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THE COMPLEX USAGE OF ENERGY EFFICIENT PUMPS IN WATER SUPPLY

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ABSTRACT

Water supply is primary source of focus for farmers in agriculture and there are lots of issues that farmers come across like lack of water resource, lack of electricity etc. It is widely known that agriculture irrigation is the process of transferring water to the soil that can enhance agriculture productivity at lower cost. So, the efficient agriculture irrigation requires a continuous water supply and agriculture pump are designed and integrated to fulfill this need as a part of agriculture irrigation system. Therefore, the article presents energy efficient pumps in water supply in agriculture.

Introduction. Irrigation is the process of supplying water artificially to the land, there are many irrigation systems that requires water pump as it plays important role in lifting the water. [4]. Water pumps are machines for moving water, they play a fundamental part in agriculture as they move water from its source to the fields and crops. Water pumps can be used with many forms of irrigation, such as drip, sprinklers or with a hose.

Water pumps can work in different ways, but in the simplest terms, water pumps consist of three main parts:[3.20-34].

- an inlet,
- pump system
- an outlet.

Water is drawn into the pump through the inlet side when a pressure difference is made within the pump system, the water

wants to move from an area of high pressure to an area of low pressure. This is used to move the water through the pump to the outlet side, into a hose, and towards your farm or water tank.

There are two main types of energy efficient pumps in supplying water, and they are categorised in how they create the pressure difference within the pump system. These types are:

Positive Displacement Water Pumps – create a pressure difference by changing the available space (volume) within the pump system. Using components such as; pistons, closed chambers and valves, the pressure is decreased on the inlet side which draws water into the pump. Then the pressure is increased forcing (displacing) the water through the outlet side of the pump system. [2.181-190].

Centrifugal Water Pumps – use rotating blades, known as impellers, which



pass energy from the rotation into the water flow to drive the water through the pump system.[2.70].

Water pumps are considered as a waste of high costs to energy. There is no single simple approach to minimizing pumping energy costs because there is no single reason that pumping systems are operated less than optimally.[6.52-63]. Instead, there are a myriad of reasons why pumping stations operate at a higher than optimal cost. Some of these reasons include:

- pumps which were incorrectly selected,
- pumps which have worn out,
- limited capacity in the transmission/distribution system,
- limited storage capacity,
- inefficient operation of pressure (hydropneumatic) tanks,
- inadequate or inaccurate telemetry equipment,
- inability to automatically or remotely control pumps and valves,[3.20-34].
- penalty due to time-of-day or seasonal energy pricing,
- lack of understanding of demand or capacity power charges,
- operator error,
- suboptimal control strategies.

Most of these problems will not be noticed without the utility actively looking for energy waste. Pumps operating efficiently look just like those which are wasting energy. Therefore, there should be implemented energy-saving pumps in water supply.

One of energy-saving water pumps is considered as solar water pump. The solar panels will keep providing free and clean energy for pump as solar energy is

available everywhere. [5.10-17]. This means, you don't need to be connected to the electricity grid or travel to purchase more fuel. In addition, the only servicing you need to do is give the panels a wipe every so often to get the dirt and dust off and you're good to go. This is why we truly believe renewable solar energy is the best way for a smallholder farmer to power their water pumps.

By powering water pump with solar energy, it will:

- Have more time to do other things, as no labour is needed to pump the water[1].
- Save money, as it does not need to buy fuel
- Be able to maintain water pump by oneself
- Be able to irrigate in an environmentally friendly and sustainable way

There are several benefits of energy efficient pumps in water supply, and they are:

- Water pumps are easily available in lower cost.
- These pumps come in wide range of variety where framers can easily buy from based on the capacity of pumps as per their needs or can even rent instead of buying.
- Water pumps are used to provide high irrigation efficiency by supplying proper amount of water to every area of the field to gain speed in cultivation.
- Low maintenance is required as it they come with less moving parts which eases the work.
- These water pumps are also utilized to remove water from heavy rains to move it from area to another.

Conclusion. Agriculture is one of the serious branch for the farmers as they produce food which is the basic need. Pumping is an important part of the



Irrigation. Therefore, there should be chosen available and efficient water pumps so as to avoid high costs for energy. One of the energy-saving water pumps is solar

water pump. As it is mentioned above, it is free and easily maintained. As a consequence, it is recommended to use solar water pumps in agricultural system.

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