

iHEPS - an energy optimisation solution for large facilities

(iSCADA solution for energy monitoring)

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Executive Summary

Energy monitoring is a highly relevant matter when it comes to efficiency and cost management of large buildings or facilities. In this age of evolving communications technologies and data acquisition, the need for an effective platform in monitoring energy consumption is desired for the optimal energy efficiency of facilities.

This paper discusses the relevance of energy monitoring and how Devices World's iHEPS provides an effective solution to overcome energy monitoring issues through cloud-based data profiling and the use of existing utility meters. This technology allows consumers to understand their energy consumption in high detail, identify any energy issues or malfunctions within their building or facility, and rectify issues through implementing proper solutions.

Energy management and its importance

Utility consumption (Electricity) in facilities is one of the largest factors affecting profitability and competitiveness. In today's market, high utility costs are one of the many challenges facing Malaysia's large enterprises as they seek to expand and drive the economy. Because of the constantly evolving technologies surrounding energy in terms of usage, consumption, efficiency and cost, a proper understanding of these factors are necessary to drive improvement in energy efficiency. Aside from the fact that energy management benefits facilities through saving cost and improving efficiency, these management initiatives provide added value to overall facility performance, improve economic health, and affect the environment positively.

How iSCADA solution is implemented into energy monitoring

The iSCADA (Internet Supervisory Control and Data Acquisition) system, developed and deployed by Devices World Sdn Bhd, is an Internet-based SCADA solution that utilizes the public Internet infrastructure as the data communication medium. iHEPS (iSCADA Hosted Energy Profiling System) uses the unique iSCADA technology platform to deliver real-time energy consumption information to users. iHEPS aims to help large electrical energy consumers understand their energy usage patterns, achieve energy efficiency and reduce energy costs. iHEPS as a solution to monitor energy consumption adds an extensive level of insight into a building or facility's energy consumption patterns as well as electricity costs. By providing real-time data on energy consumption through the use of iSCADA solutions, iHEPS gives users knowledge on how to increase the efficiency of a building or facility in terms of electricity usage.

Conventionally, electricity usage is only known at the end of the billing period when the electricity bill is presented. However, with the iHEPS solution, users are supplied with the ability to understand their consumption pattern as well as being provided with detailed electricity costs, in real-time. The benefit of active monitoring of a facility's energy usage is that it will give users insight into consumption patterns and, in turn, assist them in reducing cost. By using a hosted system, iSCADA provides many benefits such as high transparency, high capability, low CAPEX, real-time updates, data exports, and trending data graphics. All these components contribute to the highly efficient solution that is iHEPS. Tested and proven to be effective in the data it provides, along with its stability due to the removal of human error or abuse, the iSCADA platform provides building owners and facility managers a solution that will ease the efforts needed to monitor their building's energy usage and electrical costs, as well as be an effective tool for energy efficiency efforts. Below is an example of the architecture of a traditional SCADA platform as compared to the iSCADA platform.

