

# Global Energy Management System Implementation: Case Study

Republic of Korea

## LG Electronics Inc. LG Digital Park

Since the introduction of the energy management system, we have achieved a 5.4% energy performance in 2016 (2 years) compared to 2014 as a result of quantitative evaluation.



LG Electronics Inc. LG Digital Park has a variety of buildings including production, research, and welfare facilities with an area of 497,481m<sup>2</sup> in which 8,000 employees produce and research mobile and communications products.

### Business Case for Energy Management

LG Electronics has established an **EESH (Energy / Environment / Safety / Health) policy\*** to implement environmental management under the vision of protecting the clean earth and human health.

\* EESH Policy: The activities for optimize of energy efficiency, eco-friendly process operating and brand-new product developing, wealth & safety of workplace and health promotion for employees were conducted thereby implementing the Global Top Company in the EESH field and providing differentiated value to our customers, we seek to preserve the global environment and promote sustainable

social development and enhance the quality of life for stakeholders.

*“The energy management system is a continuous improvement process and requires considerable patience.”*

### Case Study Snapshot

<b>Industry</b>	LG Electronics Inc. LG Digital Park
<b>Product/Service</b>	Mobile Communications, Vehicle Components
<b>Location</b>	Pyeongtaek
<b>Energy Management System</b>	ISO 50001
<b>Energy Performance Improvement Period</b>	2 years
<b>Energy Performance Improvement (%) over improvement period</b>	5.4%
<b>Total energy cost savings over improvement period</b>	712,878 USD
<b>Cost to implement EnMS (just for capital investment)</b>	1,847,510 USD
<b>Payback period (years) on EnMS implementation</b>	2.6 years
<b>Total Energy Savings over improvement period</b>	51,489 (GJ)
<b>Total CO<sub>2</sub>-e emission reduction over improvement period</b>	2,502



Fig. Environment Management

Under the vision of environmental management, to cope with climate change, LG Electronics has established four strategies: productivity improvement, product competitiveness improvement, operational efficiency improvement, and social contribution since 2009. In order to achieve this goal, we have set a detailed goal of reducing 150,000 tons of emissions by 2020 (10% of the base year) compared to 2008 emissions.

As part of the achievement of the goal, LG Electronics introduced the energy management system throughout the company, including LG Electronics Inc. LG Digital Park, and received the initial certification in December 2010.

LG Electronics Inc. LG Digital Park was completed in 1984 to produce video and audio products. We integrated mobile phone sites from Cheongju and Seoul in 2005 and have produced the latest mobile communication products and researched TV and Display products.

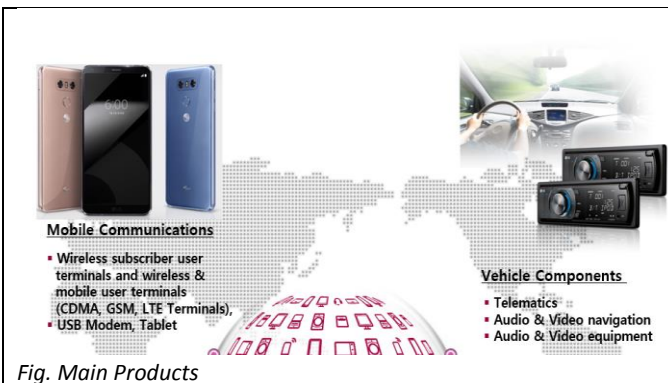


Fig. Main Products

LG Electronics Inc. LG Digital Park, which is engaged in the R&D and production of highly competitive mobile, TV and display products all over the world, regards product quality as a top priority. Thus, the importance of energy can be relatively less, but the energy management system has been actively promoted due to the declaration of the company's environmental management system and the strong commitment of its executives to the environment.

We have been able to draw many improvements that were not found in the process of establishing, operating, and evaluating the energy management system, and it became an opportunity to become more interested in energy.

There is still a lot improvement points, and we feel that there is a need to devote more time and effort to achieve the highest energy efficiency.

