CHAPTER 6

CONCLUSION AND SUGGESTION

6.1 Conclusion

The collection of data of PV water pumping system at Nong Sanuan village was performed from 3 October 1997 until 30 September 1998 by 10 minute of mean time. The data were selected from 7.00 to 18.00 which was the period when the system was operated.

From analysis by excel program, it was found that the system efficiency of normal operation month is about 0.039. It is decreases to zero from May to August 1998. Because of the water level in the pond is not enough to pump. The system efficiency of winter is about 0.039 while it is about 0.012 and 0.018 on summer and rainy. The system efficiency for long term is 0.021 approximately when the PV efficiency is 0.057. The inverter and motor and pump efficiency are 0.891 and 0.406. When the global and tilt angle performance ratios are 0.394 and 0.374. And, the final yield of this system is 2.16 approximately.

According to the simulation, it was found that the PV output power and efficiency linearly depend upon the radiation more than cell temperature. In addition, the efficiency of inverter linearly depends on the PV output power. The total head depends polynomially upon the flow rate while the flow rate polynomially upon the AC power. The water volume exponentially depends on the radiation.

6.2 Suggestion

The system could not work efficiently because there were many problems as energy and power loss, lack of knowledge and understanding of user and water management. These problems can spread like these.

1. Some part of system as inverter and PV was declined.
2. The length of pipeline that very long over 1200 meters that caused of more friction loss in pipeline.
3. In fact of work, people in village near pipeline connect and cut to install their valve to use water in their houses.
4. Selfish habit and frame habit of people who live near the system and pipeline that want to use water only their houses.
5. There are big plants that make shading on PV array.
6. The water in pond is not enough to use on May to July. It caused system did not run on this term.
7. There is not water management in village.
8. This system did not have budget to repair and development.
9. People who use this system did not know about the system and nobody takes care the system correctly.
10. There are ants, little bug and house lizards in the control box and other box. They damaged electrical controller and make them did not work.

The way to improvement and optimizing the system is very important to make more power and efficiency of system. There is some way that should do to improve and optimizing the system.

Ideas from analysis

1. From relation between total head and flow rate it should not install the new pipe from main pipeline to people house. Because it will make more friction loss that decreases the water pressure and flow rate in pipeline.
2. From simulated result, it can decrease the head loss by change the pipe diameter that is bigger than old pipe.
3. Around the area of PV array should be cut the tree and do not install anything that would make shading on PV plane. Because of from the simulation, the PV efficiency is upon the radiation those drop on the panel plane.
4. From simulated result, it should grow grasses under PV array, it can decrease the cell temperature that caused to increase PV output power. And, it should have someone to cut and decorate when it to high.
5. Try to clean and maintenance the PV system every month because it can make the better power and efficiency.
6. Close the inverter when there is not water for pump in some month as on June to August.
7. From data analysis and simulation, it should pump water to tank or install the new one that not far from pump to keep water and supply to use. In order to decrease water keeping by cut and installs new pipe to people house directly.
8. Check and approve all parts of system again to find some technical problems as leak hole, pipe broken, wire junctions and update pipeline.

General ideas

1. Put mothball in the control box and other box control box and other box to protect ants, little bug and house lizards.
2. Train people who use the system about water management and the basic knowledge of PV water pumping.
3. Take someone take care the system and understand about the system and can check and repair for basic problems.
4. Share the budget from people who use water from this system to get repair and development fund.
5. Change the system owner from Civil Work department to sub-district organization to set someone to maintenance and control the system.