ISO 50001 Energy Management System
Case Study

2020 China

泸天化集团
四川泸天化股份有限公司
Sichuan Lutianhua Co., Ltd.

General Picture of Sichuan Lutianhua Co., Ltd.

Case Study Snapshot	
Industry	Manufacturing of chemical raw materials and chemical products
Product/Service	Urea, liquid anhydrous ammonia, methanol for industrial purpose, nitric acid for industrial purpose, ammonium nitrate for industrial purpose, compound fertilizer, dinitrogen tetroxide, treatment fluid for tail gas from diesel vehicles (aqueous urea solution)
Location	Naxi District, Luzhou City, Sichuan Province
Energy management system	ISO 50001
Energy performance improvement period, in years	4 years (2016-2019)
Energy Performance Improvement (%) over improvement period	1.03%
Total energy cost savings over improvement period	9,200,000 $USD
Cost to implement EnMS	724,600 $USD
Total Energy Savings over improvement period	984,152 GJ
Total CO_2-e emission reduction over improvement period	107,948 (metric tons)

Organization Profile & Business Case

Sichuan Lutianhua Co., Ltd (hereinafter referred to as “Lutianhua Company”) is a large-sized chemical fertilizer enterprise based on natural gas which imported the internationally state-of-art technologies by packages at the earliest in our country, and is honored as the “Cradle of Modern Urea Industry. The Company is located at the core zone – Naxi District, Luzhou City between Chengdu-Chongqing Economic Development Zone and the Economic Development Axis of Yangtze River Basin. Through the construction and development of sixty (60) years, the Company has a comprehensive production capability of producing varieties of products, amounting to more than 4000 kilotons.

The energy development strategy of Lutianhua Company relies upon closely the enterprise’s development strategy. The Company carries forward the energy saving, consumption reduction, pollution control and discharge reduction, and develops with great

efforts the recycling economy and resources reutilization as so to achieve the goal of wastes reduction and wastes being utilized as resources.

Lutianhua Company focuses on its energy development strategy and energy management policy, formulates long-term and short-term energy targets, and constructs an energy target system involving national energy conservation tasks, energy management level, process and equipment improvement, product comprehensive energy consumption index, production process energy consumption index, auxiliary production process energy consumption index, etc. to help Lutianhua Company's "green" transformation and "high quality" development.

"Energy Saving and Environmental Protection, Green and Recycling, Clean Production"

- Zhao Yongqing, general manager of the Company

Business Benefits

Lutianhua passed the certification of the energy management system in October 2013 and the replacement certification of the energy management system in July 2014(GB2331-2012/ISO50001:2011).

1）During the improvement period from 2016 to 2019, the company's energy performance increased by an average of 1.03% a year, with a total energy saving of 984,152 GJ, a total cost saving of $9.2 million and a carbon dioxide emission reduction of 107,948 metric tons, by intensifying efforts to upgrade key energy-consuming equipment, optimizing technological processes, adjusting the energy-use structure, issuing benchmark values for energy consumption of production units, and conducting quantitative assessment of energy consumption of production units on a monthly basis.

2）A total of nearly $730,000 was invested from 2016 to 2019 for energy metering monitoring equipment maintenance, inspection and energy control system operation and maintenance, software upgrading, energy management system recertification audit and energy audit and related technical support.

3）We will strengthen communication with local authorities and make full use of preferential energy policies to reduce energy costs. Strive to enjoy the country's various power preferential policies in 2019, saving about $3.5 million a year.

4）Promote the application of energy saving and low carbon production technology and technology. The production process of diesel vehicle exhaust gas treatment liquid developed by the company in May 2018, compared with the domestic and foreign use of granular urea to prepare diesel vehicle exhaust gas treatment liquid products, the raw materials are cleaner, the energy consumption is lower, the product quality is better than the domestic similar products, and the third prize of Sichuan Science Progress Award is obtained, and two patent achievements are also obtained.

