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ORES Virtual Conference 2021

Decentralized MTF Data Collection at The Household Level

February 15-18, 2021

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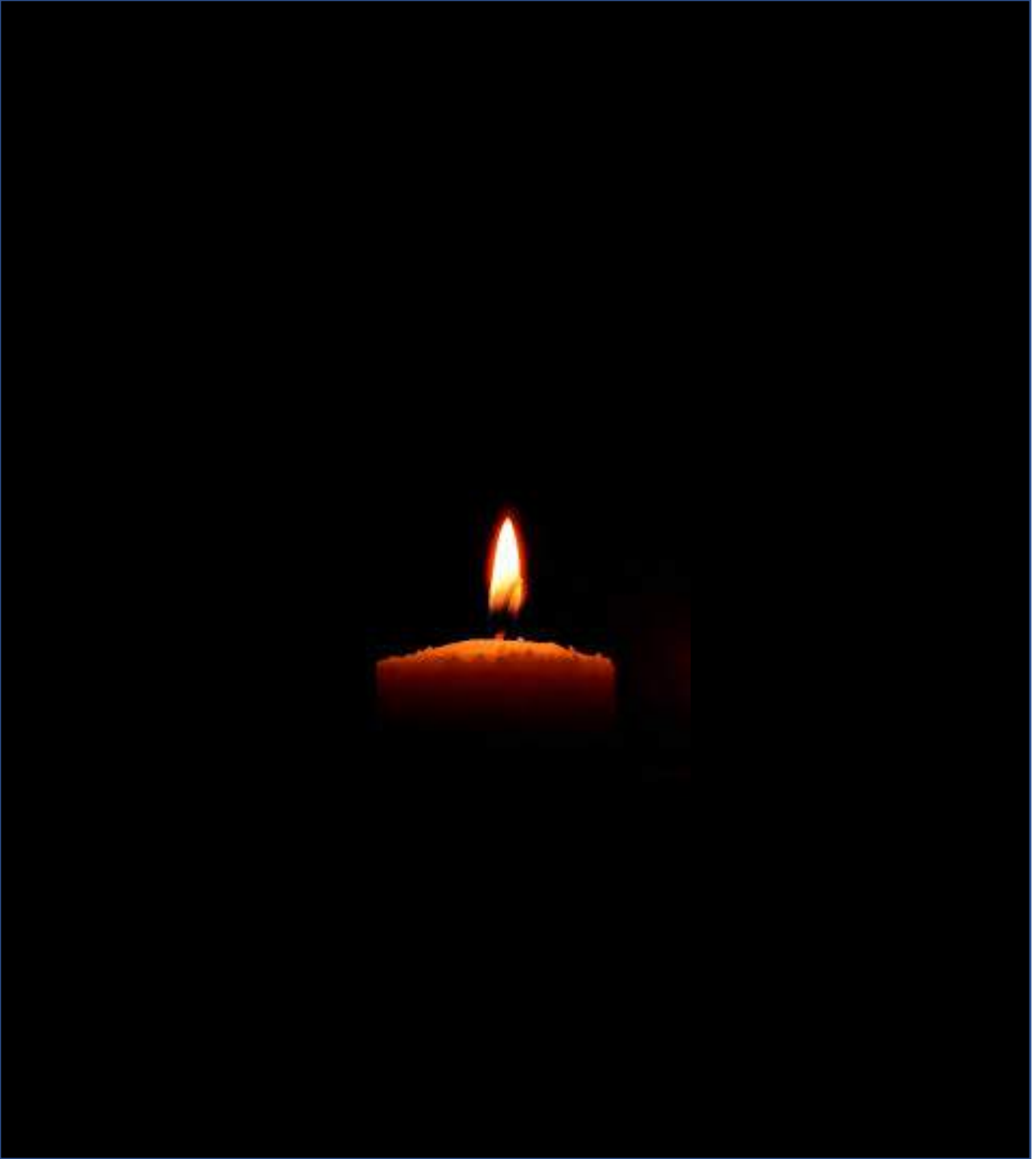
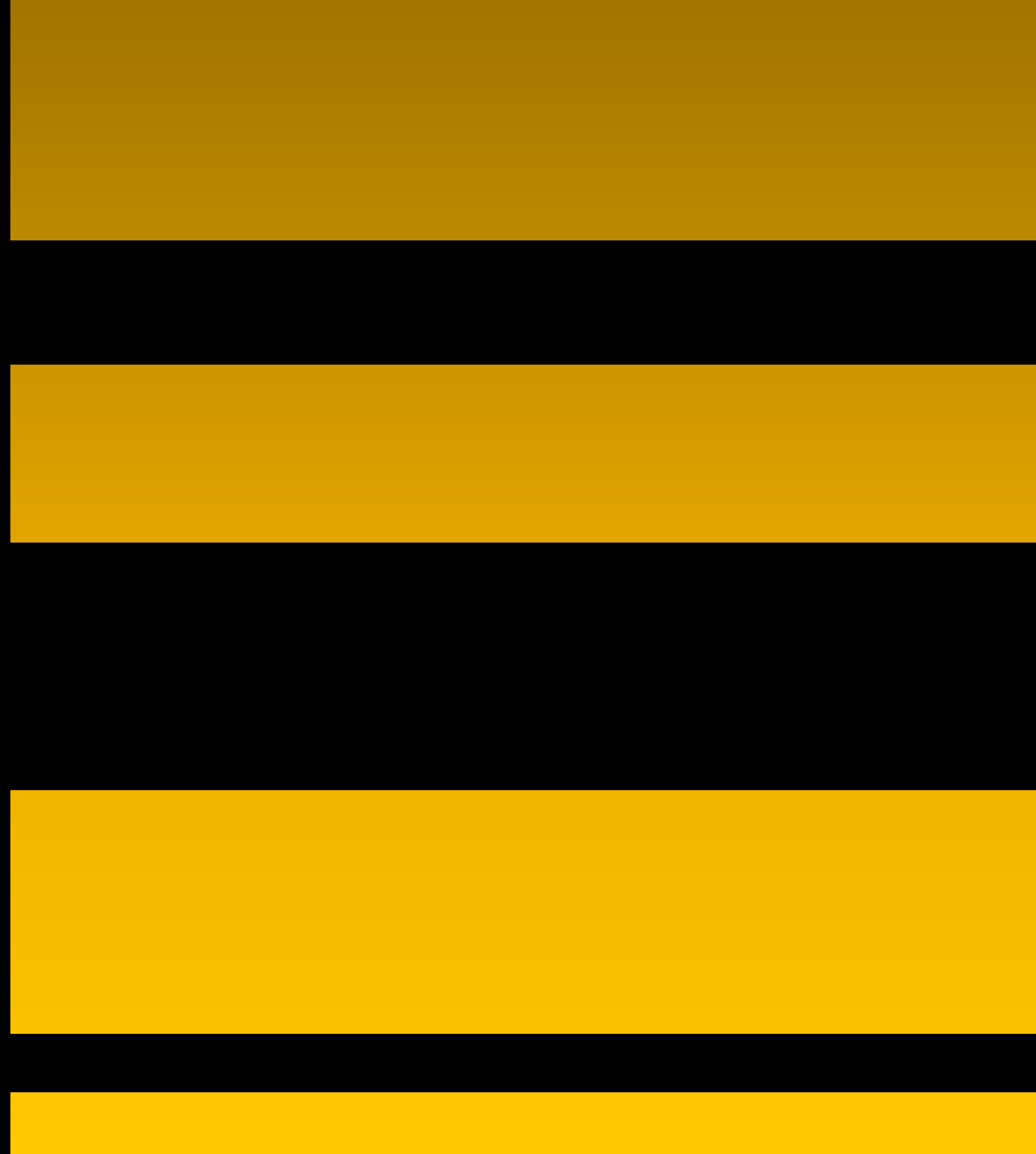
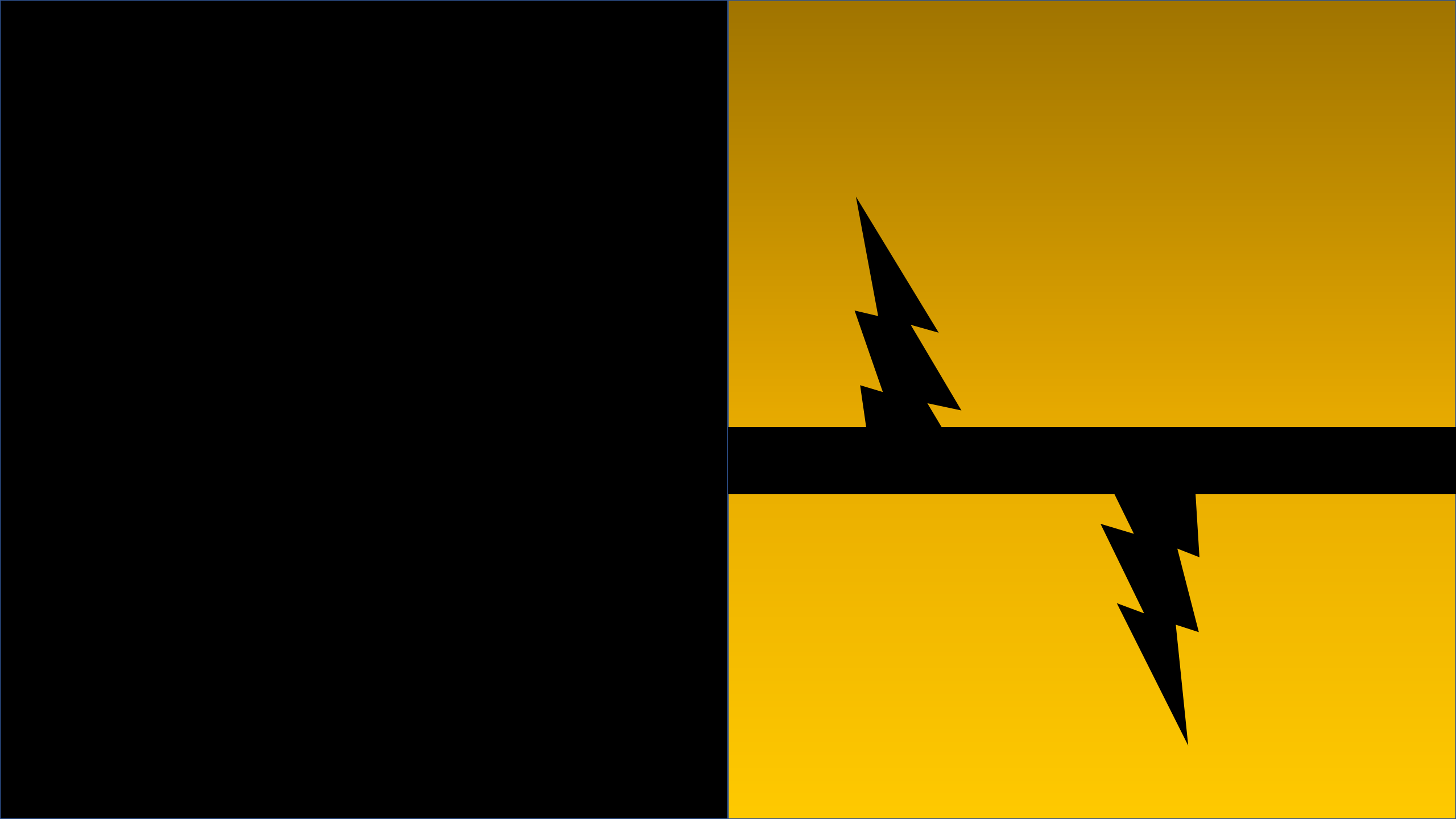






