HUMANITARIAN ENERGY CONFERENCE

16 May 2022
Kigali, Rwanda

#HumanitarianEnergy
#HEC2022

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Session 2 Track B: Skills and Data

13:30-15:00 CAT

Room B

Moderator

Laura Patel

Energy 4 Impact and Specialist Consultant

Speakers

Lama Gharaibeh

NORCAP: NRC Expert Deployments

Anaïs Matthey-Junod

IOM and NORCAP Expert

Ranisha Basnet

Energypedia

Maria Ten Palomares

Trama TecnoAmbiental (TTA)

Peter Leskovsky

ICRC

Britt Christiaens

ICRC

NORCAP

Global provider of expertise: NRC Expert Deployments

NORWEGIAN REFUGEE COUNCIL

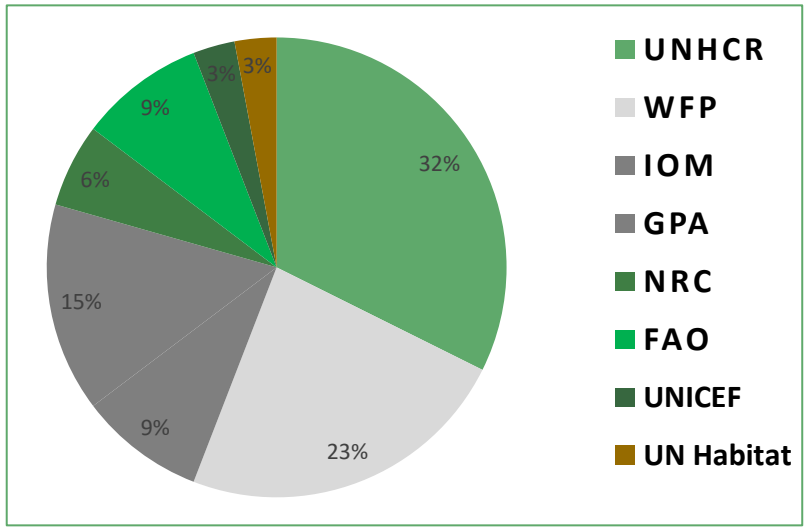
OPERATED BY NRC

Climate Action and Sustainable Responses: Green Shift Project

NORCAP Green Shift Project 2018 – 2022:

Total # of supported missions (2018 - 2022)	59 missions
Total # of Deployed Energy Experts (2018 - 2022)	40 experts
% of Male Vs % of female in deployed missions (2018 - 20221)	63%:37%
Partner agencies	8
Partners hosting energy experts (highest to lowest)	UNHCR, WFP, IOM, FAO, GPA, NRC, UNICEF, UN Habitat

Partners:



Donors:

Norad

Auswärtiges Amt

European Union
Civil Protection and
Humanitarian Aid

Sida

UN

Expansion of NORCAP Project since 2018:

2018

2019

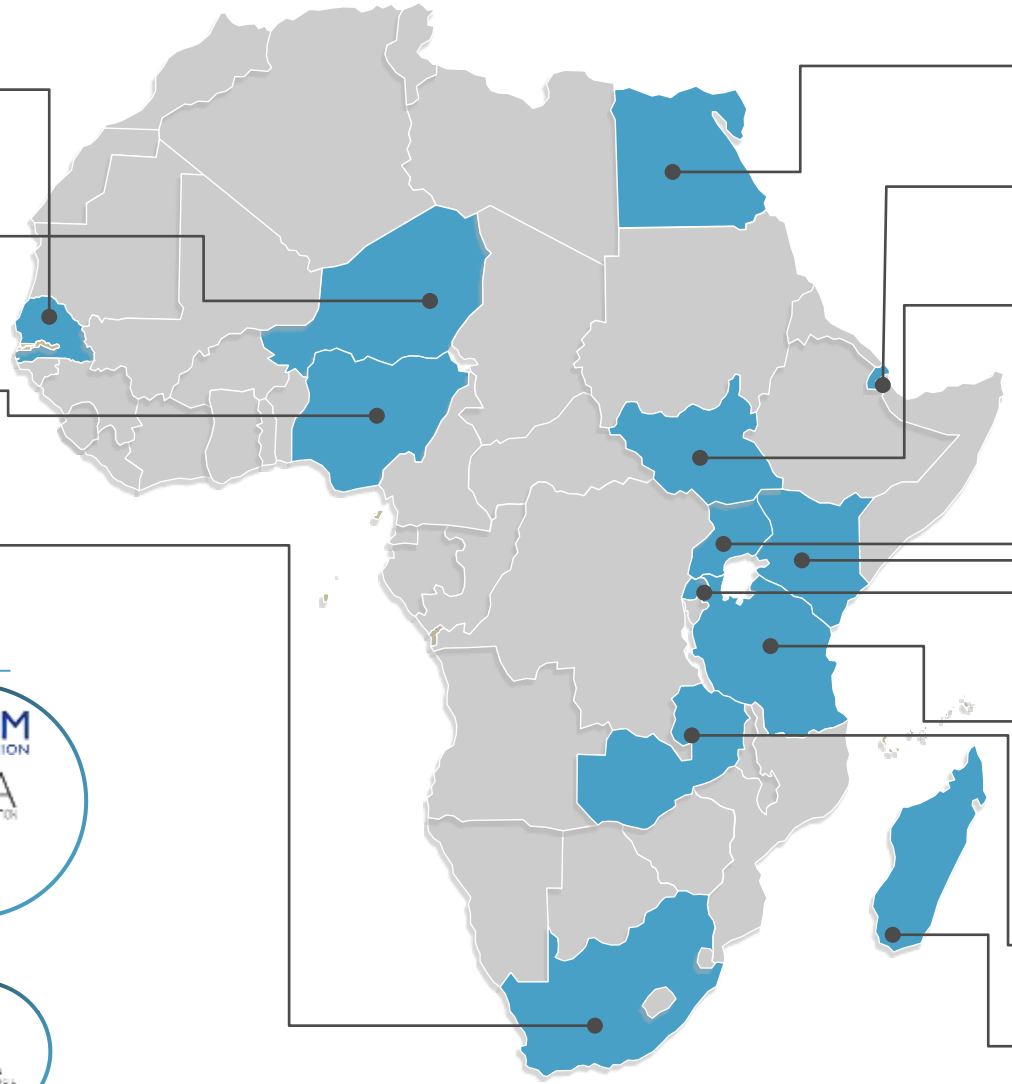
2020+

2022 All Green Shift Missions– 29 Missions

HUMANITARIAN ENERGY CONFERENCE

AFRICA

- Senegal - Regional
- Niger - Country
- Nigeria - Country
- South Africa - Regional



- Egypt - Regional
- Djibouti - Country
- South Sudan - Country
- Uganda - Country
- Kenya - Country/Regional
- Tanzania - Country
- Burundi - Country
- Zambia - Country
- Madagascar - Country

EUROPE

- Switzerland and Rome, Ukraine - Global

MIDDLE East

- Jordan - Regional

Moving the sector

Geophrey Oyugi, Biogas Energy Expert, deployed to IOM, in Malakal, South Sudan, Iban Colon/NORCAP 2020

The roster contains expertise in different thematic:

- Solar Technology: Electrification, lighting
- Biogas production
- Food Security and Agriculture
- Cooking solutions; stoves and fuel

- Reforestation
- Environmental protection

- Information management and data monitoring

- Energy Finance

- Coordination and Advocacy
- Capacity building and training

- Site Management and planning

NORCAP Energy Team visit to UNHCR missions in Tanzania, 2019

Group of women at the community kitchen powered by the biogas plant, in Malakal, South Sudan, Iban Colon/NORCAP 2020

Female Accelerator expert, Anne deployed to FAO in Uganda, conducting CEA Assessment for Cash for Cooking intervention, 2022.

Skills needed to develop expertise of experts:

- Humanitarian Context Principles:
  - The majority of energy experts come from development and private sector
  - Support to guide through new place; Partners to provide needed tools, clarify operations procedures (i.e. logistics) from the start of the mission and critical considerations
- Understanding the partners needs:
  - Context analysis and induction
  - Building strategies and plans
- Fundraising and grants management:
  - Experts role in bringing energy related funding
- Blended Finance
  - Consider new way of covering energy projects
- E-Waste management
- Environmental Protection

Anaïs Matthey, Junior Energy Expert, deployed to IOM, in Geneva, Switzerland, Anaïs in a mission to Mozambique 2022