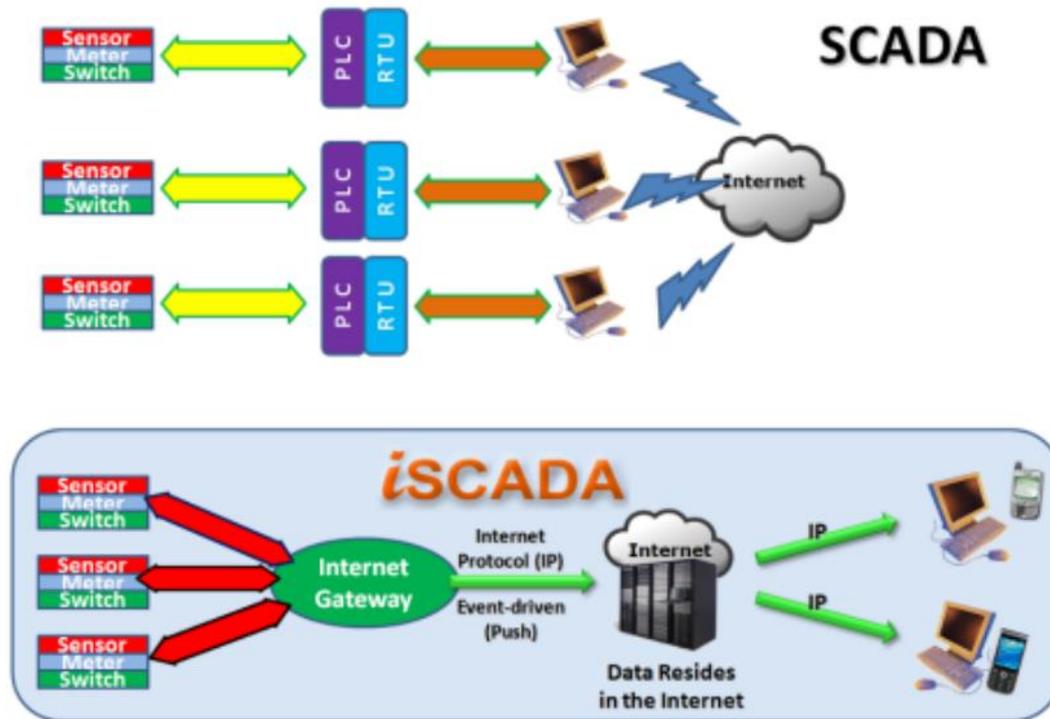


Figure 1. Traditional SCADA Architecture vs. iSCADA Architecture

iHEPS (iSCADA Hosted Energy Profiling System) architecture

The architecture of iHEPS involves the iSCADA platform, utility provider meters (In Malaysia's case, these would be TNB meters), and the iSCADA cloud infrastructure. A key factor that contributes to the highly effective nature of iHEPS is its use of the 'cloud' platform. By utilizing cloud servers, maintained by Devices World Sdn. Bhd., data is managed and stored on the internet for future analysis and documentation by the user. Below is an example of the architecture of iHEPS.