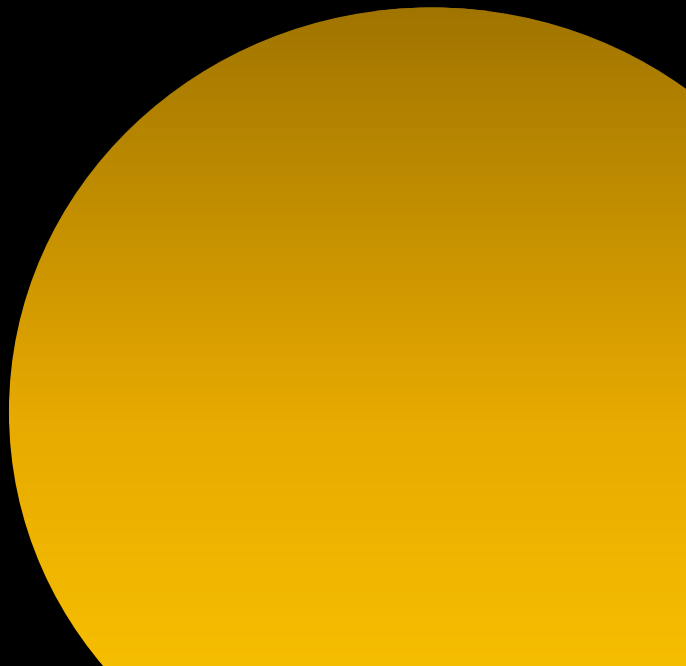


Photo: SunnyMoney Microsolar Project – Fondation Ensemble

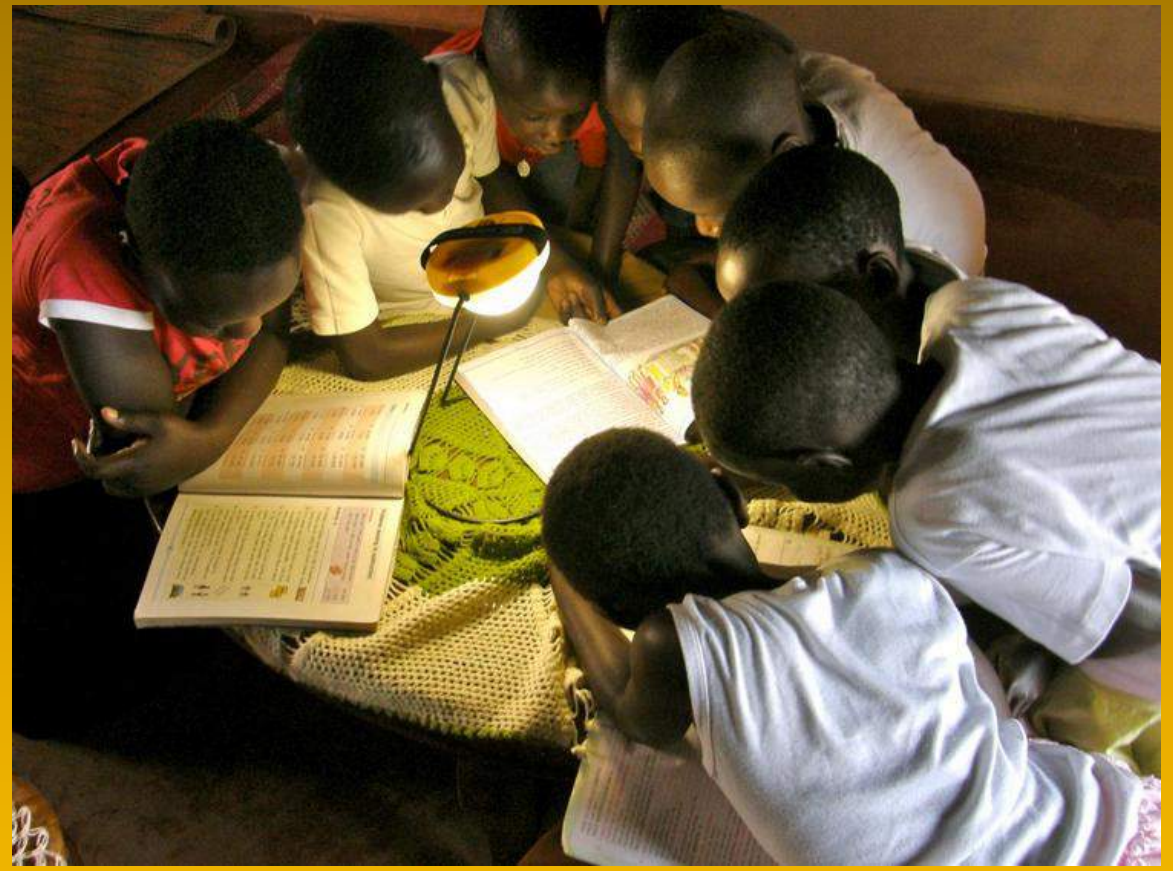


Photo: Solar Sister

Photo: SunnyMoney Microsolar Project – Fondation Ensemble

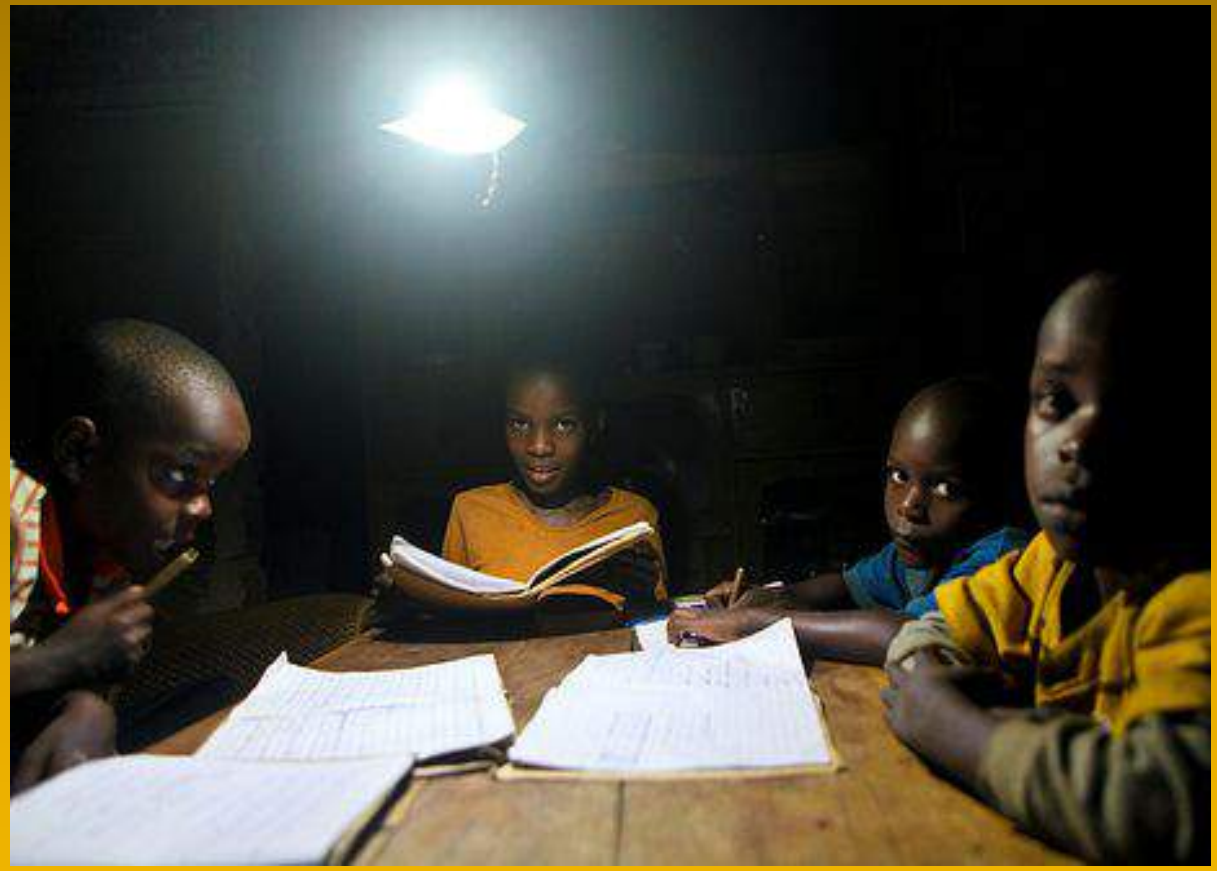


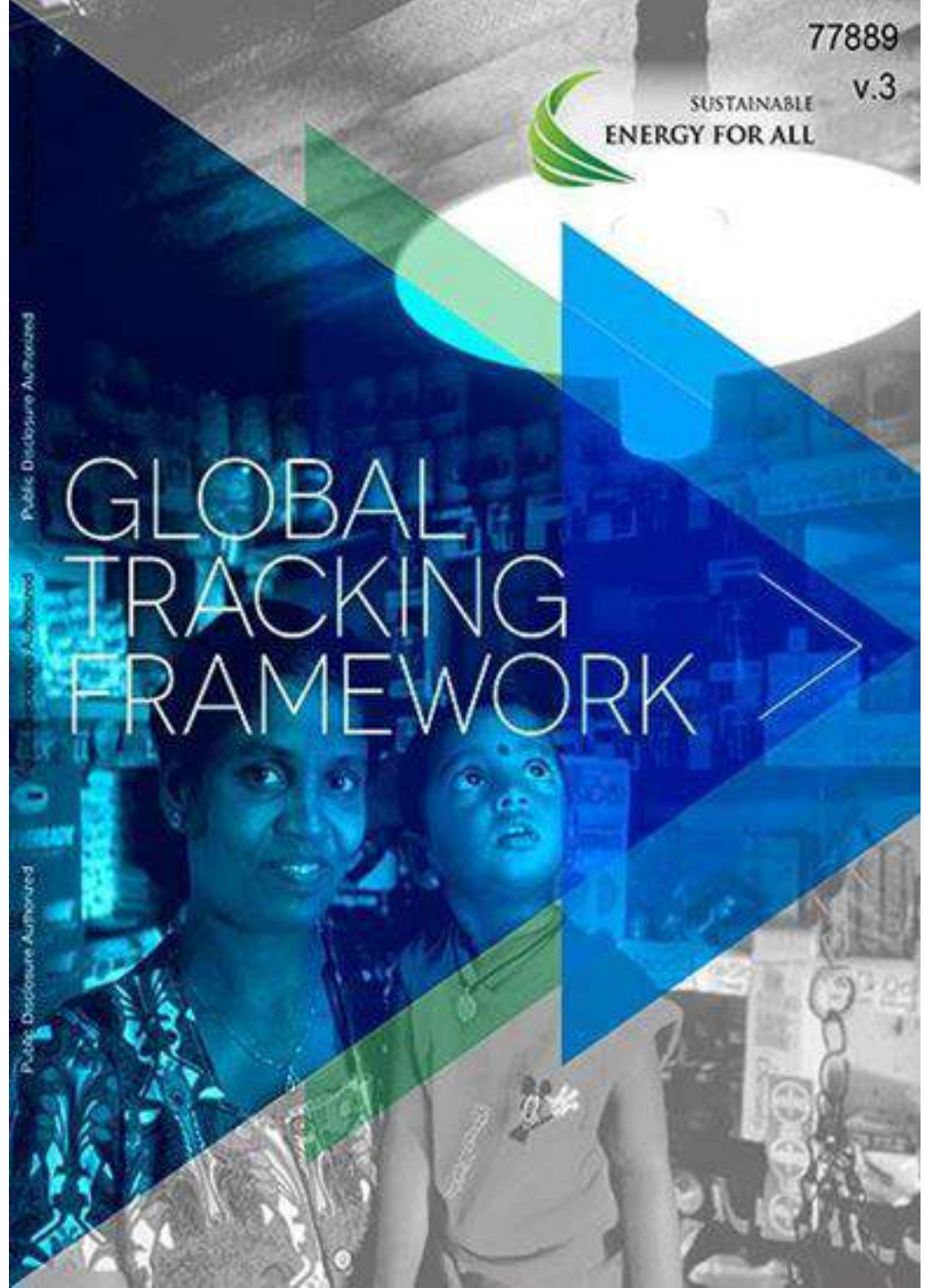
Photo: Solar Sister

Photo: SunnyMoney Microsolar Project – Fondation Ensemble

Photo: Nova Lumus

The Global Tracking Framework and the Multi-Tier Framework

Monitoring and evaluating energy access by following a multidimensional approach



ESMAP
Energy Sector Management Assistance Program

MTF | MULTI-TIER FRAMEWORK

SUSTAINABLE ENERGY FOR ALL

Bhatia, M. and Angelou, N. (2015). BEYOND CONNECTIONS Energy Access Redefined

ESMAP
Energy Sector Management Assistance Program

THE WORLD BANK

ESMAP
Energy Sector Management Assistance Program

energising development

LIGHTING AFRICA
Catalyzing markets for modern off-grid energy

AN INNOVATION OF
WORLD BANK GROUP
THE WORLD BANK IBRD · IDA
IFC International Finance Corporation