Template Slide: Project Outline

Feel free to use photos and data as much as possible

HUMANITARIAN ENERGY CONFERENCE

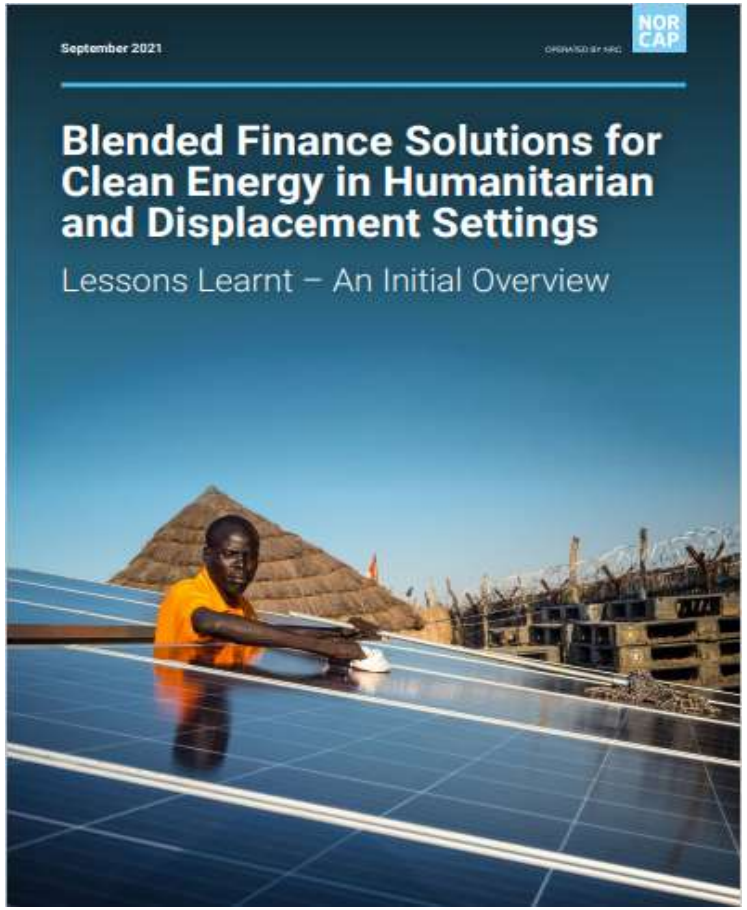
LOCATION	• Focus on Africa and Head Quarters in Europe • Piloting with NRC to work in Middle East
END USERS	• NORCAP supports vulnerable populations through its partners. The project's primary services/direct target group users are **NORCAP's partners (currently UN agencies and INGOs).** • The end-users in **vulnerable populations** are the indirect target groups served by NORCAPs partners. • NORCAP supports different humanitarian settlements; camps, and urban. • NORCAP supports direct service to end-users, facilities and operations of organisations.
AREA OF ENERGY INTERVENTION	**NORCAP Green Shift is running below projects:** • Green Shift Experts deployment: *technical assistance* • Female Accelerator: *technical assistance and capacity building* • Sustainable Settlements: *coordination and technical assistance* **Key are of Focus:** Access to Energy, Greening the supply chain, Global coordination

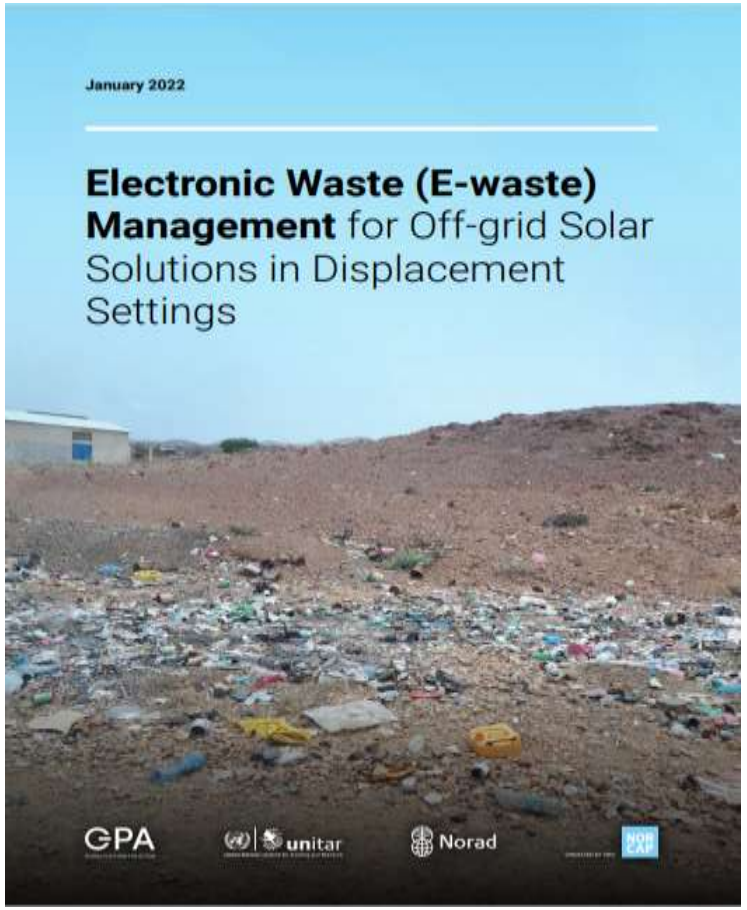
FINANCING MECHANISM	• Grant-based • Looking to develop high scale national level blended finance approach
KEY CHALLENGES & LESSONS LEARNED	• Energy is not prioritized within partner strategies or plans • Willingness to share information and data • Partners willingness to work together within a similar geographic location • Lack of energy expertise; relying on short term deployment • Lack of national policies and regulations on energy • Clear modality in working with the private sector • Lack of Government delivering energy assistance besides, including IDPs and Refugees, within national plans
LOOKING FORWARD	• Join forces to overcome challenges and avoid duplicating efforts. • Develop strategies to mainstream energy within operations and programmes. • Invest in building capacities and training. • Adopt new financing schemes and procedures to bring private investment and collaborations.

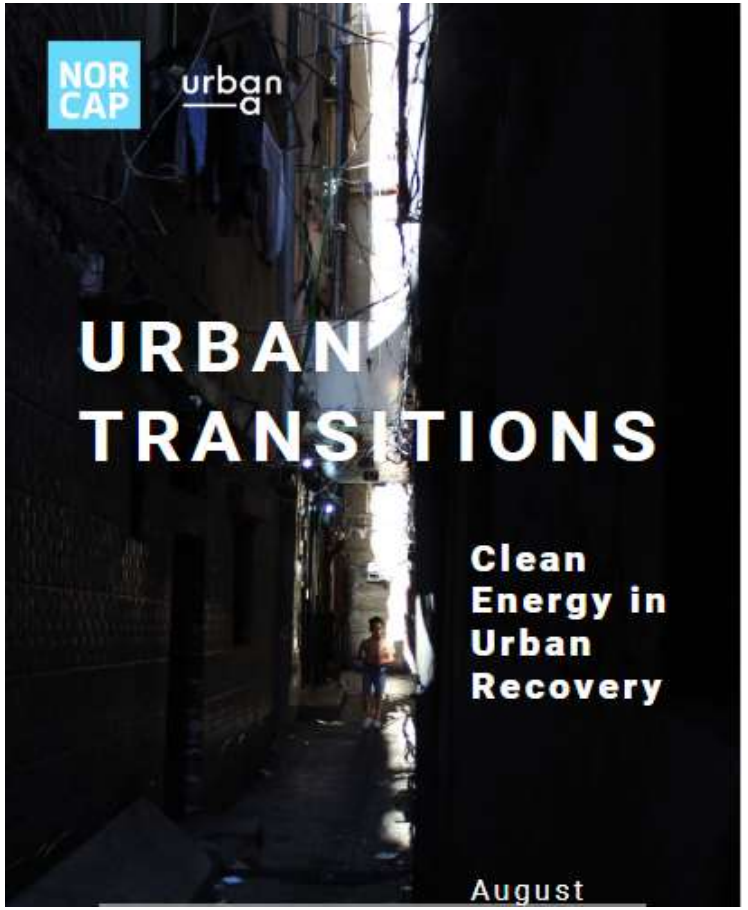
"Delivering clean energy to displaced populations"

Won the Energy Transitions category at the tve (Television for the Environment) Global Sustainability Film Awards 2021!

Knowledge Products to benefit the whole sector:







Blended Finance Solutions for Clean Energy in Humanitarian and Displacement Settings | NRC

Electronic Waste Management for Off-grid Solar Solutions in Displacement Settings | NRC

Urban transitions: clean energy in urban recovery | NRC

Reports Launching Event on January 2022

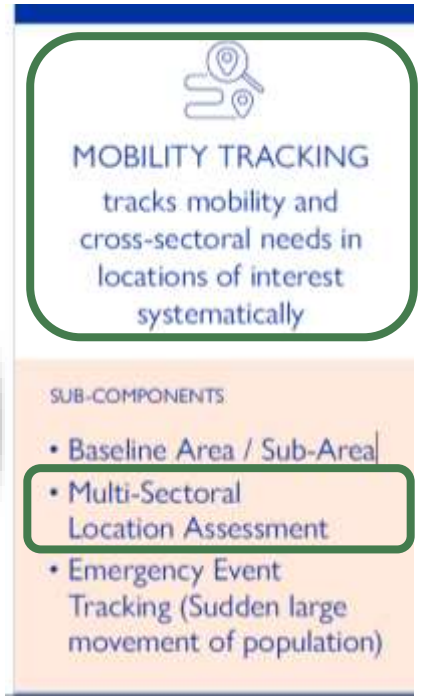
DTM Energy Module

Session 2B: Skills and Data

Anaïs Matthey-Junod (NORCAP Energy expert deployed to IOM HQ)

