

Global Energy Management System Implementation: Case Study

Japan

F-TECH INC. Kameyama Plant



Kameyama Plant, F TECH INC.



“Faced with energy shortages after the earthquake, we recognized the importance of energy management”

—Hajime Fujitaki

Director & Managing Officer

F-TECH INC.

Business Benefits Achieved

Kameyama Plant reduced CO2 emissions of 1,379 t-CO2 by 27% (compared with FY2010). We reduced 182t-CO2/year, and saved 8.8million yen through energy saving activities such as paint circulating pumps inverter control and LED installation at stamping area. (Further information page no.8) The plant's investment was 1.3 million yen to implement the EnMS and securing ISO50001 certification was paid back through cost savings in about 1.8 months.

In Japan, after the Great East Japan Earthquake of 2011, there was a power crisis because all the nuclear power plants were stopped. Meanwhile, Kameyama Plant was to review the equipment operation, they effort thoroughly to energy saving does not spend money. EnMS has also helped to reduce risk by energy cost increases.

Kameyama Plant was acquired for the first time certification from the third party ISO50001 in the auto parts professional manufacturer in October 2013.

Case Study Snapshot

Industry	Automotive
Location	Kameyama, Mie, Japan
Energy Management System	ISO 50001-The first Japanese automotive parts plant to be ISO50001certified
Product/Service	Automotive parts
Energy Performance Improvement (%)	Reduction by 27%-CO2 emission of Electricity, City gas and LPG
Annual energy cost savings	More than 7 million Japanese yen
Implementation Cost	1.3 million yen
Payback Period	1.8 months

Company and Facility Profile

F-TECH INC. is a manufacturer of suspension parts with complex functionality established in 1947. We manage the entire process, from planning and development to assembly. We produce critical-safety parts which support the dynamics of the vehicle, such as suspension arms, sub frames and pedals. Ftech employs 5,972 workers across all companies and had consolidated sales of 175,579 million yen in fiscal year 2014. Ftech is a key supplier to Honda Motor, General Motors of Canada Ltd, Nissan Motor Co., Ltd., Mitsubishi Motors Corporation, Suzuki Motor Corporation and Toyota Motor Manufacturing Canada Inc.

At Ftech, we have operated overseas locations since 1986 in order to supply our products more efficiently. We currently have a production system that covers 4 regions (Japan, North America, Central America and Asia)

The Kameyama Plant located in Kameyama City, Mie prefecture, underwent a phased expansion from 2006 through to 2009, resulting in the New Kameyama plant. They have an integrated production system from a stamping process, to welding, painting and assembly.

Business Case for Energy Management

F-TECH Group Environmental Target

At F-TECH INC, we have set a CO2 emission per unit of sales improvement of 10% for the entire group by 2020 (as compared with 2010 year).

Reduce manufacturing cost

We aim to reduce the environmental impact and enhance corporate competitiveness by reducing energy costs as a part of manufacturing costs.

The Energy Conservation Act

In Japan, an energy resource-poor country, the Energy Conservation Act of 1978 was established for the purpose of taking the necessary measures to advance the comprehensive and rational use of energy. Japan

has a long history of interest and investment in energy saving.

History of energy reduction approach

F-TECH INC. engages in environmental activities and social contributions that take into account the impact on the global environment, creating manufacturing cost reductions through energy conservation. In addition, F-Tech has initiated environmental measures in earnest since 2008. In particular, environmental managers from all domestic and overseas F-Tech companies host an annual “Global Environmental Conference”, where they and all group company managers gather and discuss environmental management, the results of our initiatives, and common concerns.

During the 2009 full-scale plant expansion, Kameyama installed an energy measuring system capable of simultaneously monitoring approximately 400 points of electricity, natural gas, compressed air and welding shielding gas. We decided to implement ISO50001 in order to help us utilize the rich energy data collected by this system and further accelerate the plant’s energy efficiency.

Keys to Success

- **Energy Management Team**

When organizing an energy management team, it is important that the EnMS team includes not only the Facility department, but also all process departments. Equipment specifications of production facilities are determined prior to mass production. For that reason, it is very important that production department are involved in team.