PRACTICAL ACTION
Technology challenging poverty

GLOBAL ALLIANCE FOR CLEAN COOKSTOVES

UNDP

UNIDO

ATTRIBUTES TO ASSESS ENERGY ACCESS

CAPACITY

Quantity of energy made available to the user

RELIABILITY

Absence of unpredictable outages of energy supply

QUALITY

Implies correct level and stability of voltage / absence of adulteration

AVAILABILITY/ DURATION

Ability to draw energy when needed for use of energy services

SECURITY

Risk of injury from the energy supply

FORMALITY/ LEGALITY

Using the energy supply, the end user is not indulging in any activity proscribed by law

HEALTH

Risk of adverse health consequences from the use of energy

AFFORDABILITY

Ability of the end user to pay for energy needed for a defined package of energy consumption

CONVENIENCE

Time spent acquiring (through collection or purchase) fuel and preparing fuel and the stove for cooking

SAFETY

Safety in using the most used cookstove within the household

AFFORDABILITY

Household's ability to pay for both the cookstove and fuel

FUEL AVAILABILITY

Availability of fuel when needed for cooking purposes

COOKING EXPOSURE

Personal exposure to pollutants from cooking activities, which depends on

- Stove emissions
- Ventilation structure
- Contact time

COOKING EFFICIENCY

Performance of the stove in regard to its thermal efficiency

Electricity access is measured based on the combination of seven attributes of energy across six tiers of access with minimum requirements by tier of electricity access

ESMAP Illustration

ATTRIBUTES		TIER 0	TIER 1	TIER 2	TIER 3[b]	TIER 4	TIER 5
Capacity	Power capacity ratings (W or daily Wh)	Less than 3 W	At least 3 W	At least 50 W	At least 200 W	At least 800 W	At least 2 kW
		Less than 12 Wh	At least 12 Wh	At least 200 Wh	At least 1 kWh	At least 3.4 kWh	At least 8.2 kWh
	Services		Lighting of 1,000 lmhr per day	Electrical lighting, air circulation, television, and phone charging are possible			
Availability[a]	Daily Availability	Less than 4 hours	At least 4 hours		At least 8 hours	At least 16 hours	At least 23 hours
	Evening Availability	Less than 1 hour	At least 1 hour	At least 2 hours	At least 3 hours	At least 4 hours	
Reliability		More than 14 disruptions per week			At most 14 disruptions per week or At most 3 disruptions per week with total duration of more than 2 hours"	(> 3 to 14 disruptions / week) or ≤ 3 disruptions / week with > 2 hours of outage	At most 3 disruptions per week with total duration of less than 2 hours
Quality		Household experiences voltage problems that damage appliances				Voltage problems do not affect the use of desired appliances	
Affordability		Cost of a standard consumption package of 365 kWh per year is more than 5% of household income			Cost of a standard consumption package of 365 kWh per year is less than 5% of household income		
Formality		No bill payments made for the use of electricity				Bill is paid to the utility, prepaid card seller, or authorized representative	
Health and Safety		Serious or fatal accidents due to electricity connection				Absence of past accidents	

Color signifies tier categorization

		TIER 0	TIER 1	TIER 2	TIER 3[b]	TIER 4	TIER 5
Availability[a]	Daily Availability	Less than 4 hours	At least 4 hours		At least 8 hours	At least 16 hours	At least 23 hours
	Evening Availability	Less than 1 hour	At least 1 hour	At least 2 hours	At least 3 hours	At least 4 hours	
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Each attribute is assessed separately

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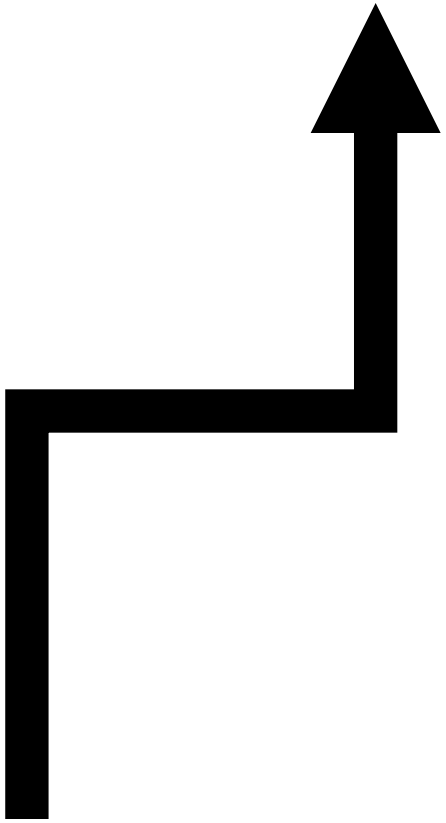
Aggregate tier is based on lowest tier value across all attributes

ATTRIBUTES		TIER 0	TIER 1	TIER 2	TIER 3[b]	TIER 4	TIER 5
Capacity	Power capacity ratings (W or daily Wh)				At least 200 W	At least 800 W	At least 2 kW
					At least 1 kWh	At least 3.4 kWh	At least 8.2 kWh
	Services						
Availability[a]	Daily Availability		At least 4 hours		At least 8 hours	At least 16 hours	At least 23 hours
	Evening Availability		At least 1 hour	At least 2 hours	At least 3 hours	At least 4 hours	
Reliability							At most 3 disruptions per week with total duration of less than 2 hours
Quality						Voltage problems do not affect the use of desired appliances	
Affordability					Cost of a standard consumption package of 365 kWh per year is less than 5% of household income		
Formality						Bill is paid to the utility, prepaid card seller, or authorized representative	
Health and Safety						Absence of past accidents	

ATTRIBUTES		TIER 1			
Capacity	Power capacity ratings (W or daily Wh)		At least 200 W	At least 800 W	At least 2 kW
			At least 1 kWh	At least 3.4 kWh	At least 8.2 kWh
	Services				
Availability[a]	Daily Availability	At least 4 hours	At least 8 hours	At least 16 hours	At least 23 hours
	Evening Availability	At least 1 hour	At least 2 hours	At least 3 hours	At least 4 hours
Reliability					At most 3 disruptions per week with total duration of less than 2 hours
Quality					Voltage problems do not affect the use of desired appliances
Affordability					Cost of a standard consumption package of 365 kWh per year is less than 5% of household income
Formality					Bill is paid to the utility, prepaid card seller, or authorized representative
Health and Safety					Absence of past accidents




7
AFFORDABLE AND
CLEAN ENERGY

ATTRIBUTES		TIER 0	TIER 1	TIER 2	TIER 3	TIER 4	TIER 5
Cooking Exposure	ISO's voluntary performance targets (Default Ventilation) PM2.5 (mg/MJd) CO (g/MJd) gn	>1030 >18.3	≤1030 ≤18.3	≤481 ≤11.5	≤218 ≤7.2	≤62 ≤4.4	≤5 ≤3.0
	High Ventilation PM2.5 (mg/MJd) CO (g/MJd)	>1489 >26.9	≤1489 ≤26.9	≤733 ≤16.0	≤321 ≤10.3	≤92 ≤6.2	≤7 ≤4.4
	Low Ventilation PM2.5 (mg/MJd) CO (g/MJd)	>550 >9.9	≤550 ≤9.9	≤252 ≤5.5	≤115 ≤3.7	≤32 ≤2.2	≤2 ≤1.4
Cookstove Efficiency	ISO's voluntary performance Targets	≤10%	>10%	>20%	>30%	>40%	>50%
Convenience	Fuel acquisition and preparation time (hours per week)	≥7		<7	<3	<1.5	<0.5
	Stove preparation time (minutes per meal)	≥15		<15	<10	<5	<2
Safety		Serious Accidents over the past 12 months				No serious accidents over the past year	
Affordability		Fuel cost ≥5% of household expenditure (income)				Fuel cost <5% of household expenditure (income)	
Fuel availability		Primary fuel available less then 80% of the year				Available 80% of the year	Readily available throughout the year

*ISO = International Organization for Standardization,
PM = Particulate Matter,
CO = carbon monoxide,
MJd = Mega Joule delivered

Households

Supply

Electricity Consumption

Services

Cooking

Heating

Productive engagements

Community facilities

School

Health facilities

Government offices

Street lighting

Community Buildings

1. Gap analysis and diagnostic review

The analysis can provide insights into possible interventions that would enable enhanced access.

2. Information on gender aspects

The multi-tier approach provides information on ownership and use of electrical appliances, use of stand-alone systems, use of mobile phones, and various aspects of cooking.

3. Flexibility of setting target tiers

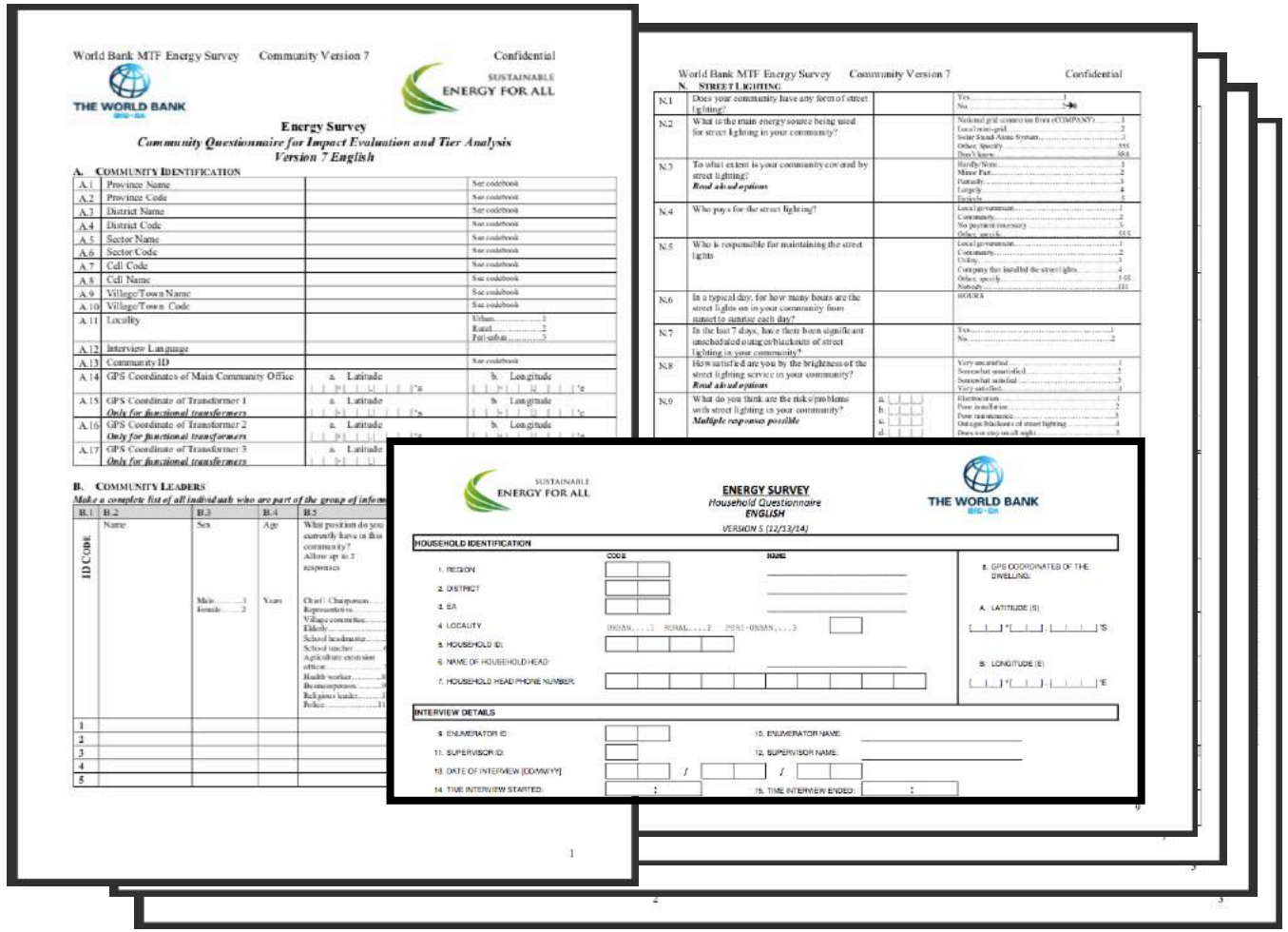
The approach allows governments (stakeholders) to set their own targets by choosing any tier above Tier 0.

