



Energy + Cloud: A New Energy Management System

Tianyi Zheng^(✉)

University of Electronic Science and Technology of China, Zhongshan Institute,
Zhongshan 528400, China
646640125@qq.com

Abstract. The main purpose of this project is to systematically monitor and analyze the power consumption in the industrial park of Skyworth Rock Base and give early warning of the equipment temperature. There are a total of 33 measurement monitoring points and temperature warning monitoring points in the Industrial park of Skyworth Rock Base, which monitor and control the electricity consumption in the research and development building, concentric building, complex building, water pump room and other areas in the industrial park.

Keywords: Analyze · Warning · Monitoring · Fine management

1 Introduction

Energy use is an essential part of all consumable businesses. Electricity, water, steam, etc. Rapid energy consumption increases the cost of production and management. How to save cost and manage effectively has always been a very difficult problem for enterprises.

At present, energy shortage and environmental degradation have become the biggest problems facing the world. In recent years, the global economy continues to high-speed growth and of mineral, the excessive use of water resources become the characteristics of global social development over the past couple of years, however, as the economic growth at the same time also triggered a global energy supplies and caused enormous pressure to environmental protection, the development of these problems require from individuals to the company must shoulder the responsibility of the social environment, take effective measures to reduce energy consumption.

The Chinese government attaches great importance to energy conservation and environmental protection and has made energy conservation and efficiency improvement part of its national strategy. By 2015, China's energy consumption per unit of GDP will be 16% lower than that of 2010. In industry, energy consumption per unit of industrial added value dropped by about 21%; The implementation rate of green building standards reached 15%.

As a provider of high-quality energy information management system, Tuoyuan helps users to improve their business competitiveness by helping enterprises to effectively manage various enterprise equipment energy and continuously reduce energy consumption. Tuoyuan has 8 years of rich industry experience, service more than 100 enterprises, business involved in more than 30 industries. At every step of energy use, our solutions can help you save energy cost by 5%–30%/year, and reduce input cost by about 70% (Fig. 1).

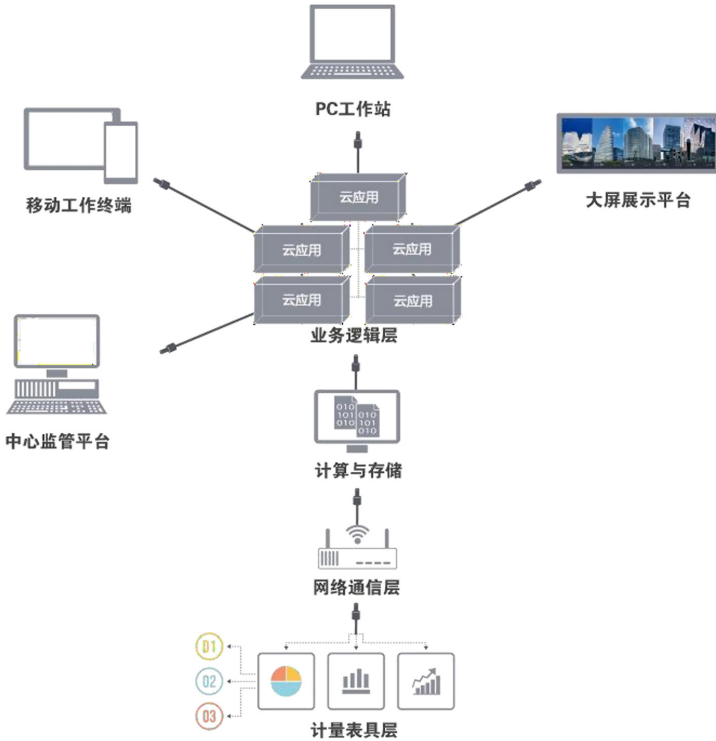


Fig. 1. The process diagram

2 System Design

The architecture of the energy management platform is shown in the following Fig. 2. The platform is mainly composed of three layers, namely the application layer, the data transmission layer and the data acquisition layer.

