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Measuring Energy Access

Progress and challenges in implementing the Multi-Tier Framework

ESMAP
Energy Sector Management Assistance Program

SUSTAINABLE ENERGY FOR ALL

Progress to date

The Universal Access Goal now Firmly Set

SE4ALL Goals

- By 2030, ensure universal access to modern energy services.

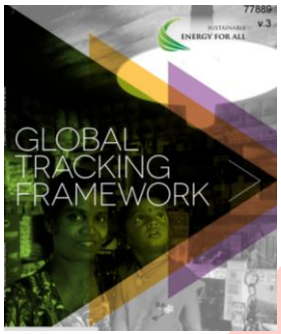
SDG 7

- Target 7.1: 2030, ensure universal access to affordable, reliable and modern energy services

COP 21

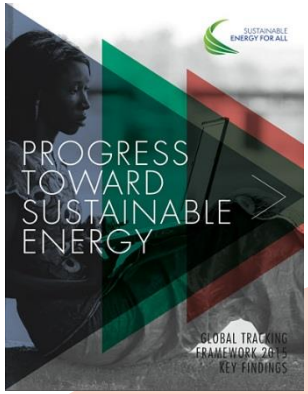
- Post-COP 21 – Focus on Sustainable Energy

SE4ALL Knowledge Hub

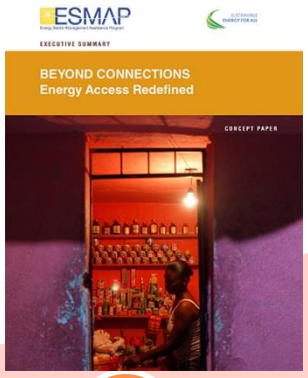


GTF
2013

RISE
2014



GTF
2015



MTF
2015

. . . .

SEAR (2016)
Energy Access Financing
(2017)h

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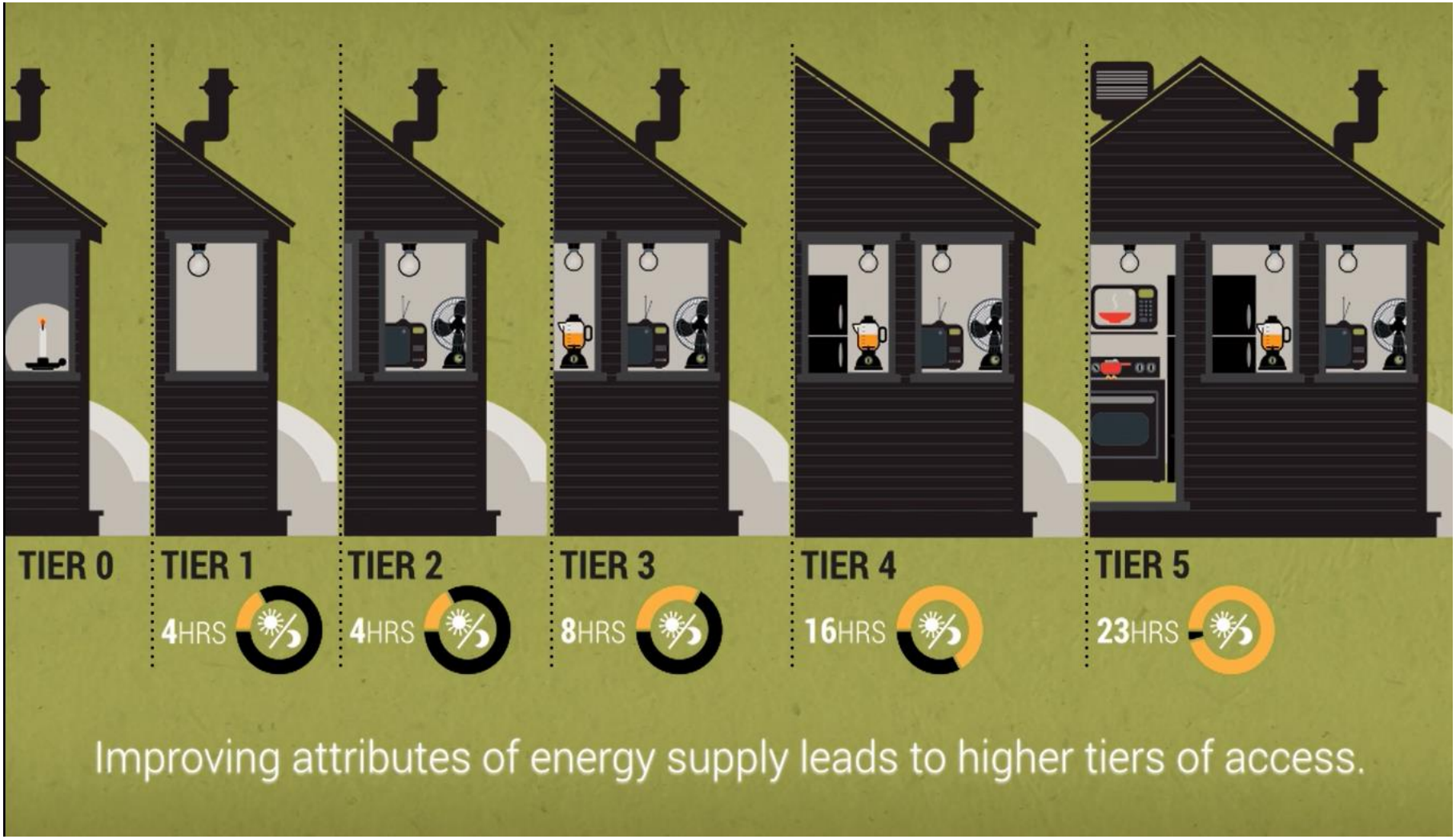
Defining Access as a Continuum of Service Levels



