

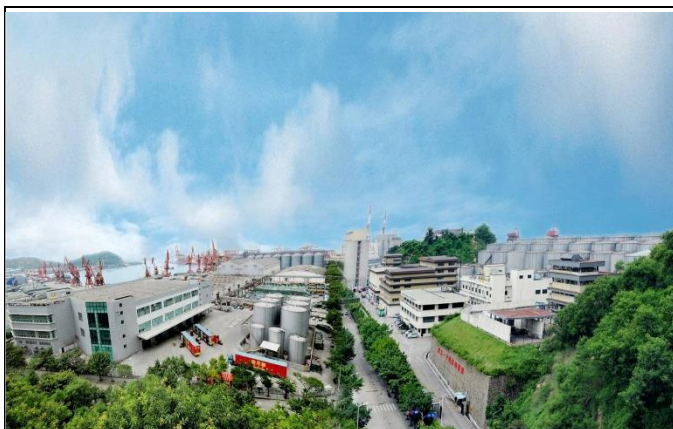
ISO 50001 Energy Management System Case Study

2020

China

Southseas Oil & Fats Industrial (Chiwan) Co.,Ltd.

"Green Factory" is one of the development strategies of Southseas Oils & Fats Industrial (Chiwan) Co., Ltd.



EnMS in Southseas Oil & Fats Industrial Factory (China)

Organization Profile & Business Case

A food factory with 7 years of Energy Management Experience in China.

Southseas Oil & Fats Industrial (Chiwan) Co.,Ltd. (SOFI), established in 1988 and located in Shenzhen City, China, is the first Oils & Grains enterprise invested by Wilmar International Limited (today Asia's leading agribusiness group) in China. With the strong support of the Shenzhen and Nanshan District governments, it has now developed into the largest domestic manufacturer of small-package edible oils and specialized producers of special oils and fats, and is one of the largest and most abundant production enterprises in the Chinese edible oil industry.

Case Study Snapshot

Industry	Food Processing
Product/Service	Production and service of Edible Vegetable oils and oil products
Location	Shenzhen, China
Energy management system	ISO 50001
Energy performance improvement period, in years	7 years (2013-2019)
Energy Performance Improvement (%) over improvement period	28.9%
Total energy cost savings over improvement period	9,150,000 USD
Cost to implement EnMS	5,790,000 USD
Total Energy Savings over improvement period	306,222 (GJ)
Total CO ₂ -e emission reduction over improvement period	20,242.34 tons

SOFI covers an area of over 70,000 square meters. Its main energy consumption includes power, hot water, natural gas and steam. SOFI produced 423,379 tons Oils in 2019, and its comprehensive energy consumption in 2019 reached 10,914.214 tons of coal equivalent (tce), which is about half of its 2012 energy consumption.

Motivations: SOFI attaches great importance to the company's environmental protection responsibilities and regards environmental protection and energy conservation as important guarantees for the company's sustainable development.

Goals: Saving resources, reducing energy consumption, reducing pollution and cleaning production. Compared with 2012, by 2020, energy consumption intensity will be reduced by 28.90%, carbon emissions per unit of product will be reduced by 14.65%, and total carbon emissions will be reduced by 35.66%.

Role plays: Combining technology and management, we have established energy-saving targets and regularly monitored energy consumption, adhered to KPI management, and promoted continuous improvement of enterprises.

Action support for energy management

- ① To carry out three-level energy management for companies, departments and workshops.
- ② Implement a large number of energy-saving technological revolution projects.
- ③ Established the Annual Outstanding Energy Administrator Award.

“EnMS serves as SOFI's energy management action guide, regulating energy use and equipment operation. It improves energy efficiency based on the PDCA model, and better promotes SOFI to become a safe, green and healthy edible oil company.”

—Wu Xiaochen, GM

Business Benefits

Less cost, high efficiency and environmental friendly

Energy performance improvement

Baseline year: 2012

Baseline period: From January to December 2012

Reporting period: From January to December 2019

The calculation formula is:

$$\left[\frac{\text{Baseline Period Consumption} - \text{Reporting Period Energy Consumption}}{\text{Baseline Period Energy Consumption}} \right] \times 100\%$$

Over improvement period, Its comprehensive energy saving is 306,222 GJ, and Its improvement is 28.9%.