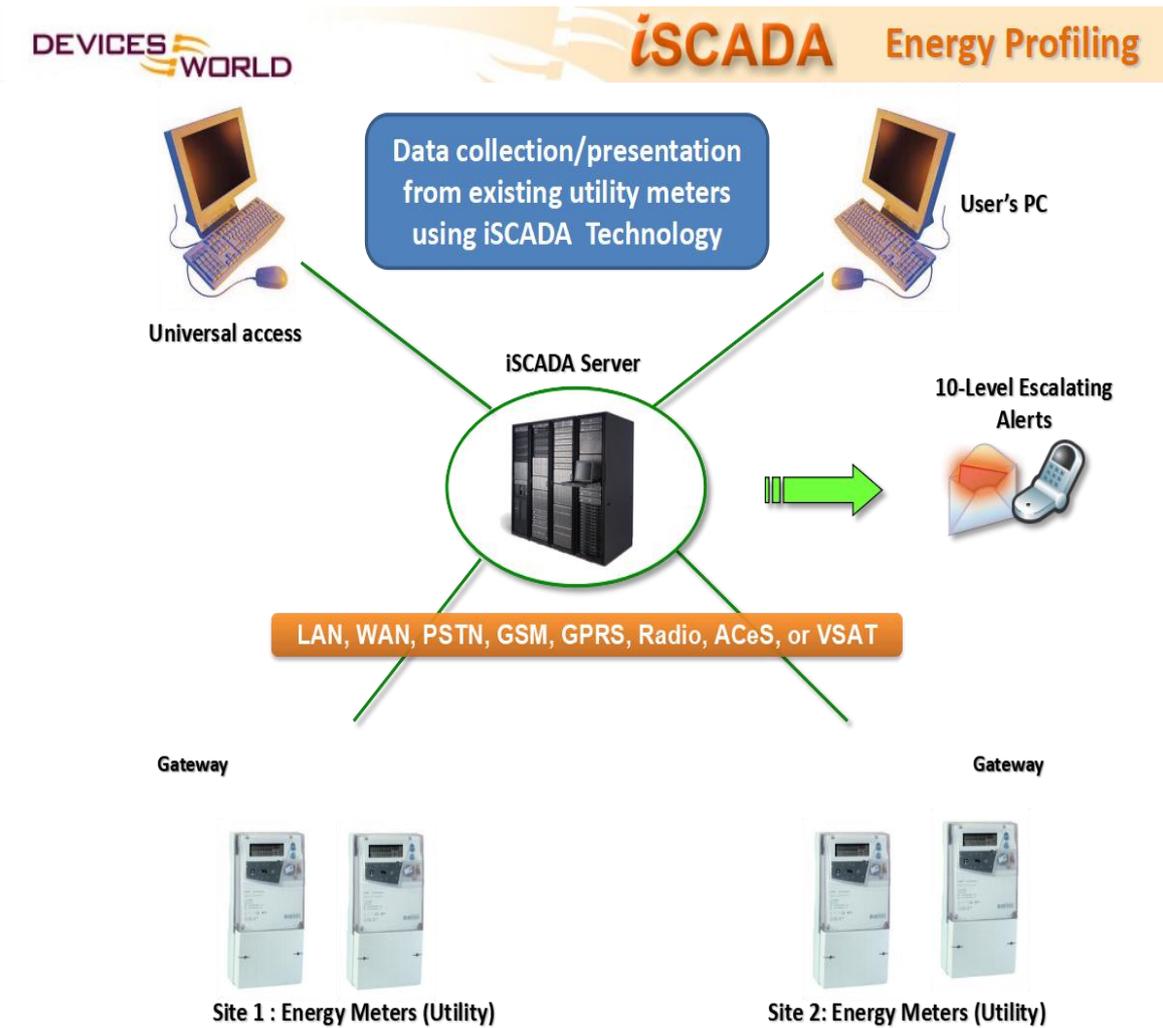


Figure 2. iHEPS Architecture

iHEPS has been developed to utilize the iSCADA platform to provide data on energy consumption and electricity costs of facilities by use of three key components: **iSCADA Gateway (Hardware)**, **iSCADA Server**, and **iSCADA software**. Each of these components contributes to the effectiveness, efficiency, flexibility and affordability of the iHEPS solution.

iSCADA Gateway:

The iSCADA Gateway is integrated to monitor the energy meters of a facility. This integration is done by means of monitoring the real energy (kWh) pulses emitted from the meters. As the system only requires a kWh pulse signal, the iSCADA gateway is able to be integrated with a wide variety of electronic meters – regardless of the meter’s manufacturer and the communications protocol. This also means that no shut downs are required during installation, avoiding unnecessary production down time or loss of efficiency.

As the pulse output is a very basic specification for electronic energy meters, it is possible to very quickly deploy iSCADA to monitor existing meters. This enables quick project roll-out and cost savings by using existing energy meters whenever possible. The Gateway then transmits site data to a managed iSCADA server via the Internet (TCP/IP Protocol) using LAN, WAN, PSTN, GSM, GPRS or satellite connectivity.

The key components of the iHEPS panel are:

- iSCADA Gateway for data acquisition and transmission
- Interface to Utility (TNB) Meters
- 3G Modem for communications using TCP/IP protocol
- Lightning Surge Arrestor
- Power Supply and Back-up battery

iSCADA Server:

The iSCADA server plays the following key roles:

- Receive data from Gateways
- Consolidate, analyse and disseminate data
- Data storage, Generate and send user Alerts (email, SMS, etc.)
- Supervision of Gateways.

The iSCADA server is used to collect, consolidate, analyse and disseminate data collected for real-time management of energy generation and usage in the power grid. The central server constantly supervises all remote locations and alerts the operator when any site fails to communicate with the server regularly. The iSCADA server is also responsible for sending out alerts to the operators or users. The data stored on this server can be accessed by any computer with internet and iHEPS account access, through the use of an internet browser, regardless of geographical location.

iSCADA Software

The iSCADA data is delivered in a simple graphical user interface (GUI) display that is clearly and easily understood. The user interface is highly effective and flexible in its job of providing data and updates to users. A list of the services provided by the interface include:

- Real-time, minute-by-minute data and demand profile to-date 24 hours
- Historical trending of energy consumption (kWh, Max Demand)
- Trending and tabulation of current electricity cost
- On Peak/Off Peak demand display as per Utility (TNB) specifications

Some examples of GUI displays are:



Figure 3. Cost Profile of iHEPS GUI

The data in the display above shows real-time financial status and overview from energy consumption and provides directions for management objectives to drive cost improvement programs.