- **Formation of the working group**

Using a theme we call “System building from defense to attack”, we established a working group composed of professionals from each department and created a framework from system construction stage of EnMS.

- **Consideration of ISO50001 related standards**

We obtained significant direction from the relevant standards. In particular, we carried out the system construction in consideration of the ISO50002:2014 and ISO50006:2014 standards in carrying out the evaluation of “Energy audit” and “Evaluation of Energy Performance.”

- **Clarification of the cost-effectiveness**

With improvement opportunities that were identified in the energy review, we were able to perform the energy saving measures with a medium and long term strategy because we clarified as much as possible required investment for expected outcomes.

EnMS Development and Implementation

Business Benefits

Tangible effect:

CO2 reduction and energy cost reduction achievements from 2012 to 2014 are as follows;

	2012	2013	2014
Reduction of CO2 emission	81t-CO2	154t-CO2	182t-CO2
Reduction savings	2.8 million yen	7.1 million yen	8.8 million yen
Required investment	6.9 million yen	9.2 million yen	2.7 million yen
Cost-effectiveness	2.5 year	1.3 year	0.3 year

Intangible effect:

- EnMS can standardize the steps such as energy data analysis, planning, implementation and effectiveness confirmation.
- EnMS can provide the framework for permanent systematic energy.
- EnMS helps focus and improve analysis skills of energy data by employee.

-EnMS can raise the energy saving awareness of employees and help them gain the know-how for identifying and implementing energy saving countermeasures.

As a result, Kameyama plant's energy performance improved.

Organizational

The EnMS management representative reports directly to the Kameyama plant General Manager, who is the senior executive. The EMS secretariat, who is in charge of system management, and facility department, who is in charge of energy saving, support the EnMS management representative. Providing support to the EnMS management representative are departments that use energy such as stamping, welding, painting and assembly, and also the production planning department. Each department head serves concurrently as environmental officers of ISO14001, creating a team of 10 people who are in charge of the ISO process and who are familiar with the manufacturing process.

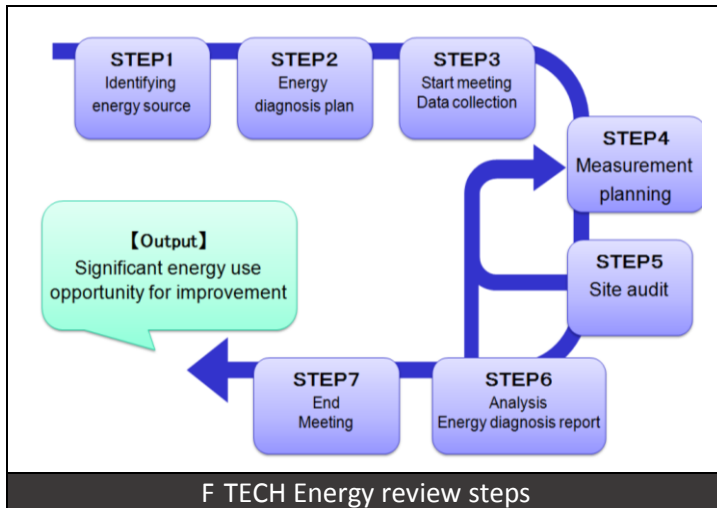
Energy review and planning

- **Energy Review**

In our energy review, we realized that we wanted to be able to take full advantage of the following two points:

- Utilize the rich data of the energy measuring system
- Utilize the energy saving know-how accumulated by the Global Environmental Conference attendees.

In Kameyama Plant, Energy review is divided into the following seven steps.



We formed the energy audit team of in-house employees who had the necessary competence. In particular, at step 3, each production department established a facility management ledger for each piece of major equipment, conducting an inventory of the current operational situation.

