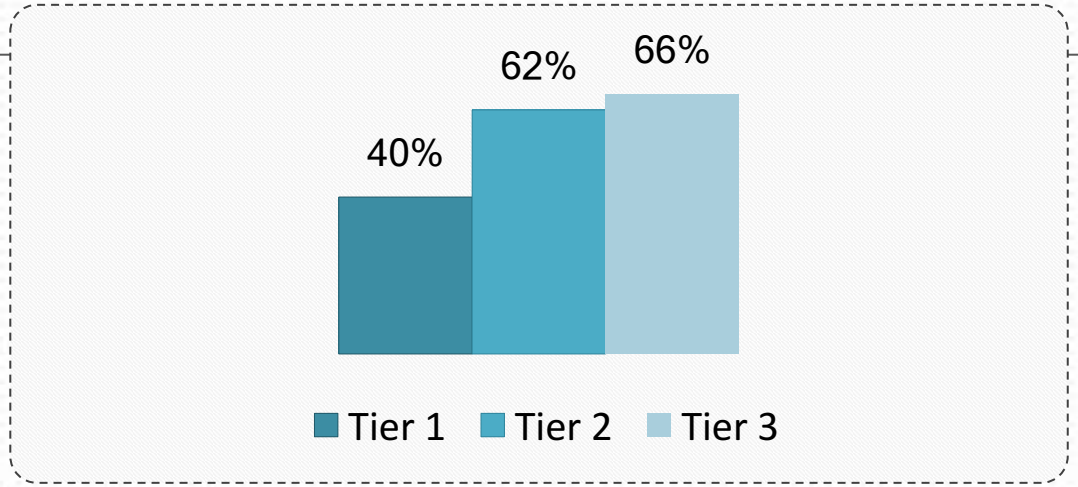
SOLAR PRODUCTS USED IN THE HOUSEHOLD

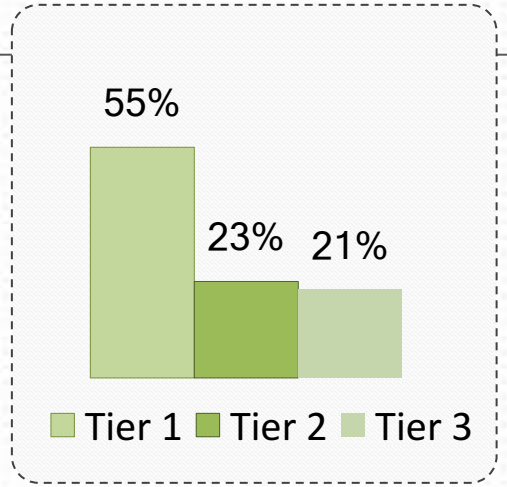
Solar Home systems 62%

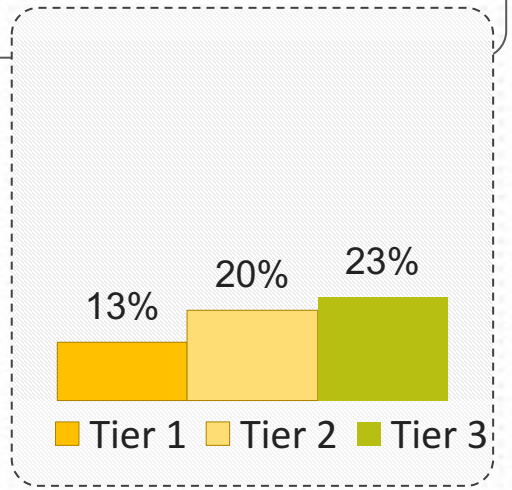
Solar Lanterns 25%

Solar Panels 21%

BY TIERS



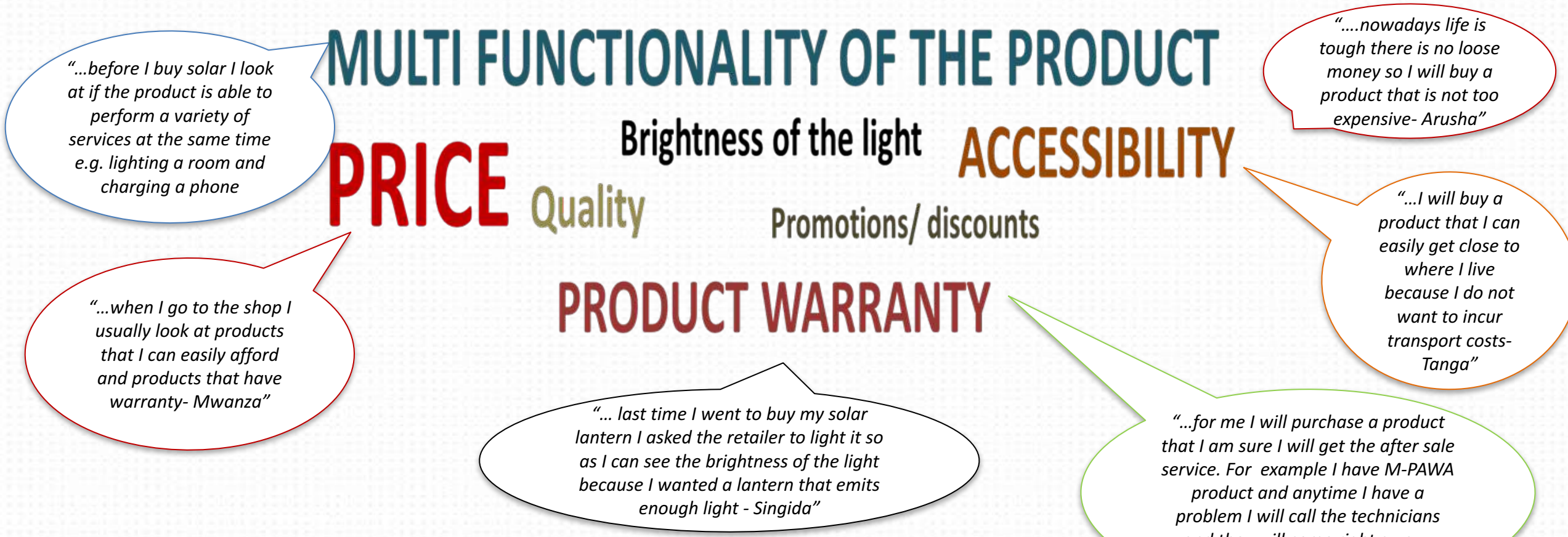




n=1378

INCREMENTAL NEEDS NOW A KEY PURCHASE DRIVER FOR RURAL CONSUMERS

Price and multi functionality of the brand are key determinants on what solar products