4. Comparison across geographies and over time

The methodology provides a robust tool for measuring access across various locales of energy use, and comparing them across geographies and over time

Data collection

ESMAP Surveys



Digital, Decentralized, Democratized

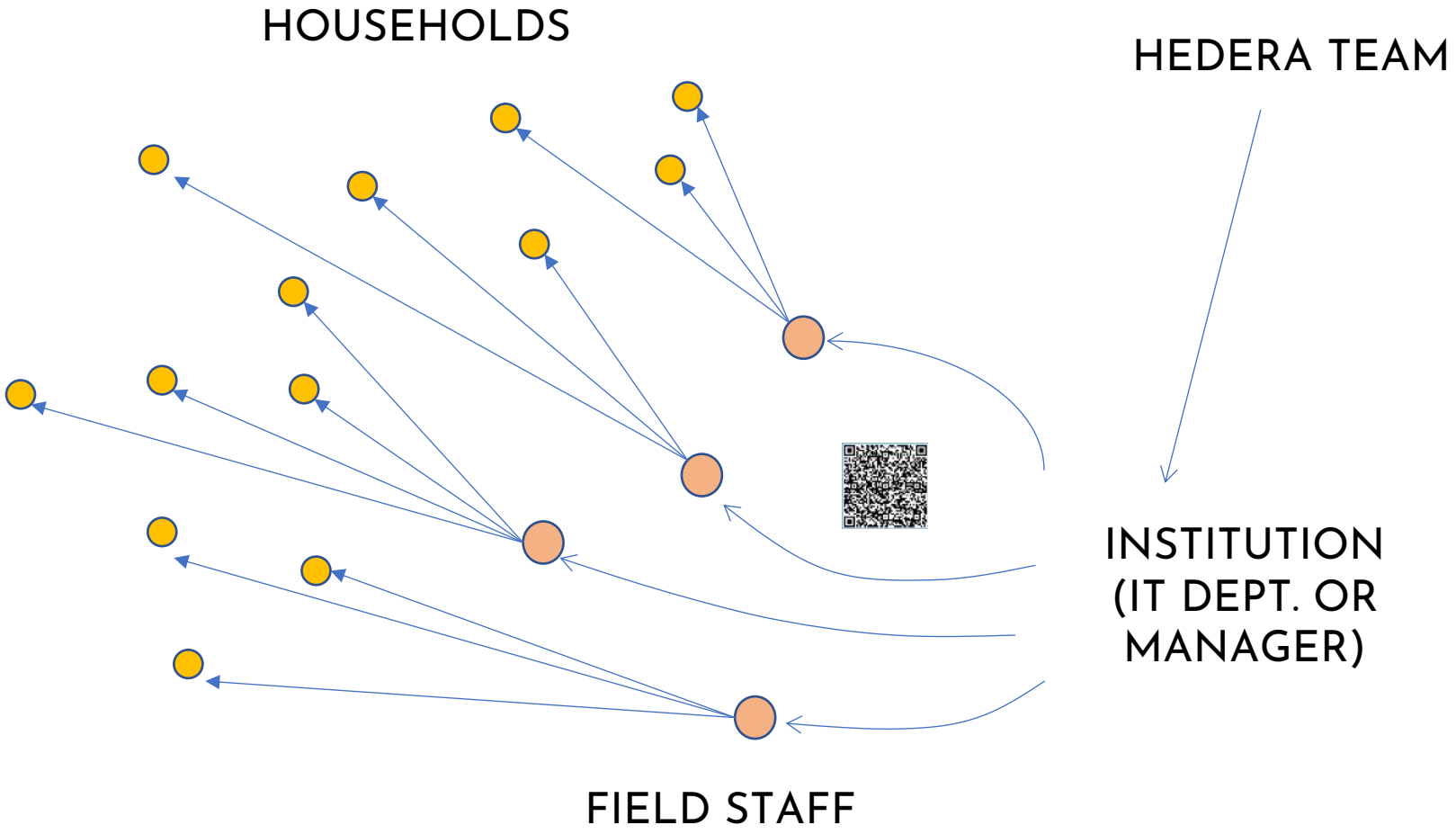
EVERYBODY MATTERS

Digital solutions for measurable and transparent sustainable development

https://hedera.online

https://hit.hedera.online

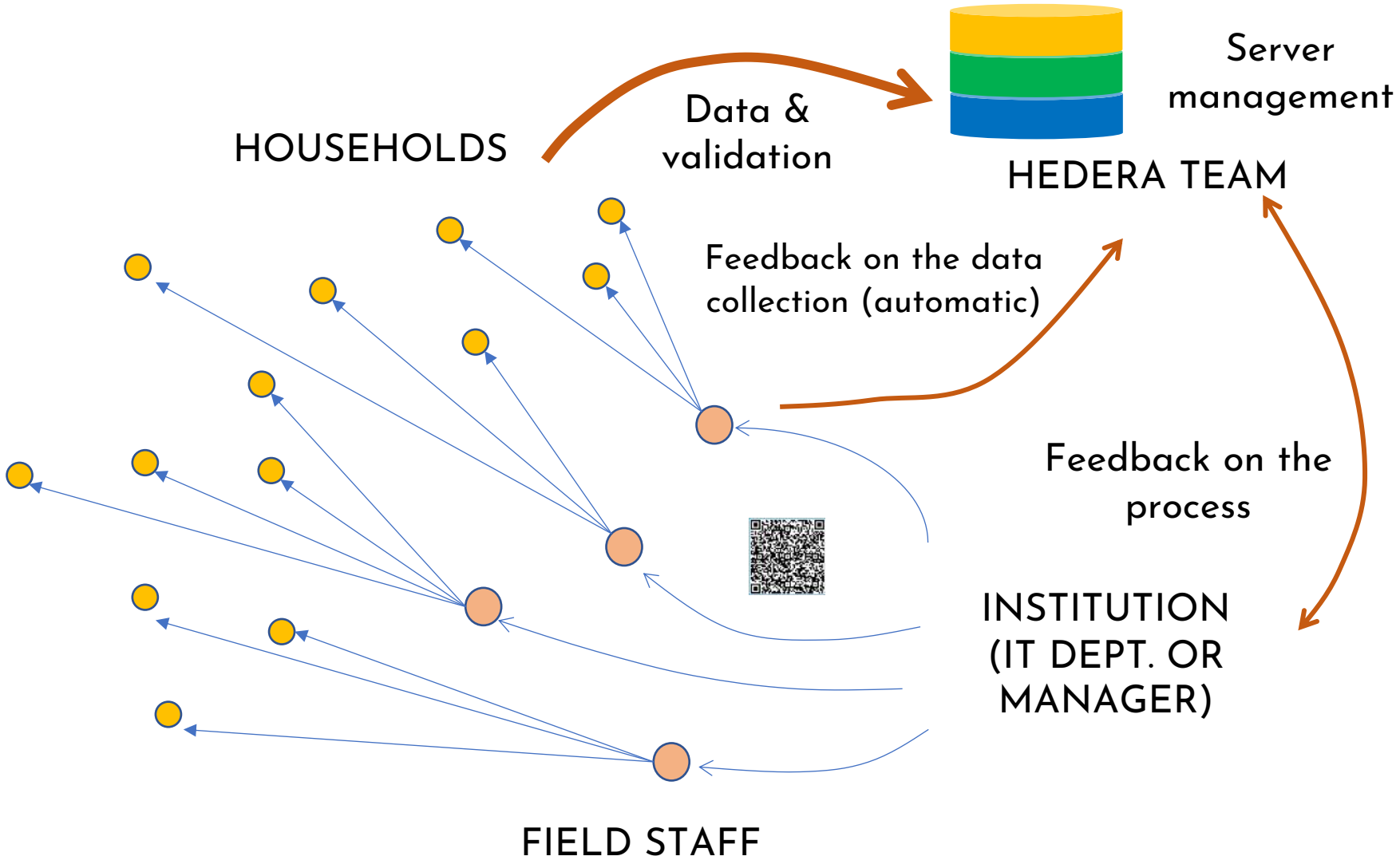
Remote installation



Train-of-trainers approach

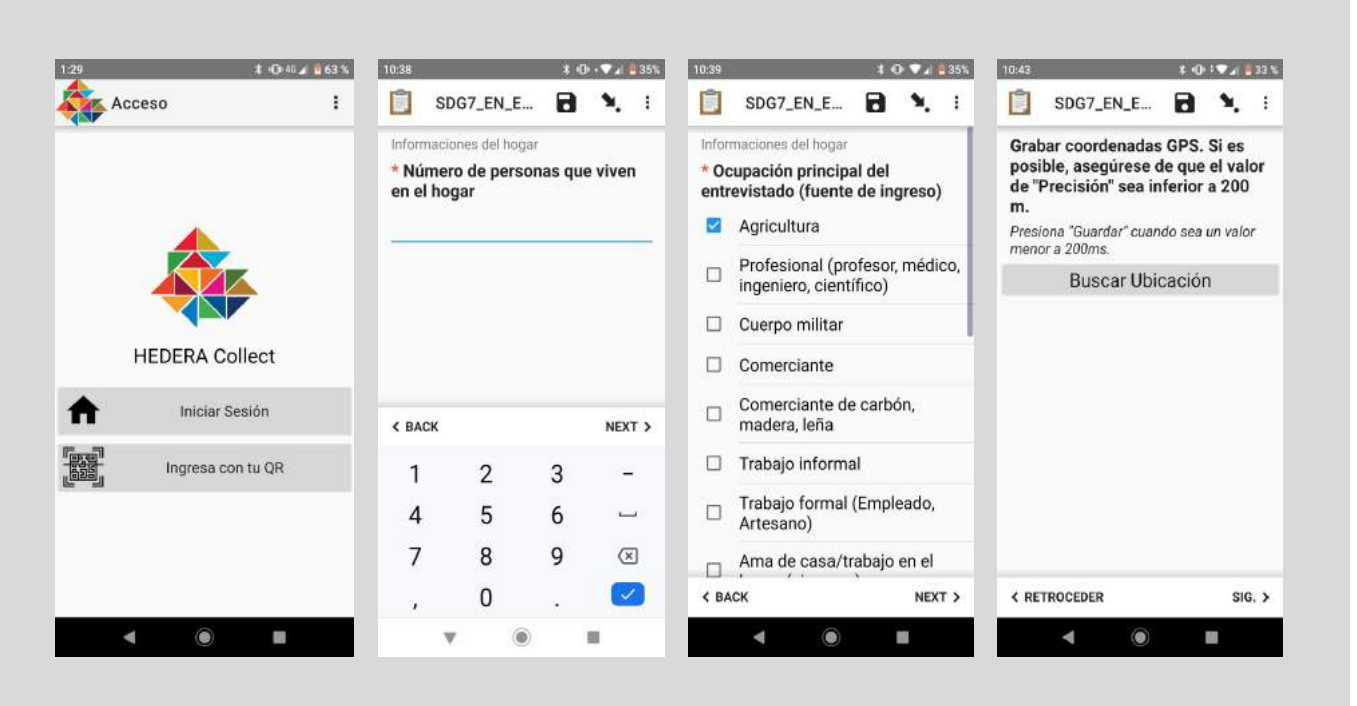
APIDE DRC, Hervé Ilombe 2020

Data processing



IMPACT TOOLKIT
HEDERA COLLECT

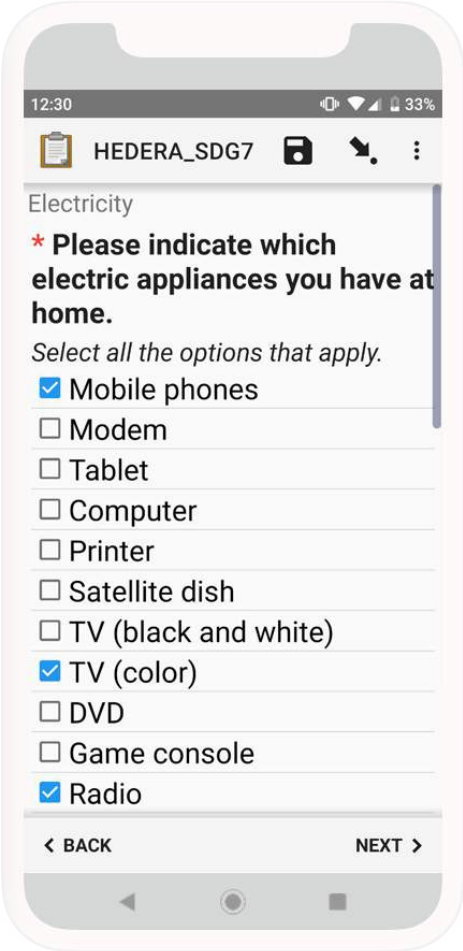
HEDERA Collect is an open-source mobile application that enables quick, easy data collection in the field, without requiring an internet connection.



