

Global Energy Management System Implementation: Case Study

South Korea

Cheongju plant of LG Chem

Cheongju plant of LG Chem, producing Information electronic materials, display and battery materials worth for 830,000 billion KRW annually, achieved 3.98% of energy saving in 2015.



Cheongju plant of LG Chem producing various information electronics material products through continuous innovation and R&D for last 27 years since 1997, contributes to the regional and national economies and delivers various activities of energy management, as a leading company placing our clients and environment as our priority.

Case Study Snapshot

Industry	Manufacturing
Product/Service	Batteries and others
Location	Cheongju, Chungchung bukdo
Energy Management System	ISO 50001
Energy Performance Improvement Period	2015(Baseline 2014)
Energy Performance Improvement (%) over improvement period	$\frac{(2,019,353 - 1,938,914)}{2,019,353} = 3.98$
Total energy cost savings over improvement period	1,169 mil KRW
Total Energy Savings over improvement period	80,438.66(GJ)
Total CO2-e emission reduction over improvement period	4,341(tons)

Business Case for Energy Management

Cheongju plant of LG Chem has shown a fast growth in LCD and IT materials since 2000 when the company successfully commercialized flat LCD panels for the first time in Korea. The company recorded the largest share in the LCD market which used to be dominated by Japanese companies in 2009, through continuously making investment in R&D. The company expands to new emerging areas such as OLED lights and water treatment filters.

Despite of the fierce competitions in the market since 2014 due to overall market recession, depreciation of Japanese currency (which increased Japanese companies' market competitiveness), and market entrance by Chinese companies, the company so far has been leading the global market based on differentiated technologies. The company introduced EnMS in order to respond fast to unpredictable external environments.

Energy management program: Cheongju plant makes efforts to identify measures for improvement applicable to key facilities through energy efficiency consulting and use energy resources efficiently by increasing engineers' capacity.

The main contents of energy consulting include process analysis, identification of loss, selection of implementation measures, while energy manager conducts process analysis and identifies measures to reduce energy loss by himself.

Energy reduction approach: Cheongju plant has participated in demand response since 2015 which was initiated to increase national electricity reserve rate and prevent circulated power-cut under the condition of power shortage.

This project aims at creating economic benefits by increasing operational efficiency in the national power market and saving power costs by providing incentives to participating companies. Cheongju plant achieved a power capacity target of 2,200 kw contracted for 2015, by introducing and operating highly efficient energy facilities. The contracted capacity increased to 2,700kW this year, and we will try our best for more efficient operation and further energy saving to achieve the target.

Business Benefits Achieved

The management and staff manage energy performance together on Cheonju plant

Since LG Chem established Green 2020 strategies in 2010, Cheongju plant makes best efforts to save energy consumption following the corporate sustainable management policy through energy partnership.

LG Chem Cheonju plant established energy management system to conform with ISO 50001, which consists of: firstly, energy actions implemented following the energy management rules, secondly, improving awareness of all involved staff and the Management and identifying actions for energy saving, and thirdly, achievement and sharing of energy management performance at corporate level.

The energy saving performance following introduction of EnMS is as below;

80,438.66GJ of total energy saving (3.98%) and 4,341tCO₂ of GHG reduction achieved during the monitoring period (2014-2015) against the baseline period (2013), which is measured following the certification criteria of highly efficient plant in Korea. The cost saving is accounted for 1,169 mil KRW.

EnMS Development and Implementation

'Energy care'

Cheongju plant committed to continuously improve its performance in the area of environment/safety/health by conforming with ISO 14001 and OHSAS 18001. We further developed an internal policy based on ISO 50001 regulations, which sets up directions, tips, and detailed action guidelines for the implementation.

By achieving external certifications on our performance, we check our performance by a third party and identify improvement potentials.

LG Chem operates Energy committee at corporate level, and Cheongju plant is actively participating in the committee. Corporate wide Energy committee's meeting is organized by CEO once in every year, to discuss energy and GHG performance, as well as methods to increase the capacity to respond to the issues. Making investment decision in the order of maximum effectiveness, LG Chem strengthens the risks management system not only at corporate but also at site level.

Energy consumption review and business planning

Review, analysis, and planning: Plant operator, the Energy committee, responsible departments and working departments review and set the energy consumption baseline, discuss, finalize procedures of energy review, and establish performance indicators afterwards. Energy consumption review results are drawn following the procedures, reported to the CEO of the company, and improvement measures are applied later.

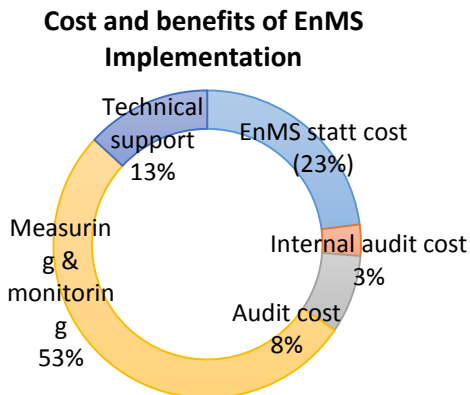
Decision making: Energy saving measures are reported to the CEO during the Energy committee meeting organized annually, and investment measures are determined by administration team. Administration team allocates targets to achieve and investment resources to each plant site. Performance is measured based on statistical analysis methods and validated on cross checks against the planned values.

Duration: The total invested time for EnMS establishment is eleven months.