to purchase- this is linked to consumers financial capacity and the brands capability to cater for the basic needs of the households such as lighting, charging phones etc.

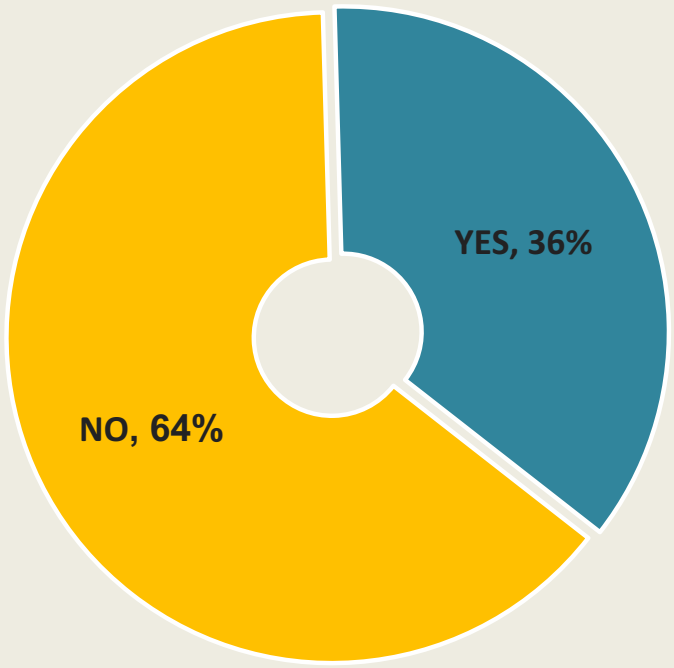


PRODUCT QUALITY IS DISQUIET AMONG A THIRD OF CONSUMERS

Faint light from the solar products has been one of the greatest challenge that more than quarter (43%) of the households surveyed faced when using the solar products

