

Supplementary Material

1. Structuring the Evaluation Model

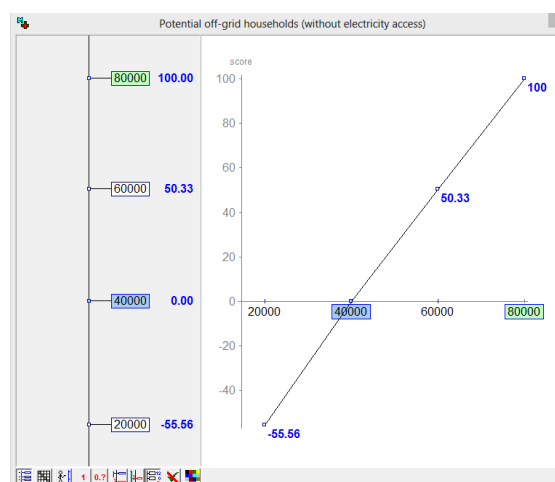
Table S1. Constructed performance scale for each criterion.

Dimension	Criteria	Unit of the descriptor	Type and Performance Scale
(E) Economic	(E1) 2018-GDP per capita	US \$	Four-level <i>quantitative</i> scale ranging from US \$3000 to US \$6000
	(E2) 2013-2018 Average GDP growth- 5 years	%	Four-level <i>quantitative</i> scale ranging from 3% to 9%
	(E3) 2018 Poverty Index (PL)	%	Four-level <i>quantitative</i> scale ranging from 10% to 40%
	(E4) 2018 Financial Inclusion	%	Four-level <i>quantitative</i> scale ranging from 50% to 80%
(C) Commercial	(C1) Potential off-grid households (without electricity access)	households	Four-level <i>quantitative</i> scale ranging from 20,000 to 80,000
	(C2) Dispersion index (potential off-grid households/area)	number of households/km ²	Three-level <i>quantitative</i> scale ranging from 0.1 to 1
	(C3) 2018 Rural Mobile phone ownership	%	Four-level <i>quantitative</i> scale ranging from 40% to 70%
	(C4) Solar PV Investment-National rural electrification plan	US \$M	Four-level <i>quantitative</i> scale ranging from US \$0M to US \$600M
(T) Technical	(T1) Solar potential	kWh/m ²	Four-level <i>qualitative</i> scale: Very High Potential: 4.5-5 kwh/m ² High Potential: 4-4.5 kwh/m ² Medium Potential: 3.5-4 kwh/m ² Low Potential: <3.5 kWh/m ²
(Env) Environmental	(Env1) Extension Protected Areas	%	Four-level <i>quantitative</i> scale ranging from 0% to 15%
	(Env2) Average terrain elevation	m.a.s.l.	Four-level <i>quantitative</i> scale ranging from 50 to 110
(S) Social	(S1) Rural Illiteracy rate	%	Four-level <i>quantitative</i> scale ranging from 5% to 15%
	(S2) Security Level (Global Peace Index)	points	Five-level <i>quantitative</i> scale ranging from 0 to 8

Table S2. Performance Profile of the Options (M-MACBETH software).

Options	GDPcap	GDPg	Poverty	FInc	PHouseholds_woEA	Dispersion	MPhone_rur%	SolarPV_inv	Solar_kWh/m ²	PAreas	Elev	Edu	Security
PER	6,941	3.26	20.5	80	148,430	0.4	75	328,866,548	Very High	16.93	235	14.6	6.8
BOL	3,548	4.62	34.6	60	18,664	0.29	53.1	357,066,229	Very High	16	100	17.6	6.2
COL	6,668	2.85	27	82	81,960	3.93	87.5	413,269,543	Very High	10.83	50	12.6	6.6

2. Building the Evaluation Model

**Figure S1.** Value function for the “Potential off-grid households” criterion (M-MACBETH software).

	80000	60000	40000	20000	Current scale
80000		no	strong	extreme	100.00
60000			no	v. strong	50.33
40000				no	0.00
20000					-55.56

Consistent judgements

Figure S2. Matrix of judgments for the “Potential off-grid households” criterion (M-MACBETH software).