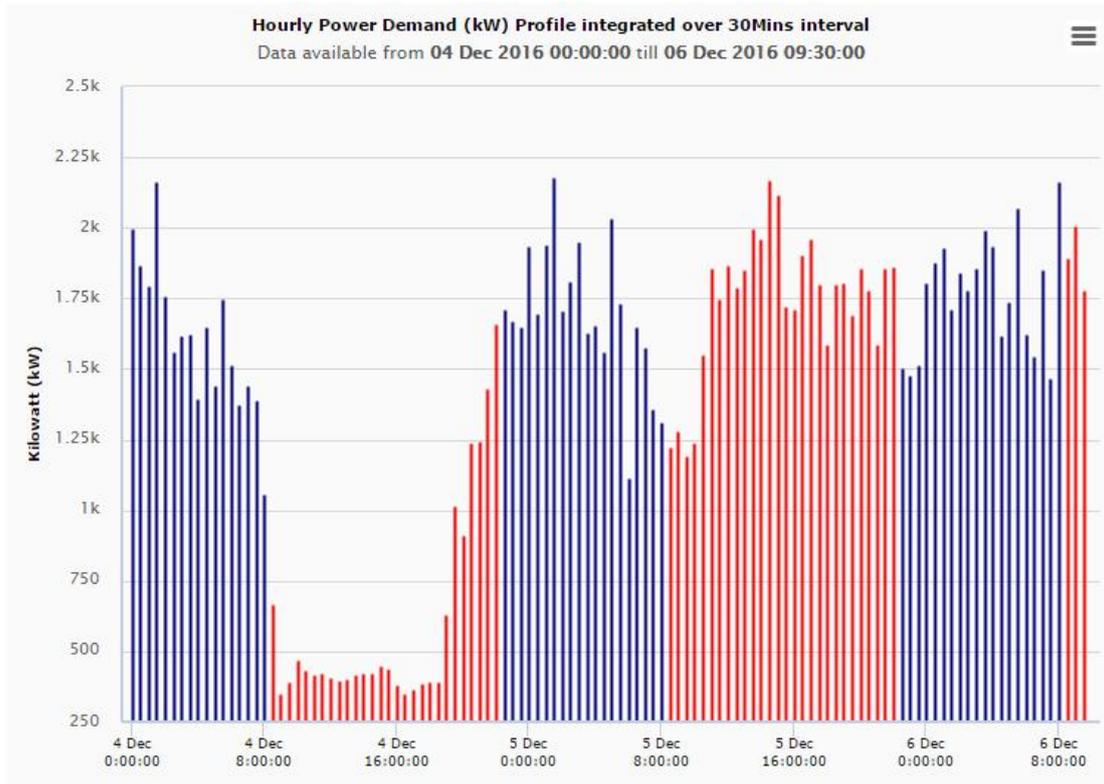


Figure 4. On Peak/Off Peak Demand Split

The display above shows the split of Peak and Off Peak Demand as per TNB specifications. This also highlights the flexibility of the iSCADA software, in which graphical displays can be designed to customer requirements. Due to the advantage of real-time, minute--by-minute data updates, users are able to determine how the energy consumption occurs and define energy savings targets to be achieved. Historical trends are easily obtained and allow for detailed analysis of cost as well as operational improvements. iHEPS in its essence is a tool that provides users the ability to improve on energy consumption and reduce cost through the data the platform supplies.

Key benefits of iHEPS

With iSCADA monitoring solutions, iHEPS provides users with instant feedback on their actual energy usage in real-time and can help determine whether the existing electricity is being consumed in an efficient pattern. iHEPS provides many benefits for buildings and facilities in terms of energy monitoring which may not be possible through traditional monitoring of electricity meters; these include:

❖ Assess electrical supply equipment

iHEPS determines not only the common load curve of kW consumption, but optionally, also information on Total energy (kVA) and power factor. This data reflects the utilization levels of the customer's electrical supply equipment.

❖ Save on electrical utility bills

iHEPS helps users determine whether existing electricity is being consumed in an efficient pattern that will incur the lowest possible cost. Large consumers are billed by the utility not only on the total energy consumed, but also on maximum demand, power factor and time-of use.

❖ Analyse impact of new tariffs on electricity costs

With iHEPS, the impact of any new tariff structures on the consumer's cost of electricity can be easily and accurately assessed even before the new tariffs are enforced.

❖ Provide a clear facility energy profile

The iHEPS solution provides users with a clear understanding and overview of their building or facility's energy profile. By connecting directly to utility meters, the data provided by the iHEPS is guaranteed to be accurate and complete in regards to total facility energy profiling.

Devices World Sdn Bhd

Devices World Sdn. Bhd. ("Devices World"), incorporated in 2000, is a 100% Malaysian-owned technology company. Devices World's goal is to research, develop and market state-of-the-art Enterprise Solutions in the areas of web-based Data Acquisition in all areas where traditional SCADA systems exists. Electronic Maintenance (eMaintenance) for Facilities Managers is a key area of focus as well as energy management, resource optimization and any area where 'cloud' based monitoring solutions will deliver clearly defined business benefits.

For more information on the iHEPS solution or iSCADA as a platform, please find the appropriate contact details below:

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