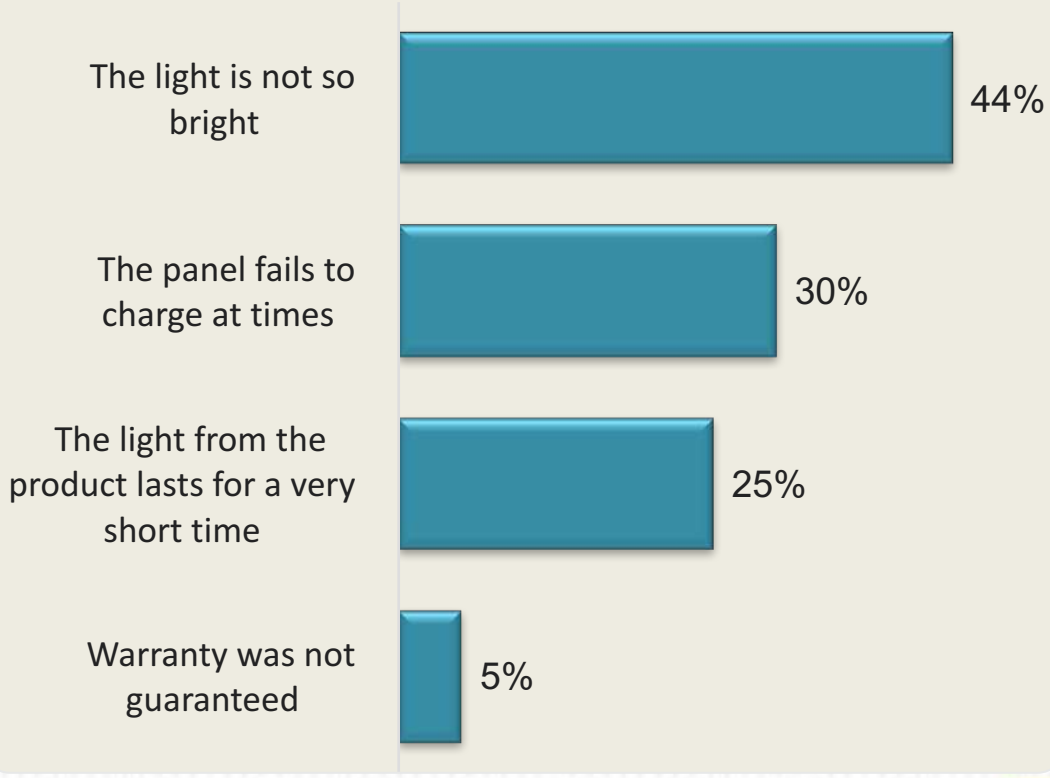
Please tell me, have you ever had any issues with your solar lighting products?

EXPERIENCED PROBLEM WITH THE SOLAR PRODUCT



What issues have you had with your solar lighting product(s)?

