



ENGINEERING · PROCUREMENT · CONSTRUCTION

OFF-GRID SOLUTIONS

Energy
for Everyone.
Everywhere.

Overview



- KSG Kirchner Solar Group
- Off-grid Market
- KSG Approach
- KSG Off-grid Solutions
 - Telecommunication sector
 - Village electrification



Headquarters Germany

KSG Headquarters Germany



KSG Business Units



■ Rooftops



■ EPC / Project Dev.



■ CPV Tracker



■ Off-Grid

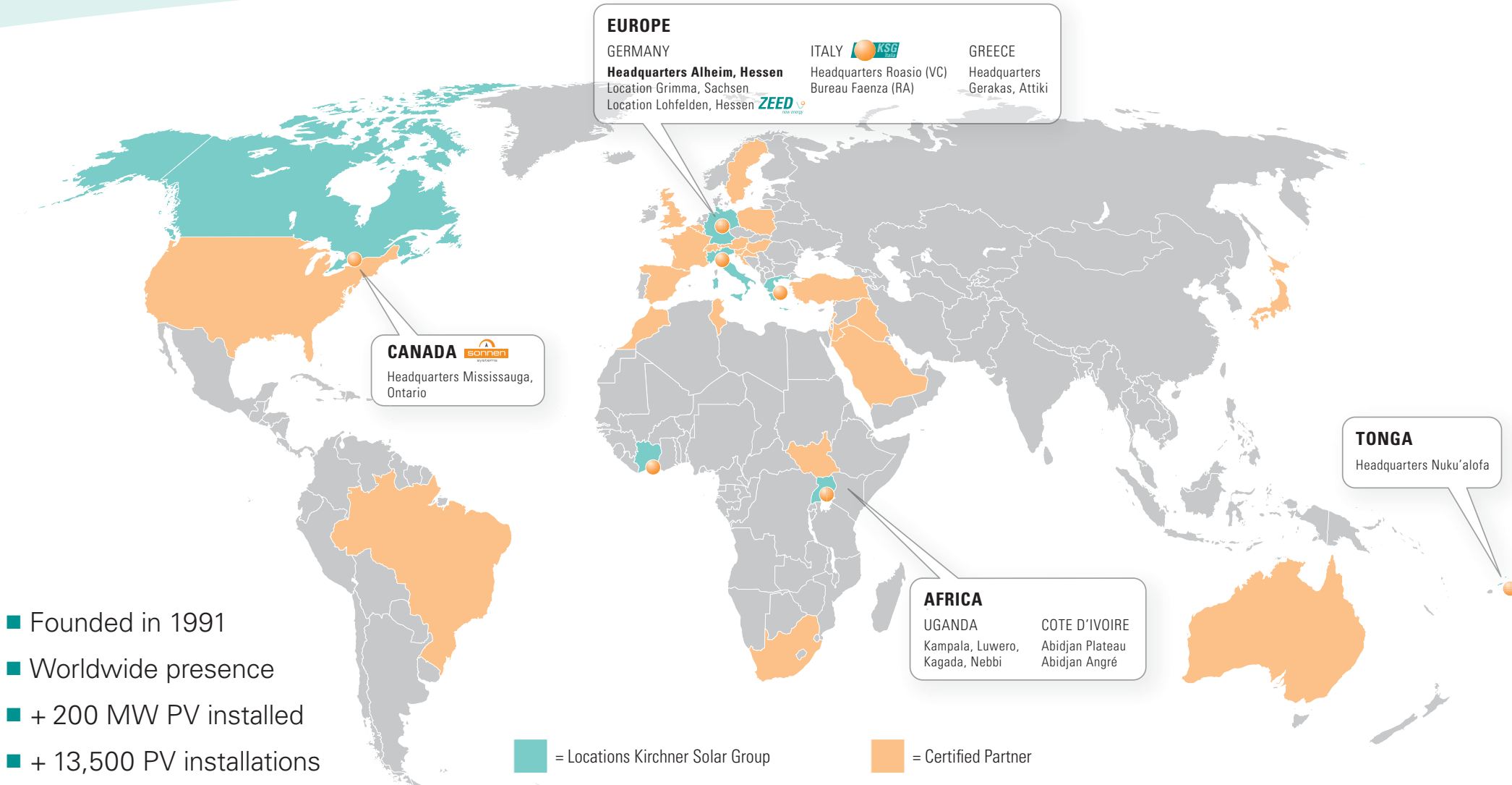


■ Wholesale PV



■ Service 24/7

KSG Kirchner Solar Group



- Founded in 1991
- Worldwide presence
- + 200 MW PV installed
- + 13,500 PV installations

KSG Solar Center Uganda



INVESTMENT SO FAR:

6.7 Billion Ush.

TRAINEES PER COURSE:

80 – 100 Accommodation provided.

