



“10 ปี adiCET ก้าวการพัฒนาพลังงานเพื่อท้องถิ่น”

ENERGY DATA MANAGEMENT SYSTEMS FOR SMART COMMUNITY WITH PV MICROGRID



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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.

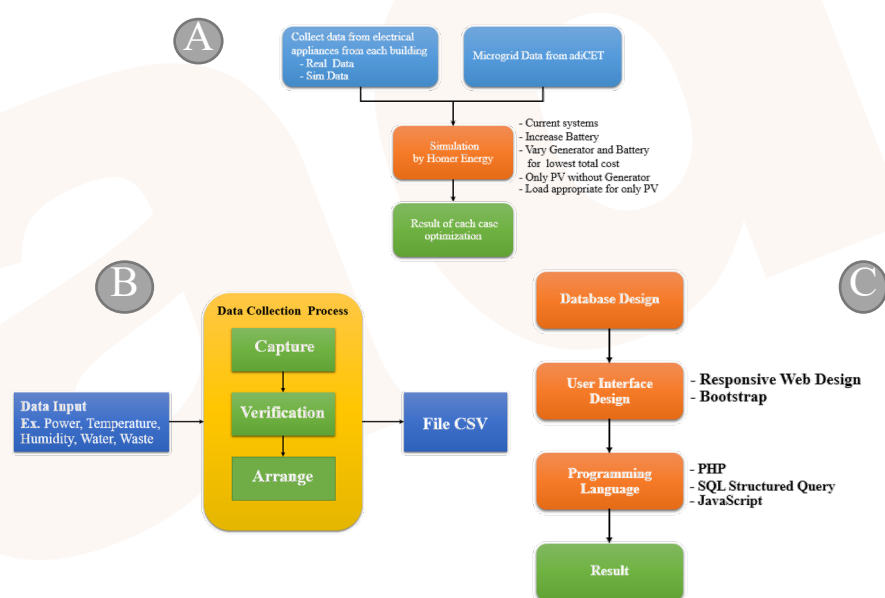


Figure 1. Research methodology flowchart (a) Microgrid and Smart Community Energy Generation and Load Potential Analysis, (b) Energy Data Collection Process and (c) Smart Community Energy Data Management System.

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.

Integrating PV, biodiesel generator and battery would be a suitable configuration appropriate for the rural area without main utility grid. This configuration could be suitable for the expansion of the community, however, there will be higher operation and maintenance cost..

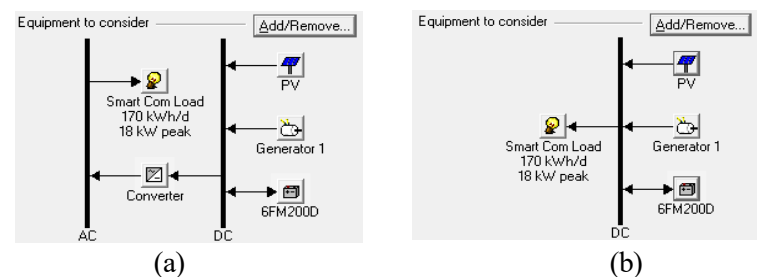


Figure 2. AC Microgrid Diagram (a) and DC Microgrid Diagram (b) from Homer

Energy Data Collection Process for Smart Community

The technique developed for data capture, verification, and arrangement provided the data with the same format to be transferred to the database. The data management process regarding the effective management of large data to reduce the uncertainty by verify the raw data and reformat the data structure. The functions from SQL were used to retrieved data for display. The Query was stored in View to reduce the operation of Query Data to modify the Query for faster and more efficient retrieval of large and complicated data.

User Interface for Smart Community Energy Data Management System

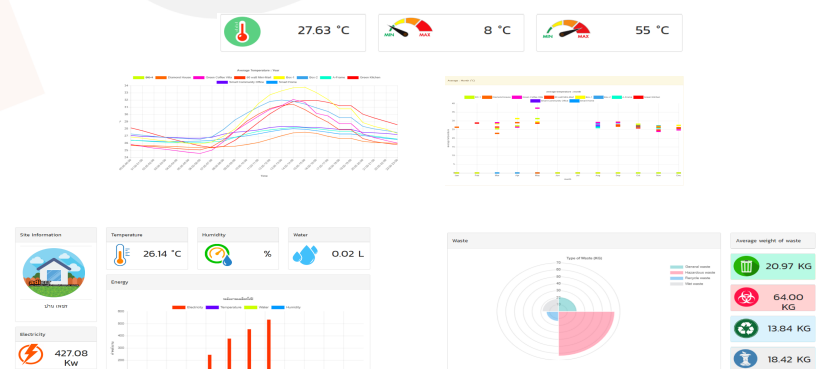


Figure 3. User Interface for Smart Community Energy Data Management System

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 realtime 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.