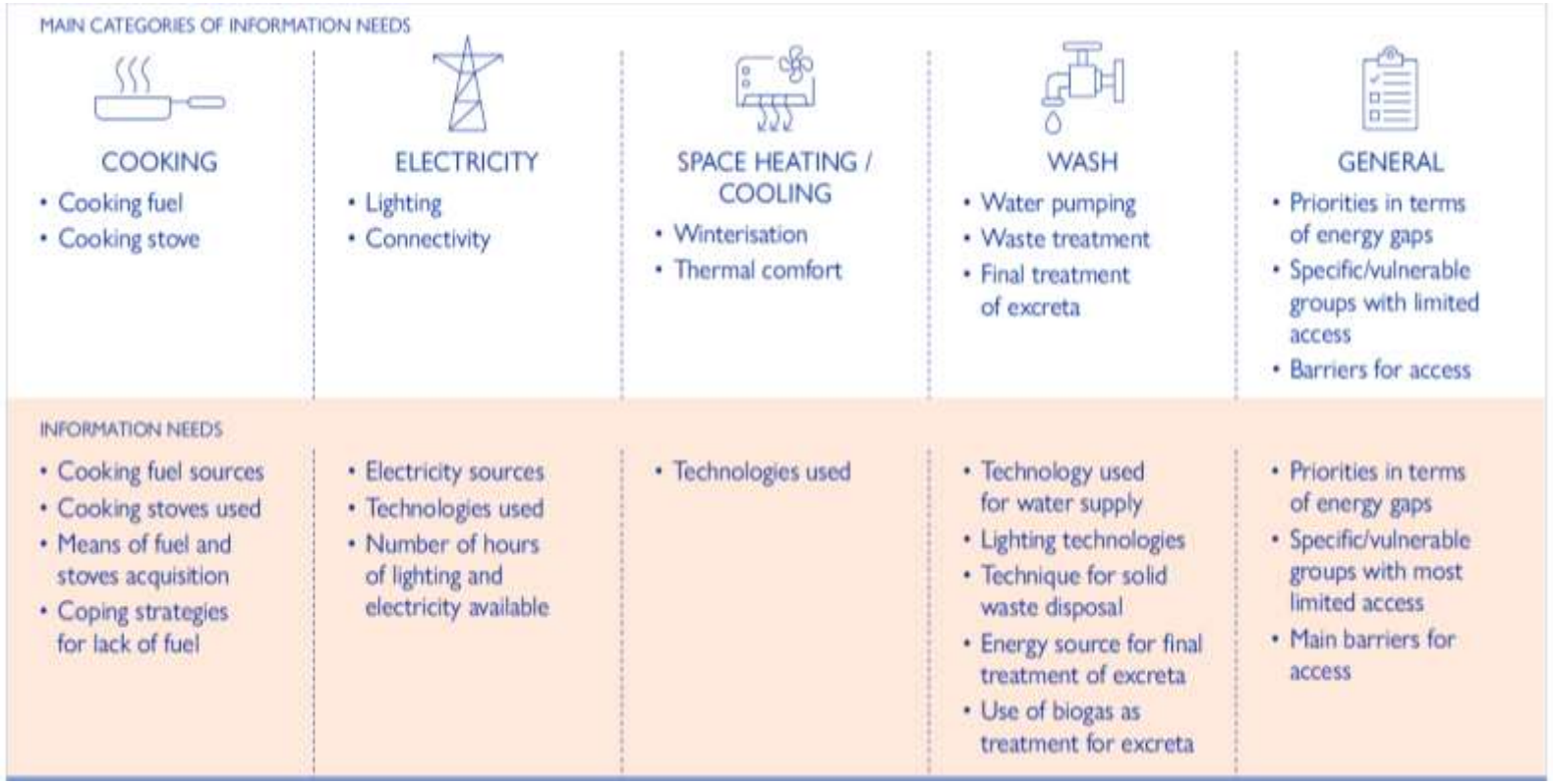
What is the IOM Displacement Tracking Matrix (DTM)?

https://dtm.iom.int/



- Data collection methodology: **Key informant interviews and observations**
- Level of assessment: **Location**

The DTM Energy Field Companion – Information needs



MAIN CATEGORIES OF INFORMATION NEEDS	COOKING	ELECTRICITY	SPACE HEATING / COOLING	WASH	GENERAL
	• Cooking fuel • Cooking stove	• Lighting • Connectivity	• Winterisation • Thermal comfort	• Water pumping • Waste treatment • Final treatment of excreta	• Priorities in terms of energy gaps • Specific/vulnerable groups with limited access • Barriers for access
INFORMATION NEEDS					
	• Cooking fuel sources • Cooking stoves used • Means of fuel and stoves acquisition • Coping strategies for lack of fuel	• Electricity sources • Technologies used • Number of hours of lighting and electricity available	• Technologies used	• Technology used for water supply • Lighting technologies • Technique for solid waste disposal • Energy source for final treatment of excreta • Use of biogas as treatment for excreta	• Priorities in terms of energy gaps • Specific/vulnerable groups with most limited access • Main barriers for access

https://displacement.iom.int/dtm-partners-toolkit/energy-0

- Field Companion for Energy: **a repository of standardized questions and answers (excel/PDF)**
- Aligned with **ESMAP MTF** and **GPA key indicators** as much as possible
- DTM selects information needs based on **context and partners request for data**
- External materials for partners
  - **E.g. FAQ** Infosheet on DTM for Energy and DTM MSLA **Analysis Framework** for Energy
- **Training** materials for DTM enumerators and staff

The pilots: Mozambique and Nigeria reports

Mozambique

- April 2021
- Region: Northern Mozambique
- 26 locations

- Number of IDPs: **91,310 IDPs** (23,335 HHs)
- 13 energy-related indicators

Nigeria

- July 2021
- 15 energy-related indicators

North Central and North West Geopolitical Zone

- 1,604 locations
- Number of IDPs: **833,006 IDPs** (134'908 HHs)

North East Geopolitical Zone

- 2,379 locations
- Number of IDPs**: 2'182'613 IDPs** (444'781 HHs)

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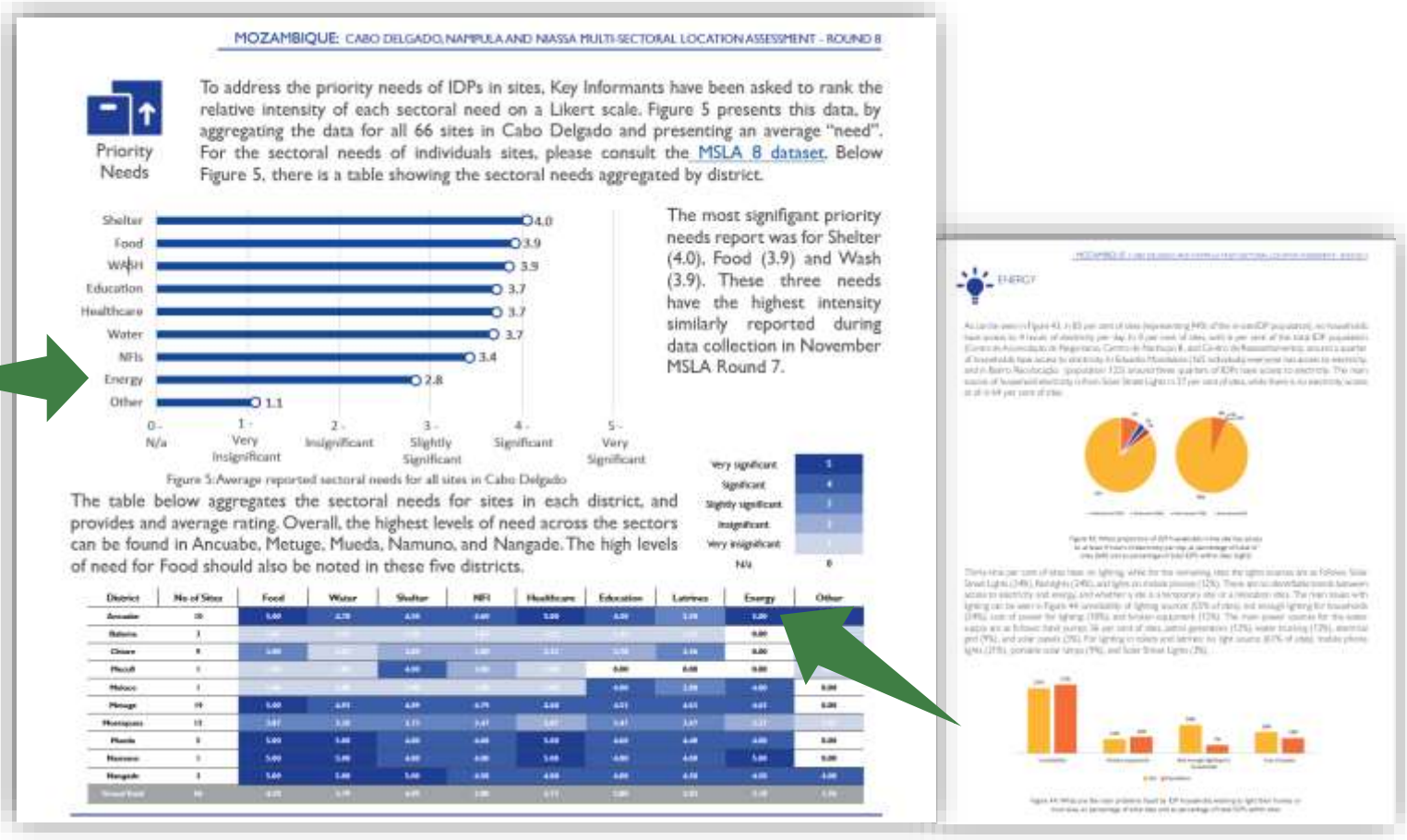
HH: household

The pilots: Mozambique – follow up in MSLA



MOZAMBIQUE: CABO DELGADO, NAMPULA AND NIASSA MULTI-SECTORAL LOCATION ASSESSMENT - ROUND 8

Priority Needs

To address the priority needs of IDPs in sites, Key Informants have been asked to rank the relative intensity of each sectoral need on a Likert scale. Figure 5 presents this data, by aggregating the data for all 66 sites in Cabo Delgado and presenting an average "need". For the sectoral needs of individuals sites, please consult the MSLA 8 dataset. Below Figure 5, there is a table showing the sectoral needs aggregated by district.

Figure 5: Average reported sectoral needs for all sites in Cabo Delgado

The most significant priority needs report was for Shelter (4.0), Food (3.9) and Wash (3.9). These three needs have the highest intensity similarly reported during data collection in November MSLA Round 7.

The table below aggregates the sectoral needs for sites in each district, and provides and average rating. Overall, the highest levels of need across the sectors can be found in Ancuabe, Metuge, Mueda, Namuno, and Nangade. The high levels of need for Food should also be noted in these five districts.

