

# CHAPTER 1

## INTRODUCTION

### 1.1 Background

The growth of primary energy consumption in the world in 2010 had been the strongest since 1973 pointing to 5.6%, said BP (2011) [1]. It is not a surprising fact that energy conservation has become a highlight in the current world trends.

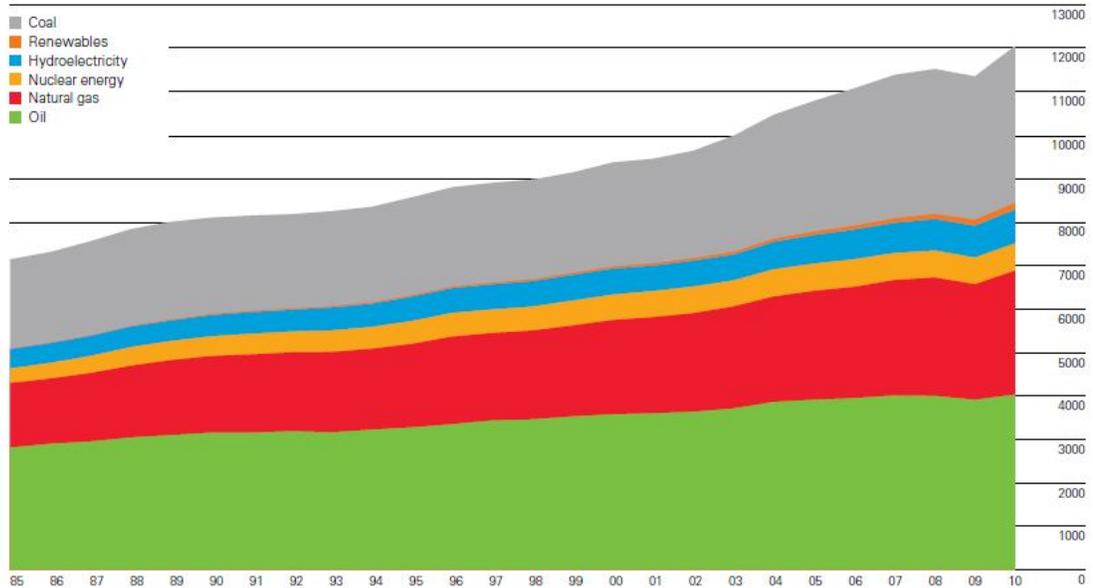


Figure 1.1 World Energy Consumption in the past 25 years

According to the report by World Energy Council (2010) more and more countries introduced a regulatory to slow down the growth in energy demand, although the attempt on energy conservation itself has been circulating since 30 years ago as stated by Palacio

(1999), the vice president of European Commissioner of Transport, from the main objective of energy policy between European Union and Member States while introducing SAVE2000 program [2].

There are many reasons why we need to save on electricity usage. The obvious reason is that we can save money, because it will affect our electricity bill. Another reason is that by using less electricity we automatically also save world's nonrenewable resources. Nonrenewable resources such as coal, oil, gas, and uranium are used to produce electricity. Consequently by using less electricity will also save those resources and preserve the environment.

Today many houses in the United States and some other countries in Europe have home energy management systems installed, that means they have the ability to monitor a detailed electricity usage from each of the household appliances that are plugged in to the power outlet. Some of these systems require the residents to install smart meter from the electric utilities company, others have very simple architecture that it can be installed without the need of having electrician coming to their homes.

A finding from Tribal Energies Research (2010) in a random survey to Australians revealed that people are actually very concerned when it comes to increase in their electricity bills [3].

In Indonesia, the energy savings problem is also becoming an issue not merely just for the purpose of saving cost but electricity in Indonesia is considered 'rare'. Unlike in other countries the home energy management system is not yet available rather than residents can only rely from their monthly electricity bill without knowing what appliances draw most of their bill. Many people usually surprised if their electricity bills suddenly jump and they cannot do anything about it.

Indonesia government has started the cost-saving programs by introducing a new package called 'STROOM'- prepaid electricity which acts just like the mobile phone recharge card so that people can have more control over their electricity spending.

Another studies revealed that if people can see their actual real-time electricity spending it will demonstrate a wide range of savings between 5% and 15% (Parker, 2006) [4] [5].

Considering all that information, the author is having an idea of how to implement simple home energy management system application in Indonesia using the existing electricity meter at home.

The author also considers an application that is easy to use and 'hassle-free' meaning that people in general will be able to use it straight away without the need of going through some complicated installation procedure or the need to install some libraries in order to run the application.

The suitable technology to build such application will be cloud-based platform. Cloud applications can be said as a hybrid between traditional desktop applications and traditional web applications. They offer benefits of both these types of software without many drawbacks. Like desktop applications, cloud applications can offer a rich user experience, immediate response to user actions, and offline mode. Like web applications, cloud applications do not need to be installed on a computer and can be updated at any time simply by uploading a new version to your web server. They also store their data in the cloud - offsite under our control.

## **1.2 Scope**

The scope of this research is:

- To assemble a monitoring device in order to identify electricity consumption for individual equipment in a house while limiting those equipment into two appliances i.e. water dispenser and one set of PC (printer, monitor, and CPU).
- Develop a user-friendly application to read data from the device and present it to an easy to read charts and graphs. The application will be built on cloud-based technology to promote greener IT.

### **1.3 Aims and Benefits**

This research objective is to be able to monitor electricity consumption for individual appliances from a particular house in Indonesia without having to modify the electricity meter from PLN.

The benefits of this research are residents can see the electricity usage from individual appliances for a period of time. They can see which appliances draw a lot of electricity power and therefore steps can be taken to reduce the electricity bill.

It can also show if particular appliances consume energy not according to the stated label, which means that it is already old enough and needs to be replaced so it does not waste unnecessary energy consumption.

In a bigger scope this will help the PLN in Indonesia to provide better and more reliable electricity service to the community.

### **1.4 Hypothesis**

We can actually monitor the electricity usage for each of the individual appliances at home and present it using cloud-based application in the form of user-friendly charts and graphs.

## **1.5 Structures**

This thesis will be written in seven chapters. The breakdown of each chapter will be listed below.

### **Chapter 1 – Introduction**

It contains the background of the problem, scope, aims and benefits, hypothesis and the structure of the thesis itself.

### **Chapter 2 – Theoretical Foundation**

It contains the relevant theories to the problem from journals, articles, surveys or any other resources which have been proven scientifically to support the solution of the problem. Some technical terminologies will also be discussed in this chapter including any tools and means that are used to develop the solution.

### **Chapter 3 – Problem Analysis**

This chapter will analyze the problem in correspond to prove the proposed hypothesis. It will compare the existing applications or solutions, including the advantages and disadvantages.

#### **Chapter 4 – Solution Design**

This chapter will discuss the detailed steps in designing the solutions including any diagrams of the system design.

#### **Chapter 5 – Implementation and Testing**

Results, observations or implementation of the solution will be discussed in this chapter including the testing of the proposed solution.

#### **Chapter 6 – Discussion**

This chapter will evaluate and clarify the result. It will discuss how author comes up with the solutions and any difficulties in designing the proposed solutions. It will also highlight whether the solution can prove the hypothesis and compare any advantages and disadvantages of the proposed solution to the existing solutions.

#### **Chapter 7 – Conclusion and Recommendation**

This chapter will summarize all the important aspects of the thesis including the background of the problem, the solution's implementation as well as any suggestion for future development of the application.