
I. Project Information:

Name: Refugee Settlement Electricity Access (RSEA) Database
Version: 02-0
Spatial coverage: Sub-Saharan Africa
Temporal coverage: 2020
Projection: WGS 1984 (EPSG:4326)
Creation date: June 2021
Update date: 2021-09-20

II. Description:

This study illustrates how, by using publicly available traditional and earth observation data, a continental database was created to capture the multidimensional factors which determine the decision to deploy renewable mini-grids in almost 300 refugee settlements. Focusing on Sub-Saharan Africa, the Refugee Settlements Electricity Access (RSEA) database is used to exemplify the benefits of open-access interoperable data for the scientific community and other stakeholders in the humanitarian and development sectors.

The RSEA DB was designed and developed to gather the multidimensional factors that can determine a refugee settlement's energy dimension. These factors were chiefly environmental (such as variability of solar radiation and avoided GHG emissions), technical (electrification status, distance to grid), social (population, electricity demand, social infrastructure), and economic (e.g., PV mini-grid component prices) considerations that can influence a stakeholder decision on the deployment of a PV and battery storage mini-grid in a displacement setting.

III. Authors:

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IV. Reference:

Baldi, Duccio; Moner-Girona, Magda; Fumagalli, Elena; Fahl, Fernando (2021): Refugee Settlement Electricity Access (RSEA) Database. European Commission, Joint Research Centre (JRC) [Dataset] PID: <http://data.europa.eu/89h/4261bf3c-7e8e-4b16-925b-68cf4eade37>

V. RSEA tabular data:

Name: Refugee_Settlements_Electricity_Access_DB_ver02-0.xlsx
Format: xlsx
Projection: EPSG 4326
Attributes: Same attributes of the RSEA database

VI. RSEA database:

Name: Refugee_Settlements_Electricity_Access_DB_ver02-0.gpkg
Format: geopackage (*.gpkg)
Layers: Baseline, Tier_2, Tier_3
Projection: EPSG 4326
Attributes: See item VIII

VII. Layers

Baseline:	Scenario with Household electricity needs registered from the field (around 130 Wh/day at year 0).
Tier_2:	Scenario with Household consumption raised to 200 Wh/day (at year zero).
Tier_3:	Scenario with Household consumption raised to 1000 Wh/day (at year 0).

VIII. RSEA DB attributes:

Settlements attributes

Attribute	Description	Unit
id_set	Unique ID	number
region	Regions of Sub-Saharan Africa	-
country	Country name	-
iso3_code	ISO3 country code	-
site_name	Name of the site or location (it can host more than one settlement)	-
settlement_name	Name of the settlement	-
type_unhcr	Settlement type defined by UNHCR	-
lon	Longitude	decimal degree
lat	Latitude	decimal degree
dist_border	Linear distance from the closest national border	km
dist_grid	Distance from the location and the country national electricity grid	km
pop	Refugee Population	number
hh	Households	number
bus	Businesses	number
inst	Institutions	number
avg_sph	Average sun peak hours per location	number

Energy demand and CO₂ emissions attributes

Attribute	Description	Unit
id_set	Unique ID	number
site_name	Name of the site or location (it can host more than one settlement)	-
settlement_name	Name of the settlement	-
e_dem_hh_kwh	Energy demand for HH (estimated @ year 5)	kWh/day
e_dem_bus_kwh	Energy demand for Businesses (estimated @ year 5)	kWh/day
e_dem_inst_kwh	Energy demand for Institutions (estimated @ year 5)	kWh/day
e_dem_kwh	Total energy demand (estimated @ year 5)	kWh/day
hh_cratio_kwh	Household consumption ratio at year zero	kWh/connection/day
bus_cratio_kwh	Business consumption ratio at year zero	kWh/connection/day
inst_cratio_kwh	Institution consumption ratio at year zero	kWh/connection/day
day_co2_t	Daily CO ₂ avoided (@ year 5)	tonnes CO ₂
year_co2_t	Yearly CO ₂ avoided (@ year 5)	tonnes CO ₂

PV battery distribution costs attributes

Attribute	Description	Unit
id_set:	Unique ID	number
site_name:	Name of the site or location (it can host more than one settlement)	-
settlement_name:	Name of the settlement	-
pv_kwp	Solar PV (optimized)	kWp
bat_kwh	Batteries (optimized)	kWh
gen_sol_usd	CAPEX_Generation for Solar PV	USD
gen_bat_usd	CAPEX_Generation for Batteries	USD
gen_oth_usd	CAPEX_Generation for Other	USD
dist_last_usd	CAPEX_Distribution for Customer connection	USD
dist_over_usd	CAPEX_Distribution for Overhead connection	USD
dist_sub_usd	CAPEX_Distribution for Substation	USD
oth_log_usd	Other CAPEX for Logistics	USD
oth_cont_usd	Other CAPEX for Contingency	USD
rep_usd	Replacement CAPEX	USD
tot_cost_usd	Total Project Costs	USD
lcoe_usdc_kwh_5	LCOE @5% discount rate	USDc./kWh
lcoe_gen_usdc_kwh_5	LCOE @5% discount rate Generation CAPEX only	USDc./kWh

Attribute	Description	Unit
lcoe_usdc_kwh_10:	LCOE @10% discount rate	USDc./kWh
lcoe_gen_usdc_kwh_10	LCOE @10% discount rate Generation CAPEX only	USDc./kWh
lcoe_usdc_kwh_12	LCOE @12% discount rate	USDc./kWh
lcoe_gen_usdc_kwh_12	LCOE @12% discount rate Generation CAPEX only	USDc./kWh

Sensitivity analysis attributes

Attribute	Description	Unit
id_set	Unique ID	number
site_name	Name of the site or location (it can host more than one settlement)	-
settlement_name	Name of the settlement	-
sens_om_1_all	O&M variation of 1% more in the LCOE All	USDc./kWh
sens_om_1_gen	O&M variation of 2% more in the LCOE All	USDc./kWh
sens_om_2_all	O&M variation of 1% more in the LCOE GenOnly	USDc./kWh
sens_om_2_gen	O&M variation of 2% more in the LCOE GenOnly	USDc./kWh
sens_25_fee_all	Connection fee reduction of 25% in the LCOE All	USDc./kWh
sens_50_fee_all	Connection fee reduction of 50% in the LCOE All	USDc./kWh
sens_75_fee_all	Connection fee reduction of 75% in the LCOE All	USDc./kWh
sens_100_fee_all	Connection fee reduction of 100% in the LCOE All	USDc./kWh

IX. Copyright:

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X. Changelog:

2021-07-07	Version 1.0 Fixed typographical error (<i>pv_battery_distribution_costs</i>).
2021-07-14	Version 1.1 Float attributes refactored to 2 decimal places (all layers).
2021-09-20	Version 2.0 Baseline and Tier_3 scenarios added to the database as new layers. All attribute fields were unified for each scenario.