District	No of Sites	Food	Water	Shelter	NFI	Healthcare	Education	Latrines	Energy	Other
Ancuabe	10	5.00	4.20	4.50	4.40	5.00	4.00	3.20	5.00	
Balama	3								0.00	
Chiure	9	5.00	4.00	5.00	5.00	4.33	3.56	4.56	0.00	
Macomia	1			4.00	3.00		0.00	0.00	0.00	
Meluco	1						4.00	3.00	4.00	0.00
Metuge	11	5.00	4.91	4.09	4.73	4.00	4.91	4.91	4.91	0.00
Montepuez	12	3.67	3.58	3.75	3.67	3.67	3.67	3.67	3.33	
Mueda	5	5.00	5.00	4.00	4.00	5.00	4.00	4.00	4.00	0.00
Namuno	5	5.00	5.00	4.00	4.00	5.00	4.00	4.00	5.00	0.00
Nangade	5	5.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	0.00
Grand Total	66	4.95	4.79	4.89	3.98	4.73	3.89	3.93	3.98	1.56

ENERGY

- Energy data collected as part of the MSLA in the Central Provinces of Mozambique were used to **inform site selection** for our **Innovation Norway-funded energy access project** in Sofala Province.
- DTM enumerators were **trained** to conduct **household-level energy surveys** for the project.

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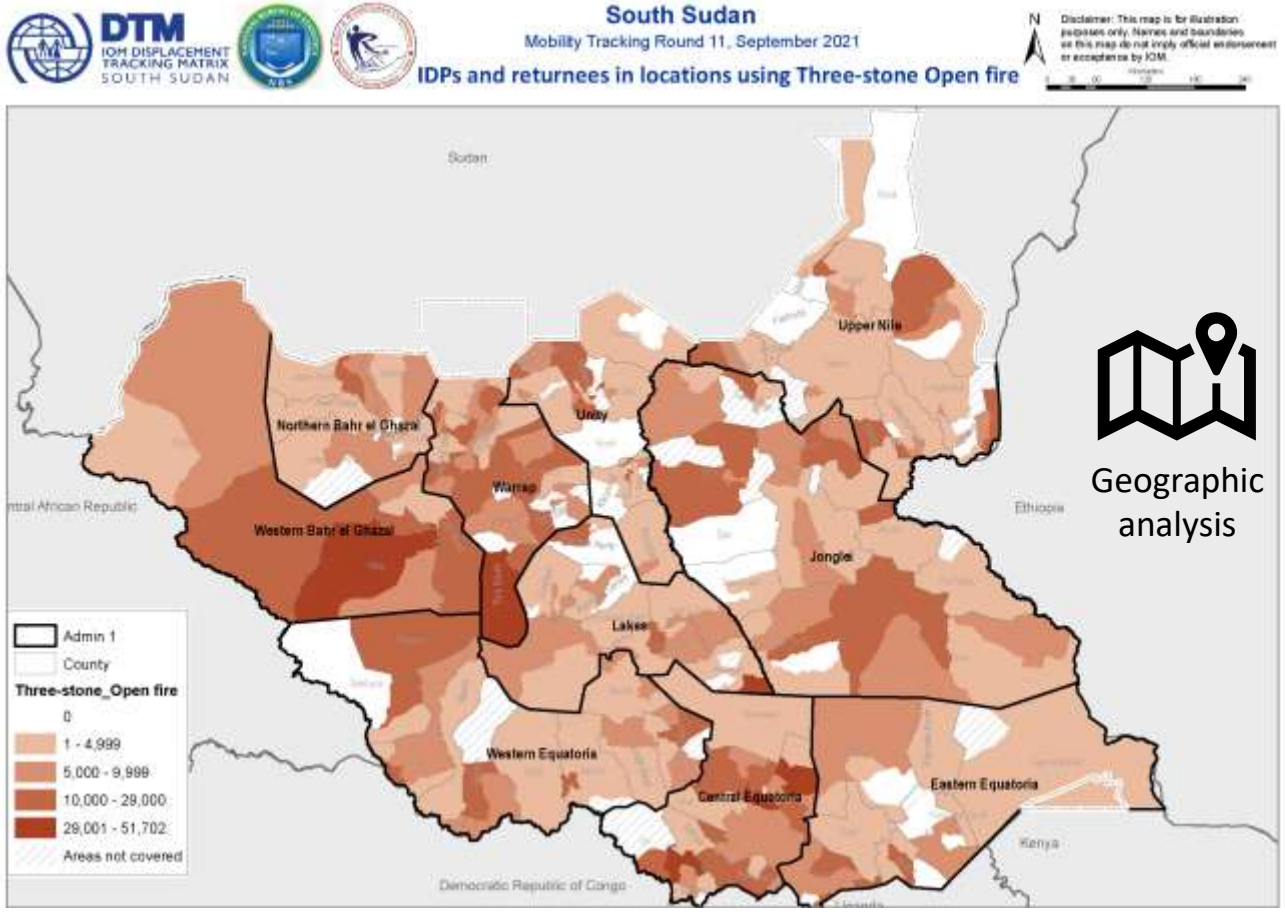
The pilots: South Sudan and Niger

South Sudan

- September 2021
- 10 States
- **2,606 locations**
- **1,705,584 IDPs** (313,464 HHs) and **1,506,783 returnees** (292,178 HHs)
- 9 energy-related indicators

→ Niger

- December 2021
- 4 regions
- **307 locations**
- **+300,000 IDPs**
- 9 energy-related indicators



Geographic analysis

IOM UN MIGRATION | DTM IOM DISPLACEMENT TRACKING MATRIX

What we learnt and next steps

Key achievements

- With 4 pilots in 2021, DTM has collected energy-related data in
  - **+6,600 locations**
  - Representing **4.7 million IDPs and 1.5 million** returnees (South Sudan)
- The pilots have helped **raised internal and external interest** to include energy in MSLA exercises
- DTM has demonstrated **the capacity to serve a wide range of partners** with energy access data at the location level and can play a role in capturing a **baseline** for SDG7 in displacement settings

Learnings

- Thanks to its **wide network of enumerators**, DTM enumerators can conduct **different types of assessments** (key informant interviews, observations, household level surveys) if correctly trained and if resources allow
- Data **analysis** and **report** writing requires **expertise and resources**

Future improvements

- Reinforcing training (training of the trainers) as it directly affects data **quality** and **consistency**
- Datasets could be available publicly* beyond the DTM website, reliefweb and HDX to simplify sharing/notifying of new available data
- **Encourage partners to make use of the data and provide feedback, based on information needs!**

Thank you for your attention!

For more information, please contact greening@iom.int

Links and complementary information

- https://dtm.iom.int/
- https://dtm.iom.int/reports/nigeria-%E2%80%94-multi-sectoral-location-assessment-energy-access
- https://displacement.iom.int/reports/northern-mozambique-crisis-%E2%80%93-multi-sectorial-location-assessment-summary-report-energy?close=true
- https://displacement.iom.int/dtm-partners-toolkit/field-companion-excel
- https://displacement.iom.int/dtm-partners-toolkit/energy-0
- https://displacement.iom.int/dtm-partners-toolkit/guide/dtm-energy

Humanitarian Energy Knowledge Sharing Tools

Ranisha Basnet, Energypedia

Humanitarian Energy Knowledge Sharing Tools

Developed in partnership by:

GPA GLOBAL PLATFORM FOR ACTION · energypedia · ICRC · giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

7 AFFORDABLE AND CLEAN ENERGY

Humanitarian Energy Knowledge Hub

This hub is a one-stop destination for anyone interested in the humanitarian energy nexus. It consolidates, manages and links the latest information and knowledge from the sector. This hub is also a living knowledge product and is continuously updated.

Partners are invited to share their resources to feature on the hub by emailing **energy@unitar.org**

Humanitarian Energy Knowledge Sharing Tools

Developed in partnership by:

GPA GLOBAL PLATFORM FOR ACTION · energypedia · ICRC · giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

7 AFFORDABLE AND CLEAN ENERGY

Private Sector Stakeholder Database

Database of private sector actors who are active in the humanitarian energy space. This database provides a list of companies in an easy and structured way. The companies can also easily create a profile and share their work.

Invitation to all private sector suppliers to fill in your product and service information to be featured in the database on Energypedia

Humanitarian Energy Knowledge Sharing Tools

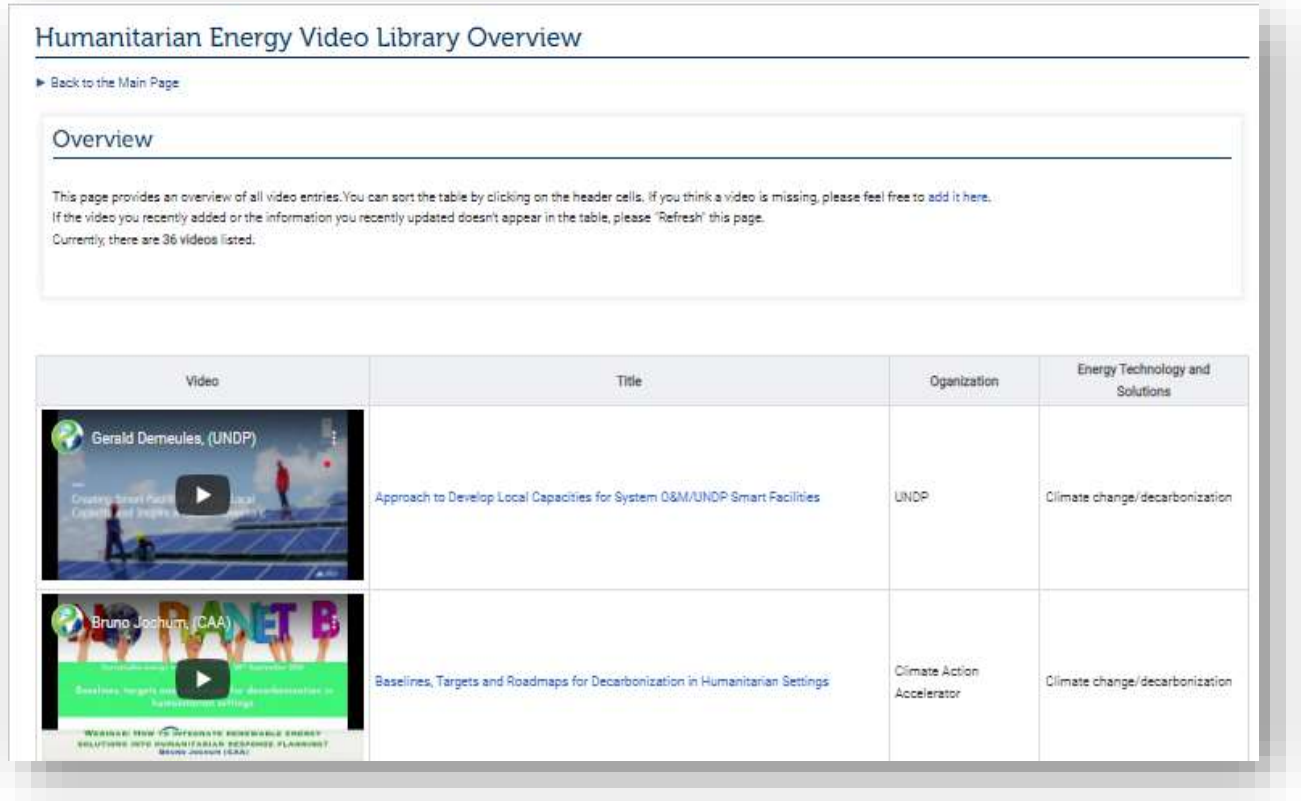
Developed in partnership by:

