





### Services of a Solar Energy Consultant for:

# Design and supervision for the implementation of two solar water-pumping systems

#### A. **Projects description:**

#### A.1 Qsaibeh Solar Pumping

The site is located in the village of Qsaibeh, South Lebanon. The existing well is used to pump water to a concrete storage tank that in turns distributes water to end-users.

The **118kWp** solar pumping system to be installed consists in adding solar panels with all accessories and required electronic equipment to power the existing water pumping system.

The PV panels will produce energy that will be directly used to power the pump without a battery storage. PV panels will produce DC power, the conversion of DC to AC current will be done via a variable speed drive inverter.

The different components ensure smooth operation of the pumping system, linked to the existing power network and providing free energy over an extended period of time.

#### A.2 Ansar Solar Pumping

The site is located in the village of Ansar, South Lebanon. The existing well is used to pump water to a concrete storage tank that in turns distributes water to end-users.

The **129kWp** solar pumping system to be installed consists in adding solar panels with all accessories and required electronic equipment to power the existing water pumping system.

The PV panels will produce energy that will be directly used to power the pump without a battery storage. PV panels will produce DC power, the conversion of DC to AC current will be done via a variable speed drive inverter.

The different components ensure smooth operation of the pumping system, linked to the existing power network and providing free energy over an extended period of time.







#### B. <u>Mission Requirements:</u>

- The two sites shall be considered as a bundle.
- The allocated timeframe for the delivery of the design and tender documents is 3 weeks.
- All documents will be reviewed by RMF / USAID. The expert shall do all the needed adjustments and reply to all questions until the satisfaction of RMF / USAID.
- The timeframe to reply to RMF / USAID questions is 3 working days.
- All documents should be submitted as editable files.
- Visibility requirements should be respected.
- All documents produced are the property of BALADI program.

## C. Consultant Requirements:

- Curriculum Vitae and portfolio.
- Previous experience in solar pumping design.
- List of previous projects designed including project name, location and sizing of the PV System.

#### D. <u>Quotation:</u>

| DESIGN, including the following tasks:      | Man-days | Rate | Total (USD) |
|---|----------|------|-------------|
| Design, water simulation, layouts, etc      |          |      |             |
| Tender Documents: RFP, BOQ, specs, etc.     |          |      |             |
| Replying to RMF / USAID questions           |          |      |             |
| Coordination, site visits, & feedback       |          |      |             |
| Bids analysis                               |          |      |             |
| Total DESIGN                                |          |      |             |
| SUPERVISION, including the following tasks: | Man-days | Rate | Total (USD) |
| Submittals review                           |          |      |             |
| Site supervision & reporting                |          |      |             |
| Commissioning & training                    |          |      |             |
| Replying to RMF / USAID questions           |          |      |             |
| Total SUPERVISION                           |          |      |             |







# ANNEX I: QSAIBEH SITE DETAILS

The system layout is summarized in the following figure:



The system design is based on the pump Aturia BG8A27.

The sizing and design consideration produce the following pump characteristics curve:

























| Site Details | Site Name                          |      | Qsaibeh                     |  |
|--------------|------------------------------------|------|-----------------------------|--|
|              | Site Location                      |      | Qsaibeh                     |  |
|              | GPS Coordinates                    |      | 33°20'41.17"N 35°23'28.24"E |  |
|              | Road Access                        |      | Yes                         |  |
|              | Site Owner                         |      | Municipality                |  |
|              | Expected Date                      |      | Summer 2020                 |  |
| Pump / Well  | Rating pump Turbine                | HP   | 100                         |  |
|              | Rating pump Motor                  | HP   |                             |  |
|              | Brand and model number of pump set |      | Gruppo Aturia BG8A27        |  |
|              | Installation year                  |      | 2017                        |  |
|              | Pump depth                         | m    | 500                         |  |
|              | Well depth                         | m    | 542                         |  |
|              | Water surface level inside well    | m    | 400                         |  |
|              | Pipe length                        | m    |                             |  |
|              | Pipe diameter                      | inch | 4                           |  |
|              | Diesel Generator                   | kVA  | 250                         |  |
|              | Measured current                   | Amp  | 125x3 @380V                 |  |
|              | Flow rate SUMMER if ever measured  | m3/h | 18                          |  |
|              | Flow rate WINTER if ever measured  | m3/h |                             |  |