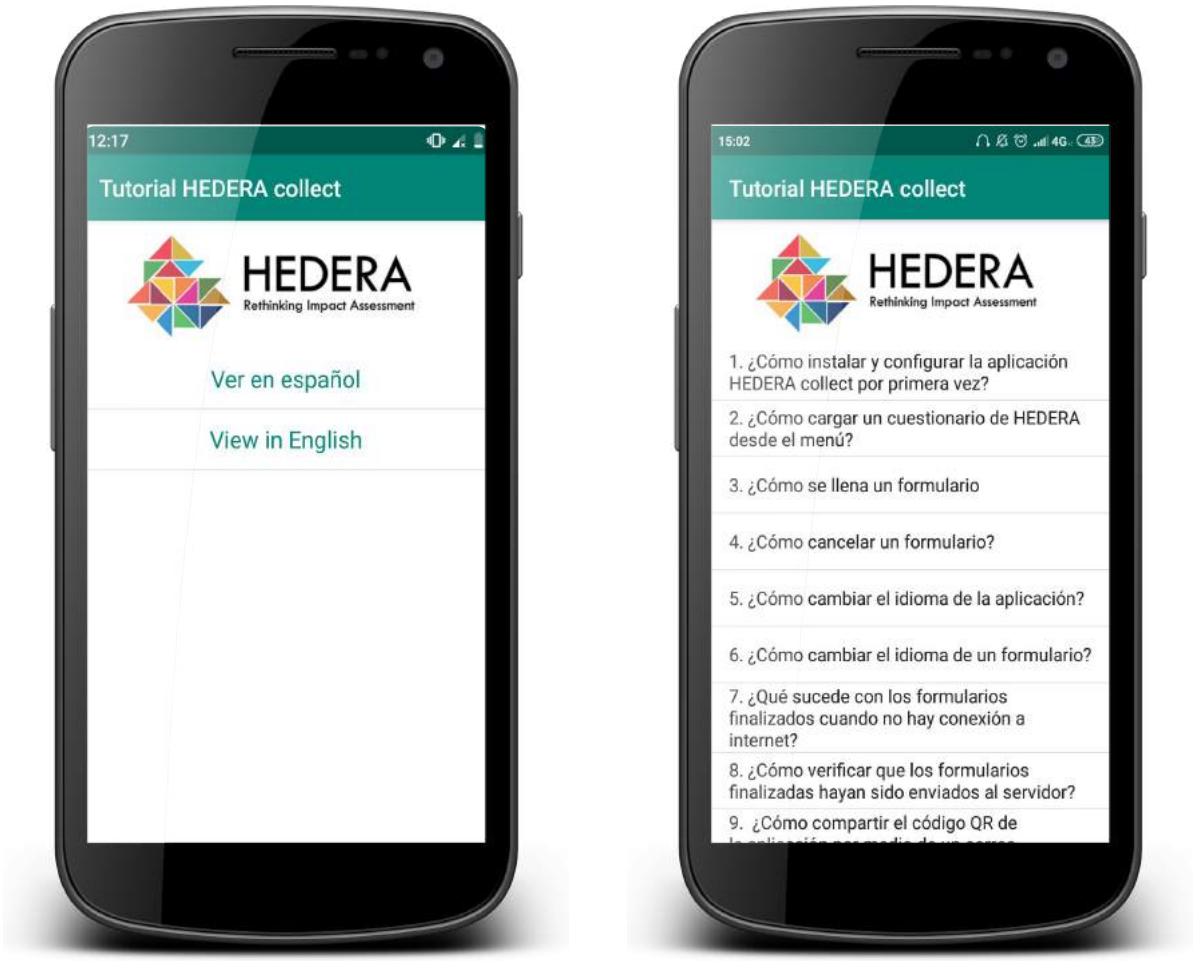
Application and surveys available in English, Spanish, French, and Portuguese

IMPACT TOOLKIT
HEDERA COLLECT

Data collection app



Tutorial app with short videos for providing help in the field



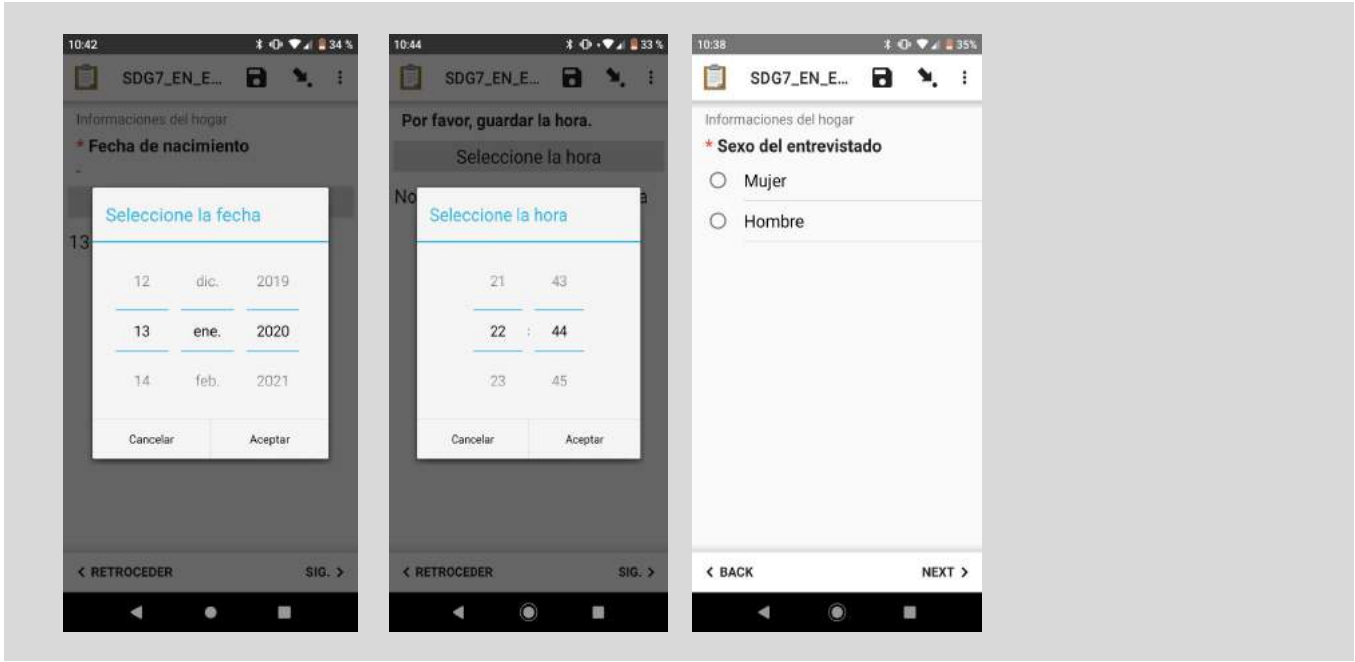
IMPACT TOOLKIT
HEDERA COLLECT

Data processing features:

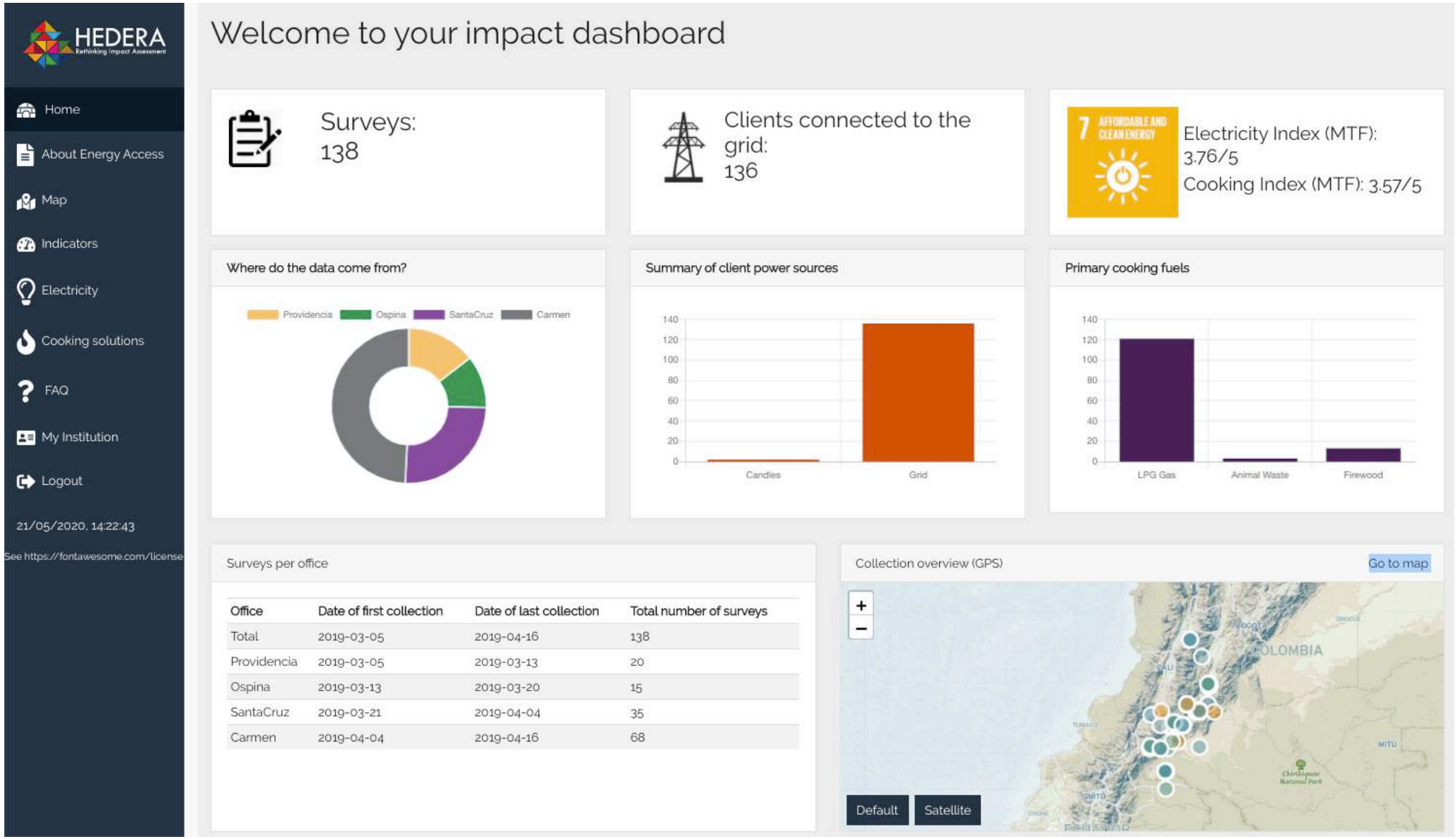
Automatic calculations (arithmetic operations) in the application, automatic filters, and data validation through parameter specification

Types of data that can be collected:

GPS, date, time, codes, images (photos & selfies), signatures, space plotting (area measurements), answers to multiple choice and open questions, and audio recordings