GPA GLOBAL PLATFORM FOR ACTION · energypedia · ICRC · giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

7 AFFORDABLE AND CLEAN ENERGY

Humanitarian Energy Video Library

This library includes short video presentations on topics related to humanitarian-energy nexus and aims to promote knowledge exchange and sharing among humanitarian and energy actors.



Partners are invited to add in their webinars to the library by emailing **energy@unitar.org**

Discussion and Audience Q&A

Data for needs identification, project design and business model development in displacement settings

Learnings from the World Bank-funded projects ¨Energy access for host communities and Forcibly Displaced People in the Sahel and Lake Chad Basin¨

Energy in displacement settings in the Sahel: background

- **3.5+ million people fled across the Region** (Burkina Faso, Chad, Mali, Mauritania, Niger) since 2011: within countries (IDP) and across borders (refugees).
- 26% electrification rate 26% : **64 million+ people in the Region live without electricity**.
- **Nascent private off-grid sectors:** cannot absorb the existing demand in the off-grid rural areas (electrification rates under 15%).
- Main/national **grids**: not covering camps or IDP settlements in urban settings.
- Few projects and policies addressing FDPs: **integrated electricity plans do not take FDP into consideration**.
- Linkages **Energy & Humanitarian Space**: energy as a means of achieving protection and well-being of displaced-affected communities.

Need to **engage the private sector** to enhance the energy access opportunities of FDP & develop **energy solutions: flexible** & **effective** while addressing the **increased complexity** of the humanitarian context.

Project objectives and scope

- Conduct an assessment of electricity access to better understand **demand** and **supply** and identify **market barriers**, key **market players** and support required to promote the growth of basic electricity services.
- Identify options for **fast delivery mechanisms** and preparing **investment operations** on electricity access displacement-affected communities across the Sahel and Lake Chad Basin.

- *Extensive literature review of national and regional **energy policies***
- *5,**230 end-user interviews** at 7 sites in 6 countries*
- *Semi-structured interviews to major **stakeholders***
- ***Multi-country analysis** of socio-economic and energy parameters*

1 Energy Access in displacement settings

*Contextualise **forced displacement** and **energy access** situation in the **Sahel** and characterize the **energy needs** of displacement-affected communities.*

- ***Data aggregation** from multiple sources to obtain total number of displaced and host communities and total population*
- ***Geo-spatial least-cost** of electrification analysis*

2 Energy interventions

*Identify the **most suitable energy interventions** to address the identified energy needs of displaced populations.*

- *Outputs of the **LCOE** analysis and the energy needs assessment*
- *GOGLA, Verasol documentation and other relevant sources*

3 Market characterization

*Present the **size** of the potential market to reach and analyse the off-grid **market landscape** in the Sahel countries, including main market **barriers**.*

- *Outputs of energy intervention analysis*
- *Outputs of the market assessment*
- *Outputs of the socio-economic assessment*
- *Interviews to donors and implementers of **successful programmes***

4 Implementation

*Identification of **business models** and **delivery mechanisms** that are needed to carry out the energy interventions within the current socio-economic and market context.*

5 Roadmap

*Guide the **implementation milestones** to reach sustainable electrification of displaced-affected communities.*

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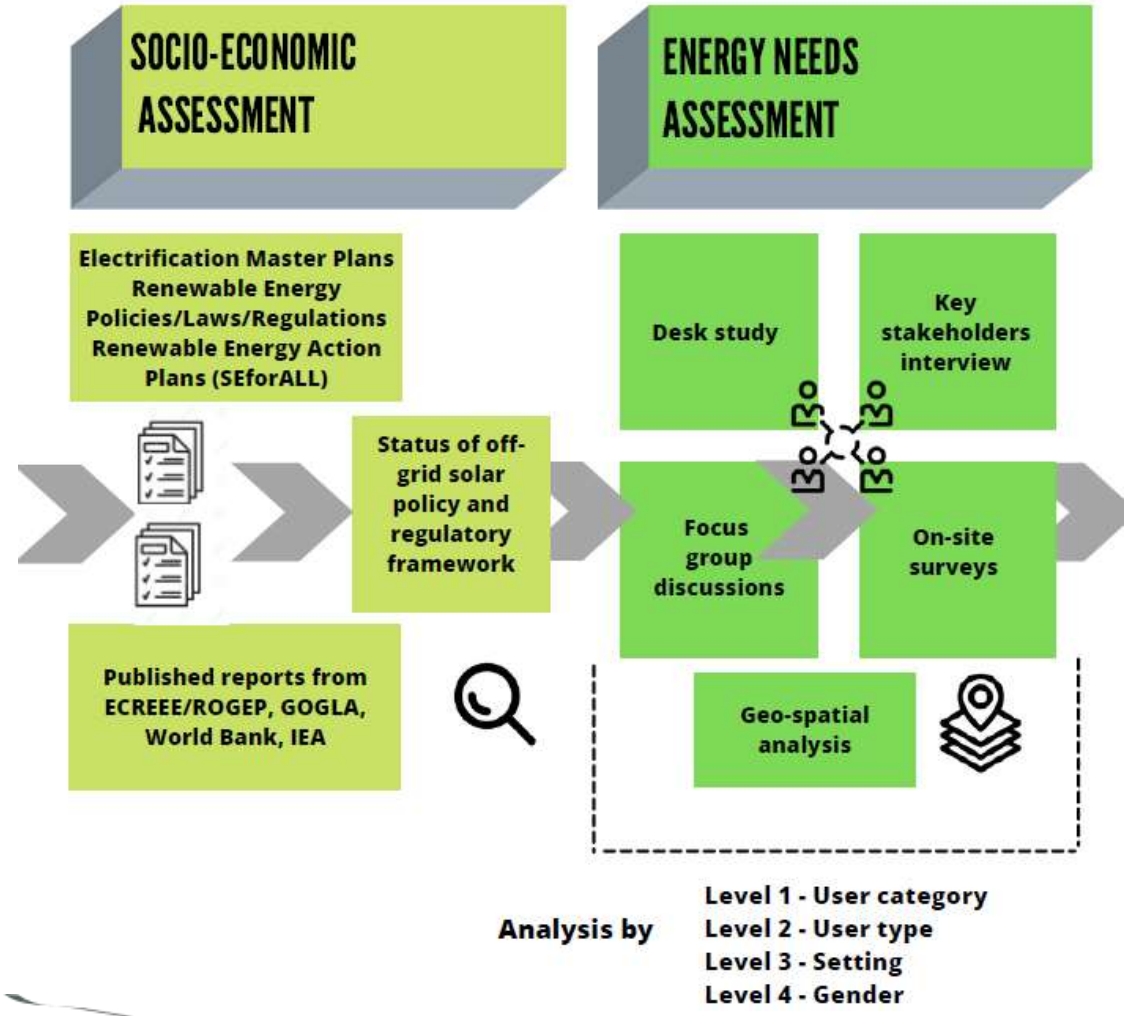
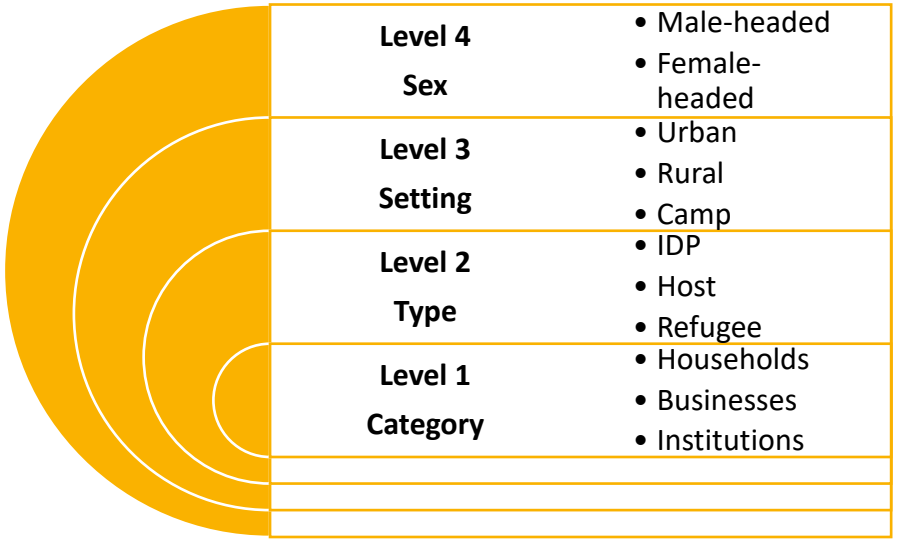
Energy needs of displacement-affected communities: methodology





- Identify key **similarities, differences**, and interwoven **relationships**.
- Understand the **different energy needs** distinguishing by end-user categories, end-user types, settings, and sex.
- Identify **empirical proof** for main socio-economic and energy trends.
- Build up an **energy profile** for each setting.
- Identify the inputs for the **Least-Cost of Electrification analysis**.