| Wellhead    | Existing Flow meter?  |      | Yes (with M-bus) |
|-------------|---|------|------------------|
|             | Existing piezoresistive pressure sensor?                    |      | No               |
|             | Existing level sensor inside well?                          |      | Yes              |
|             | Existing check valve?                                       |      | Yes              |
|             | PT100 cable on pump?  |      | No               |
|             | Existing reservoir  |      | Yes              |
| Reservoir   | Capacity  | m3   | 250              |
|             | Head from wellhead to top of reservoir                      | m    | 8                |
|             | Pipe length from wellhead to top of reservoir               | m    |                  |
|             | Pipe Diam from wellhead to top of reservoir                 | inch | 4                |
|             | Water requirements per summer day                           | hrs  | 18               |
|             | Water requirements per winter day                           | hrs  | 16               |
|             | Existing level sensor/float switch in reservoir             |      | Yes              |
| Solar Array | Array installation method                                   |      | Ground           |
|             | Array ground area   |      |                  |
|             | Existing Lighting protection                                |      | Na               |
|             | Major shading elements                                      |      | No               |
|             | Space in weather-protected room for equipment installation? |      | Yes              |







## **ANNEX II: ANSAR SITE DETAILS**

The system layout is summarized in the following figure:



The system design is based on the pump Aturia BG8B18.

The sizing and design consideration produce the following pump characteristics curve:

















| Site Details | Site Name                          |      | Ansar                       |  |
|--------------|------------------------------------|------|-----------------------------|--|
|              | Site Location                      |      | Ansar                       |  |
|              | GPS Coordinates                    |      | 33°22'24.72"N 35°20'51.08"E |  |
|              | Road Access                        |      | Yes (difficult)             |  |
|              | Site Owner                         |      | Municipality                |  |
|              | Expected Date                      |      | Summer 2020                 |  |
| Pump / Well  | Rating pump Turbine                | HP   | 125                         |  |
|              | Rating pump Motor                  | HP   | Aturia H8125                |  |
|              | Brand and model number of pump set |      |                             |  |
|              | Installation year                  |      | 2019                        |  |
|              | Pump depth                         | m    | 350                         |  |
|              | Well depth                         | m    | 480                         |  |
|              | Water surface level inside well    | m    | 240                         |  |
|              | Pipe length                        | m    |                             |  |
|              | Pipe diameter                      | inch | 4                           |  |
|              | Diesel Generator                   | kVA  | None                        |  |
|              | Measured current                   | Amp  | 180x3 @380V                 |  |
|              | Flow rate SUMMER if ever measured  | m3/h | 55                          |  |
|              | Flow rate WINTER if ever measured  | m3/h |                             |  |







| Wellhead    | Existing Flow meter?  |      | Yes (Analog) |
|-------------|---|------|--------------|
|             | Existing piezoresistive pressure sensor?                    |      | No           |
|             | Existing level sensor inside well?                          |      | Yes          |
|             | Existing check valve?                                       |      | Yes          |
|             | PT100 cable on pump?  |      | No           |
|             | Existing reservoir  |      | Yes          |
| Reservoir   | Capacity  | m3   | 300          |
|             | Head from wellhead to top of reservoir                      | m    | 83           |
|             | Pipe length from wellhead to top of reservoir               | m    |              |
|             | Pipe Diam from wellhead to top of reservoir                 | inch | 6            |
|             | Water requirements per summer day                           | hrs  | 18           |
|             | Water requirements per winter day                           | hrs  | 16           |
|             | Existing level sensor/float switch in reservoir             |      | Yes          |
|             | Array installation method                                   |      | Ground       |
| Solar Array | Array ground area   |      |              |
|             | Existing Lighting protection                                |      | Yes          |
|             | Major shading elements                                      |      | No           |
|             | Space in weather-protected room for equipment installation? |      | Yes          |