

CHAPTER 7

CONCLUSION AND RECOMMENDATION

Conclusion

From the study of PV water pumping system at the Energy Park, Naresuan University that was funded, designed and installed by the New Energy and Industrial Technology Development Organization (NEDO). The following results have been obtained are as follows.

1. The results of the characteristics of PV module experiments were:
 - When the solar radiation increase, the efficiency of the PV module will increase if the temperature is constant
 - When the temperature is increased, the efficiency of PV module will decrease if the solar radiation is constant
2. The result of PV water pumping with 1,323 Wp (9.1872 m²) of PV, and 550W., 0.75 Hp motor:
 - The efficiency of PV water pumping depends on the solar radiation at low temperatures (< 40 °C ambient). When the temperature of PV is increased as a result of heating by solar exposure, the efficiency of PV will decrease from 10-11% to 7-9% though the solar radiation is increased.
 - In the case of high solar radiation, the efficiency of the system will decrease because the efficiency of the PV array will decrease at high solar radiation because the temperature of PV is increased due to unavoidable energy absorption within the solar panel.
 - Flow rate varies with solar radiation and depends on the power supply to the motor and pump, when available power is high, the motor and pump will produce a high flow rate of water pumped.
3. From the economic assessment of the PV water pumping system it was found that the cost of water pumped is 3.14 Baht/m³. From this, the PV water pumping system is likely to be economically suitable to use if we adjust for the externality costs (i.e. environmental and social costs) of using the diesel system and for the increased reliability of PV over small diesel pumping. This means that it probably is still advantageous to use the PV system because of the many benefits of using renewable energy.

Recommendation

From this research it was found that the overall efficiency of the PV water pumping system is low because the efficiency of the PV panels in combination with the motor/pump is low. The PV array efficiency is low partly because of the high temperature at array causing decreased voltage and lower power. For future studying, PV array temperature should be reduced in temperature through means such as:

1. Plant some trees for cooling down wind, but be careful for their shadow.
2. Plant some grass under and around the PV array to reduce the ground temperature around the panel.
3. Raise the level of the PV array for increasing air flow around and under the panel.
4. Install cold water pipes at the back of PV modules for cooling the PV modules.
5. Adding a PV powered fan to increase air flow across the panels for cooling.