TRAINING COURSES:

2 – 3 p. a.

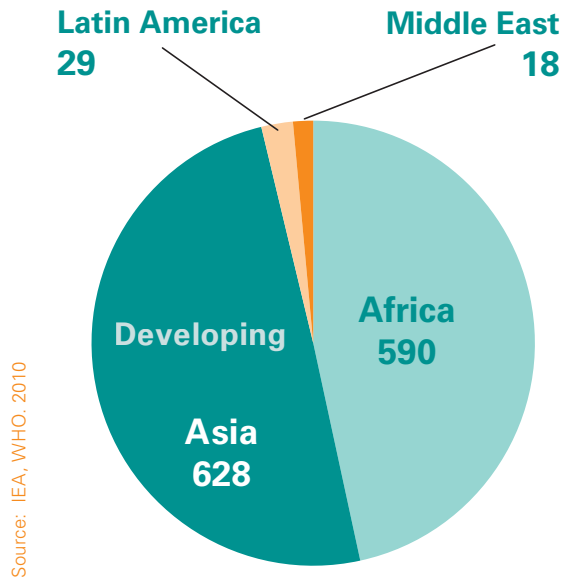
TRAINING DISCIPLINES:

- PV-Installer
- Electricians
- Locksmiths
- Welders
- PV-Marketing Specialist

Off-Grid Market

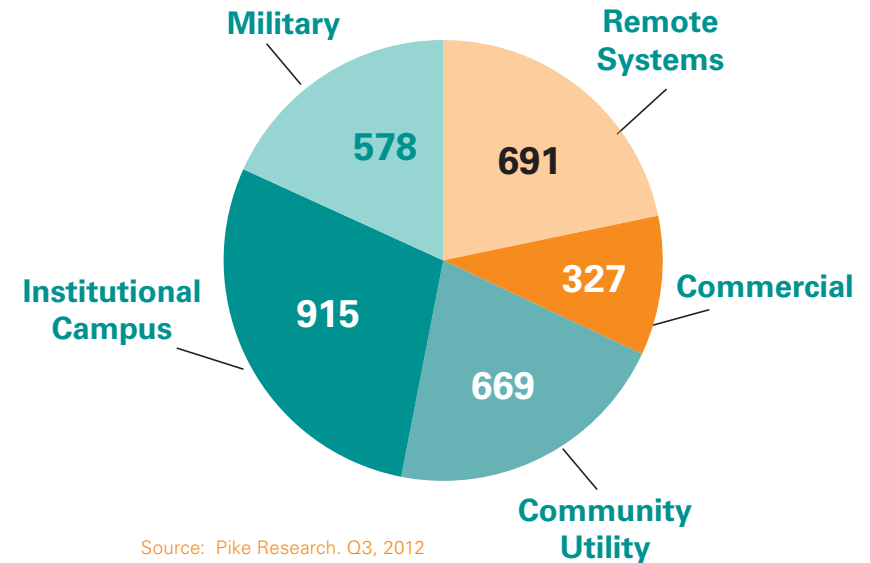


Population w/o electricity (millions)