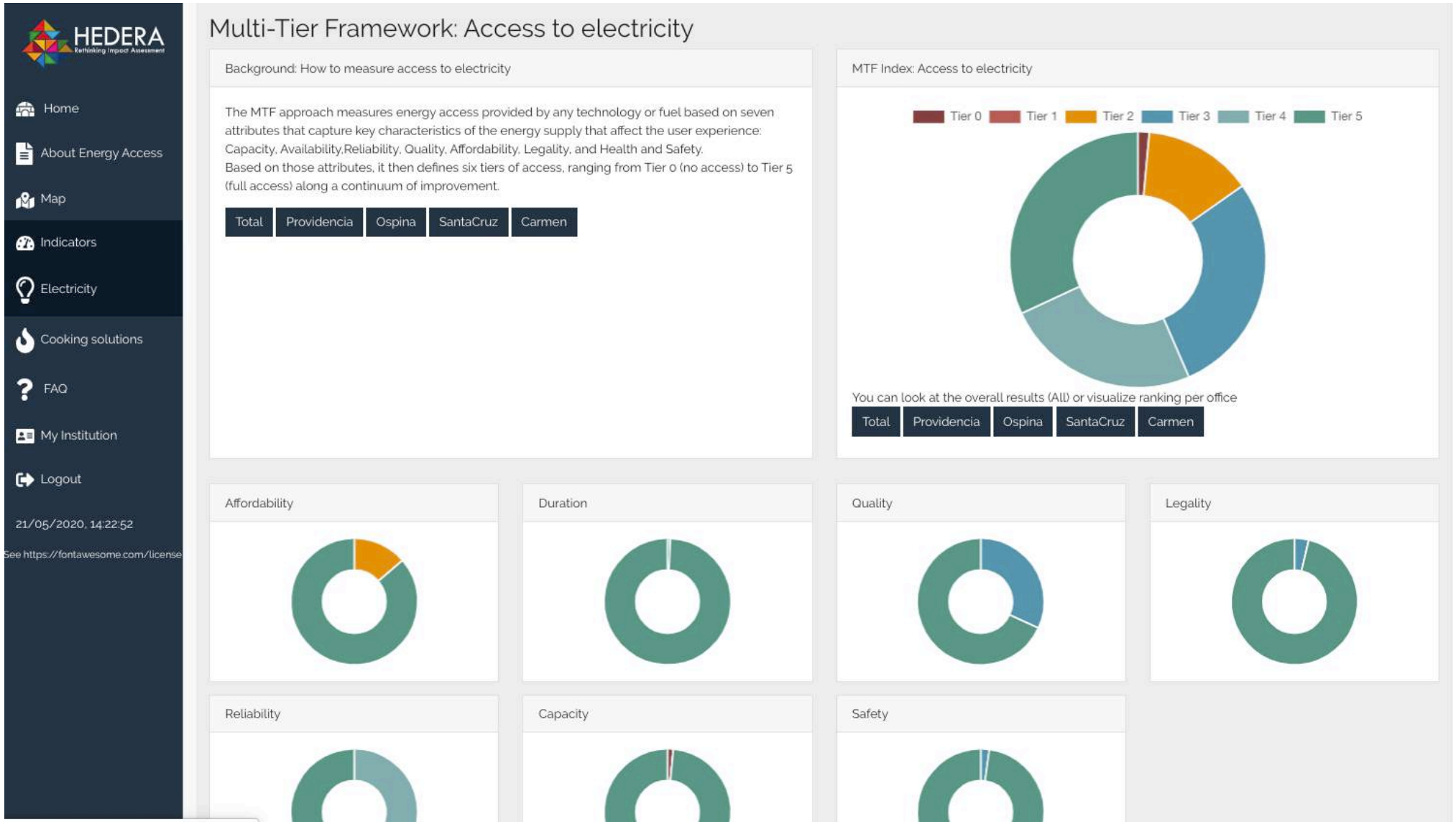


Dashboard



Office	Date of first collection	Date of last collection	Total number of surveys
Total	2019-03-05	2019-04-16	138
Providencia	2019-03-05	2019-03-13	20
Ospina	2019-03-13	2019-03-20	15
SantaCruz	2019-03-21	2019-04-04	35
Carmen	2019-04-04	2019-04-16	68

Electricity Supply – Multi-Tier Framework Assessment per Household



Energy access analysis, Mexico (July/August 2019)

Energy access analysis, DRC (Jan/Feb 2020)

Digital Reports with MTF results

Household Study (APIDE)

Introduction

The Multi-Tier Framwework for Measuring Energy Access

Data Collection

Summary of Results

Interactive Analysis

Access to Electricity

Power Sources

Multi-Tier Ranking

Appliances

AFFORDABILITY

RELIABILITY

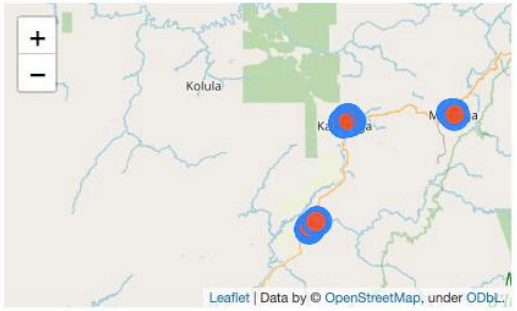
Data Collection Summary

This section provides an overview of the location of households surveyed, survey collection dates and regions, and individual survey duration.

Data Collection Map

The map shows the GPS coordinates of all households covered in the mobile survey.

Note: Only the valid GPS records are shown.



ON THIS PAGE

DATA COLLECTION SUMMARY

DATA COLLECTION MAP

SURVEY COLLECTION DATES

OVERVIEW OF SURVEYS PER LOCATION

SURVEY DURATION

Cooking stoves as per tier ranking

LEGALITY

SAFETY

Access to Modern Cooking Solutions

Cooking Stoves and Cooking Fuels

Multi-Tier Ranking

Pictures of Cooking Stoves

CONVENIENCE

AFFORDABILITY

AVAILABILITY

SAFETY

HEDERA

The HEDERA Impact Toolkit

About us

Pictures of Cooking Stoves

Cooking Stoves

This page presents photos of the household cooking stoves, organized per MTF tier, taken during data collection.

