

ISO 50001 Energy Management System Case Study

P.R.China

HeNan Xinlianxin Fertilizer CO.,LTD

XLX formed a long-term mechanism of systematic energy saving through the EnMS project and achieved economic benefits of USD 37.5 million in 5 years.



Organization Profile & Business Case

Henan Xinlianxin Fertilizer Co.,Ltd. was founded in 1969, (hereinafter referred to as “XLX”) listed on the main board of the stock exchange of Hong Kong in 2009 with a registered capital of 236 million USD. As a large-scale fertilizer production enterprise integrating research & development, production, sales and service, XLX is a national high-tech enterprise, a demonstration enterprise of technological innovation in petrochemical industry, and a demonstration enterprise of scientific and technological innovation in energy conservation and emission reduction in Henan province. At present, XLX has annual production capacity of 2.8 million tons of urea, 2.3 million tons of compound fertilizer, 700,000 tons of methanol, 200,000 tons of dimethyl ether and 50,000 tons of furfuryl alcohol.

In order to promote energy efficiency, reduce energy consumption and disposal & environmental costs, XLX sticks to “Low-cost and differentiation competitive advantage” development strategy with the adoption of the international advanced coal gasification technology, XLX has won the 2014-2015 Provincial Quality Award,

entitled as “Green Plant” in 2018 and as “national synthetic ammonia industry leader of energy efficiency benchmarking enterprise” for consecutive 7 years during 2011-2017. XLX was the first in the industry to pass the ISO9001, ISO14001, OHSAS18001, ISO 50001(GB/T23331-2012) certification.

全国碳排放管理示范工程签约仪式暨培训会在心连心举行



Figure1 Carbon Emissions Demonstration Project Training Sessions



Figure2 Energy Management Center



Figure3 Production Dispatch Center

The corporation had set up a leading group for energy conservation and carbon reduction at the company level, established an energy management center, built an energy management system, implemented demonstration projects of the energy management center, and continuously improved energy management through technological innovation and QC tackling key problems. XLX has currently formed a systematic, standardized, standardized, visual energy management model with all the staff participating in energy saving.

“Production control, technology innovation, energy saving and low carbon emissions and sustainable development. EnMS is helpful to our energy management”

—Xingxu Liu, Chairman of XLX

Business Benefits

The main products of XLX are synthetic ammonia, methanol and urea. The cost of energy consumption such as coal, electricity and steam accounts for about 90% of the total production cost. The annual energy cost expenditure is more than 769 million USD. For the corporation, saving is profit and reducing consumption is efficiency. XLX invests nearly 15.4 million USD every year for energy audit, QC, system audit, energy management system upgrade & maintenance, and pours a large amount of money into subsequent technical improvement and optimization. In 2017, XLX completed 73 outstanding technical innovation projects, 78 outstanding QC activity achievements and 75 outstanding management innovation achievements, invested 15.1 million USD and created more than 26.5 million USD of direct economic benefits. For example, in 2017, the second branch of the company carried out the QC project to reduce the ammonia consumption of gas production tons and coal consumption. The corporation gradually established refined operating standards and realized a 2% year-on-year reduction in consumption and cost saving of more than 5 million USD through data analysis, parameter optimization and process competition.

The corporation sticks to the goal of being the "energy efficiency leader" and constantly improves its energy efficiency. In 2017, the comprehensive energy consumption per unit product of synthetic ammonia (anthracite) was 1076kgce/t, which was 74kgce/t lower than the advanced value of 1150kgce/t of national energy consumption quota standard. The comprehensive energy consumption per unit product of synthetic ammonia (bituminous coal) is 1221kgce/t, 279kgce/t lower than the national energy consumption

quota standard advanced value of 1500kgce/t. 2013-2017, XLX accomplished the establishment of energy management system, the construction of energy management center project, the urea energy balance optimization, the balance of steam system optimization, nitrogen fertilizer production systems use measures

Case Study Snapshot	
Industry	Chemical Industry
Product/Service	Urea, Industrial Methanol, Liquefied Anhydrous Ammonia
Location	Xinxiang City, Henan Province, P.R.China
Energy management system	ISO 50001
Energy performance improvement period	2013-2017
Energy Performance Improvement (%) over improvement period	4.0%
Total energy cost savings over improvement period	\$37.5 million \$USD
Cost to implement EnMS	\$10.0 million \$USD
Total Energy Savings over improvement period	6594 (GJ)
Total CO ₂ -e emission reduction over improvement period	560930 (Metric tons)

such as waste heat pressure, which contributes to emission reduction including 225000 tons of total energy saving of standard coal, 560930 tons of CO₂, 8442 tons of NO_x, 16880 tons SO₂ and 153040 tons of dust, creating direct economic benefits of about 34.6 million USD.