Energy needs of displacement-affected communities: key findings

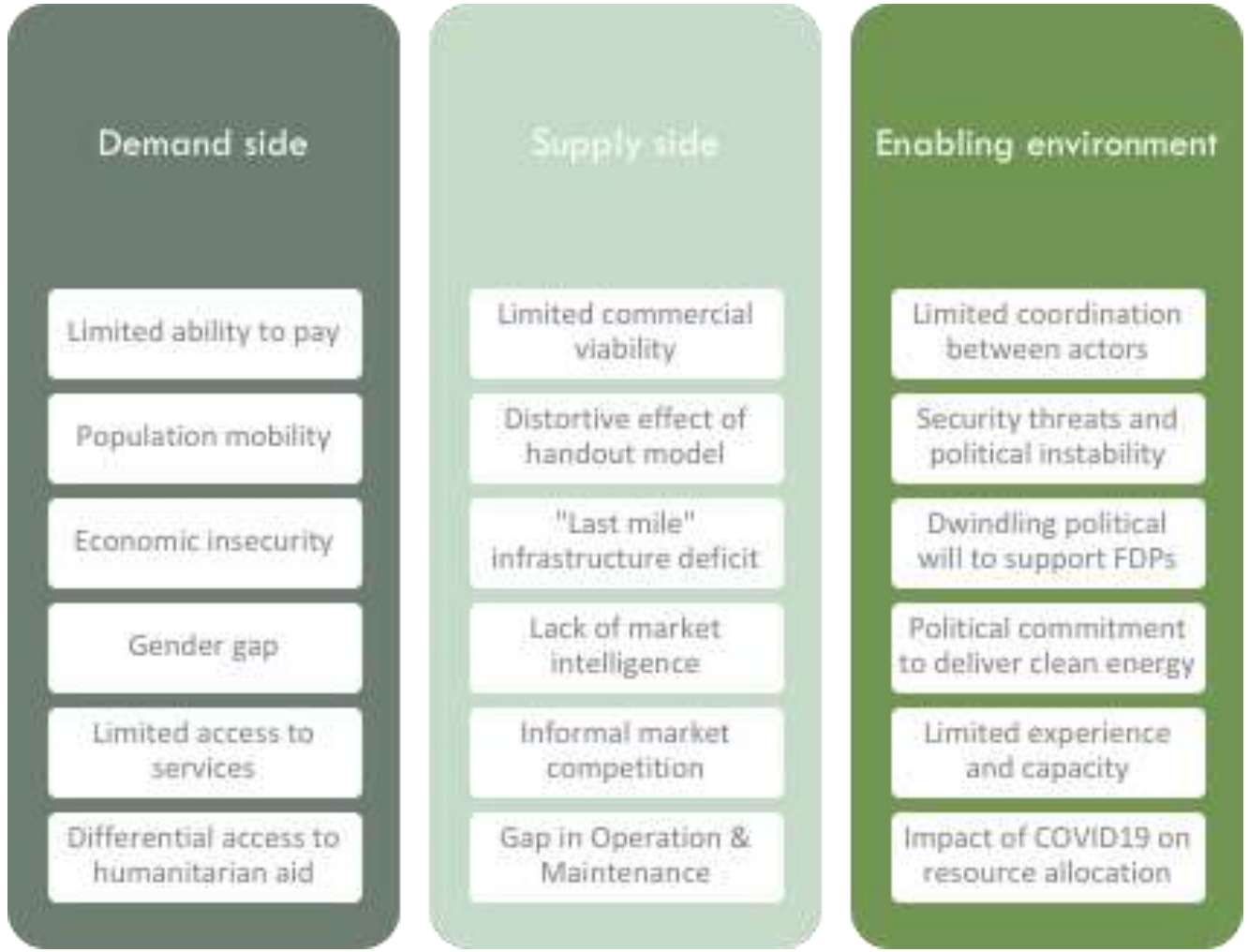



- Vulnerability of **IDP households in urban settings**: lower access to basic services and left behind by humanitarian aid.
- Limited access to **expensive** but **low-quality** energy products: alternative coping mechanisms.
- Key role of **humanitarian actors**: essential means of livelihood and access to SAS systems.
- Limited access to traditional **financial services**.
- **Health centers** and **schools**: energy infrastructure under-maintained, assets inefficiently used and a lack of clarity of responsibilities.
- Business generation is an **incentive** for both IDP and refugees to remain in the settings.

Energy delivery in displacement settings: barriers

- There are a range of **barriers** hindering the delivery of effective business models.
- A **combination of approaches** are needed to overcome the various challenges.
- A **flexible**, **adaptable** and **context specific** range of measures and delivery mechanisms are needed.
- Demand and supply side **subsidies** are crucial for all approaches

These factors play out differently across **end-user types** – refugee camps, urban and rural settings



Energy delivery in displacement settings: business models & delivery mechanisms

Example: mini-grids

- **PPP Energy Service Company (ESCO) model**: mini-grid **assets** are owned and financed by the Government; private company installs and, or operates them.
- **PPP model-split asset with grant:** the Government finances and/or owns the **distribution network**; the private operator **finances**, builds, owns the generation assets, and operates the entire mini-grid.
  - Humanitarian agency as service provider.
  - Private developer as service provider.

Camps in high-risk areas, rural settings	PPP-ESCO	Strategy at regulatory and contract level in case of grid extension
		De-risking mechanisms
		Partnerships humanitarian & development actors
		CAPEX and OPEX-based subsides
Camps in low-risk areas, urban settings	PPP Split-asset with grant	Stratetegy at regulatory and contract level in case of grid extension
		De-risking mechanisms
		CAPEX and OPEX-based subsides
		Tailored PPA/leasing templates

Energy delivery in displacement settings: business models & delivery mechanisms

The number of **forcibly displaced people** has increased by **400 %** during the last 3 years and the number of people on the brink of starvation has risen almost tenfold.

The complex insecurity context and the climate challenges need a combination of **innovative** energy **business models**, **financing mechanisms**, and **implementation strategies** together with the political will from governments and donors to include displacement-affected communities as part of nationwide electrification plans to ensure the **protection**, **well-being**, and **integration of FDP**.

Data for needs identification, project design and business model development in displacement settings

Learnings from the World Bank-funded projects ¨Energy access for host communities and Forcibly Displaced People in the Sahel and Lake Chad Basin¨

Thank you!

Maria Ten Palomares

maria.ten@tta.com.es

Sharing of ICRC capacity development work for humanitarian agencies and communities / Project examples

Announcement of Regional training Hubs

in Nairobi and Dubai

Peter Leskovsky and Britt Christiaens - ICRC

Water & Energy Knowledge Hub

*"the Energy and Water Knowledge Centres could be a **place of knowledge exchange**, inviting important regional actors from financial institutions, private sector, academics and other humanitarian organizations which are implementing their **projects with energy components** as well.*

*The Energy and Water Knowledge Centres could also **foster and craft meaningful partnership** including with universities, aid agencies and the private sector*".

ICRC project business case, 2021

Water & Energy Knowledge Hub

- **Regional** training hubs (Nairobi/Dubai)
- **Multilateral partnership**
- ICRC / Strathmore University (SERC)
- Schneider Electric & Grundfos foundation
- Focus on **sustainable energy and water supply**
- Training lab with specialised equipment and tools
- Vocational training for **ICRC staff and operational partners**
- Aspirations: **use by other potential partners** (accredited courses)

More info SERC: https://serc.strathmore.edu/

Water & Energy Knowledge Hub

Electricity foundation course – Schneider Electric

- Electrical safety
- Introduction to electricity measurements and physics
- Power generation, transmission and distribution
- Transformers, motors and generators
- Wiring, diagrams and installations
- Earthing and lightning safety
- Power distribution panels, MV and transmission lines
- Solar power and mini-grids

Efficient borehole water pumping course - Grundfos

- Basics of hydraulics and electricity necessary for design
- Data collection & analysis for identification of suitable solutions for water supply
- Data use for optimisation of pumping system
- Sizing of pump, pipes, cables, genset, PV (solar panels) and control panel
- Technical specifications for all required material and evaluation of offers
- Supervision, important points to check during installation & commissioning
- O&M training

Water & Energy Knowledge Hub

Electricity foundation course

- Curriculum development: ongoing
- Installation and testing of equipment: June 2022
- ToT training for Strathmore engineers (8-days): July 2022
- Trainings for ICRC engineers (5-days): Sep-Dec 2022

Electromechanical course - efficient borehole water pumping

- Curriculum development: ongoing (+ consultancy)
- Installation of equipment: July 2022
- ToT training for Strathmore engineers (5-days): Sep 2022
- Trainings (5-days): Oct-Dec 2022

+ technical expertise / local resources & solutions / outreach
- adaptation to humanitarian context (no “plug and play”)