ON THIS PAGE

COOKING STOVES

COOKING TIER 0

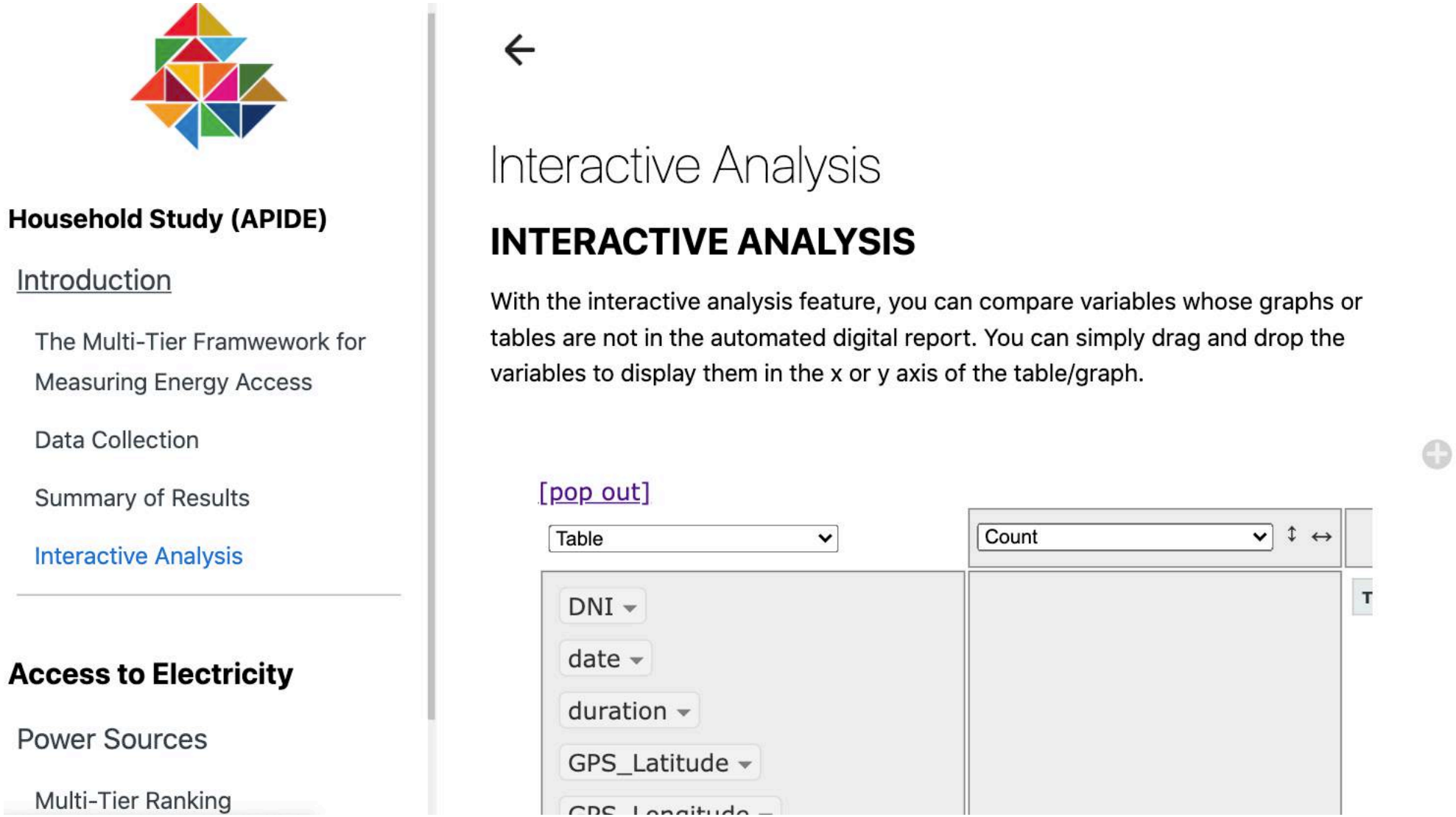
COOKING TIER 1

COOKING TIER 3

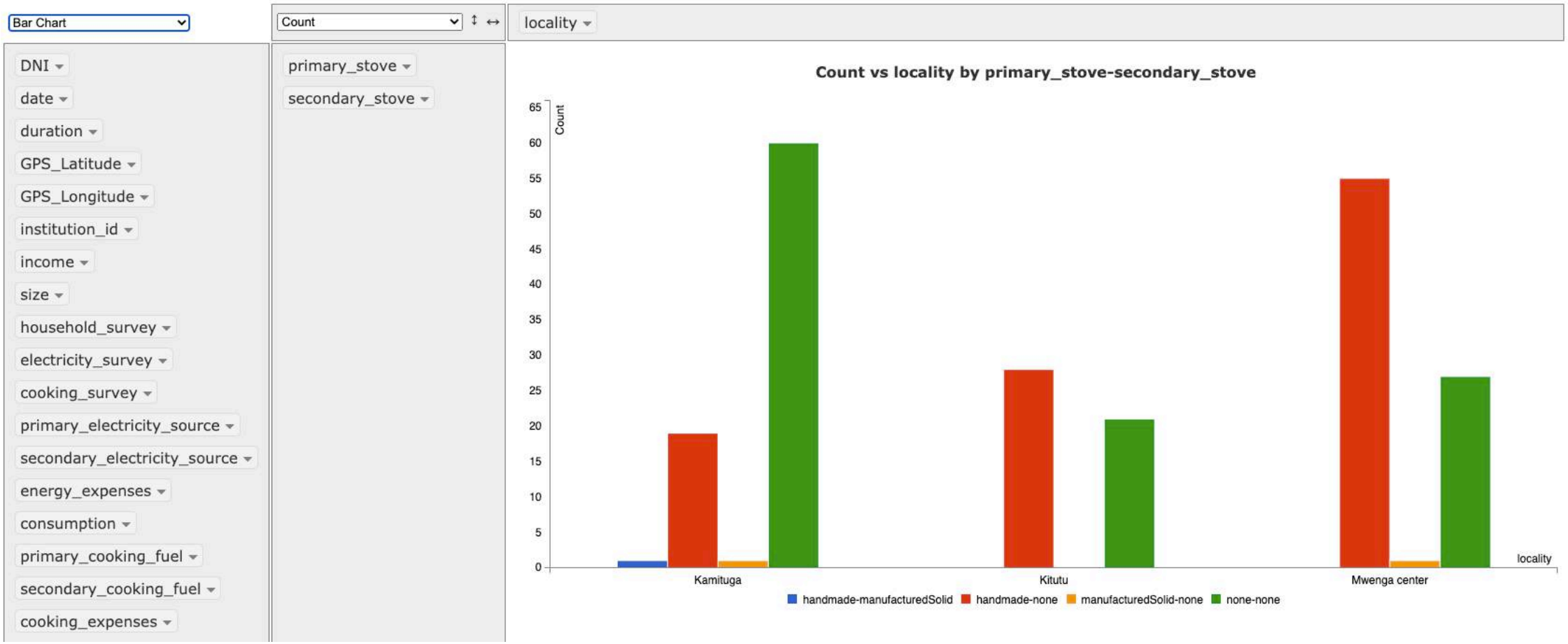
Cooking Tier 0

Cooking stoves of households in **Tier 0**

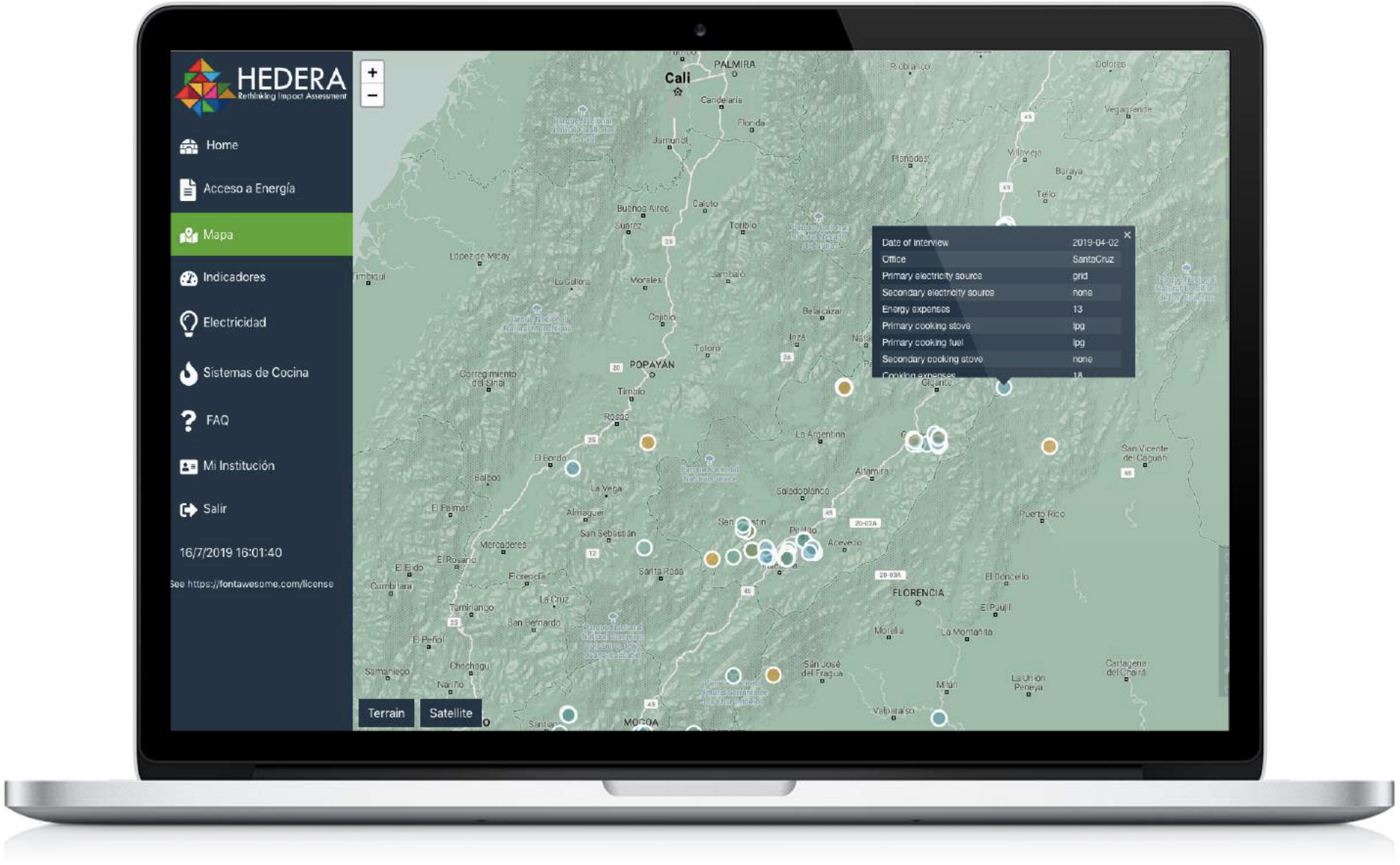
Interactive analysis of data



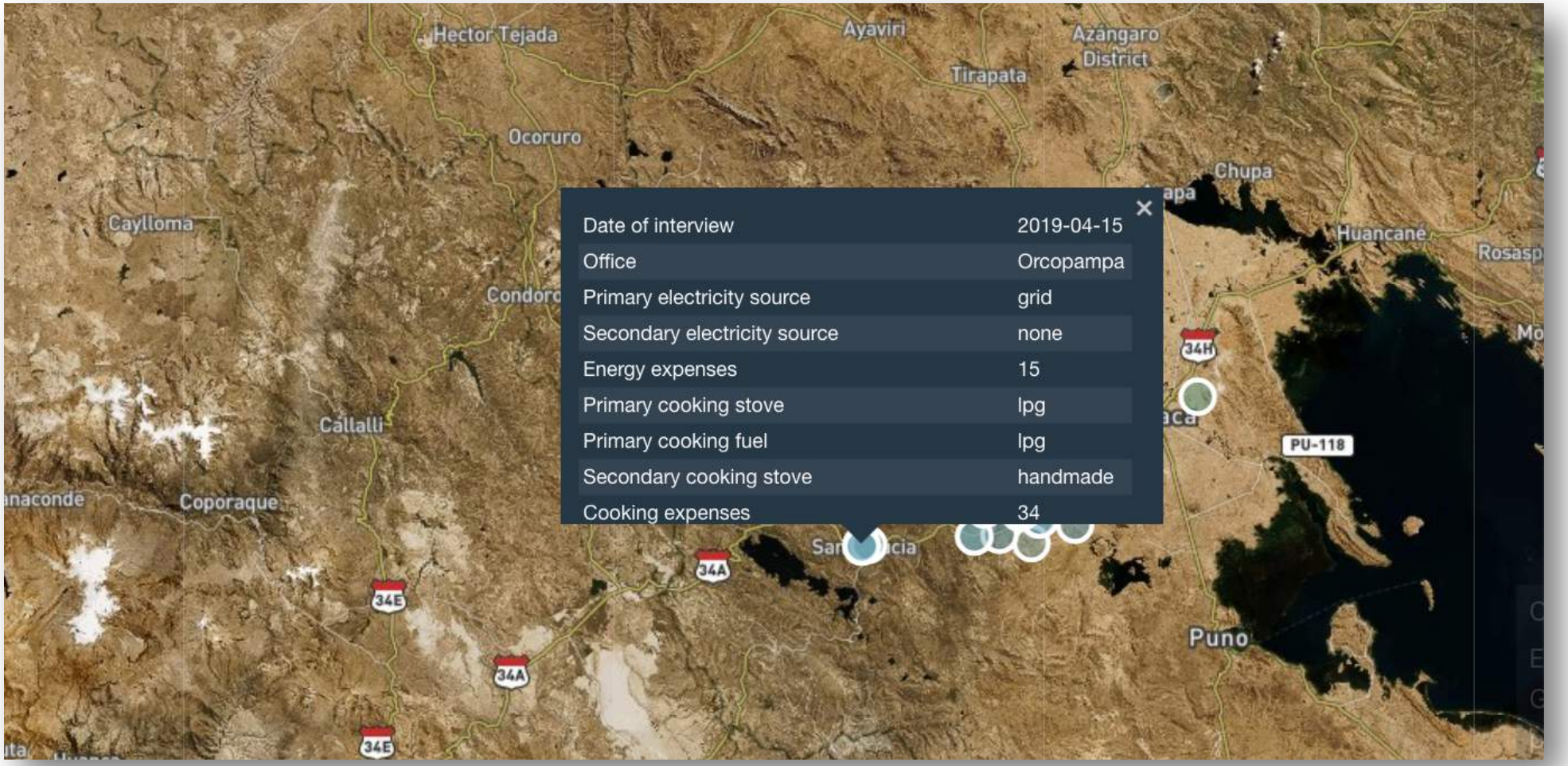
Flexible graphs/tables



Maps – filters per power source / cooking stove and fuels



Indicators household-based

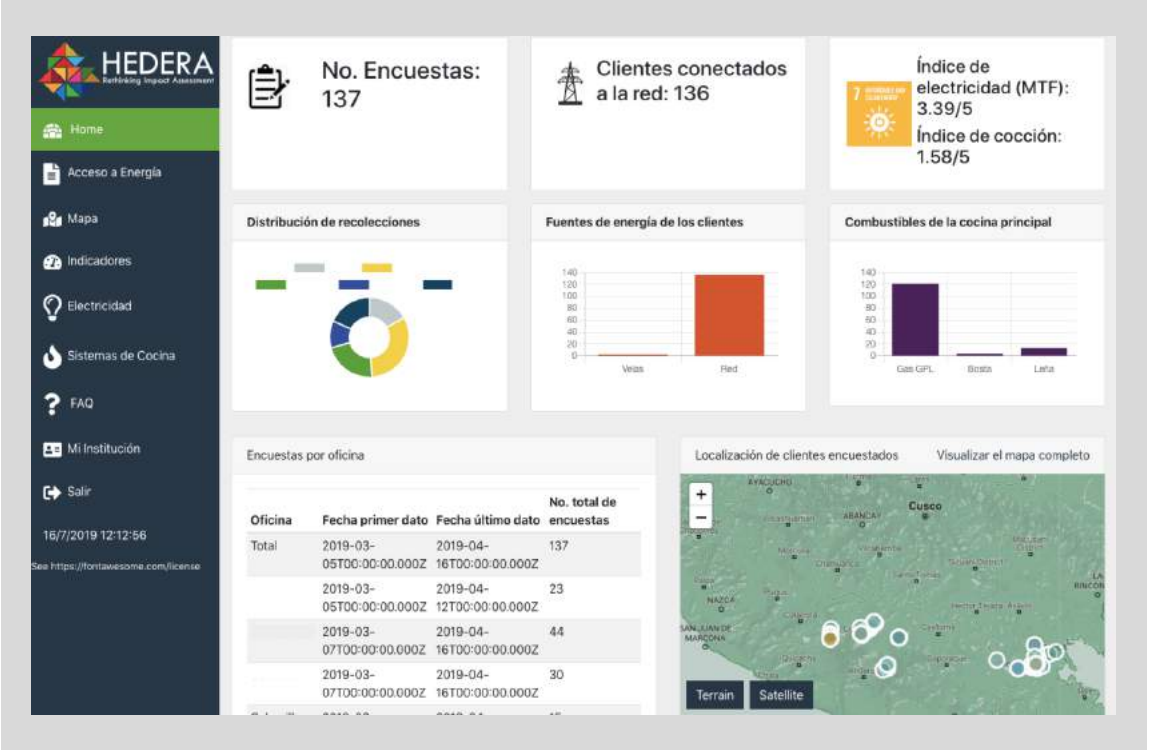


Data Collection in Peru

Market Research on Need for Green Loan Product Expansion

April – June 2019

- Execution of the digital tool in a period of two months through telephone calls.
- The installation, recruitment, and training of the survey team were done remotely.
- Loan officers collected the GPS coordinates locally, and GPS data were merged with other survey data.



