ENERGY DATA MANAGEMENT SYSTEMS FOR SMART COMMUNITY WITH PV MICROGRID

Manote Tonsing, Worajit Setthapun, Jiratkwin Rakwichian, Boonyang Plangklang
Asian Development College for Community Economy and Technology, Chiang Mai Rajabhat University, Thailand.

Introduction

Energy data such as energy consumption from buildings and energy production from distributed generations are very important to determine the optimal sizing, design and configuration of renewable energy and microgrid systems. The goal for future communities are based on the concept of Smart Community with sustainable energy. The main objective of this research is to develop the energy data management system for the Smart Community with PV AC & DC Microgrid.

Research Methodology

The flowchart of the research scope is shown in Figure 1. This research methodology was divided into 3 parts: 1. Analysis of DC & AC Microgrid potential with microgrid simulation (Figure 1(a)); 2. Energy data collection procedure (Figure 1(b)); and 3) Development of energy data management system for Smart Community (Figure 1 (c)). The detail descriptions of the each part of the methodology are explained in the following section.

Results

Energy Generation and Load Potential Analysis, (b) Energy Data Collection Process and (c) Smart Community Energy Data Management System.

The results from the Homer simulation of the AC and DC microgrid hybrid systems Figure 2. revealed that the present Microgrid used in Smart Community could be able to support the expansion of the community and higher usage of power consumption. The cost for the hybrid system would be less than only usage of PV as distributed generations.

Conclusion

Renewable energy application is one of the fundamental key for the sustainable community development. However, renewable energies (RE) are considered as unreliable energy sources because it can not provide constant power generation like traditional fossil fuel based power plants. Therefore, RE distributed generations are connected together through the microgrid systems and the energy generation can be managed to provide stable power sources. Power generation sources should be appropriate for the community power consumption. Monitoring the real-time energy consumption data is very important for the RE and microgrid operations. The data can also be analyzed further to determine the appropriate sizing and configuration of the RE and microgrid systems for future planning of increase power need due to community expansion. The goal for future communities are based on the concept of Smart Community.