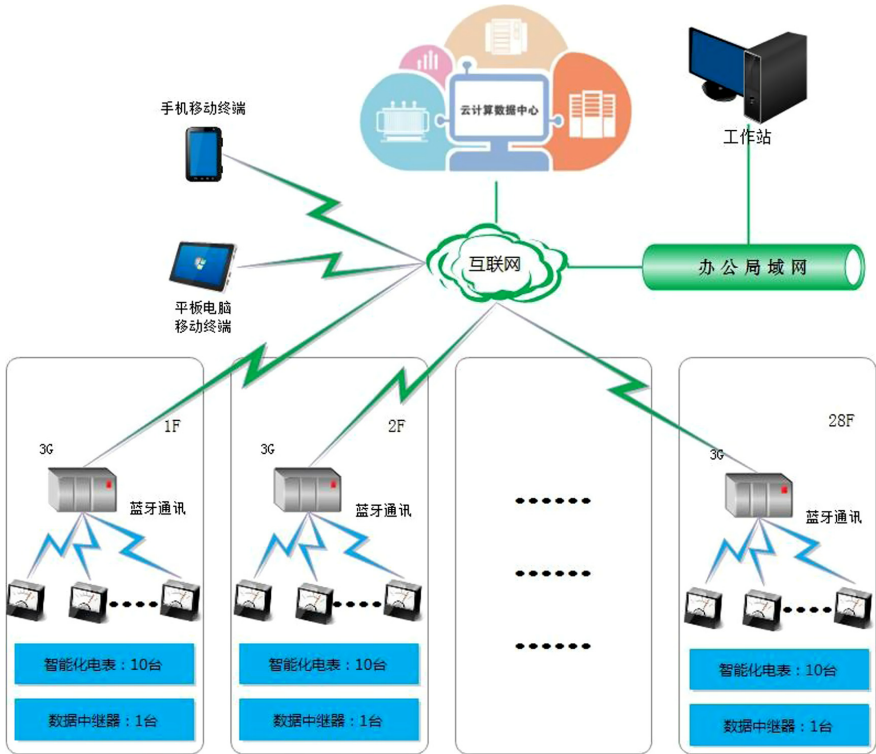


Fig. 2. The architecture of the energy management platform

- 1) Data acquisition layer: it is mainly composed of various measuring instruments, through which data acquisition of various energy or output (electricity, water, steam, compressed air, etc.) can be realized; The instrument is a direct acquisition equipment of energy consumption data, so its stability and accuracy are very important to the system.
- 2) Data transmission layer: Mainly composed of data repeater, it realizes data transmission from data acquisition layer to application layer through data transmission layer; The data repeater requires stable signal and strong anti-interference ability. The data repeater is responsible for the unified reception of the scattered transmitted information and serves as the summary gateway to transfer the information and data of each device to the cloud service platform.
- 3) Application layer: mainly composed of cloud service platform and clients, it realizes the final collection, storage, analysis and management of data; Cloud service platform is the core of the energy management platform, integrating collection, storage, analysis and management, while the user is the embodiment of the energy management platform, is to provide users with a variety of energy management data analysis tool, to help users achieve energy data analysis and management, provide clear data support, help enterprises to improve the efficiency of energy use. The user supports the use of multiple users and devices (mobile phones, tablets, work computers).

3 System Implementation

3.1 Jupiter Energy Data Terminal

The Jupiter Energy Data Terminal is an intelligent power monitoring terminal with built-in data storage. To measure current, voltage, power, power and so on many electric parameters, with a built-in clock and large capacity storage function, the time interval can be set according to historical data, frozen and stored in electric meter internal storage medium with wire and wireless communication function, can be convenient to readout instrument stored in real-time and historical data (Fig. 3).

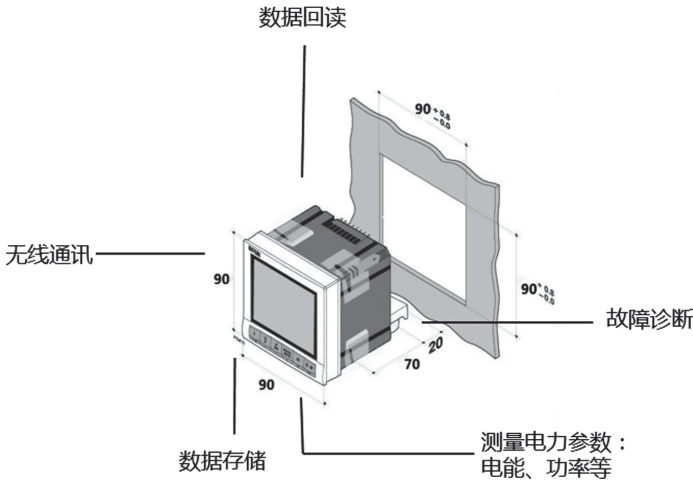


Fig. 3. Jupiter energy data terminal

3.2 Venus Intelligent Data Relay

Venus Intelligent Data Relay is an intelligent data repeater capable of collecting and forwarding energy data from Jupiter energy data terminal and Mercury Data Converter (Fig. 4).