Plan

The decision-making level of Lutianhua Company attaches great importance to energy management, and has set up a leading group on energy conservation and emission reduction for a solid level of energy management in the company, formulated a medium- and long-term development plan and made clear the direction of development.

1）Organizational approach

One is to establish the head of energy management. It is determined that the general manager of the company is the first responsible person for energy

management, and the representative of the company manager is the specific responsible person for energy management.

Second, establish and improve energy management institutions. Implement the three-level energy management system of the company, subsidiary company and department workshop to ensure that the energy management of the company is in a controlled state.

The third is to strengthen the process control, establish the daily consumption assessment mechanism of the production plant, announce the completion of the material consumption index of each production plant every month, and link with the performance appraisal to ensure that the production consumption is effectively controlled.

2) Goal setting

At the beginning of a year, by combining the energy saving indexes requested by the government, Company's energy saving plans, analytical results of energy utilization status, by taking into account comprehensively the budgets for production, formulate the annual energy objectives, indexes and energy management schemes of the Company. Break down the energy objectives and indexes, sign one by one the responsibility documents of energy saving and discharge reduction objectives with secondary units, and make it linked with the work performance examination of the responsible person of each unit in such a way to ensure the completion of annual energy saving objectives.

3) Construction of energy management system

By following the requirements of ISO50001 standard, the Company has formulated 14 energy management systems, such as, *Standard for Energy Management*, *Formulating of Energy Objective Indexes and Management Schemes as well as Management Procedures*, *Quota Management System for Energy Consumption*, and etc., the energy management work has been standardized through such series of energy management systems from energy procuring, metering, statistics, production process management, quota examination and etc., and the energy management level of the Company has been further improved.

4) Energy evaluation and planning

Firstly, formulate the *Management System for Energy Evaluation*, making clear the departmental responsibilities, evaluation methods, bases, requirements and evaluation periods in order to seek for the energy saving potentials and opportunities of production plants.

Secondly, revise the *Management System for Energy Statistics* and the *Management Procedures for Measuring Equipment*, and standardize the management of energy statistics and metering process.

Thirdly, carry out the audit and systematic analysis of energy use situation, forming an *Energy Audit Report*, and prepare the energy saving plans on the basis of energy audit in order to point out the directions and objectives for reducing the energy consumption of unit product and energy consumption of processes in the next step.

5) Energy performance evaluation

Firstly, by following the requirements of ISO50001 system, on a basis of energy metering and statistics management, by taking energy evaluation as a means, by improving the energy usage efficiency and reducing the energy costs as a direction, by applying the energy balance tables, energy network diagrams as well as the system management concepts of PDCA sustained improvement, 60 energy performance parameters and 6 energy-consuming processes at Company level were identified, 35 main energy-consuming equipment were determined, and detailed operating procedures and control measures were formulated, and responsibilities

were made clear.

Secondly, make perfect unceasingly the evaluation method for energy performance examination, by combining the optimal values in the history, set up the examination indexes for the annual and monthly consumptions of production plants, carry out the quantization examination on the consumptions of production plants using normalization method, use it as the bases for monthly energy performance evaluation so as to make the energy performance evaluation become more reasonable and comparable.

"Strengthen the energy benchmarking management, detail the analysis of energy consumption data, do practically the technical innovation in energy-saving and water-saving."

- Sun Guang, director of Company Production Management Department

Do, Check, Act

1) Operation control and sustained improvement

Firstly, establish an all-round examination system for energy performance. Formulate the annual energy-saving objectives and monthly energy performance indexes, carry out the examinations every month, and make it linked with the performance award of the employees;

Secondly, do well the seamless refined energy-saving of plants as well as the control of plant startup and shutdown, formulate the schemes for refined startup and shutdown, and reduce the discharge of "3 kinds of wastes";

Thirdly, by making use of the *Monthly Report on Process Production Analysis*, summarize and analyze the energy consumption of every production plant;

Fourthly, make perfect the *Analytical Process of Plant Status*, carry out analysis and evaluation of plant status and equipment status every quarter, and implement the plan-oriented systematic maintenance.