Time	Energy Consumption (tce)	Product output (tons)	Product unit consumption (kgce/tons)
2012	20365	561644	36.26
2013	16480	528660	31.17
2014	13910	438878	31.69
2015	12538	384215	32.63
2016	11530	350900	32.86
2017	10735	350500	30.63
2018	10874	390168	27.87
2019	10914	423379	25.78

Figure 1 Energy Consumption of each years

Over improvement period, the total CO2-e emission reduction of SOFI is 20,424.34 tons.

Time	CO ₂ -emissions (x10 ³ kg)	Product output (tons)	Product unit consumption (kg/tons)
2012	55489	561644	85.87
2013	45394	528660	93.03
2014	40828	438878	90.96
2015	34948	384215	104.51
2016	36674	350900	94.71
2017	33197	350500	92.42
2018	36059	390168	84.32
2019	35700	423379	85.87

Figure 2 CO₂-emissions of each years

Costs and energy cost savings

Cost to implement	Cost to implement (\$USD)
Internal Staff time to develop and implement the EnMS	1,374,545
Internal staff time to prepare for external audit	916,364
Additional monitoring and metering equipment installed to meet EnMS requirements	234,848
Third party audit costs	63,091
Technical assistance (e.g. hired consultants to assist with EnMS implementation)	5,790,000
Other (e.g. internal communications)	
Total	8,378,848.485

Figure 3 EnMS costs of each sides

NO.	Project Name	Time	Investment (USD)
1	Heat exchanger replace	2015	57576
2	Transformation of cooling water system in crystallization section	2015	303030
3	Unpowered product conveying line	2015	106061
4	Use clean energy	2013	201515
5	Stripping system transform	2013/2016	4968182
6	Vacuum system transformation in transesterification section	2014	45455
7	Oil tank insulation	2015	106061
8	refrigeration device reform of oil blending room and central air-conditioning system	2016	318182
9	Motor energy efficiency improvement	2016	174394
10	Evaporative cooling transformation of separating workshop	2017	72727
11	Frequency conversion transformation of air compressor	2017	1267424
12	PLC transformation	2016	303030
13	Capacity improvement	2018	15152
14	Elevator frequency conversion renovation	2017	132409
15	Capacity improvement	2017	190909
16	Capacity improvement	2019	151515
17	Capacity improvement	2018	454545
18	No power transformation of cooling tower	2015	73712
19	Transformation of bottle blowing machine	2018	1296970
20	Reform of refrigerator system	2018	696970
21	Refrigerator maglev transformation	2019-2020	545455
Total			11481273

Figure 4 EnMS costs of enery-saving projects

1. Improvement achievements of Energy performance

During the period from” the 12th five-year plan” to” the 13th five-year plan”, a total investment of more than 3 billion RMB has been made to the production line in technology upgrading, energy conservation and emission reduction, which improve the utilization rate of raw materials, save resources, and reduce energy consumption and pollutant emissions. Thanks to a large amount of investment in energy conservation and transformation, significant results have been achieved in energy conservation and consumption reduction, with energy consumption decreasing year by year and energy performance increasing by 4.13% annually.

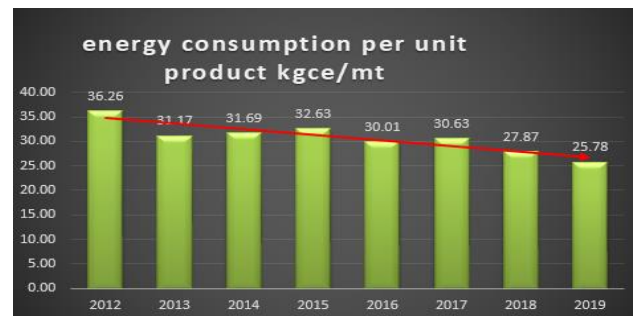


Figure 5 Energy consumption per unit product over the years

2. Energy and energy cost saving

Due to the decrease of energy consumption per unit product, the energy consumption cost of the product also shows a declining trend year by year, which improves the competitive advantage of the product in the market. Energy consumption cost was saved by 9.15 million USD from 2013 to 2019.