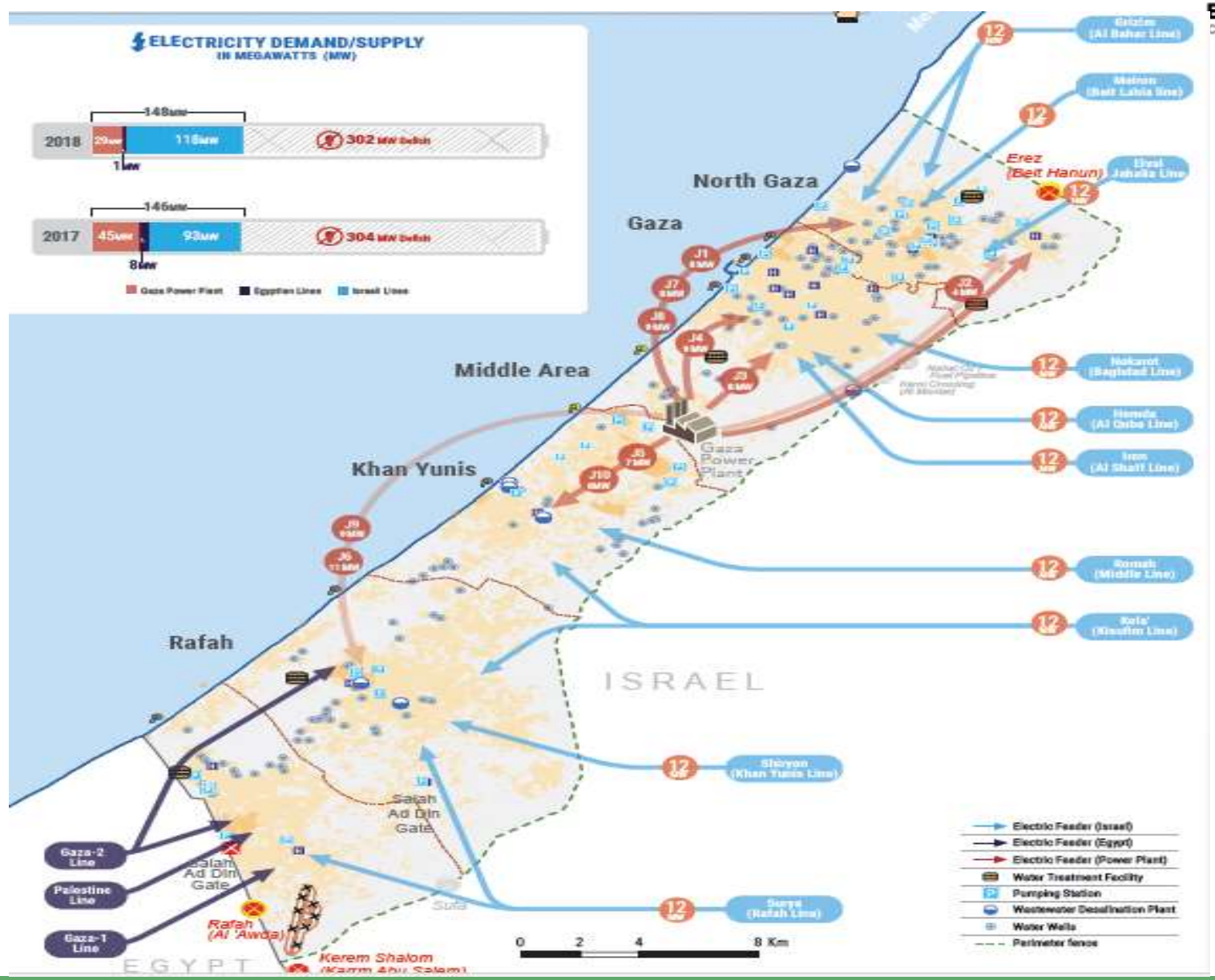
Strategy Documents among internal /organizational changes focus energy related actions to following guidelines/principles:

° activities related to change mind set from “normal practice” to adopting a new principles, modules and materials which can cause access to humanitarian energy and related services for everybody, while using renewable sources, respecting environmental rules and challenges;
° propagating impactful projects models and ideas for covering energy or services supply needs within ICRC AOR (area of operation);
° implementing social science, consumption monitoring in order to develop energy saving strategies for Organization staff and integrate energy conservation practices in ICRC responses;
° investing for long term change and involve external financing through market-based ways to deliver sustainable energy; when considering conduct rehabilitation of urban, water of energy systems – conduct analyses which allow more effective restoration, operation or priority rehabilitation;
° use a new approach towards donors and private sector investors in to project planning, preparation , financing and implementation, to reduce high financial budget impacts, focus on multi-year projects;
° develop energy delivery models which would enhance resilience of essential services for end users;
° orientate to innovative technical and financial partnership to increase and accelerate investments;
° define all stages of Energy Transition – from analyses, to design, implementation, adaptation and evaluation phases;
° include resilience/sustainability criterion in order to eliminate social or socio-economical impact on affected population or community

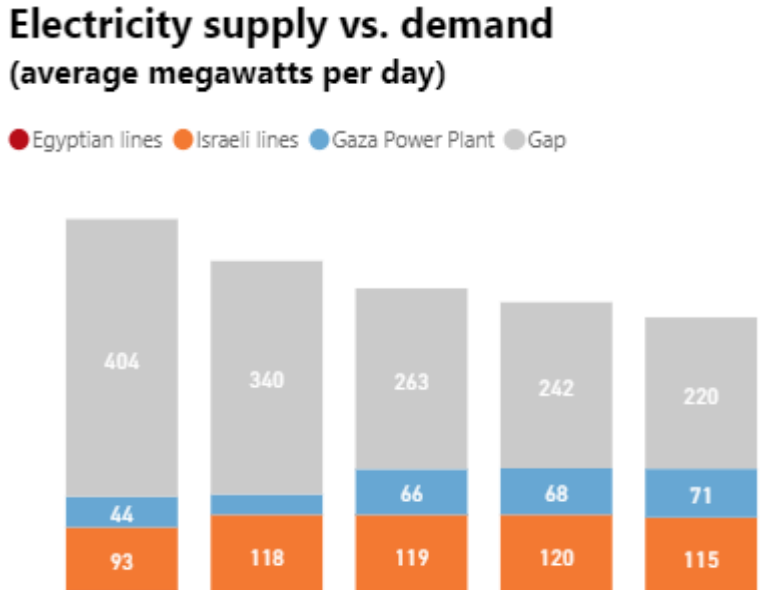
ICRC humanitarian example
Creation sustainable power/water supply net in Gaza

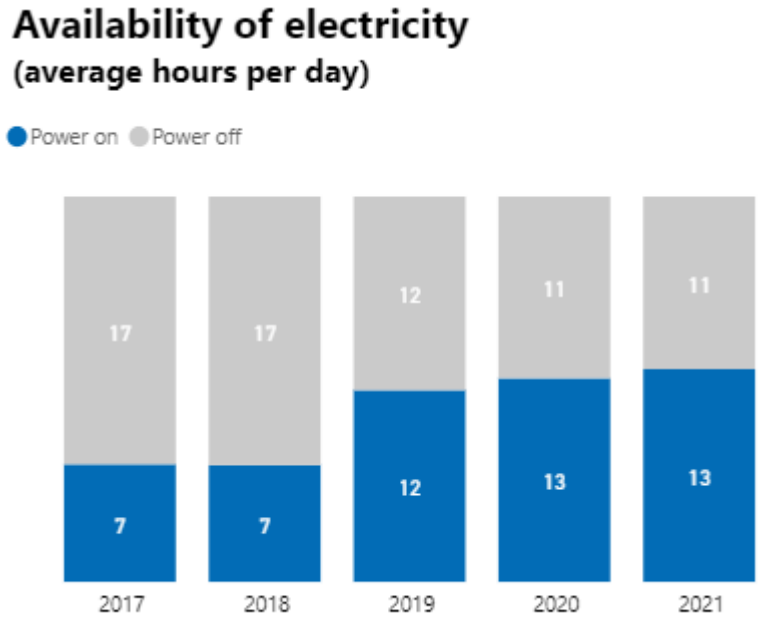
Gaza Strip could be characterized as "island" bordered by Mediterranean sea, Israel and Egypt. From "energy point of view" is fully depending on neighboring countries supply (fuel, power). Due to instantly growing demand power supply is scheduled for limited hours. Water supply is depending on power or fuel supply

ICRC focus is specific, mostly on medical installations, water/power supply and public services support (among others). Project as part of water supply system. As the ICRC contribution towards Gaza resilience, PV power supply was considered hybrid type (PV, grid& fuel generators) with "on grid" with dedicated power line allowing to economically supply "energy surplus" to the Grid. Results collected after 2 years of operation confirmed feasibility of concept with high operational, economic and socio-economic impacts.