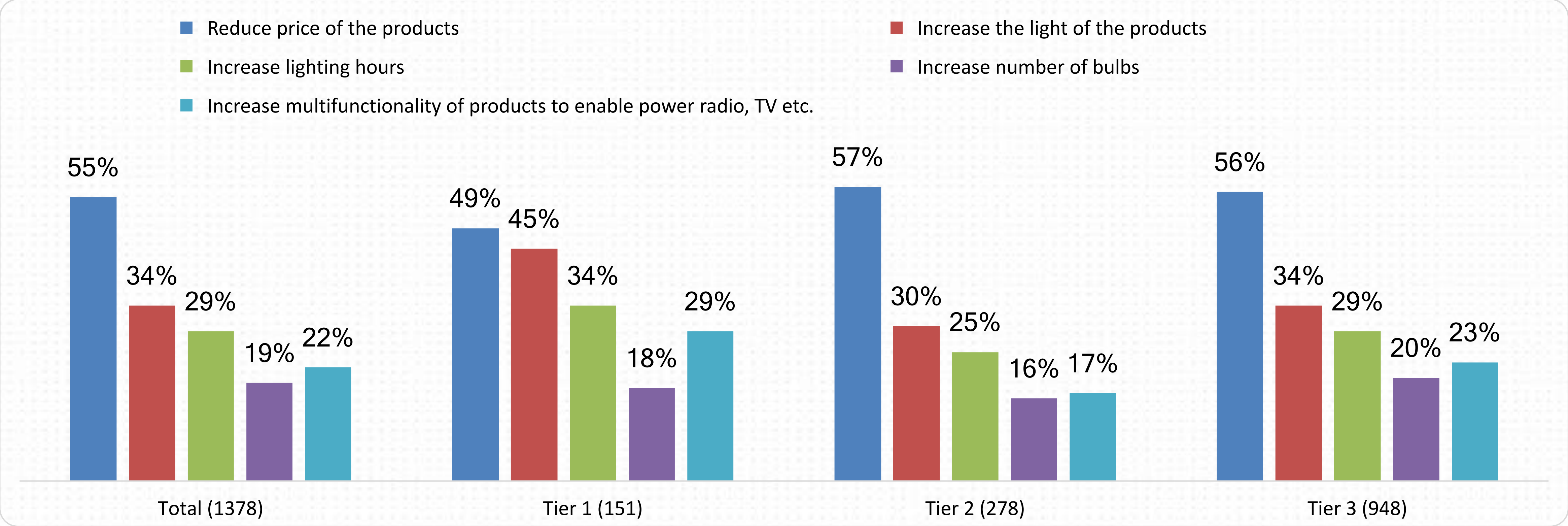
SOLAR PROBLEM EXPERIENCED



CONSUMERS TOP CONCERNS – FOR IMPROVEMENT: SIMILAR ACROSS TIERS

More than half of the households surveyed have recommended for a reduction in price on the solar products. Other concerns included brightness of light and a longer duration of lighting of the solar products

Q25. What do you think can be done to improve your experience with solar lighting products?



n=1378

IPSOS POV

COST IS A BIG CHALLENGE

- There is willingness to pay for higher capacity products, but cost is a barrier to rural consumers.

QUALITY = TARGET POPULATION

- 'QUALITY' as a stand alone attribute is not a concept the mass market understand well, rather they have issues with low level of brightness, batteries not charging and short lighting span – all which define product quality (all these issues worry consumers)
- Sales agents driven purchases carry the day – low quality, unverified products, but cheap