### Business Benefits Achieved

The annual management meeting reviews and determines the expected growth rate, and estimates the expected energy use and greenhouse gas emissions. Each year targets for reducing energy costs versus budgeted plans and setting greenhouse gas reduction targets against BAU (Business As Usual) are set to reflect the projected energy use and the greenhouse gas emissions.

In order to achieve this, all departments share data and collaborate with each other to achieve the best synergy. The active encouragement and participation of executives in energy management activities that can be excluded has motivated all employees to devote their efforts under the slogan of quality first. Because the LG Electronics Inc. LG Digital Park consists of various buildings with different purposes, finding of energy saving activities was not an easy process. However we were able to achieve my confidence by stepping up and implementing my goals in a step-by-step manner.

In the meantime, we conducted the internal reviews and reports on our effort and participated in the

performance evaluation project of the energy management system promoted by Korea Energy in order to confirm the performance clearly. It was confirmed that the following achievements were achieved in two years.

- Baseline period : 2014
- Project period : 2016
- Energy performance (Electricity) : 5.88 % (48,534 GJ)
- Energy performance (LNG) : 2.45%(2,996 GJ)
- Energy performance (Total) : 5.44 % (51,490 GJ)
- Energy saving costs : 712,878 USD /2year

Because a third party has proved similar performance internally as expected and reviewed, LG Electronics Inc. LG Digital Park was able to gain more confidence in the operation of energy management system.

## EnMS Development and Implementation

Under EESH policy of LG Electronics, a company-wide effort is important to achieve reductions in greenhouse gas emissions and achieve our own energy efficiency targets and, first of all, the various energy activities such as energy supporter, energy campaign, and energy patrol which can be easily done were planned and performed in order to lead enterprise-wide participation at LG Electronics Inc. LG Digital Park.

Next, the energy wastage was reduced through standardized procedures and manuals for energy-consuming facilities and the monitoring of energy usage was enhanced. In the energy field, experts from each field gather to conduct in-depth discussions regularly in order to abandon existing practices and methods and to carry out innovative and creative approaches.

It does not apply all the items required by the PDCA (Plan-Do-Check-Action) cycle and standards, but works to improve the LG Electronics Inc. LG Digital Park and improve them so that the energy management system is fully operating in the enterprise management system.

## Organization

The EESH general manager of LG Electronics Inc. LG Digital Park also plays a leading role in energy management. Below that, the team leader of the facility engineering team acts as the energy manager. With regard to energy management, the facility engineering team and the relevant department personnel were

appointed to participate in and collaborate with it throughout the company.

The facility engineering team is playing a role in implementing greenhouse gas reduction and energy saving activities for stable supply of utility facilities required for business operation and response to GHG emission trading system and conducting public-relations and education on energy management and conducts actual energy management, and so is a department that practically plays a role of energy management.

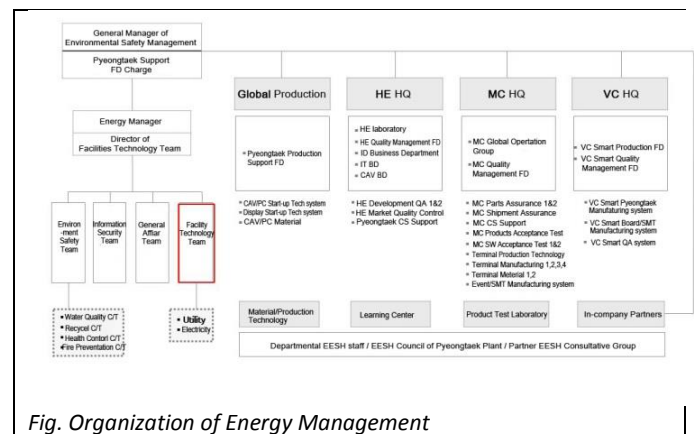


Fig. Organization of Energy Management

## Energy review and planning

### Understanding of the current situation

By creating and managing a Fence Diagram, the energy flow and use of LG Electronics Inc. LG Digital Park are can be understand and the impact on the changes is checked.