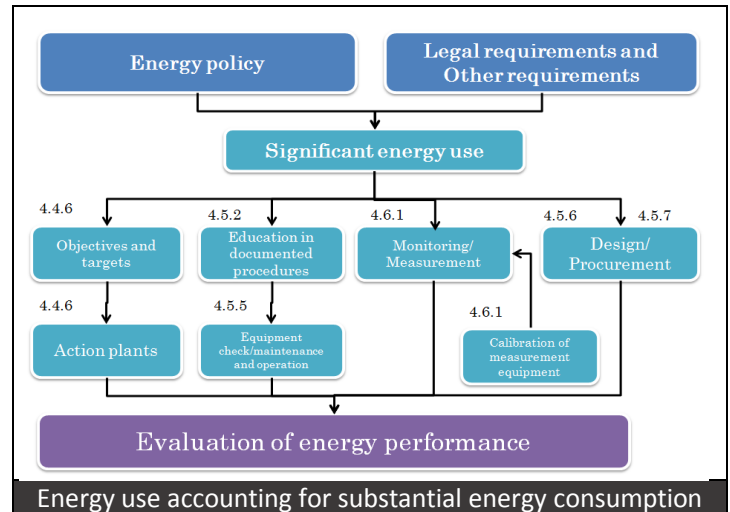
In the site audit of step 5, the Energy audit team identified the improvement opportunities while checking the actual field situation based on the data that they collected at step 3, including the information of facility management ledger.

Improvement opportunities that have been identified are summarized in the energy audit result report by the energy diagnostician and are communicated to the each department. The report contains specific measures and estimated energy saving consumption and reduction costs.

Outputs of Energy review are improvement opportunities, and energy use accounting for substantial energy consumption. For improvement opportunities, we evaluate based on 4 criteria:

“Estimated annual reduction in energy cost”, “Time required for improvement”, “Payback period”, and “Impact on environmental safety and quality.”

Improvement opportunities that have a high rating are to be implemented on a priority basis. Energy uses accounting for substantial energy consumption are reflected in the other elements of the ISO50001 diagram below:



• Energy Baseline

Energy baseline was set to the 2011 fiscal year after completion of expansion work at Kameyama Plant and installation of energy measuring system.

• Energy performance indicators

Energy sources include electricity, Natural gas and LPG. Energy performance indicators are identified as the CO₂ emissions per unit of NET sales.

• Kameyama Plant energy target

We set a 2014 fiscal year target of reducing CO₂ emissions per unit of NET sales 1%, as compared with 2011 fiscal year.

Development and use of professional expertise, training, and communications

• Introduction training

EMS secretariat members participated in the external training, who then performed in-house training sessions to spread that knowledge. In addition, at the points during our EnMS building, training sessions were given by external consultants, and from them we also received advice on EnMS construction.

- Awareness education for employees

At the general meeting, we provided awareness education to all employee, so that they understood the purpose and intent of ISO50001. By utilizing the suggestions system we were able to receive environmental improvement suggestions from employees that related to their daily tasks.

	2012	2013	2014
Submission rate	99%	114%	148%

Tools & Resources

- Utilization of EMS

Kameyama Plant has been certified to ISO14001 since 1998, and is now in a mature stage for EMS. Therefore we worked on a system construction that integrated the EMS system as much as possible.

- Utilization of the Energy Monitoring System

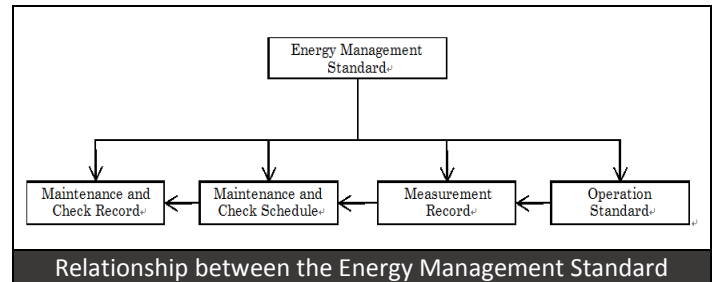
We used the energy measuring system installed in 2009 and portable power measurement equipment.

Steps taken to maintain operational control energy performance improvement

- Set of energy management standard

We set the criteria for “Management”, “Measurement and recording”, “Maintenance and inspection”, “Criteria for newly installed equipment” for each major piece of equipment, and have established the operational standards for energy saving based on energy management standards. We have created it in reference to the criteria detailed in Japan’s Energy Conservation Act.