Plan

It was guided by the cost target and energy saving target, XLX has always adhered to the development strategy of "combining total cost leadership with

differentiation" in order to promote the implementation of the corporation's strategy. The corporation has set up a leading group for energy conservation and carbon reduction at the company level with the general manager taking charge of the work in person to promote the corporation's energy conservation and carbon reduction and has implemented three-level energy management structure of the corporation, the branch plant and the workshop, with proper guidance and supervision, ensuring the effective implementation of various energy-saving measures.

In 2003, XLX set up an energy management agency – the energy management center and has been operating it to conserve energy according to the policy of "Production control, technology innovation, energy saving and low carbon emissions and sustainable development". Starting from the perspective of energy conservation and rational use of energy, the corporation will supervise and inspect the energy consumption of each energy-using unit in a planned way, and carry out energy conservation project in combination with each branch plant and each functional department, so as to promote the corporation to tap the potential of energy conservation and the progress of energy conservation technology.

A planning conference is held every September to determine the development and planning of the following three years and plan the next year's work tasks in detail. In November, each department formulates work objectives and management plans for the next year as per the planning conference requirements and the completion of this year's goals. Each energy-using unit, based on the planning conference arrangement, firstly determines the energy planning and the energy conservation and emission reduction measures for the next year, then organizes the energy review according to the corporation's

"energy management review procedure" to identify the energy conservation improvement opportunities as well as formulate detailed energy conservation and emission reduction measures.

Do, Check, Act

During 2013-2017, XLX formed a long-term mechanism of systematic energy saving through the EnMS project and achieved economic benefits of USD 37.5 million. The comprehensive consumption of synthetic ammonia unit products reduced from 1093kgce/t to 1076kgce/t.

XLX corporation managers organized and signed the performance target responsibility letter every year, the general manager signs the production consumption target responsibility letter with the deputy general manager who signs the target responsibility letter with each branch factory director. The corporation implements the target hundred-mark evaluation rule indicating that the target score is linked with the year-end bonus. For example, the comprehensive energy consumption of synthetic ammonia, coal consumption per ton of ammonia, electricity consumption per ton of ammonia and other energy targets are included in the corporation's energy performance target system, and the weight of the target is decomposed reasonably. In 2017 the corporation comprehensive energy consumption of ammonia target is 1275 kgce/t, the target score is 10%, but actual accomplished 1221 kgce/t and achieved a composite score of 12.4% through the implementation of energy performance goals management, energy efficiency factor weighting analysis, energy saving control points management, energy efficiency enhancement, which greatly promoted the participation of saving energy and reducing consumption, increased initiative, and guarded the benchmarking status of being the "leader of energy efficiency".

In 2013, we introduced the advanced balanced scorecard strategic performance management tool, which delegated the corporation's annual targets such as energy consumption index and cost reduction index into each unit layer by layer from the four dimensions of finance, customer, internal operation, learning & growth, turning them into operable measurement indicators. The energy management center tracks the completion of energy conservation goals every month, then records them into the balanced scorecard system and issues circulars so that all departments and personnels responsible for energy goals are aware of the progress of their work.

name	unit	2013	2014	2015	2016	2017	total
Comprehensive energy consumption per ton of synthetic ammonia	kgce/t	1093	1082	1081	1079	1076	
Amount of energy saving	10 ⁴ tce	4.45	5.61	3.17	4.59	4.68	22.5

based on the rule of the PDCA cycle. Nowadays, XLX has gradually set up a scientific, improved and efficient production management system.