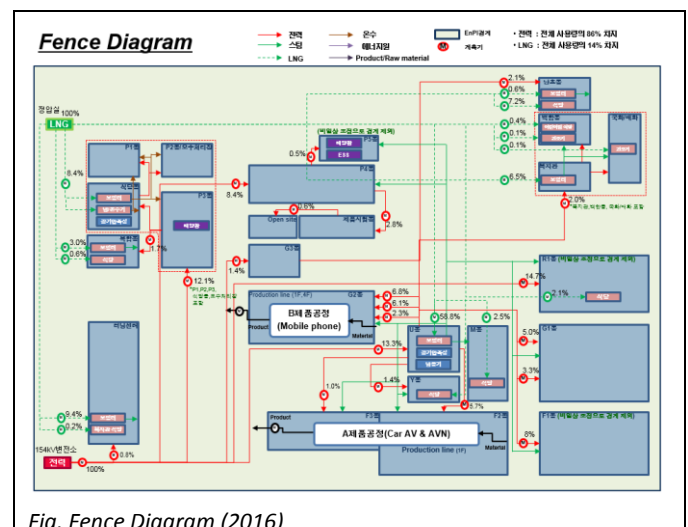


Fig. Fence Diagram (2016)

LG Electronics Inc. LG Digital Park is also able to consume energy at the plant, but it cannot ignore the energy consumption of the research center and the welfare center, so management of this part is necessary.

Also, the building continues to be built and expanded, energy saving products are introduced and applied by deriving ideas from the planning process so that no waste of energy occurs in new and expanded buildings.

**Significant Energy Use (SEU) Drawing**

Since most of the production facilities are line facilities, there is a great possibility of reduction in speed, moving, and operation optimization and the energy use was also improved mainly by the UT dong.

Next, we focused on managing the energy use of the Research Center, identifying unnecessary energy, and introducing the highly efficient facilities by step-by-step effort. In the case of production plants, utility usage improvement was carried out first, and research on improving process efficiency was carried out, and activities are continuously being discovered.

*“No Lightness and Weight in Energy Saving.”*

**Finding opportunities for improvement**

LG Electronics Inc. LG Digital Park is regularly conducting discussions on improvement for energy management and energy conservation activities by the facility engineering team and related departments centered on the energy manager.

The meeting is a step-by-step meeting to discuss energy saving ideas, improve and complement the ideas found, and makes investment decisions for implementation. These regular meetings are a good opportunity to find out, improve and implement the smooth energy efficiency improvement activities.

The electricity monitoring system establishes and transmits data that is monitored in real time, and

supports discussion and improvement activities of meetings.

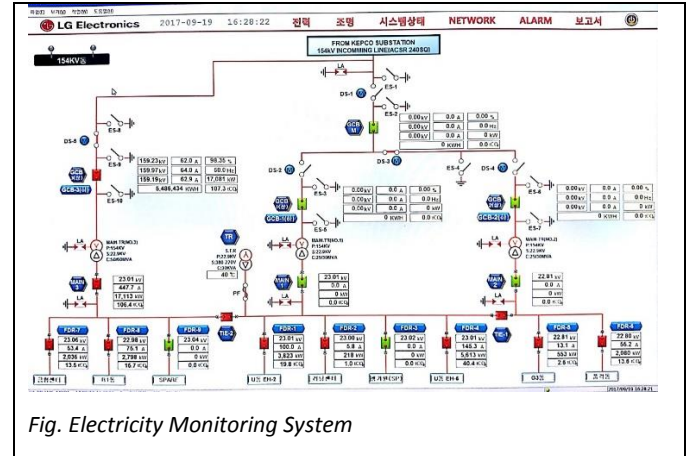


Fig. Electricity Monitoring System

**Energy Performance Check**

**Identifying of Influential factors**

We predicted and analyzed the factors affecting each energy use and derived the factors affecting the energy use of LG Electronics Inc. LG Digital Park.

