

**Technical report for groundwater well 15-19/036 in Attil**

Owner: Attil Agricultural cooperative Project

Date of visit: 13/2/2020

Participants: PHG, MoA-Tulkarem And well cooperative

Through field measurements of the amount of extraction from the well and the total pressure on the turbine at several locations of the project and reading the energy consumption, it turns out that the size of the eclectic engine in (110 kW) is greater than required. This means there is an energy loss of more than 30% at the expense of the farmers as the current consumption About 50 kwh, and the power factor is very low, around 75%. This causes a second loss of energy in the public grid. These problems have nothing to do with the turbine yield, which ranges between 65-72 m3 per hour at a total pressure of about 170-160 meters. After reviewing the information about the well (static/dynamic water level, size of pumping pipes..etc), it turns out that the depth of the static water is about 57 meters below the surface and the diameter of pumping pipes 6 "and length inside the well 130 meters. The existing turbine design is 100 cubic meters at a total pressure of 140 meters, and this does not match with the current situation of the turbine performance. Based on the above-mentioned technical information, the following conclusions have been addressed:

• The capacity of the electric motor is more than twice that required from the current output, which results in energy loss

• The design of the electrical panel needs to add a capacitor and to adjust the power factor from 75% to 98% as well as an inverter to control the speed

• There is a significant decrease in the yield of the turbine based on the proposed design; the decrease in yield is more than 35% compared to design value.

Based on the above data of the current situation, there are two types of technical problems: a) the electrical engine, and control panel are not properly operating with malfunctions b) mechanical problems in the turbine and very low efficiency. Accordingly; the proposed interventions are as follows:

* Disjoin the well equipments: rise the pumping and turbine pipes, supply and install a new turbine, speed of 1500 rpm, 100 m3 / 150-160 meters.
* Remove bearing, transmission shafts and pumping pipes, replacing all the damaged installations.
* Supply and install hydrostatic water level monitoring device in the well.
* Disjoin the well control panel, supply and Install a new electrical control panel with full sensors and protection (current, voltage, loads, lightning strikes, flow, pressure, and temperature, static and mobile water level) with VFD rotation regulator.
* Maintain all existing discharge fittings at the pump exist (pressure reducer, water meter, pressure barrel, etc.).
* Disjoin the existing electric motor, supply and install of new VHSM vertical electric motor (1500 rpm) capacity 120 hp.

**The estimated cost of well rehabilitation works is $ 70,000**

**PHG/Eng. Abdul-Latif Khalid**