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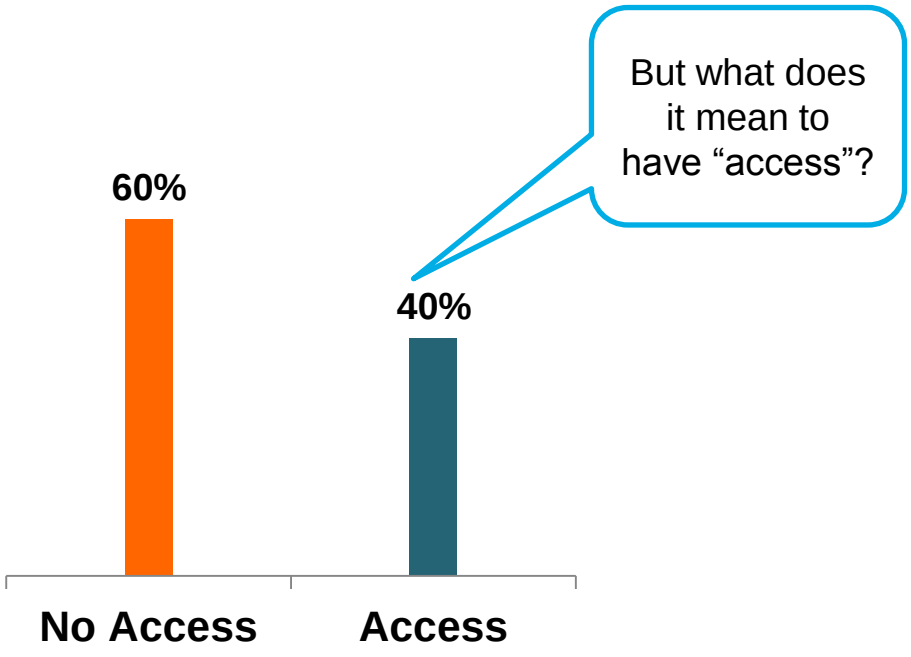
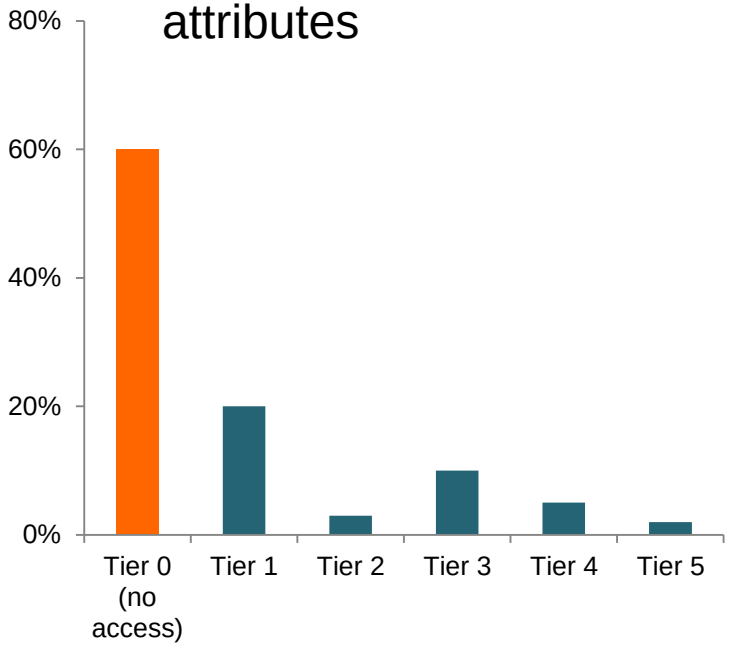
How is Access Typically Measured?