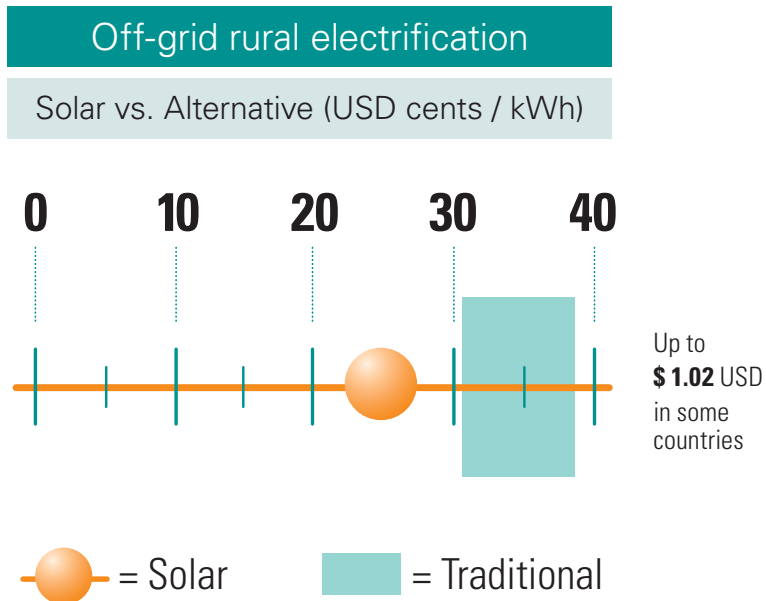
- Rural electrification challenges:
 - High costs grid expansion
 - Insufficient population density
 - Low electricity requirements
 - Complicated grid maintenance

Diesel micro-grids worldwide



- Diesel micro-grid challenges:
 - Rising diesel costs
 - High OPEX costs
 - Complex logistics
 - High carbon footprint

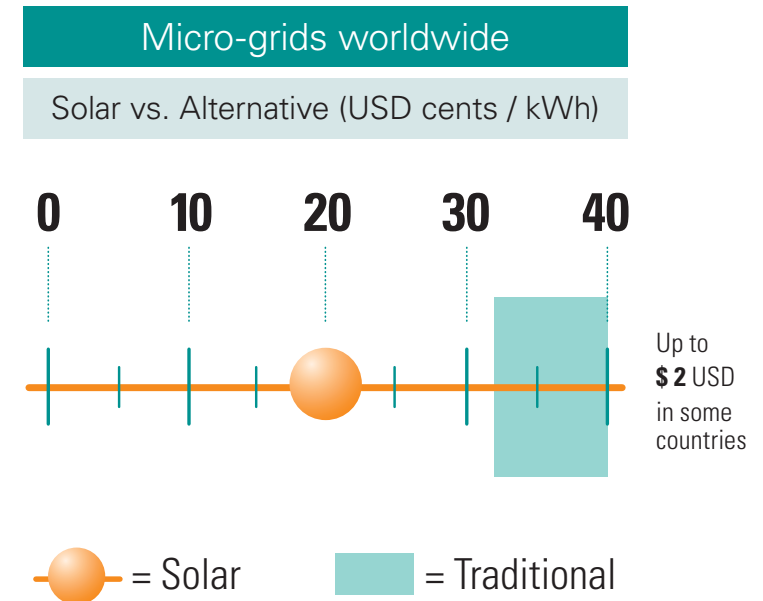
Off-Grid Market



Source: US EIA, McKinsey. 2012

■ Solar advantage in rural electrification:

- Low individual investment
- Decentralized
- Household sized systems
- Minimum maintenance needed



Source: US EIA, McKinsey. 2012

■ Solar advantage hybrid micro-grid:

- Minimum diesel use
- Low OPEX
- Supply reliability
- Minimum carbon footprint

■ Case: Telco-Sector in Africa









- 5 Mio. mobile cell towers worldwide consume 1% of the world's electricity
- Many in off-grid regions or unreliable grids
- Over 150.000 mobile cell towers in Africa
- Annual growth rate is assumed at 19%
- Rising competition leads to consolidations and cost pressure



KSG Telecommunication sector

■ Top Operators in SSA by number of connections

2012

Operators	Total Connections	Headquartered	Countries
	103,319,174	South Africa	Liberia, Botswana, Guiana, Benin, Cameroon, Congo, Côte d'Ivoire, Ghana, Guinea-Bissau, Nigeria, Rwanda, South Africa, Swaziland, Uganda, Zambia
	70,955,587	United Kingdom	DRC, Lesotho, Mozambique, South Africa (Vodacom), Tanzania, Ghana, Kenya (Safaricom)
	63,507,689	India	Burkina Faso, Chad, Congo, DRC, Gabon, Ghana, Kenya, Madagascar, Malawi, Niger, Nigeria, Rwanda, Sierra Leone, Tanzania, Uganda, Zambia
	28,592,053	France	Côte d'Ivoire, Botswana, Cameroon, CAR, Madagascar, Niger, Uganda, Equatorial Guinea, Mauritius, Guinea-Bissau, Guinea, Mali, Senegal, Kenya
 Globalcom	23,859,754	Nigeria	Benin, Ghana, Nigeria
	19,402,674	UAE	Tanzania, Nigeria, Benin, CAR, Côte d'Ivoire, Gabon, Niger, Togo
 Millicom	16,961,871	Luxembourg	Chad, DRC, Ghana, Rwanda, Senegal, Tanzania, Mauritius
	2,147,588	Sudan	Mauritania, Ghana, Senegal, Guinea, Nigeria