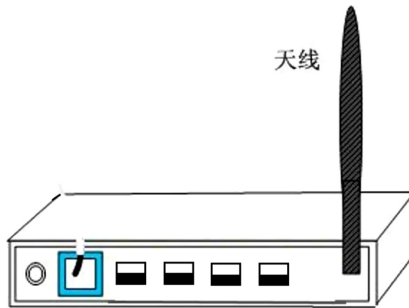


Fig. 4. Venus intelligent data relay

3.3 Mercury Intelligent Data Converter

Mercury Intelligent Data Converter is an intelligent data adapter that can transform Modbus protocol acquisition equipment. It is suitable for converting and storing data of data acquisition instruments with Modbus protocol, such as intelligent flow meter and existing intelligent electricity meter, to Mercury, and sending the data to the enterprise private cloud computing center through The Golden Star data repeater (Fig. 5).

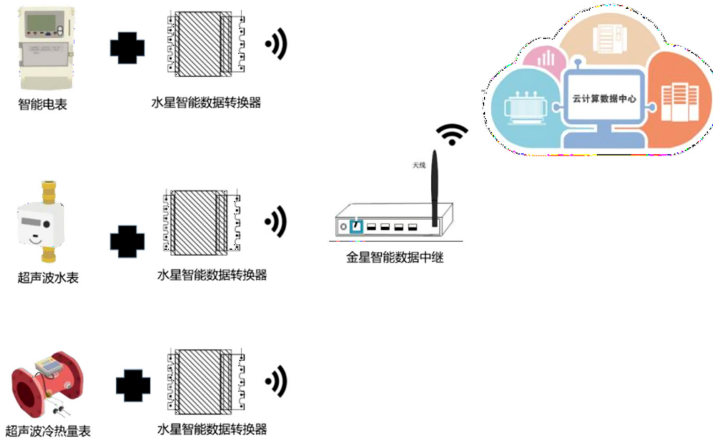


Fig. 5. Mercury intelligent data converter

4 Conclusions

From the perspective of enterprise management, Energy + cloud Energy management solutions provide enterprise managers with high visibility of Energy use and consumption, and assist enterprise decision makers in formulating and implementing Energy conservation and efficiency management strategies.

- 1) Rapid diagnosis of energy use problems and impacts to accelerate the promotion of energy conservation and efficiency;
- 2) Highly integrated equipment operation and energy consumption information;
- 3) Realize remote closed-loop energy management, optimize workflow, and maximize production efficiency;
- 4) Establish a high-quality and extensible energy management system, which lays a good foundation for enterprises to meet development and environmental challenges and establish digital management; Thus in the fierce competition of the market in favor of the unbeatable place.

References

1. Kumari, A., Gupta, R., Tanwar, S., Kumar, N.: Blockchain and AI amalgamation for energy cloud management: challenges, solutions, and future directions. *J. Parallel Distrib. Comput.* **143**, 148–166 (2020)
2. Ibrahim, G.J., Rashid, T.A., Akinsolu, M.O.: An energy efficient service composition mechanism using a hybrid meta-heuristic algorithm in a mobile cloud environment. *J. Parallel Distrib. Comput.* **143**, 77–87 (2020)
3. Lu, Y., Liu, M.: A simplified prediction model for energy use of air conditioner in residential buildings based on monitoring data from the cloud platform. *Sustain. Cities Soc.* **60**, 102194 (2020)
4. Hassan, H.A., Salem, S.A., Saad, E.M.: A smart energy and reliability aware scheduling algorithm for workflow execution in DVFS-enabled cloud environment. *Fut. Gener. Comput. Syst.* **112**, 431–448 (2020)
5. Energy - Solar Energy; Findings in the Area of Solar Energy Reported from University of Cadiz (Cloud Motion Estimation From Small-scale Irradiance Sensor Networks: General Analysis and Proposal of a New Method). *Energy Weekly News* (2020)
6. Information Technology - Cloud Computing; Researchers at School of Computing Science and Engineering Report New Data on Cloud Computing (Energy Efficient Resource Scheduling Using Optimization Based Neural Network in Mobile Cloud Computing). *Technology News Focus* (2020)
7. Information Technology - Cloud Computing; Study Results from Anna University Broaden Understanding of Cloud Computing (A novel energy estimation model for constraint based task offloading in mobile cloud computing). *Mathematics Week* (2020)