Energy access has been measured using **binary** indicators



The MTF redefines energy access as a continuum of service levels, based on key attributes



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Multi-Tier Framework for Electricity

Multi-Tier Framework for Electricity

	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Capacity		Capacity (from 3W to above 2kW) and ability to power appliances (applicable for off-grid solutions)				
Duration - day		From at least 4 hours a day to over 23 hours a day				
Duration - evening		From at least 1 hour in the evening to over 4 hours				
Reliability					Number and duration of outages (applicable for Tier 4 & 5 only)	
Quality					Voltage problems do not affect the use of desired appliances (Tier 4&5)	
Affordability				Basic service less than 5% of a household income (Tiers 3-5)		
Legality					Service provided legally (Tier 4&5)	
Health and Safety					Absence of accidents (Tier 4&5)	

Moving up the tiers

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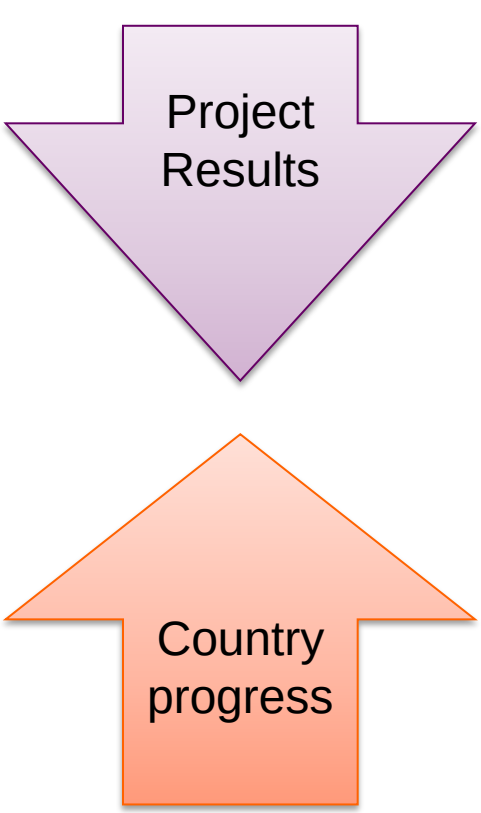
Multi-Tier Framework for Cooking