KSG Reference project Uganda



■ Pilot site:

Nakawomeka
(mobile cell tower)



Kabunyata
(village electrification)



KSG Uganda
(solar training center)



Luwero District



KSG Telecommunication sector



- Installation KSG Solar Genset for mobile cell tower in Nakawomeka



- Pilot site at mobile cell tower Nakawomeka

Inverter and battery bank



Energy container and installation



KSG Telecommunication sector



■ Impressions KSG Solar Genset in Nakawomeka



KSG Village electrification



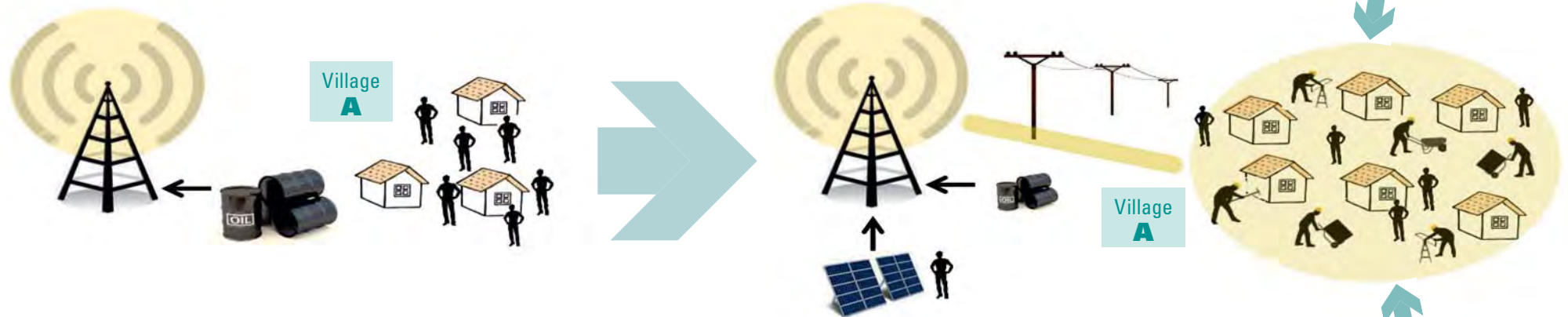
In cooperation with:
giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