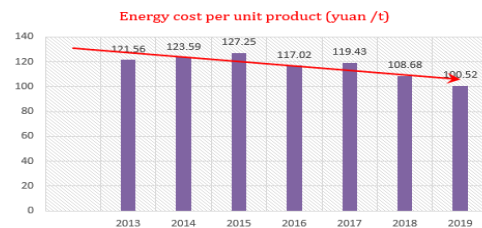


Figure 6 Energy cost per unit product over the year

3. Carbon emission reduction

From 2013 to 2019, a total of 20242.34 MT of carbon dioxide emission was reduced, showing a

downward trend every year. (Due to the acquisition of the bottle blowing workshop in 2015, the carbon emission is not comparable in 2015, so the chart starts from 2016).

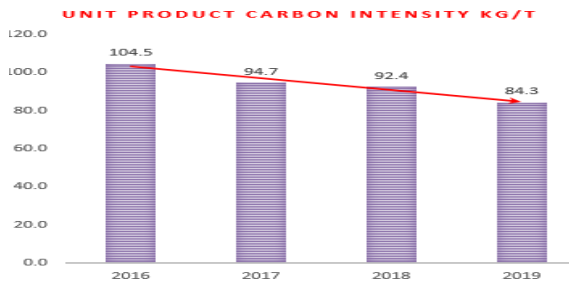


Figure 7 Co₂-emissions per unit product

4.Related savings about the energy management

Relying on the computer network technology, communication technology, measurement control technology and so on, SOFI has built energy management center information system, realize the energy monitoring, energy management, energy metering by visualization, digital and networking. We improved the basic data system to establish a system for monitoring, managing and evaluating energy use. Reduced manual meter reading and saved 1.36 million yuan in labor costs.

Plan

SOFI is adhering to the group's strategic objectives "To establish an ideal group", by "the largest production scale, the highest quality and most safety products, the most abundant product structure, the best service and the best team" to achieve, the company set a "scale and product diversification development strategy" as the goal in three years, strive to become most excellent team of grain and oil production enterprise with the largest production scale, the highest quality and most safety products, the most abundant product structure, the best service and the best team. Play a greater role in achieving the group's vision goals.

Keys for energy management strategy:

- 1) Through equipment transformation, improving production efficiency, energy conservation and emission reduction, to maximize economic and social benefits;
- 2) Build and improve the company's automation, information management system, to help the company to develop new products, technical innovation and automation management.

Measures for energy management strategy:

- 1) Introduce the latest international and domestic energy management and energy technology to optimize the use of energy.
- 2) Make full use of the intelligent analysis of the database to help the high-level managers' decision-making, scientifically and reasonably configure the staff and implement flexible operation time to reduce the cost.

The cost of production is a hindrance to the company's ability to make more profits, In order to survive, our company must constantly control costs in all aspects of our life cycle. Therefore, our company must pay attention to the level of integration between management and control. On the basis that the financial system and the business system are already interconnected, we use the finance system to monitor the whole process of purchasing and sales, fully account and control the full cost of the product.

In addition, through the continuous technical transformation, we make good personnel, equipment, information resources, information security as five guarantees, improving production efficiency through personnel skill upgrading, through studying the defects existing in the business process and organizational structure of production, operation and work, and make effective improvement to improve operational efficiency, through the purchase of more advanced network, intelligent production equipment, reduce the waste of energy, through process adjustment and use of advanced inspection equipment to reduced personnel input, reduce the rate of defective products, through the reasonable production process allocation, reduce the switching cost. On the premise of ensuring product

quality and safety, we improve equipment and process to improve production efficiency.

The establishment of energy management system is not only the management of energy saving, but also the comprehensive promotion of technical energy saving and structural energy saving measures.