Fifthly, by making use of the energy-saving supervision center of the government, carry out every year the supervision of energy saving by the Company, make comparison with the benchmarking values of energy consumption among the industry, make analysis of insufficiency and formulate the scheme for energy efficiency improvement. From 2016 to 2019, the energy performance was improved by 1.03% on annual average as per the calculation of comprehensive energy consumption of unit product. In particular, the new ammonia plant of the Company operated continuously for 452 days in 2017, breaking the national record of continuous operation among the similar production plant.

2) Professionals and communications

First, according to the assessment standards of professional and technical personnel in Sichuan Province to assess the company's energy administrator qualifications and ability to assess, only after the assessment of qualified to have the second year of qualifications.

Secondly, at present, the Company has 55 full-time and partial-time energy management persons, 52 internal auditors for energy management system, and 95 full-time metering inspectors.

Thirdly, as a competent department for energy management in the Company, the Energy Management Department is responsible for preparing the energy-saving plans as well as the schemes for energy-saving propaganda activities, responsible for the popularization and application of new energy-saving technologies as well as the training work on energy management.

Fourthly, attend actively the training of the laws and regulations regarding energy saving, studying and training as well as technical exchanges of state-of-art energy-saving technologies organized by the country,

provinces, cities and industries.

3) Tools and resources

First, in accordance with the requirements of the General Principles on the Provision and Management of Energy Use Unit Energy Measuring Instruments, GB17167-2006, the Procedures for the Management of Energy Metering shall be compiled so that the company's energy metering and management shall conform to the national standards and relevant government regulations. Our company's energy measuring instrument equip rate is 97.56% in 2019.

The second is to establish and perfect the information management system, adopt Kingdee ERP system, EAM equipment management system, production real-time data system, make the company production, sales management, equipment management, energy consumption management comprehensive combination, fully controlled, real-time feedback, dynamic coordination.

The third is to conduct internal audit and self-inspection of the company's energy management system every year and hire qualified professional certification bodies to supervise and examine the operation of the company's energy management system.

Fourth, nearly $182,000 a year is spent on energy management to ensure improved energy performance.

Transparency

Lutianhua Company takes "perfecting the management system, standardizing the management process, strengthening the process control, and controlling the performance risk from the source" as the guidance, and regards the system management work as an important measure to promote the promotion of the company's operation management. Greenhouse Gas Emissions Disclosure through the company's official website 、Official website of the National Accreditation Authority 、The official website of Fangyuan Logo Certification Group announces to the public the suitability, adequacy and effectiveness of the operation of the company's energy management system.

Photo 1 Status of the company's energy management system published on the official website of the National Accreditation Authority

Photo 2 Status of the company's energy management system published on the official website of Fangyuan Logo Certification Group

Photo 3 The disclosure of the company's greenhouse gas emissions released on the official website of Sichuan Lutianhua Co., Ltd.

Lessons Learned

A. Follow closely the energy-saving front technology, strengthen the Technical Exchange and cooperation

with KBR, BASF, SIEMENS, CASALE, HONEYWELL, CCECC, TOYO and other companies, introduce the latest energy-saving ideas and technologies, look for energy-saving measures, reduce the comprehensive energy consumption of main products and main processes.

B. strengthen the training and learning of energy management. Through the analysis of typical energy cases, guide the energy managers of the company to find the focus objects of energy management according to the PDCA cycle, develop ideas and find the best operation mode to improve energy performance.

C. Increase the assessment of energy performance, improve energy performance in the company's performance in the proportion.

D. Set aside special funds for rewards of rationalization proposals to encourage employees to find energy saving tips and potential energy saving measures in their actual work, so as to minimize energy consumption.

E. Introduce Green, low-carbon and ecological concepts into new product development.

F. Integrate talent development into the company's strategic planning, optimize the allocation of human resources, talent echelon construction, salary and performance reform, human resource management informatization and other aspects, and continuously promote the reform and innovation of human resource management.