- Impressions KSG Solar Genset for electrification in Kabunyata



KSG Electrification conception

■ Project: Mobile cell tower and village for rural electrification



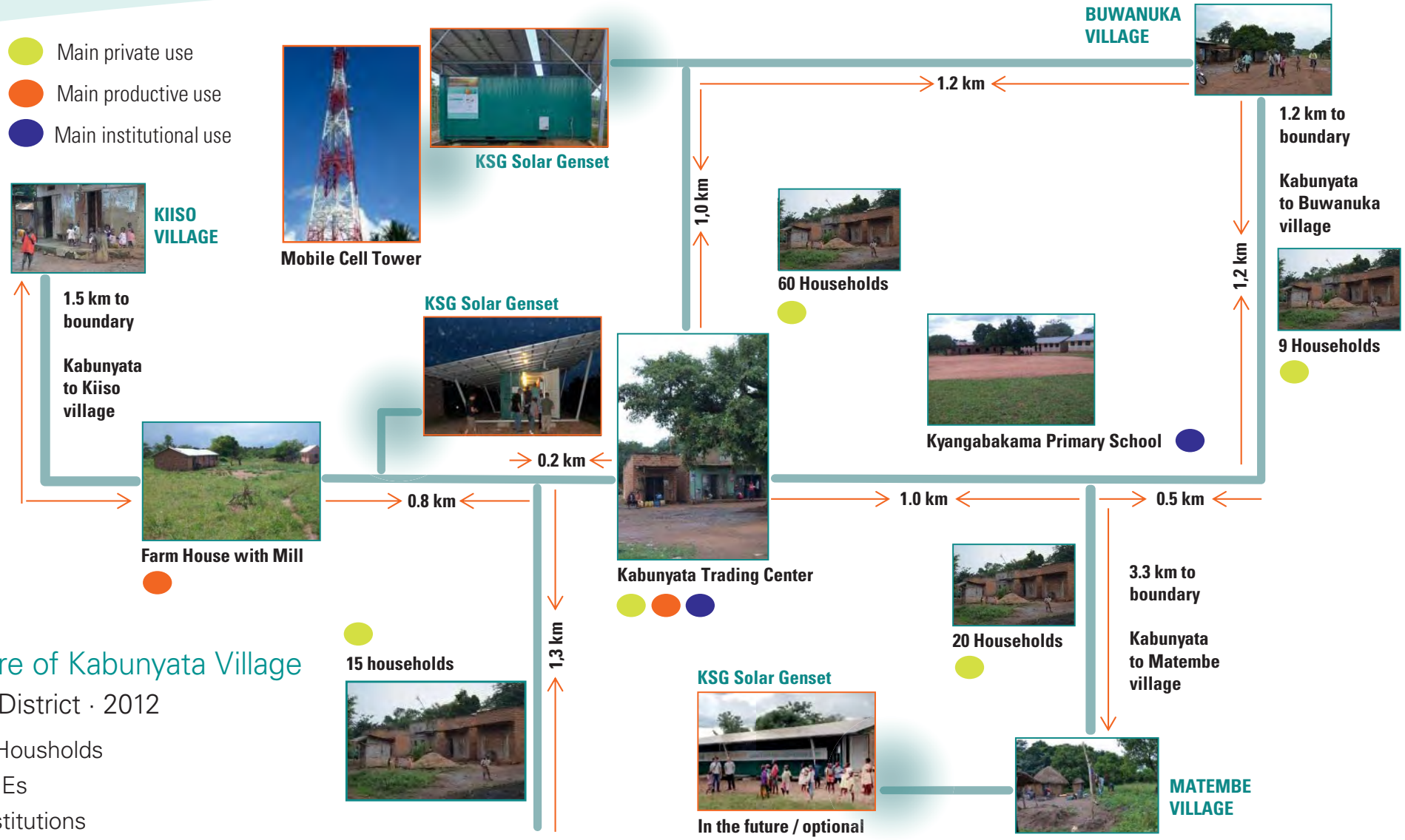
■ Before KSG Solar Genset ...

- Mobile towers are run by diesel
- Rural communities have no access to electricity, use paraffin and kerosene
- No economic development in rural areas
- High environmental burden

■ After KSG Solar Genset ...

- Solar substitutes diesel, energy costs sink significantly
- Establishment of small enterprises
- Creation of job opportunities in the villages
- Training in operation and maintenance

KSG Village electrification



Structure of Kabunyata Village

Luwero District · 2012

- forty Housholds
- ten SMEs
- two Institutions

Local customers and productive use



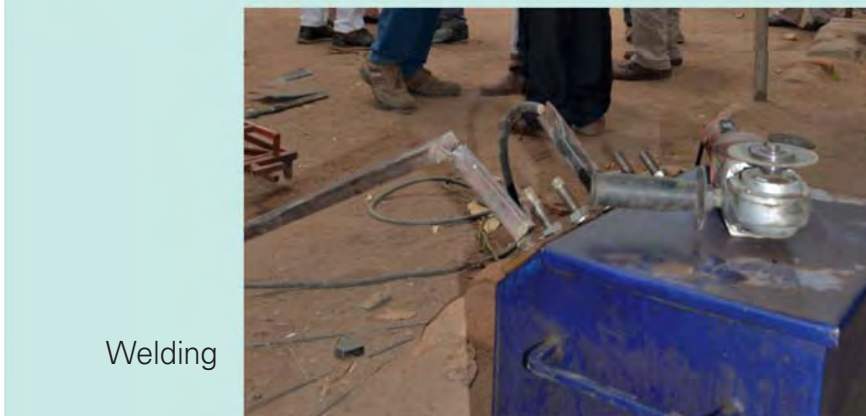
- ... after electrification with KSG Solar Genset



Haircutter



Foodstore



Welding



Bottleshop



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Thank you for your attention!