As per the following flowchart, we created operation standards, and then perform daily and periodic checks. We aim to save energy by taking into account the criteria.



Approach used to 1) determine whether energy performance improved and 2) to validate results

- Monitoring Energy data

We charted the energy data collected by the energy monitoring system, and employees are able to access the data from the company’s intranet. We are management of the energy use per unit of production of each process and holiday electric power. EnMS members get together for meetings, and have a discussion about the environment. At these meetings, if there is abnormal energy consumption, we investigate the cause.

- Energy Savings Discussion

We have held “Energy saving open discussion meetings” since 2014 in order to improve our ability to analyze energy data. EnMS team members analyze the detailed energy data from other departments and they report the problem in a report to the relevant department. The department, which receives the report, investigates the cause and implements improvement measures.

- Internal Audit

We conducted an internal audit in the complex audit of ISO14001. There is an internal audit twice a year, we conducted internal audit to focus on ISO50001 either once. In particular, we confirmed the compliance status of the energy management standards, site audit and suitability of targets through the ISO50001 internal audit.

Cost-benefit analysis

Cost benefit analysis: Cost, savings and pay back	
Total Cost for implementing EnMS	1,328,000yen
1. Internal Staff Time	528,000yen
• Energy Review	108,000yen
• Energy data analysis * 1	180,000yen
• Internal Audit	30,000yen
• EnMS training	210,000yen
2. External consulting fees	800,000 yen
3. ISO50001 Audit (3 rd party auditor)	600,000 yen
Total Energy Saving(3 years)	18,701,902yen
• 2012 Energy Saving	2,844,000 yen
• 2013 Energy Saving	7,083,037 yen
• 2014 Energy Saving	8,774,865 yen
EnMS Payback (2014)	1.8 Months

* 1 : The energy monitoring system is not included in total cost for EnMS implementation, because this system was installed before ISO50001 implementation.

EnMS implementation schedule

Year	Month	Activities
2011		
2012	January	Investigation
	February	
	March	★ Kick-off
	April	
	May	System constructio
	June	
	July	
	August	Energy review
	September	
	October	
	November	Action plan
	December	
2013	January	Internal Audit
	February	
	March	Management review
	April	
	May	
	June	1 st stage Third party audit
	July	
	August	2 nd stage Third party audit
	September	
	October	ISO50001 certification



Top management and EnMS team ,
Kameyama Plant in Japan

Lessons Learned

Identifying Areas of Significant Energy Consumption

It was easy for the Kameyama Plant to identify the areas of significant energy use because there are rich energy data measured by the energy measuring system. However, we needed a way of identifying significant energy use without the energy monitoring system in order to implement the energy review at plants that do not have the energy monitoring system. Therefore, we created a facility management ledger for major equipment, which calculated the theoretical annual energy use from the information of the rated capacity and the annual operating hours. In addition, there are aspects of energy saving for each facility, everyone can grasp the energy saving situation at first sight.

Evaluation of Energy Performance

It was very difficult to evaluate energy performance. Kameyama Plant uses the CO₂ emissions per unit of NET sales. Energy performance had worsened due to a decrease in domestic production numbers. We evaluated the energy performance by correcting the energy performance in consideration of the relevant variables such as NET sales, Paint hanger numbers and temperature.

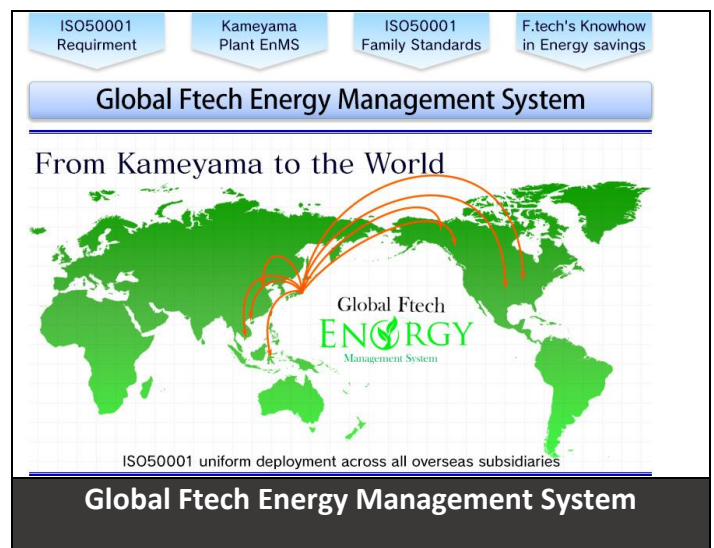
Energy Management Standard Training

Kameyama Plant has established criteria for operational management of facilities for energy saving based on the energy management standard. We then educated the operators associated with the operation of the