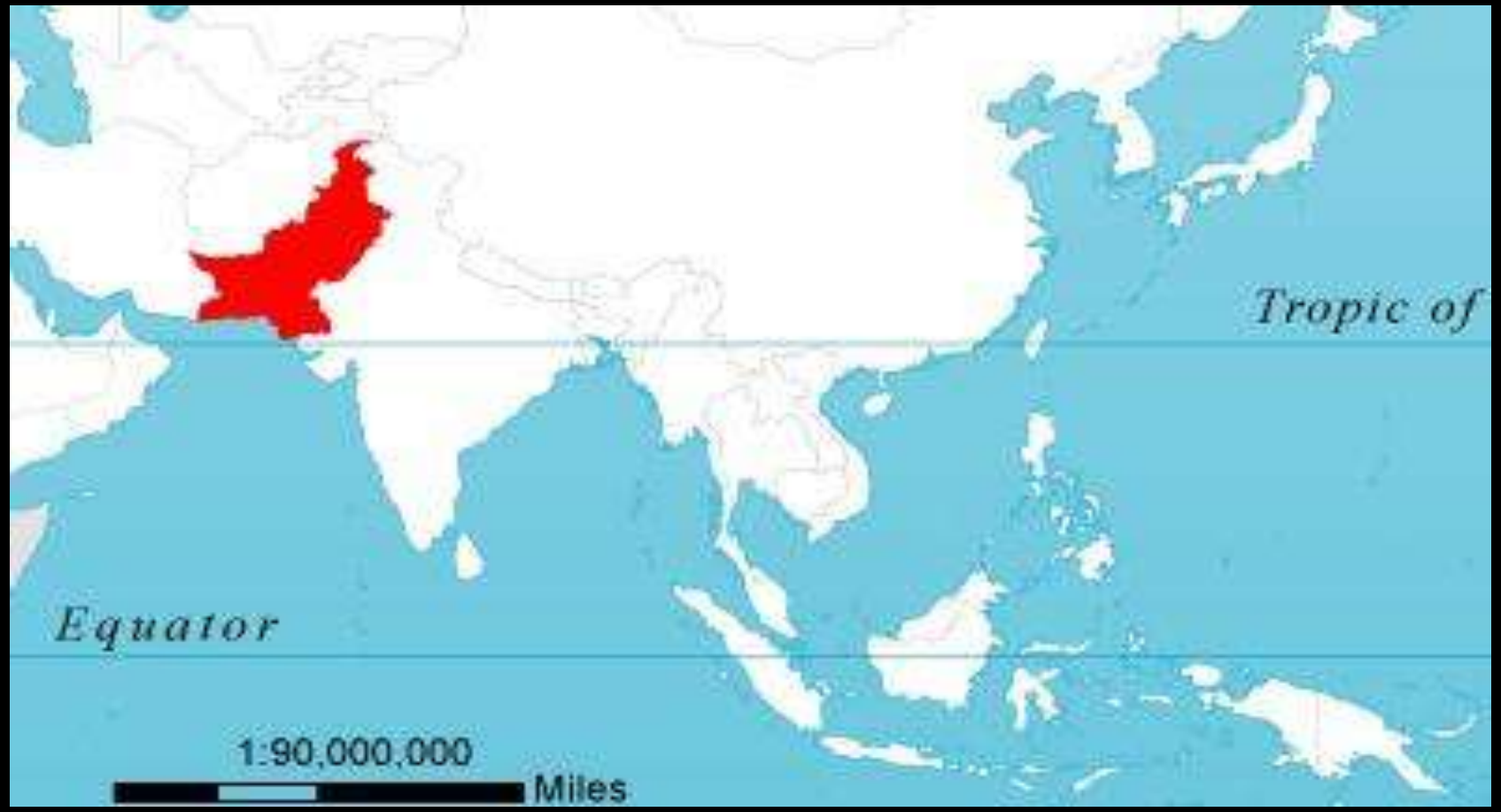
MARKET IS MOVING FROM PICO TO HIGHER CAPACITY SYSTEMS

- Need driven by multiple functions. The future is in higher capacity home systems (at an affordable price)

COMMUNICATION TARGETING

- Repeat purchase and upgrade to higher capacity systems
- Target Informal distribution networks (training days? Incentives? Accreditation?)

CASE STUDY: EcoEnergy
Successfully implementing Pay-As-You-Go solar in Pakistan



Shazia Khan /// CEO and coFounder of EcoEnergy

Pakistan: Country Overview

200 Million people

6th largest country in world

64% population under 30

Pakistan: Energy Access Picture

70 million off-grid

71 million under-electrified

1.2 million businesses off-grid

No grid expansion plan

$2.2b/year spent on energy alternatives

The problem:

to create a commercially viable business model for off-grid electrification in Pakistan.