Multi-Tier Framework for Cooking

	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
Indoor air quality		Concentration of PM2.5 and CO; tiers aligned with WHO guidelines				
Efficiency		Tier benchmarks under development, awaiting results of ISO process				
Convenience			Stove preparation time and fuel collection and preparation (applicable from Tier 2 on)			
Safety			Absence of accidents and alignment with the ISO process (from Tier 2 on)			
Affordability					Levelized cost of cooking solution < 5% of household income	
Quality and availability of fuel					Cooking not affected by seasonal variations in fuel quality and	

Benefits of Multi-Tier Energy Access Results



- MTF provides more information about households with access, allowing for a differentiation of service levels
- MTF has a minimum quality and quantity requirements for a “connection” to count as access (e.g. at least 4 hours of daily supply to count as Tier 1)
- MTF measures and allows an aggregation of households with access served by different technologies – e.g. grid and off-grid (comparing apples with apples)

Applying MTF – Where Are We?

Support from more than 20 agencies in conceptualization
PILOTS:
- Aug.-Sep. 2013: Kinshasa, DRC.
- Oct.-Dec. 2013: Uganda
- May 2015: Bihar, India.
- Dec 2015: Malawi

Jun.-Dec. 2015: MTF survey in Guinea (3,000 HH)

Apr. 2016: Launch of MTF Global energy access survey in 15 countries.

: This is where we are

Conceptualization and piloting

Application

2011 2012 2013 2014 2015 2016 2017

The UN General Assembly declares "International Year of Sustainable Energy for All."

UN General Assembly declares **"Decade of Sustainable Energy for All" 2014-2024**

SDG 7: "**Ensure access to affordable, reliable, sustainable and modern energy for all"**

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MTF Implementation Plan: Survey Tools

MTF Energy Global Survey

- Estimated time: 90 minutes
- Nationally statistically representative Rural/Urban
- Provides data for multi-tier Supply and Demand information – households and community module
- Implemented by a local survey firm supervised by WB team
- Need to collaborate with National Statistical Office

MTF Energy module – integrated in National Surveys*

- Estimated time: 15 mins
- TA and training available and funded by SREP/ESMAP
- Key supply and demand information allowing tier calculation
- Additional simplification of monitoring being tested – e.g. use of cell phone surveys
- Need to collaborate with National Statistical Office

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* Collaboration with the World Bank survey group

SUSTAINABLE ENERGY FOR ALL

Country baselines (at least 20 low access countries)

Ongoing:
Kenya, Rwanda,
Honduras

In procurement
Ethiopia, Liberia, Niger,
Bangladesh, Myanmar

Upcoming
Uganda, Nigeria, DRC,
Zambia, India,
Cambodia, Nepal, Haiti

Second wave

What Information will the Surveys Provide?

HOUSEHOLD ELECTRICITY ASSESSMENT

- **SOURCE**: including mini-grid, off-grid solution and solar lantern
- **SUPPLY CHARACTERISTICS:** duration, reliability, quality, affordability, legality, health and safety
- **DEMAND CHARACTERISTICS:** Use of appliances, energy expenditures, affordability of services

HOUSEHOLD COOKING ASSESSMENT

- SOURCE: Combination of fuel/cookstove for up to 5 cookstoves
- **SUPPLY CHARACTERISTICS:** information on the fuels and physical characteristics of the cookstove (efficiency, convenience…)
- Information on cooking location to determine air pollution
- **DEMAND CHARACTERISTICS:** Cooking expenditures, affordability

