



Sampling Design and Survey Weights
Transition to Clean Energy Enterprise
Survey- Tunisia 2023

Transition to Clean Energy Enterprise Survey

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*for the Arab Countries,
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**Renewable Energy Tunisia:
Sampling design and survey weights
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This document describes sampling design and survey weights of the survey of Renewable Energy in Tunisia.

Sampling design

Target population and Sampling frame

The target population of the surveys was businesses with less than 100 employees that started business operations before 2023. Businesses that started their operations during 2023 were not eligible for the survey. An ideal sampling frame for a probability sample should cover all target population units, i.e., a list of all working businesses of size 100 employees or less that started operations before 2023 with their telephone numbers. Unfortunately, we could not find such list in Tunisia. Therefore, we used data from Tunisia Yellow Pages, and data from the Institut National de la Statistique (INS). We had access to a list of about 185,966 businesses from INS and 8,685 businesses from the Yellow Pages. Although the sampling frames does not necessarily cover all businesses in Tunisia, it is large enough and cover many business sectors.

Unfortunately, we could not assess the coverage of the sampling frame especially with the lack of official numbers about our target population in Tunisia.

Sample design and selection

Four samples were selected for the survey of Renewable Energy in Tunisia, three samples from the INS frame and one sample from the Yellow Pages. The three samples of INS were stratified by sample sectors and business size; those samples were selected from businesses with telephone numbers (businesses without telephone number were not considered for selection). All businesses from the Yellow Pages were included in the fourth sample; no selection was done.

Survey implementation

Up to three calls were attempted to contact phone numbers that did not answer or busy lines. Table 1 presents the distribution of the selected businesses according to the final status after the three attempts.

Table 1: Distribution of selected samples according to the final contact

Final contact result	INS			Yellow Pages Sample 4	All	
	Sample 1	Sample 2	Sample 3		n	%
	n	n	n	n	n	%
Phone disconnected/ busy	18	59	2	131	210	1.34%
Not in service	785	3602	355	1184	5926	37.73%
Did not answer	176	709	56	563	1504	9.58%
Picked up and refused	975	2485	313	1345	5118	32.59%
Incomplete and refused	142	531	11	468	1152	7.34%
Incomplete and call returned	3	52	3	1	59	0.38%
Complete	45	188	21	46	300	1.91%
Company size is ineligible	0	0	15	50	65	0.41%
Someone who cannot tell about the business earnings and employees, and did not give phone number of someone who can	16	83	6	26	131	0.83%
The owner's company is the government	88	963	32	140	1223	7.79%
The establishment year is 2023	1		0	0	1	0.01%
Someone who cannot tell about the business earnings and employees, but gave phone number of someone who can	3	13	0	0	16	0.10%
Total	2252	8685	814	3954	15705	100.00%

Survey weights

The weight calculations started by calculating design weights that reflect the selection probabilities of selecting the businesses from the sampling frame. Because a simple systematic sample was selected from the INS frame, the design weights were calculated as the inverse of the overall selection probability of businesses as follows:

$$W_j^0 = \frac{M}{m}$$

where M is the total number of businesses in the INS frame, and m is the number of businesses selected for the survey. The design weight of the Yellow Pages sample was assigned to 1 as no selection was done.

The design weights were adjusted for nonresponse among eligible phone numbers, including numbers without known eligibility. Eligible cases are defined in Table 2. A nonresponse

adjustment factor was calculated as the inverse of the weighted response rates by business sector as follows:

$$A_c = \frac{\sum_{c=1}^{E_c} W_{cj}^0}{\sum_{c=1}^{E_c} W_{cj}^0 R_{cj}}$$

where E_c is the number of eligible businesses in business sector c , R_{cj} identifies the completed businesses among eligible businesses, where $R_{cj} = 1$ for businesses who completed the survey and $R_{cj} = 0$ otherwise. The adjusted weight for nonresponse was then calculated as:

$$W_j^1 = W_j^0 A_c$$

The survey weight was then calculated as a normalized version of W_j^1 as follows:

$$W_j^2 = \frac{W_j^1 n_{comp}}{\sum_{j=1}^{n_{comp}} W_{cj}^1}$$

where n_{comp} is the total number of businesses completed the survey.

Table 2: Final contact results by eligibility status

Final contact result	Eligibility	R_{cj}
Phone disconnected/ busy	Unknow eligibility	0
Not in service	Ineligible	NA
Did not answer	Unknow eligibility	0
Picked up and refused	Eligible non-respondent	0
Incomplete and refused	Eligible non-respondent	0
Incomplete and call returned	Eligible non-respondent	0
Complete	Eligible respondent	1
Company size is ineligible	Ineligible	NA
Someone who cannot tell about the business earnings and employees, and did not give phone number of someone who can	Eligible non-respondent	0
The owner's company is the government	Ineligible	NA
The establishment year is 2023	Ineligible	NA
Someone who cannot tell about the business earnings and employees, but gave phone number of someone who can	Eligible non-respondent	0