Performance analysis meeting is held monthly with A, B, C and D levels of management implemented, and the assessment will be conducted according to the completion of the task, which is linked to the salary and bonus, and the production department is encouraged to actively complete the energy targets and indicators (for example, grade A: performance score * 1.2, grade B: performance score * 1.0, grade C * 0.8, grade D * 0.6). XLX also implements the target reporting system and each department prepares the target reporting materials at the end of the year, and reports on the achievement of targets such as energy performance, cost performance and per capita labor efficiency, the completion of supporting measures, existing problems and the main work measures of the next year.

XLX adheres to the production guidelines of "Planned control, optimized process, hourly measurement, safety, environmental protection and stability of long period". "Adequate preparation, organized network, clearly assigned responsibility, ordered measures" is guaranteed in every process. The corporation emphasizes the three basic management including "succession", "range checking" and "after-work evaluation". In addition, team building activities are carried actively. Control over security, environmental protection, energy, equipment and quality are enhanced. The full implementation of "lean manufacturing" mode to ensure the production target is

Transparency

Xinlianxin Shenleng Energy Co., Ltd is the first enterprise in Henan province to conduct carbon capture, utilization and storage (CCUS). The corporation is the first listed company in Henan province to disclose "greenhouse gas emission" information. The 2016 environmental, social and governance report released by XLX covered greenhouse gas emissions and has been disclosed to the whole society on the Hong Kong stock exchange. As the first carbon emission management demonstration enterprise, the corporation held the signing ceremony and training meeting of the national carbon emission management demonstration project in 2017, becoming the first carbon emission management demonstration enterprise in Henan province.



Figure4 Environmental, Social and Governance Report

Lessons Learned

- A Implementation of performance management of energy conservation and emission reduction

XLX has established the "leading group for energy conservation and carbon reduction" headed by the general manager that strictly implements the responsibility system for energy conservation goals, which transforms the enterprise strategy into the behavior of all employees through the performance management system for energy conservation goals so as to ensure the realization of enterprise strategy with performance management. The corporation has also opened up the channel to transfer the strategy into performance.

- B Establishment of contrast mechanism and comprehensive evaluation system

XLX has always insisted on benchmarking management, established a comparison mechanism within the production system, and continuously optimized and improved the operation through vertical comparison of workshop energy consumption indicators. In addition, the corporation adheres to the development idea of "going out and bringing in" by constantly referring to the advanced indicators of the industry, learning the advanced practices in the industry in order to surpass other companies on the basis of catching up with the benchmark through data collection, comparative analysis and tracking study.

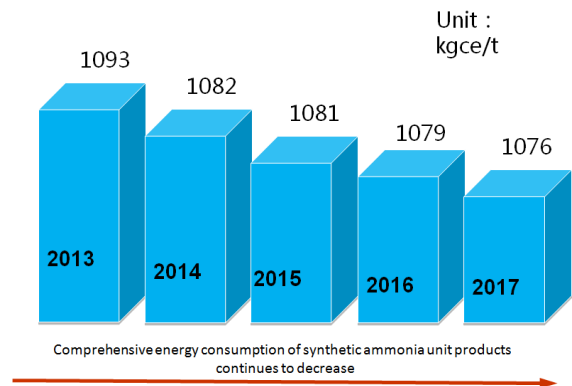
- C Launch of "energy efficiency benchmarking activities" & energy conservation and consumption reduction

In the face of mature and stable production technology, the primary problem to achieve energy saving and

consumption reduction is how to avoid the humdrum work. The company checks the standards not only for the overall "standard" of advanced enterprises, but also for that of advanced technology and equipment.

- D Process control and ensurance of the "safe, stable, long period, maximum capacity, excellent process" operation

The most difficult problem for energy saving and consumption reduction that should be given emphasis in daily production is to achieve the maximum efficiency of the use of equipment to ensure stable and long cycle operation, which requires few or even no stop, zero accidents. The corporation introduces Dupont process safety management concept. Control over security, environmental protection, energy, equipment and quality are enhanced through the three basic management —"succession", "range checking" and "after-work evaluation" and "safe, stable, long, full, excellent" operation is ensured to finally achieve energy saving and consumption reduction.



Energy efficiency leader, Leading China , We are in action !
Figure5 Synthetic Ammonia Comprehensive Energy Consumption Data

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.