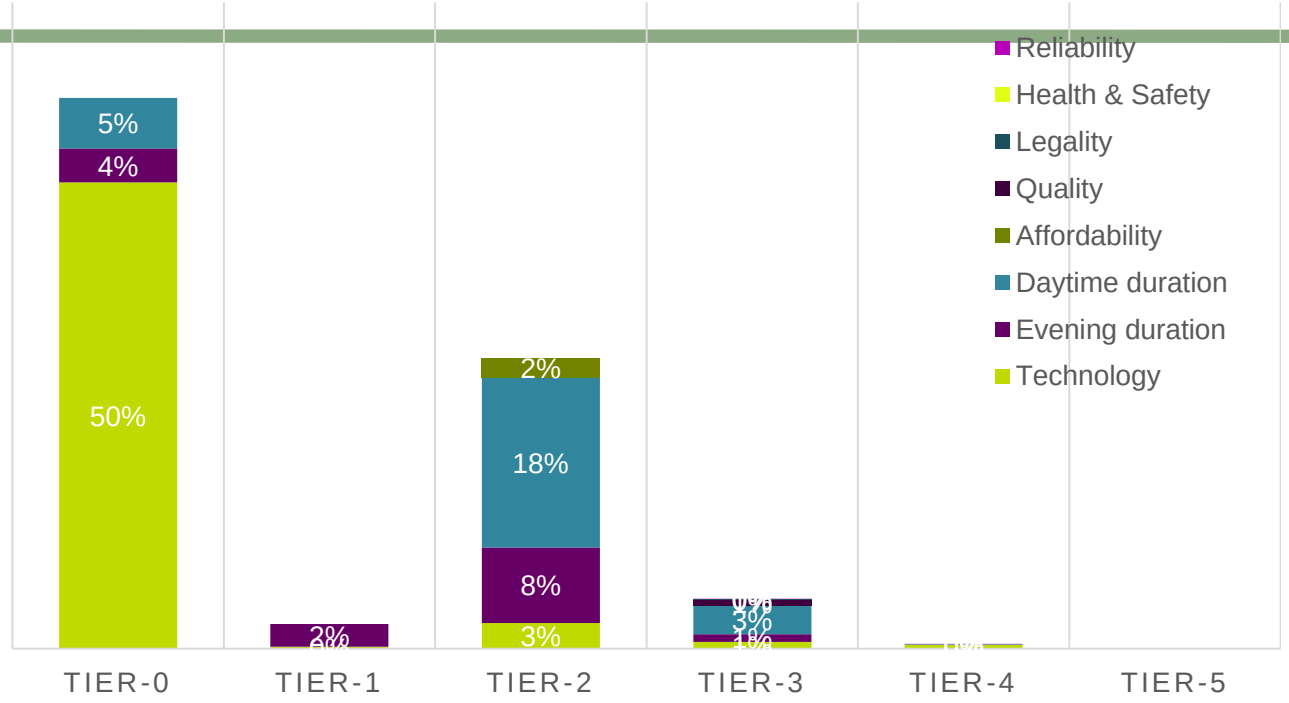
GENDER ASPECTS

- Gender disaggregation
- Use of time by gender (collecting fuel, cooking etc)

POVERTY AND IMPACTS

- Electricity and cooking aspects evaluated by poverty quintile
- Impacts of access on quality of life in the household

MTF survey: Gap Analysis (Guinea example)



Gap analysis at Glance:

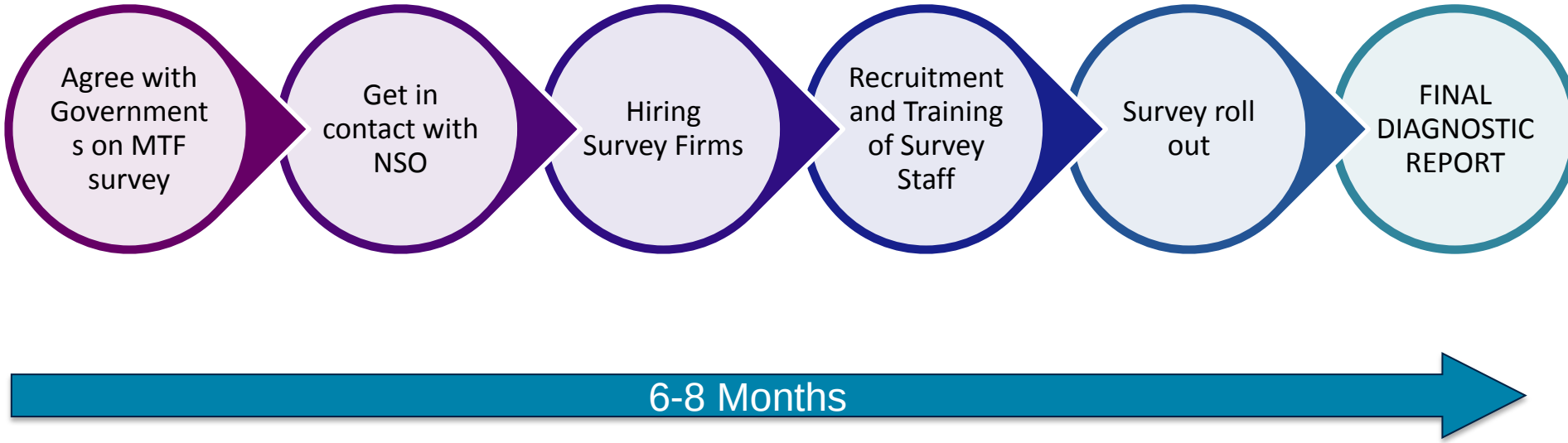
9% of household with connection is in **tier 0** due to the low duration in supply during day time (5%) or evening time (4%)

18% of household with connection is in **tier 2** due to the low duration in supply during day time.
3 % of household is in **tier 2** due to technology gap (system with low capacity)

Challenges and next steps

Data collection

- Long process to ensure Government buy-in



Conceptual: framework adjustments and simplification

- E.g. electricity reliability and affordability – are we measuring them correctly
- Are tier thresholds set on the right levels?