Do, Check, Act

The energy management system of SOFI implements three levels: the company, department and workshop. SOFI sets up the energy management group, which is the leading organization of the company's energy management work. The group leader shall be the general manager, the energy management representative shall be responsible for the development and implementation of the specific work of energy management, and the managers and supervisors of the departments of production, storage and transportation, quality control, HR, and finance shall be the team members. The permanent organization is set up in the metrology section of the quality control department, which is responsible for the organization and coordination of the company's daily energy management.

The leaders of SOFI attach great importance to energy saving and consumption reduction, and invest a large amount of capital in the annual equipment transformation and update, pay attention to the application of new energy saving technologies, and optimize the structure of energy consumption. The energy-consuming equipment used by the company, such as boilers, central air conditioners and motors, can meet the energy efficiency limits and energy efficiency levels in relevant standards. One of the main energy sources used by the company is steam generated by waste heat from Mawan power plant, and heat exchange is adopted in the process of refined oil processing and crude oil processing to make full use of waste heat from the energy supply system to improve

energy efficiency and reduce energy input on the premise of ensuring safety and quality. The insulation system, air conditioning system, distribution system, motor system, vacuum system, lighting system, air compressor system, refrigeration system have been also transformed.

Combined with the actual situation of the company, The overall goal is divided into various factories, production lines, and key energy-consuming equipment, and a system is established that the manager is fully responsible for the department's energy saving goals. Saving energy and reducing consumption is one of the performance indicators of every manager, The KPI performance of each department is assessed regularly. In addition, the incentive measures for energy saving and consumption reduction are incorporated into the relevant systems of enterprise evaluation and promotion, and the implementation and effectiveness of energy saving work are fully taken into account in the selection of excellent teams and best individuals this year.

SOFI's energy management refers to the whole process of energy storage and transportation, transmission, conversion and use management, which not only involves the production process and operation management, but also includes the comprehensive management of the quality and maintenance of various materials, equipment, appliances. The company attaches great importance to energy conservation, takes the energy conservation law and regulations as the guidance of energy conservation work, focuses on energy conservation, clean production.

SOFI has established the company's energy management system and standards by referring to the relevant national energy management standards, and has provided for energy procurement, finance, measurement, statistics, use, assessment and other aspects, thus improving the company's energy management system. Developed an energy management system. The energy management team tracked and inspected the activities of each of the

energy management systems mentioned above on a monthly basis, proposed improvement suggestions on the inspection findings and followed up on the closure of problems, and rewarded outstanding projects and energy managers.



Reformed cold vacuum System



Reformed air compressor system

Transparency

In 2015, Southseas Oil & Fats Industrial (Chiwan) Co.,Ltd. passed the ISO 50001.



Lessons Learned

We will strengthen the circular transformation of industrial parks.

To build and form an industrial park that ADAPTS to the regional resources and industrial characteristics of Nanshan District, promotes industrial upgrading and promotes international competitiveness.

1. Optimize the spatial layout

Realizing coordinated development with the surrounding areas in terms of industry and functions.

2. Industrial restructuring

We will build a comprehensive agricultural industry model with strong adaptability, and integrate the whole agricultural value chain of agricultural products from planting to processing, from brand products to distribution services.

3. Construction of industrial chain of circular economy

Strengthen the cooperation among enterprises in the park and build a circular chain between industries.

4. Efficient use of energy and resources

From the perspective of technical means, resource utilization, market field, industrial development, park construction and other aspects, to build the park's ecological environment.

5. Operation management innovation

We will start with the improvement of industrialization and informatization and the construction of management platforms such as energy management centers, accelerate the construction of public service platforms such as information flow and capital flow in industrial parks.

Through the Energy Management Working Group (EMWG), government officials worldwide share best practices and leverage their collective knowledge and experience to create high-impact national programs that accelerate the use of energy management systems in industry and commercial buildings. The EMWG was launched in 2010 by the Clean Energy Ministerial (CEM) and International Partnership for Energy Efficiency Cooperation (IPEEC).

For more information, please visit www.cleanenergyministerial.org/energymanagement.