CONSUMER LOGISTICAL REGULATORY FINANCIAL

ECOENERGY

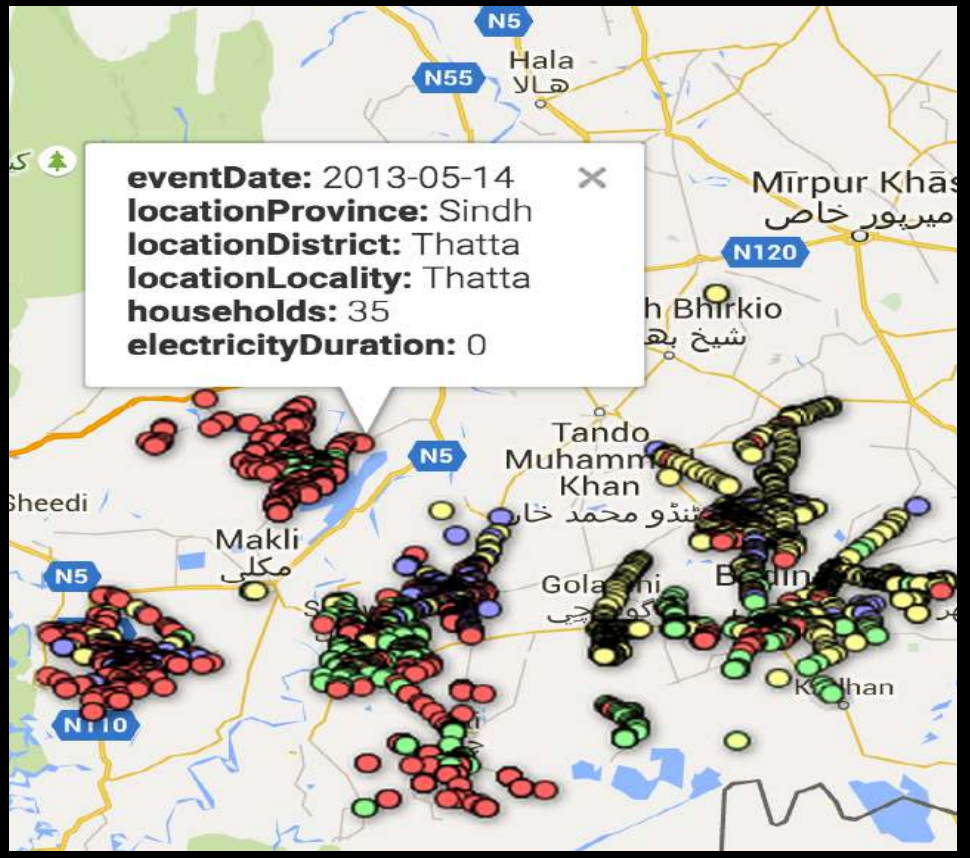
The bigger problem…

Zero data.

ECOENERGY

Talk to your customers!

Mapping energy access



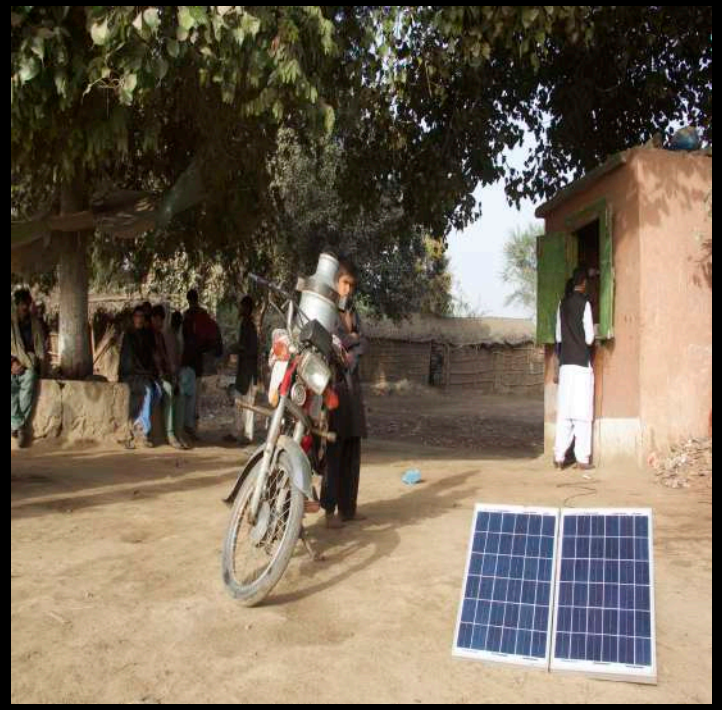
44,000 households and 2200 villages

4 years relationship building and research

LIVELIHOODS INCOME PURCHASING POWER CONSUMER PREFERENCES FINANCING NEEDS

Market Segmentation and Targeting the Right Customer

ECOENERGY



EARLY ADOPTER

REVENUE GENERATION

PRODUCTIVE END USE

Where to sit on the value chain

Product Design
Product Manufacturing
Pay Go Tech

IT Infrastructure
Sales
Customer Service

Financing

Market building…what does it take to SCALE adoption of a new technology

MASSIVE BEVIORAL SHIFT

EcoEnergy Pioneered PAYGO solar in Pakistan

ENFORCE REPAYMENT

INCREASE EFFICIENCY IN PAYMENT COLLECTION

We have customers…now what?