equipment so operators understand the importance of the operation criteria.

Ftech Group Benchmark Implementation

F-TECH INC. has issued “Global F tech Energy Management System,” which is a common group energy management system in March, 2015. We put the lessons learned and know-how from the Kameyama Plant in this system. We have begun a global deployment of ISO50001 since 2015. This will introduce ISO50001 framework to overseas benchmark bases. In July 2015, F&P AMERICA MFG., INC., located in Ohio, USA, started began implementation and was completed in February, 2016. We started similar implementation activities at two plants in China in January and March, 2016 and then next step will be Asia Pacific benchmark base implementation. We plan to introduce the ISO50001 in all the group mass production plants.



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.



President Fukuda, F TECH INC.

“From Kameyama to the world, we will introduce an energy management system, which was first constructed at the Kameyama Plant, to all other Japanese plants and oversea plants and then we will enhance the business competitiveness.”

—Yuichi Fukuda

President,
F-TECH INC.

Stamping Area Installation LED

Before

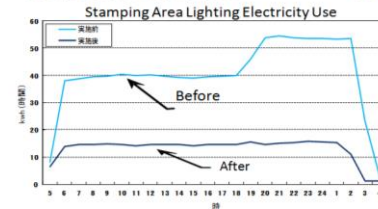
At stamping area, lightings had passed for 25 years, and degraded. Even if a lamp was exchanged, lighting has problems such as a light bulb of lighting will burn out immediately.

- The kind of lighting : Mercury lamp
- Power consumption : 1,050w
- Installation number : 76 light
- Lamp Life Expectancy : 12,000h

After

First of all, we confirmed the required intensity of illumination each operational area, and installed either 1,000w equivalence or 700w equivalence.

- The kind of lighting : LED
- Power consumption : 321w/241w
- Installation number : 25 light / 51 light
- Lamp Life Expectancy : 60,000h



Summary of Effect

- Before improvement : 370Mwh/year
- After improvement : 150Mwh/year
- Reduction effect : 220Mwh/year
- Reduction effect : 3.7million yen/year

Business Benefits Stamping Area Installation LED



Top management and EnMS team,
F&P AMERICA MFG.,INC. in the USA



EnMS team ,
F Tech Zhongshan Inc. in China

Paint Circulating Pump Inverter Control during Non-operation

Before

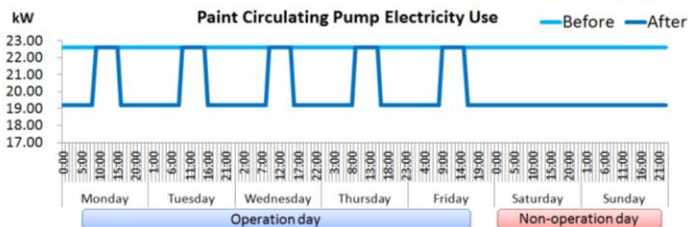
• 2 paint circulating pumps worked in order to stop precipitation of paint by 48Hz for 365 days 24 hours. Inverters were installed and adjusted it to 48 Hz.

※ Working time is 19 h/day and 244 day/year

After

• Paint circulating pump could not stop because of quality issue during non-operation time, however, we can decrease the number of inverter Hz. We changed from 48Hz to 41Hz. If painting conveyor stop, inverter rotation change to 41Hz.

- Before improvement : 198Mwh/year
- After improvement : 173Mwh/year
- Reduction effect : 25Mwh/year
- Reduction effect : 0.5 million yen/year



Business Benefits Paint Circulating Pump Improvement