Table. Identifying of Influential factors

Energy Source	Independent variable (P-Value)			F-Test	Adj. R <sup>2</sup>
	Board amount (EA)	CDD (22°C)	HDD (22°C)		
Electricity (GJ)	0.05861	0.00025	0.01332	0.00155	77.83%
LNG (GJ)			0.00000	0.00	93.48%

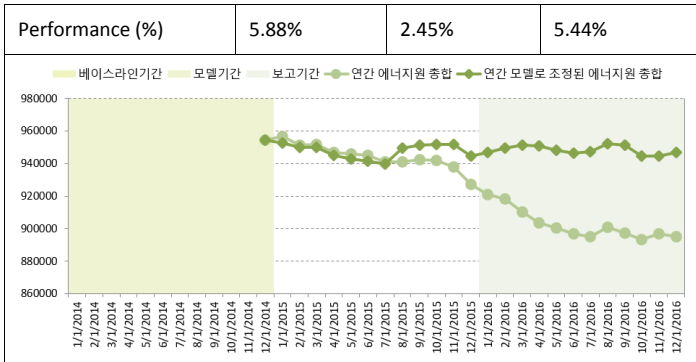
**Energy performance drawing**

Using the derived influence factors, energy performance of 2016 compared to 2014 was verified and 5.44% of energy performance was confirmed.

Table. Energy Performance Drawing

Division	Year	Electricity (GJ)	LNG(GJ)	Total(GJ)
Baseline period	2014	824,036.87	120,716.97	946,753.84
Report Period	2016	775,502.96	117,761.38	895,264.34
Performance(GJ)		48,533.91	2,955.60	51,489.5





**Cost Benefit**

Various energy-saving activities ranging from improvement activities for existing unreasonable customs which do not incur investment costs to high-efficiency facility replacement, have been uncovered and performed during the achievement period (two years).

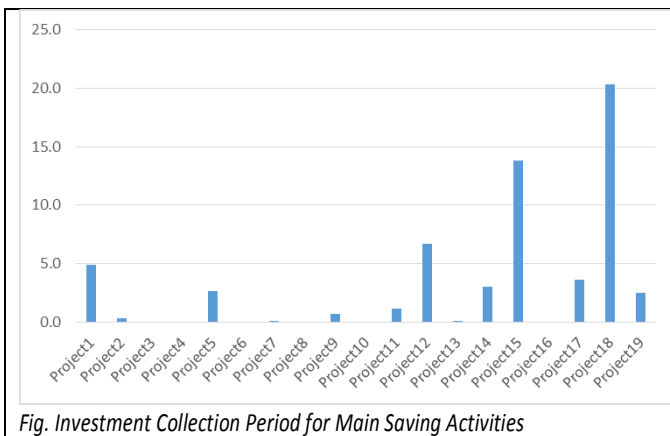


Fig. Investment Collection Period for Main Saving Activities

We confirmed the energy cost savings of about 712,878 USD during the performance period (2015~2016) by implementing the energy efficiency improvement activities. The payback period for the savings activities exclusive of the internal labor cost and EnMS Certification and related investment costs is about 2.6 years, and the energy management system was able to confirm significant energy savings.

**Communication, Education and Tool**

LG Electronics Inc. LG Digital Park has regularly gathered EESH general managers, environmental safety teams,

information security teams, general affairs teams, and facility engineering teams to create an enterprise-wide communication channel.

The facility engineering team promotes and educates on energy saving and promotes awareness of energy use through various campaigns.

In the performance evaluation, the energy management system EnPI Tool developed by Korea Energy Agency is applied and utilized as an internal performance evaluation method and the derived models are constantly improved and verified and used to predict energy usage and manage usage.

**Lessons Learned**

**Importance of communications**

Because each department carries out its own tasks, it is important to form a consensus through education about energy use and constant communication channels in order to lead enterprise-wide participation.

**Establishing of a virtuous cycle system connected with regulations**

We have achieved considerable energy savings through various activities carried out through company-wide efforts and encouragement.

This has had the extra effect such as greenhouse gas reductions and the virtuous cycle system in which we invest the proceeds generated through the sale of emission credits reduced in conjunction with the Emission Trading System in to energy-saving activities invests was established.

LG Electronics Inc. LG Digital Park plans to invest in the energy-saving activities of the profit generated by Greenhouse Gas reduction in 2018.

## Keys to Success

---

- Phased Approach
- Active Participation of CEOs
- Identification of Energy Performance

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](http://www.cleanenergyministerial.org/energymanagement).