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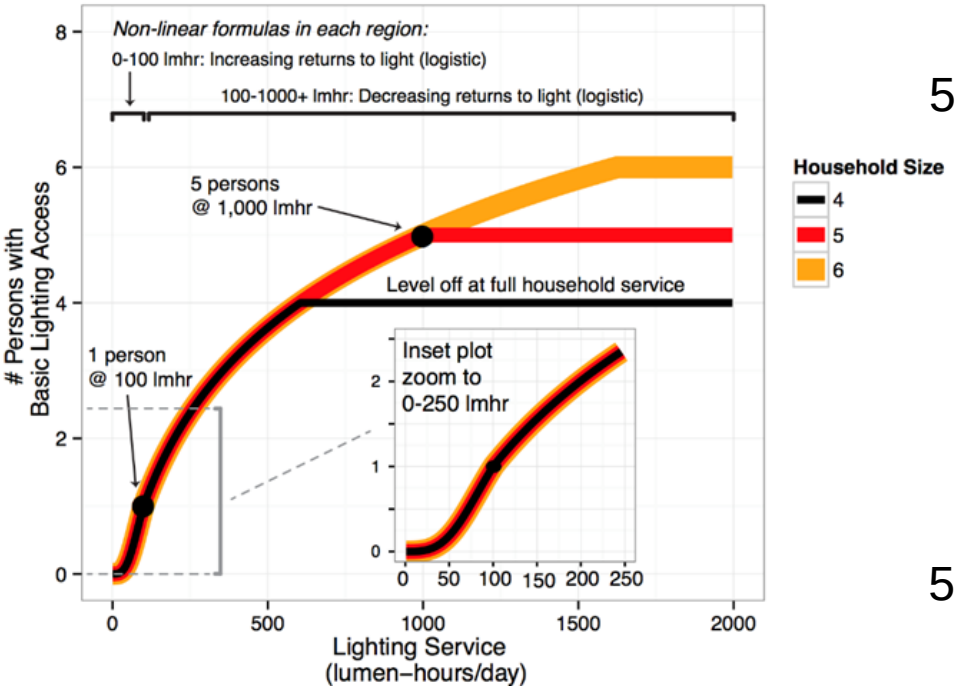
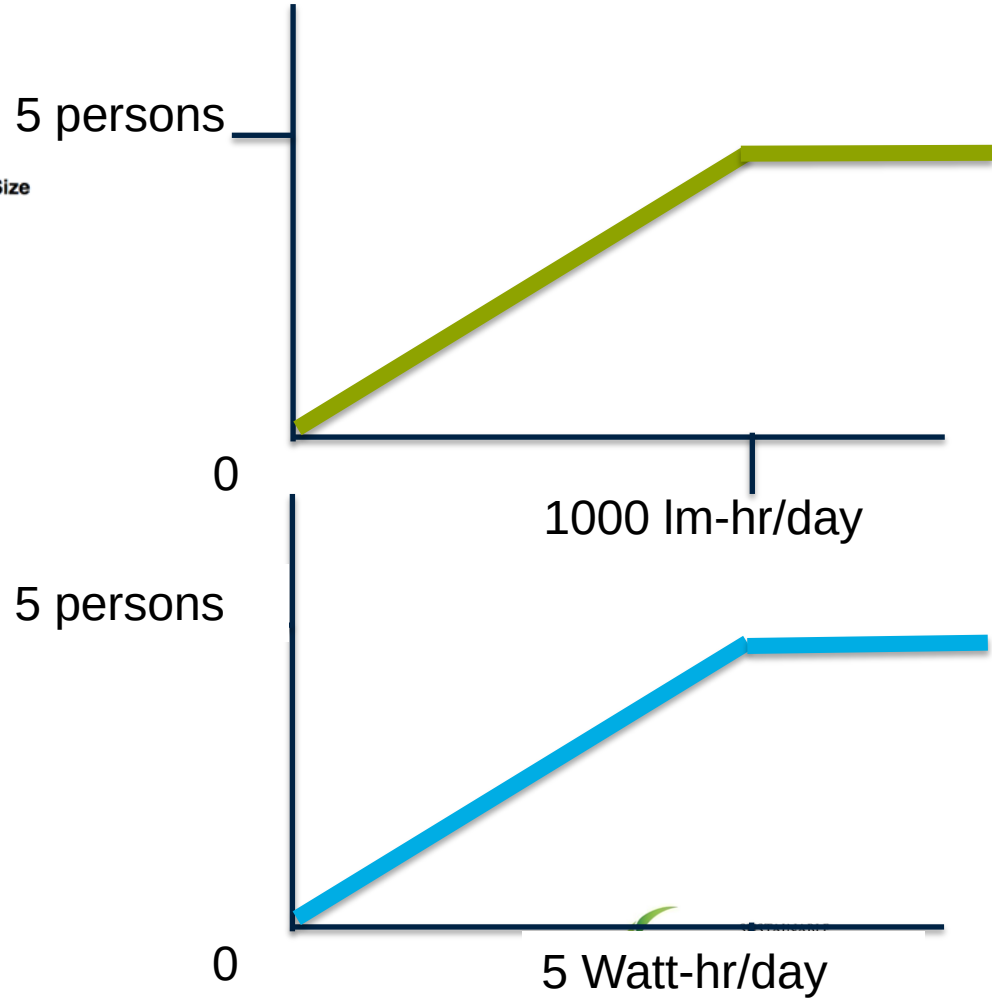
Simplify methodology for below tier 1 lighting products

Current methodology difficult to grasp and can be misleading

From: To e.g. a linear curve (200lmh = 1 person)





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Defining indoor air quality and efficiency tier thresholds

Multi-Tier Framework for Cooking

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Estimated tier impact of access projects/programs

Off-grid and cooking

- Relatively easy if technology known and tested

Grid connections

- Easy once tier distribution in the country/project area known (MTF survey)

Upstream investment

- Adapt current “inferred access” methodology – tiers based on MTF survey results
- Estimate improved access based on the MTF surveys (e.g. from Tier 1 to Tier 3)
- Estimate tier distribution based on available sector statistics (where MTF surveys are not available)

Thank you!

For more information on the report:

https://www.esmap.org/node/55526

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