Cost-benefit analysis

The largest share of EnMS implementation costs is measuring and monitoring system cost (53%), staff costs (23%), and others.

▼ Cost-benefit analysis of EnMS implementation



Introduction of EnMS

In order to check energy performance, we used the EnMS policy implemented by Korea Energy Agency, which also involves 3rd party verification.

▼ EnPI Tool (KEA)

에너지경영시스템 EnPI TOOL

산업통상자원부 한국에너지공단
<2016-03>

호환성: EXCEL 2007 버전 이상



이 TOOL은 한국에너지공단에서 사업장의 에너지 성과평가를 돕기 위해 제작되었으며, 사업장에서 사용하는 에너지원에 적합한 모델을 도출하고 이에 대한 분석을 시행할 수 있습니다.

에너지원은 총 5개까지 입력 가능하며, 각 에너지원에 해당하는 독립 변수는 8개까지 분석 가능합니다. 미국의 SEP(Superior Energy Performance) 기준을 벤치마킹하여 일부 기준을 수용하였고, 한국 실정에 부합한 TOOL이 되도록 사용자 편의성 및 통계 지표를 강화하였습니다.

엑셀의 리본 탭 메뉴 중 'EnPI Tool'을 이용하여 분석을 시행하실 수 있으며, 사용과 관련하여 자세한 사항은 '에너지경영시스템 EnPI TOOL 매뉴얼'을 참조하시면 됩니다.

We set the entire plant as the energy performance improvement boundary and the duration with one or two years. Baseline emissions were determined based on monthly data for 24~36 months.

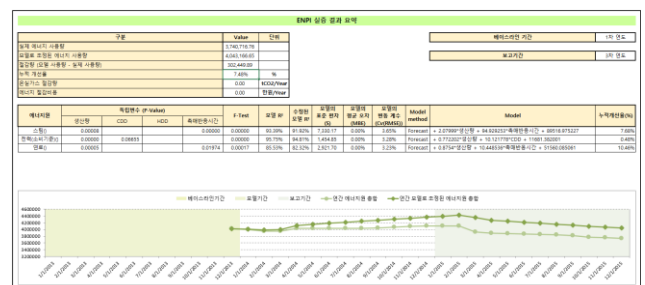
Applied performance analysis method was regression analysis. We identified factors significantly influencing processes by energy source. Identified influence factors are production level by energy source, total SM production, catalytic reaction time affecting the total SM production, and heating and cooling degree-days reflecting the features of in-house typed Cheongju plant.

Upgrade the methods of validating performance results

In the past, we acknowledged performance is validated if the calculated results are reasonable. After introduction of EnMS, performance achieved by product team was calculated, consolidated, and the consolidated value was validated against the measured value drawn from EnMS analysis models.

We only validated the performance only when the value of energy saving performance by each production team is greater than the one drawn from the energy performance evaluation model.

▼ The result drawn from EnPI Tool of EnMS (Example)



'Establishment of realistic target and performance evaluation

We establish realistic energy performance target which is achievable for team members and consistent with the corporate energy management policy initiated by the CEO.

What is the most important is establishing realistic target and make continuous efforts to improve energy performance.

Also, in evaluating energy performance, energy improvement processes should be systematically evaluated as well, such as performance assessment, difficulties of the measures and the level of team contribution considering both individual and team performances as well as internal and external environmental changes.

Communication is the foundation for increasing energy saving capacity

Employee training: LG Chem invites internal and external energy experts and delivers various energy related trainings such as ISO 50001 internal audit training.

We also create social values through partnership program such as supporting our suppliers with investing in energy saving projects.

Expert: LG Chem signed MOU with KEA, a implementing agency of Ministry of Trade, Industry and Energy, and provided staff training on EnMS performance evaluation.

We also invited external experts on EnMS performance evaluation and delivered technical trainings at 1 and 2 Cheongju plants and established an improved performance evaluation system by building statistical models applicable to Cheongju plants.

For an analysis of energy management performance based on statistical methods, basic data management is the key importance.

Therefore, we need to establish an internal management process defining data and factors influencing energy consumption, and manage the performance

Once the performance is systematically evaluated after a successful implementation of EnMS, we will use the system for planning and verifying our business plan and comply with external regulations such as calculation of GHG at BAU and allocation of performance targets to each business department.

We will also establish a energy saving target through building optimized models for each business department , validate their performance by cross-checks, and improve departmental energy performance.

Lessons Learned

Lessons Learned – Establish sustainable EnMS

For a stable operation of EnMS, CEO's supports in energy management is the key to success. The level of strengths of corporate energy management regulations and policies is determined based on the CEO's willingness to support

Also, it is important to establish targets at realistically achievable level, encourage staff to achieve the goal, and reward their performance based on a fair and clear incentive system.

For a sustainable operation of EnMS, it is important to announce the energy policy at the corporate level, let the staff know the willingness of the CEO and raise awareness of and participation from staff and the management

Prioritization of EnMS

It is important to recognize energy saving as a key success factor. Following the guidelines on EnMS, all staff should plan, implement and review the required energy saving actions and performance on each site, and the company should actively support the actions. All staff should take responsibility for energy saving and make efforts for a successful implementation of EnMS.

Keys to Success

- A strong willingness of the CEO in energy management
- Establishment of a sustainable management system
- Establishment of achievable targets and clear performance reward system
- Increase of staff's awareness in energy management and communications.

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.