Data Collection in Peru

Market Research on Need for Green Loan Product Expansion

April – June 2019

Validation of:

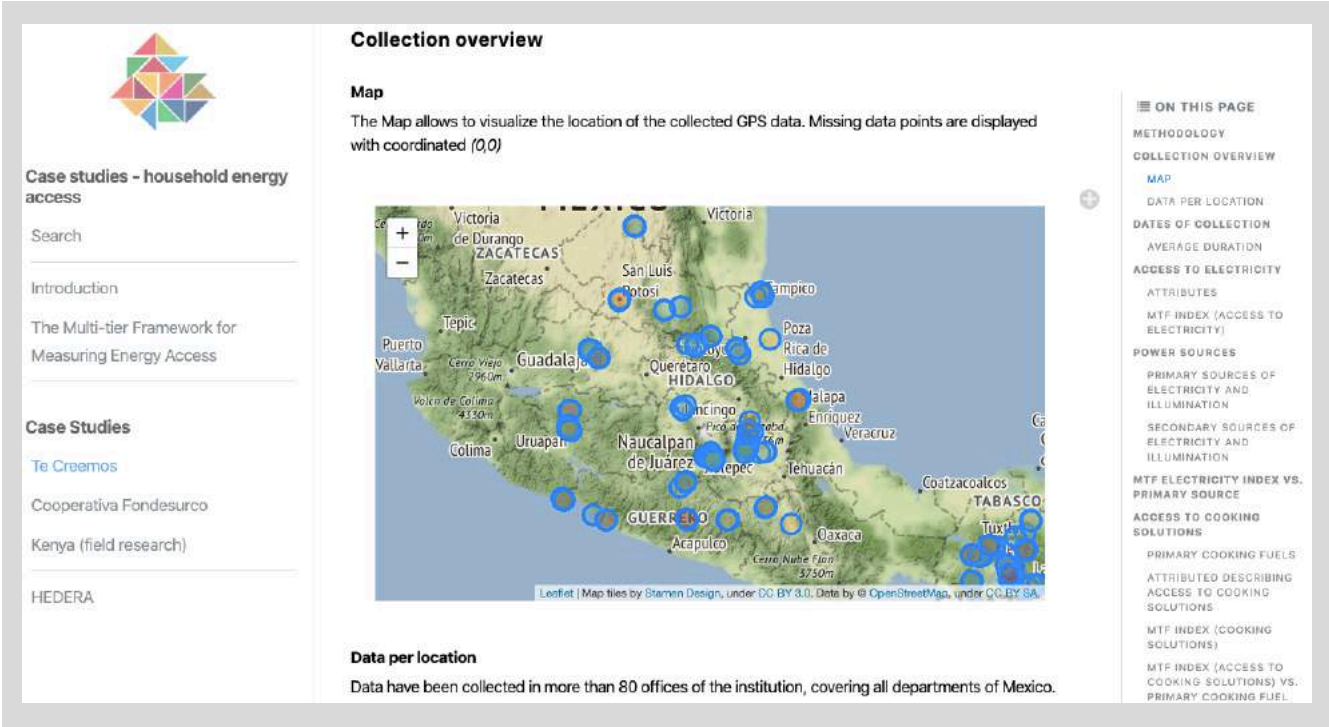
- Survey on access to basic energy services and digitization of the institution's questions
- Dashboard
- Digital reports
- Georeferencing and filtering of results

Analysis of Energy Needs Throughout Mexico

Te Creemos Financiera Popular

July 2019

Execution of the digital tool in a period of one week through the MFI's credit advisors. Remote installation by the MFI's IT department and loan officer training through the HEDERA Collect tutorial app.



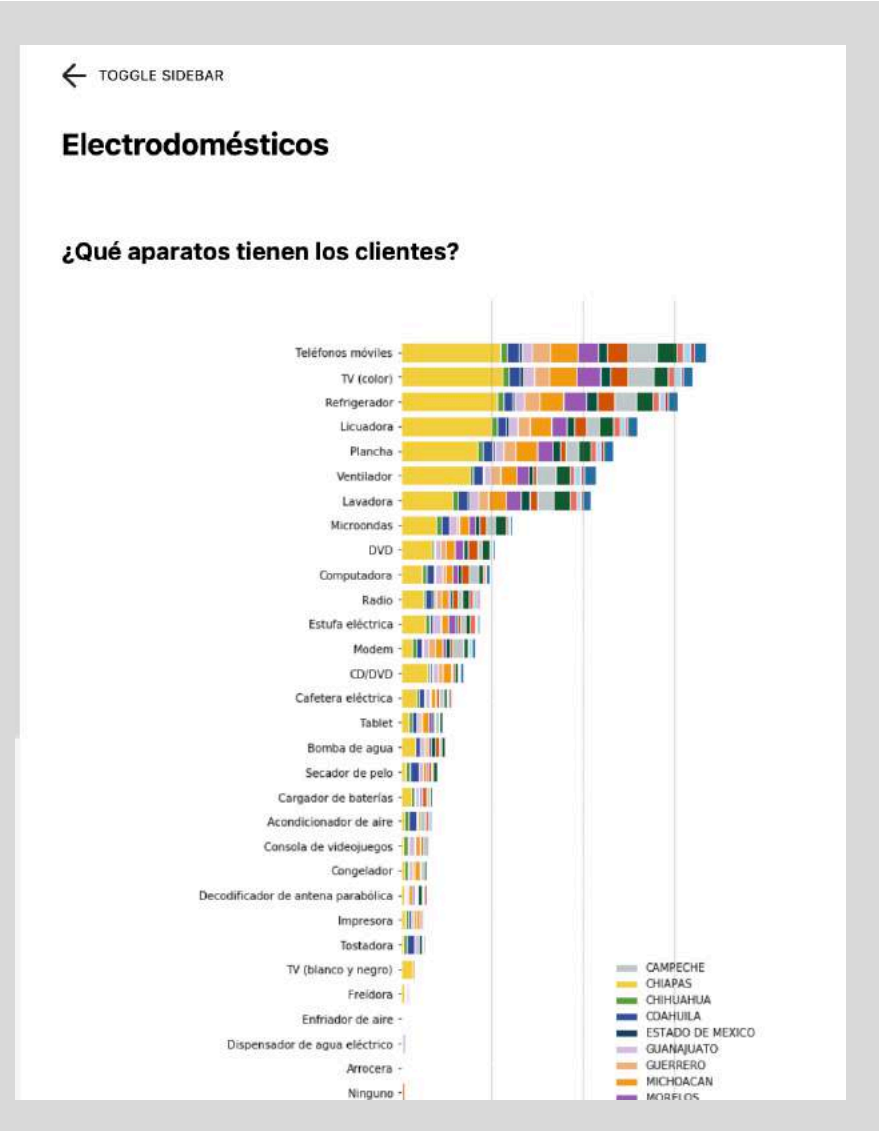
Analysis of Energy Needs Throughout Mexico

Te Creemos Financiera Popular

July 2019

Validation of:

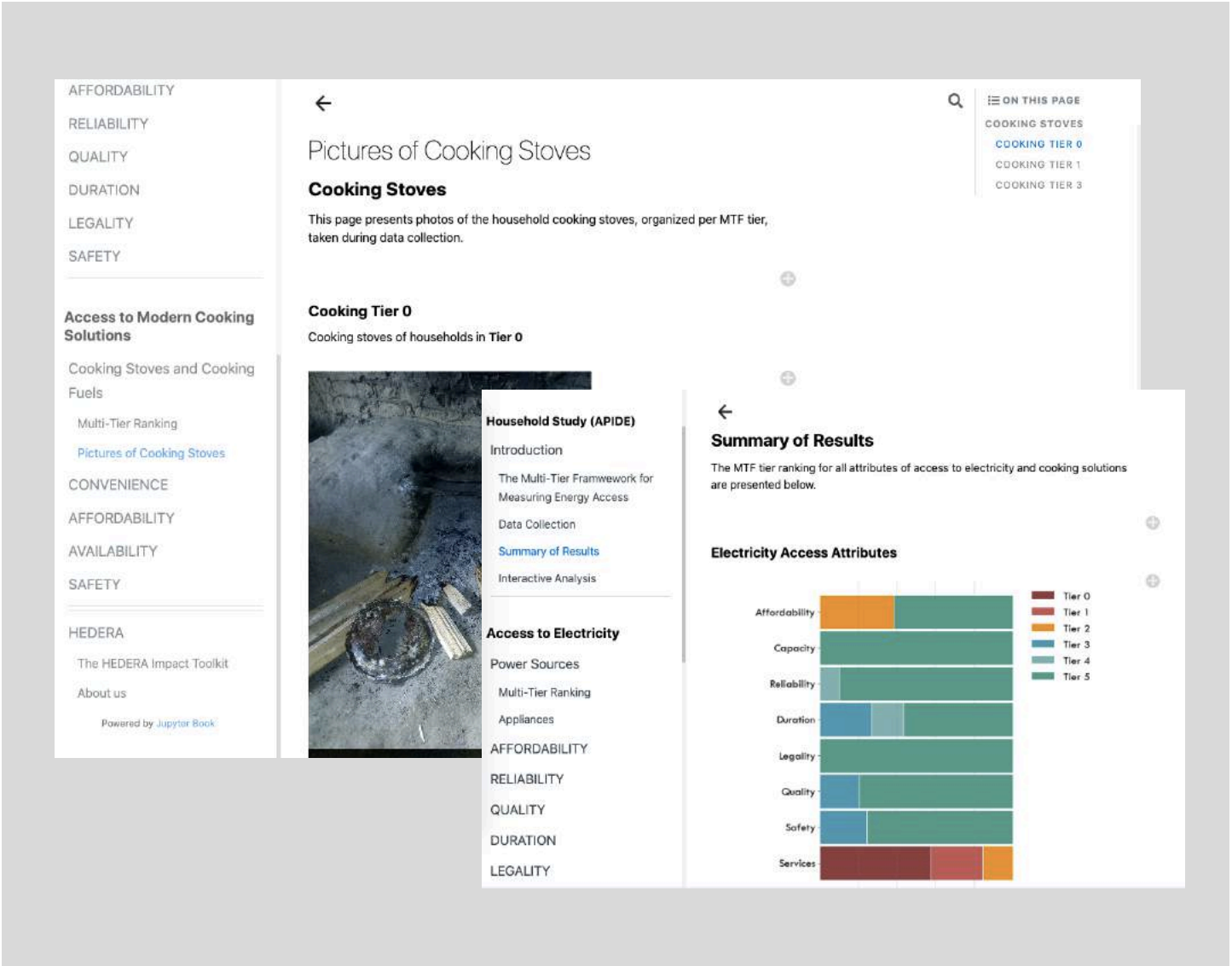
- Remote application installation by IT department
- Training exclusively through application
- Digital report and dashboard for data monitoring



SDG 7 Baseline Assessment in DRC

Jan – Feb 2020

- Provision of mobile application for data collection, as well as digital material for remote training, to conduct their market assessment in their outreach area.
- APIDE field staff were trained during a one-day workshop (held by one member of the organization).
- The trained team interviewed more than 220 households over a period of 10 days.



CASE 1	CASE 2	CASE 3
• Call center data collection + GPS data collected in-situ	• Remote installation to staff mobile phones coordinated by MFI's IT department	• Remote training for the field staff • Data collection during household visits (mostly offline)
• Easy coordination • Reduced number of people involved	• Support from IT dpt • Impressive outreach in few days	• Staff motivation is a key (in this case, high motivation due to clear needs)
• Missed opportunity for awareness raising of staff	• If the institutions is already advanced in the use of digital tools (e.g., mobile app for customer surveys), it is preferred to design API and include the energy access questionnaire in the existing system	• Repeated training & feedback to staff would be helpful

MTF | MULTI-TIER FRAMEWORK

Baseline establishment

Establish a global baseline of energy access, starting in 10-15 high access deficit countries based on the multifaceted definition according to MTF

MTF | MULTI-TIER FRAMEWORK

Transfer capacities

Transfer capacity to national statistical offices to keep tracking progress toward SE4ALL goals and SDG in the future

MTF | MULTI-TIER FRAMEWORK

Tools improvement

Continue improving tools and capacities for tracking progress towards reaching the SE4ALL objective of universal access to modern energy services by 2030, based on MTF

MTF | MULTI-TIER FRAMEWORK

Sharing data

Provide reliable data on energy sector that can meet needs of multiple stakeholders*

**government, regulators, utilities, project developers, civil society organizations, developmental agencies, financial institutions, appliance manufacturers, international programs and the academia*

HEDERA's Shared Objectives with ESMAP – Multi-Tier Framework

- Baseline establishment
- Transfer capacities
- Tools improvement
- Sharing data

Thank you!

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