2.1. Estimating the Weighting Coefficients: Simple Weighting Questionnaire

Instructions: Imagine an option exists that is neutral in every criterion:

1. How much would a swing from neutral to good in the *Potential off-grid households* increase its overall attractiveness?

Table S3. MACBETH categories used by the DM to model the differences in preference.

Extreme		Very strong		Moderate		Strong		Weak		Very weak		No
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A similar question was subsequently asked for each of the other criteria, thus completing the last column of the judgments weighting matrix, as follows:

	[Finc]	[SolarPV_inv]	[Security]	[Solar_kwh/m2]	[PAreas]	[Elev]	[NEUTRAL]
[PHouseholds_woEA]	?	?	?	?	?	?	extreme
[Dispersion]	?	?	?	?	?	?	v. strong
[GDPg]	?	?	?	?	?	?	extreme
[GDPcap]	?	?	?	?	?	?	v. strong
[Poverty]	?	?	?	?	?	?	v. strong
[MPhone_rur%]	?	?	?	?	?	?	v. strong
[Edu]	?	?	?	?	?	?	v. strong
[Finc]		?	?	?	?	?	strong
[SolarPV_inv]	?		?	?	?	?	moderate
[Security]	?	?		?	?	?	moderate
[Solar_kwh/m2]	?	?	?		?	?	moderate
[PAreas]	?	?	?	?		?	weak
[Elev]	?	?	?	?	?		weak
[NEUTRAL]	?	?	?	?	?	?	no

Consistent judgements

Figure S3. Weighting matrix of judgments (M-MACBETH software).

The next step was to elicit qualitative judgments from the decision maker regarding the difference of attractiveness between swings. It began with the comparison of the most attractive swing to the second most attractive swing, by asking:

2. How much more attractive is a swing from neutral to good in *Potential off-grid households* than in *Dispersion Index*?

A similar comparison was subsequently made between the swing in *Potential off-grid households* and each of the other swings, thus completing (from left to right) the first row of the weighting matrix. This process was then repeated row-by-row, until the weighting matrix of judgements was completed. The consistency checks were automatically made each time a judgement was entered into the matrix. The MACBETH software then created the weighting scale for each criterion.

Table S4. Final weighing matrix of judgments and associated weighting scale.

	[Finc]	[SolarPV_inv]	[Security]	[Solar_kWh/m²]	[PAreas]	[Elev]	[NEUTRAL]	Current Scale	
[PHouseholds_woEA]	V. Strong	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme	18.47	Extreme
[Dispersion]	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	Extreme	16.52	Very strong
[GDPg]	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	12.71	Moderate
[GDPcap]	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	12.71	Strong
[Poverty]	Strong	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	11.52	Weak
[MPhone_rur%]	Moderate	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	V. Strong	8.91	Very weak
[Edu]	Moderate	Strong	Strong	Strong	Strong	V. Strong	V. Strong	7.83	No
[Finc]	No	Weak	Moderate	Strong	Strong	Strong	Strong	5.22	
[SolarPV_inv]		No	Weak	Weak	Weak-Mod	Moderate	Moderate	1.85	
[Security]			No	Weak	Weak	Weak	Moderate	1.53	
[Solar_kWh/m²]				No	Weak	Weak	Moderate	1.20	
[PAreas]					No	V. Weak	Weak	0.87	
[Elev]						No	Weak	0.66	
[NEUTRAL]							No		
Consistent judgements									

Figure S4. Table of rankings for each criterion (M-MACBETH software).

GDPcap	GDPg	Poverty	Finc	PHouseholds_woEA	Dispersion	MPhone_rur%	SolarPV_inv	Solar_kwh/m2	PAreas	Elev	Edu	Security
PER	7	20	COL	PER	COL	COL	COL	VHigh	0	50	5	0
COL	BOL	PER	80	COL	1	PER	400000000	PER	10	COL	10	4
6000	PER	COL	PER	80000	0.5	60	BOL	BOL	COL	BOL	COL	BOL
5000	3	30	60	40000	PER	BOL	PER	COL	BOL	110	PER	COL
BOL	COL	BOL	BOL	BOL	BOL	50	200000000	Med	PER	PER	BOL	PER