Energy (water) challenge in Gaza





Chronic Electricity Deficit

- Critical Facilities run way below their design capacities
- About 100,000 generators consume 500,000 liters of fuel daily
- Way forward: increase supply, manage demand

Socio-economic criteria for Project evaluation

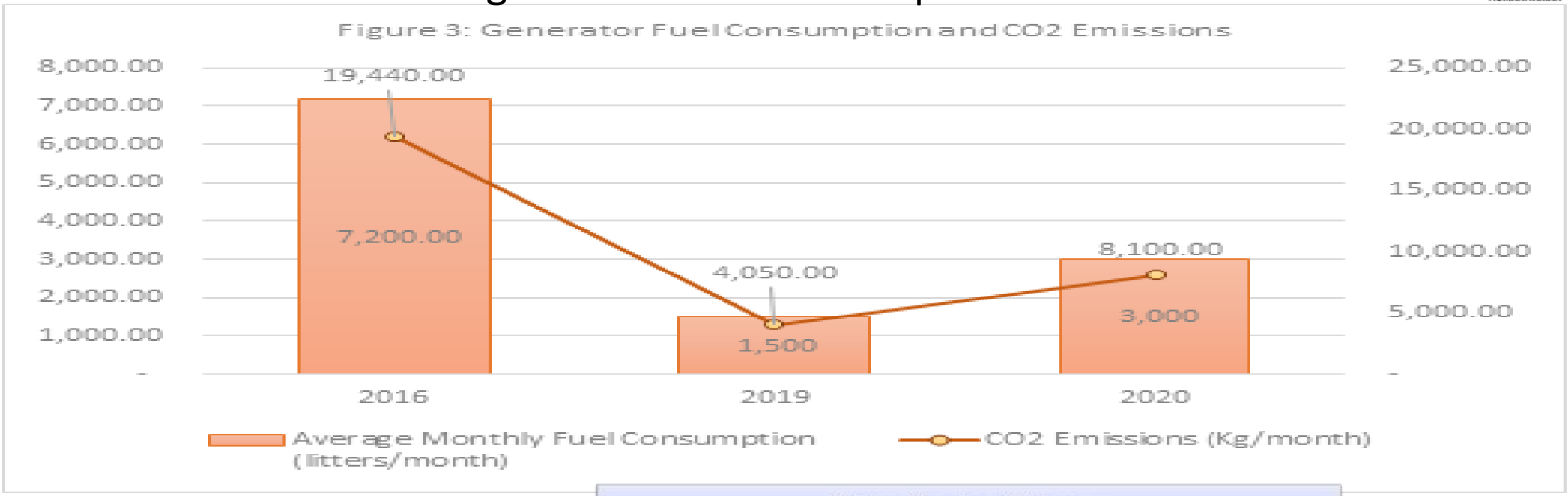
- °increasing of power/water supply for almost 1 mil inhabitants;
- °creation of more integrated power supply system following related also to water supply net with application of SCADA(supervisory control and data acquisition) , redundant power lines to critical facilities, PV power supply systems using “net-metering” with injection of surplus electricity to grid, implementation of AR (automatic reclosers/switches) to MV lines, smart meters and LV circuit breakers;
- °reduce use of fuel operated generators and related carbon emissions;
- °improve capabilities of desalination and waste-water management plants;
- ° significant improvement of power/water supply and quality of life;
- °creation of job offers for local inhabitants;
- °subject of water part of project was Rafah city(220k inhabitants) where is installed 29 wells in net,8 desalination plants(brackish water) and 1 sea water desalination plant

Major benefits achieved by implementation of this ICRC Project

- Save the power consumed by one of the main water facilities in Rafah (estimated to save 41% of facility consumption in summer months), save 100% of fuel needs to operate generators, ***increased Canada well water production by 36%, increased the water distribution from Canada boosters by 54%, and an overall improvement in the water service provisions in Rafah City from an average of 62 Litters/Person/Day in 2019 to an average of 67 Litters/Person/Day in 2020*** **],**
- **Sustainability of water supply operations** [*reduce the dependency on non-renewable energy source (generator), fuel consumption reduction from 13,280 litters in 2019 to 440 litters in 2020, and no generators maintenance,*
- The project is deemed to be **financially viable** with pay-back period of 5.46 years in case of 33.40% water bills collection rate. Despite the low water bills collection rate, there is significant increase in CMWU revenues (around 122,000 USD comparing to around 55,000 USD for 2020 comparing to 2019). Shall the economic situation improve in Gaza, and in-turn, the water bills collection rate, the CMWU revenues will increase and ultimately, CMWU may start paying their due electricity bill to GEDCo ,
- Contribution to Gaza resilience: secure the power availability in 1 public water well through solar, independent from the public grid if needed.
- Limit the exposure of intervention teams **,**Contribute in using the net-metering system/ on-grid in Gaza and produce documented proof of its practical humanitarian applications and potential benefits.
- extended working hours of pumping station from 14 hours to 20 hours per day
- Increase water supply services to part of Rafah Governorate population from once every 3-4 days to once every 1-2 days.

Gaza Project implementation benefits

- Dramatic reduction of generator fuel consumption and CO2 emissions



Public Health:
Decrease the likelihood of local public health hazards related to the failure of critical water infrastructures due to disruption of power supply

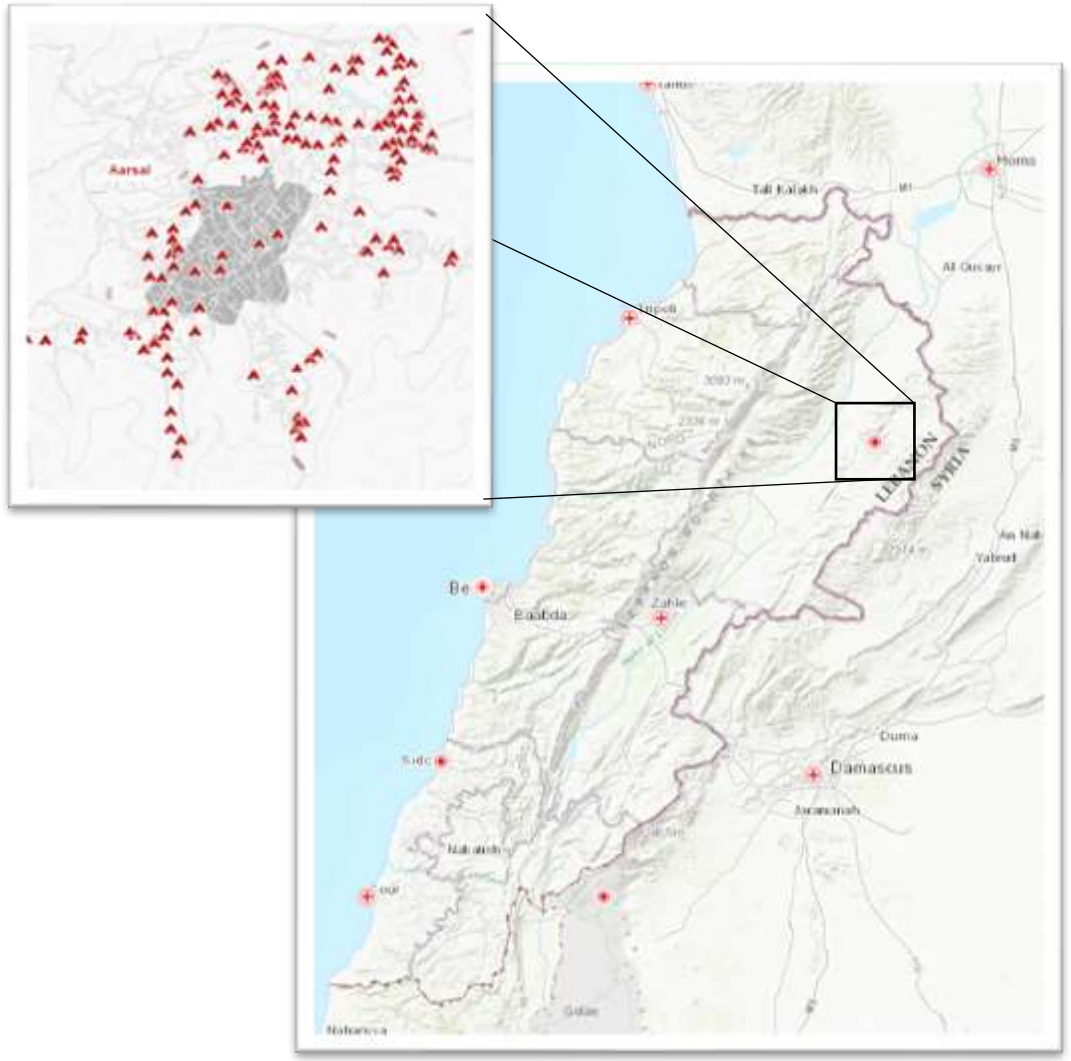
Water Service Delivery:
Improve the reliability of power supply to the targeted facility and indirectly part of the general population in Gaza

Power Service Delivery:
Improve the reliability of the water services for the population served by Canada well

Service Provision:
Improved preparedness to Emergencies

SOLAR APPLICATION

Aarsal, Lebanon



Solarization of Pumping Stations in Arsal (124 km N-E of Beirut),Lebanon

- About 12 h unstable and irregular power per day
- Water production: 1’080 m^3/d (~25% of need)
- Leaking distribution network (~25-50% losses)
- Expensive coping mechanisms, water trucking, bottled water, private networks
- Weak water system management and irregular supply to different zones

Concluding on results and challenges

Challenges

- Limited choice of location
- Landowndership issues
- Fragile organizational environment
- Limited technical knowledge and skills of operators
- Integration with other systemic support activities

Results

- Water production increase by 35.7% (405 m^3/d),
- serving 3’375 additional individuals
- Reduced operational cost ,stable water supply during day, water reservoirs enable water distribution overnight.

Considering present overall crises in Lebanon (limited power and fuel supply PV powered water sources are significantly increasing of drinking water supply to local population

Successful with room for improvement

PROS & CONS

PROS	CONS
Increased production by 35.7% (405 m^3/d)	Limited choice of location
Additional 3’375 individuals are served	Landowndership issues
Reduced operational cost	Fragile organizational environment
Independent operation from grid power supply	Limited technical knowledge and skills of operators
Sustainable, clean & echofriendly	Pumps’ Motors burning when not specified for solar pumping operation since operating on lower frequencies results in overheating these motor
Low maintenance required	Electrocution risks due to high DC voltage
Cost effective and short payback time	Derated output due to dust and soil deposits caused by the landscape which requires frequent cleaning
Evolving technology reaching higher efficiency values and higher power outputs at a reasonable initial cost increment compared to older products	Derated output due to weather conditions with high temperatures in summer and cloudy days in winter reducing the panels’ power generation
In context: surviving the country’s fuel & electricity crisis	Operation limited to daily sunny hours with zero autonomy: system doesn’t store energy
Long life span of up to 25 years	Necessity of storing water instead of energy resulting in additional cost for building reservoirs

Discussion and Audience Q&A

Thank you for attending the Skills and Data session at #HEC2022!