Scaling Strategy

ECOENERGY

- Strong partnerships all along the value chain
- Lower costs of customer acquisition
- Increase streams of revenue using existing infrastructure
- Off-load financing to meet end user consumer needs

BBOXX Invests into EcoEnergy

FOCUS ON UNIQUE CORE COMPETENCY

LEVERAGE EXISTING EXPERTISE

EcoEnergy Acquires Brighterlite

INCREASED MARKET PENETRATION MOVE DOWNSTREAM CONSUMER INSIGHTS

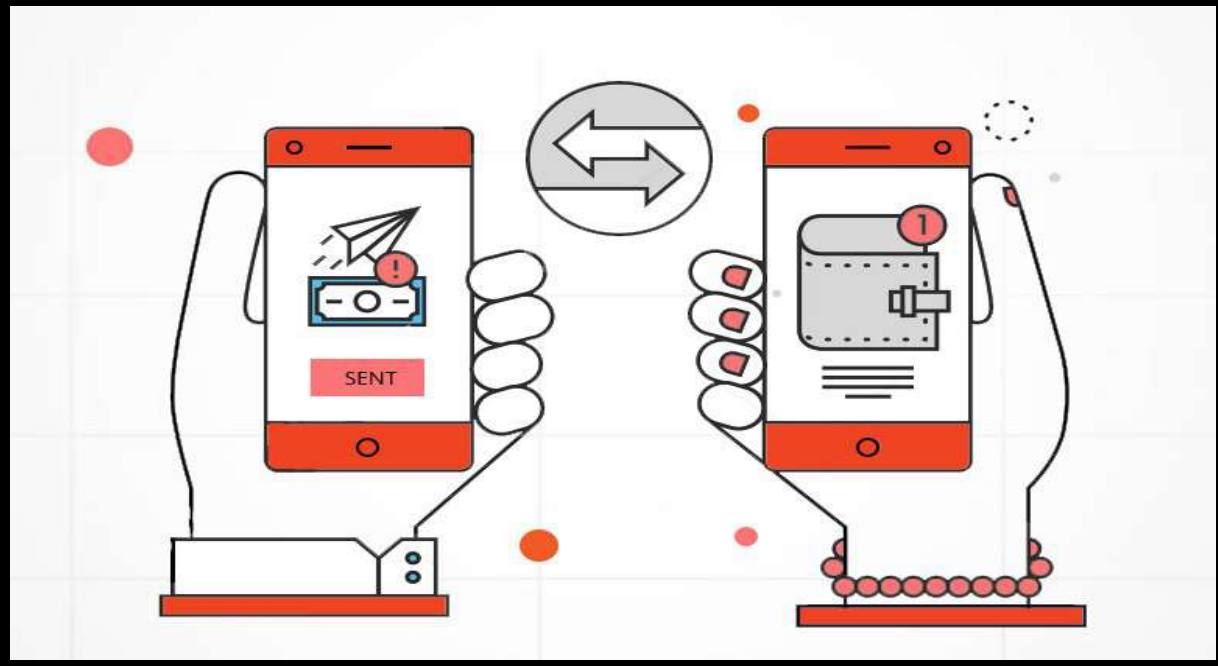
Mini-Grid Pilot with REON Energy Q2 2018

ECOENERGY

USE EXISTING INFRASTRUCTURE MOVE UPSTREAM PRODUCTIVE END USE

EcoEnergy Pioneers innovative consumer financing

FINJA
the new way to pay



FINJA (fintech) MEEZAN BANK (asset finance) UBANK (MFI)

We have some more customers…now what?

OTHER BARRIERS TO SCALE

The problem: Financial

NO WORKING CAPITAL

EQUITY INVESTORS PERCEIVE PAKISTAN AS RISKY

(After relentless and time-consuming lobbying) financing solutions slowly beginning to emerge

DFI LOAN GUARANTEES DEBT FUNDS FOR PAYGOS PROFIT SHARING

The problem: Regulatory

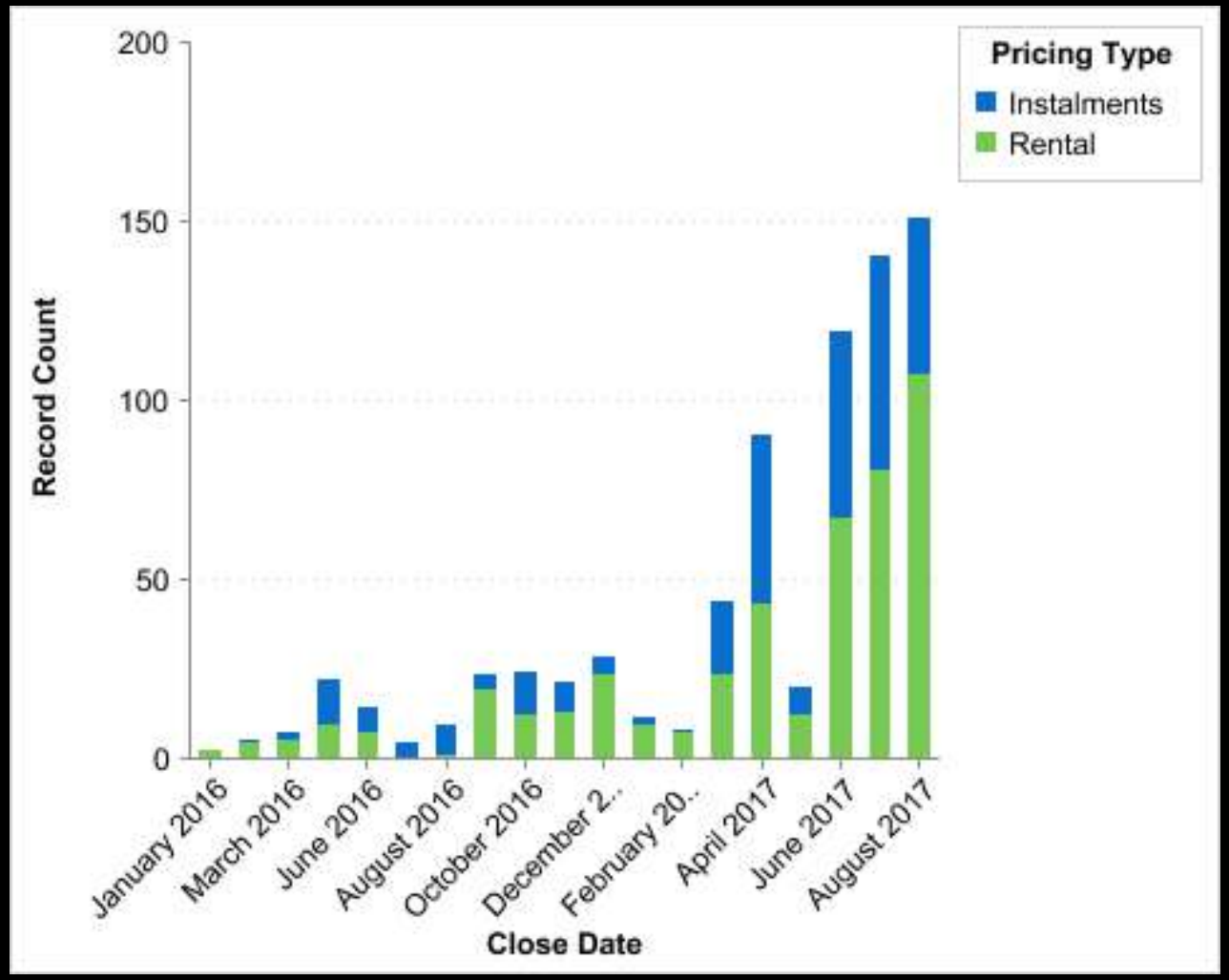
GENERAL SALES TAX IMPORT DUTY

INCONSISTENCY BETWEEN CUSTOMS RULES MAKES IT DIFFICULT TO PLAN

Partnerships with valuable advocates
provides entrance to stakeholder meetings with Pakistani government officials

Growth

- 15,000 solar lanterns 2014-2016
- 1500 shs in 2017
- 10000 shs in 2018
- 50000 shs in 2019



Consistent month/month growth, except for May 2017, due to stock-out.

Slowly overcoming foreign perspective on Pakistan

Investment Climate and Political Stability

Improving investment climate

- Morgan Stanley updated from Frontier to Emerging Market
- FDI increased by 5% to $2.4b in FY17
- Major inflows from Netherlands, France, UK

Moving towards long-term political stability

- 1st democratic elections held in 2013
- Disqualification and ouster of Prime Minister on charges of corruption

The future

(…not totally relevant, just miss that guy.)

Thank you.

Shazia Khan, CEO EcoEnergy
skhan@ecoenergyfinance.org

Global Off-Grid Solar FORUM & EXPO

GOGLA LIGHTING GLOBAL WORLD BANK GROUP

Second round of discussions and final thoughts