Global Energy Management System Implementation: Case Study

INDONESIA

PT. KMK GLOBAL SPORTS

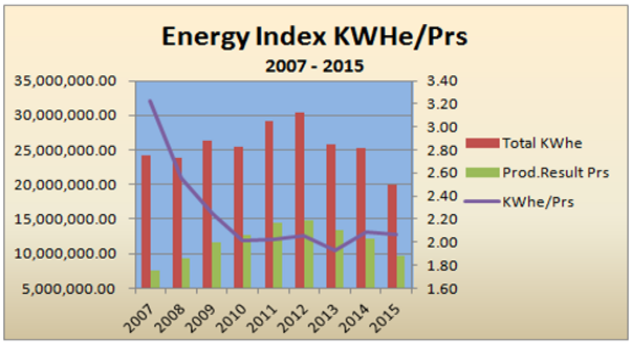
Maintaining the production energy efficiency through Energy Management System

Business Benefits Achieved

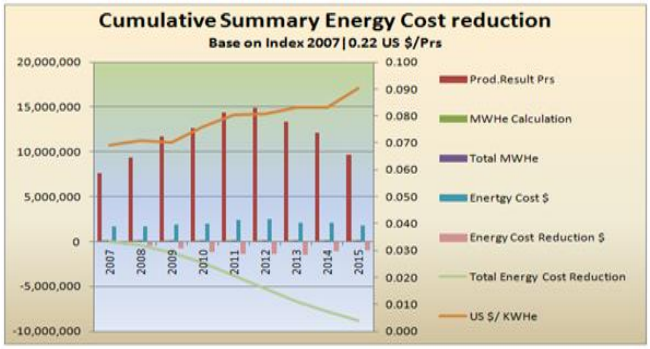
US $ 8,789,585.71 million saving achievement on energy efficiency as cummulative saving of energy from the year 2007 to the year 2015.

The energy use increased as the company grew and expanded. The Energy Management System will help the company control the energy usage.

At the beginning of the energy program in 2007, K1 produced 7.5 million pairs of shoe/year and used 24 Gwhe in energy. Over the next 5 years, In 2012 the production increased by 100% producing 15 million pairs of shoe, however the energy consumption only increase by 25% as much as 30 GWhe.

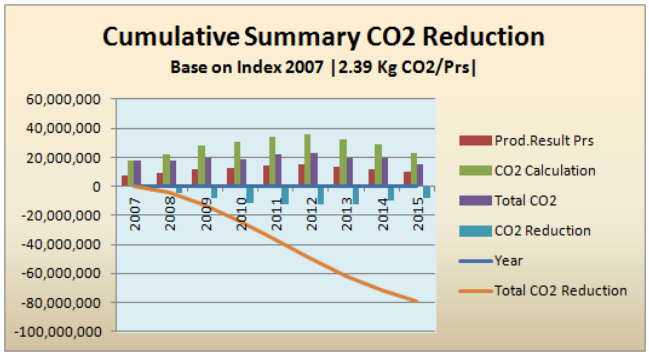


The energy index is determined as KWh/pairs as the company produce the shoes quantified per pairs. In the beginning of 2007, the index was 3.2 KWh/pairs. By implementing the Energy Management system, the energy index is now 2.0 KWh/pairs and the company is committed to continuous improvement to achieve a lower energy index.



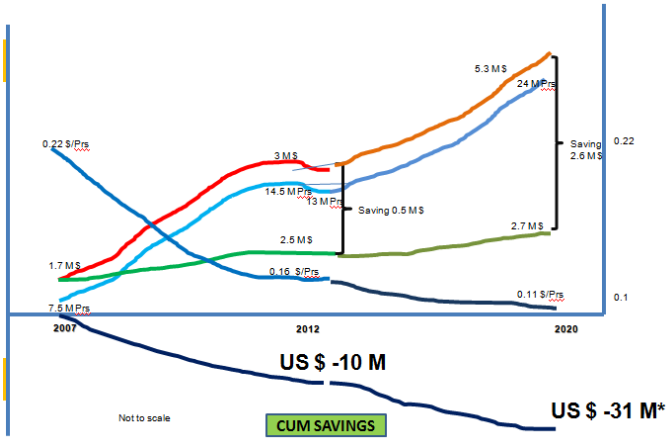
Each year since 2007, the energy cost saving has increased. It proves that the company is on the right direction towards energy saving.

As the the company increased the energy saving, it also reduced the carbon footprint significantly. Below is the graph of cummulative CO2 reduction based on index year 2007 (2.39 Kg CO2/pairs).



PT. KMK Global Sports had setup long-term energy goal. The company aim to increase the target of shoe production to reach 24 Million pairs of shoe by 2020. By implementing the Energy Management System the energy consumption will reach 38 Gwhe. The potential saving will be 38 Gwhe compare if the Energy

Management System was not implemented properly as shown on the graph below :



Graph. Energy Performance & Potential Saving of PT. KMK Global Sports up to year 2020

"Keep it Tight. Keep it Simple"
—CK Song, CEO

PT. KMK GLOBAL SPORTS
FOOTWEAR MANUFACTURING

Case Study Snapshot	
Industry	Manufacturing
Location	Cikupa - Indonesia
Energy Management System	ISO 50001
Product/Service	Footwear Mfg.
Energy Performance Improvement (%)	37.5% (baseline 2007)
Annual energy cost savings	Average 1 Million US$ (Since 2007)
Cost to implement	2 Million US$ (Total since 2007 – 2015)
Payback period	2 years

Company Profile

PT. KMK GLOBAL SPORTS is a foreign investment company. It was built in 2000 and start the production in the year of 2001. The company is located in "Jalan Cikupamas Raya No, 17, Cikupa, Tangerang". The area is under Banten Province in Republic of Indonesia country. It occupied 13.6 ha area of land in the western part of Java Island.

The company employed 12,800 workers, with around 40 expatriate from Korea, Taiwan, and China working in the same roof. Most of our employee are female workers (85%), and the senior high school is the average education level for our employee (63%). Only 2.5% is graduated from university or diploma level. Some also graduated from post graduate level. The average age of our employee is 32 years old which mean the turnover is low and quite stable.

PT. KMK Global Sports produced sport shoes and sandals. Total average production is 1.2 million pairs of shoe and sandal each month. All of the finished product are exported to overseas.

The company has 3 main buildings with two storeys for main production building, while the other buildings are supporting process, utilities, storage and offices.

Business Case for Energy Management

The Energy had been one of important factor of company's operational. Energy is needed in each aspects of shoe manufacturing. Management had realized this and write their commitment on company energy policy. Three highlight on our energy policy are :

1. Commitment to comply with national regulation of energy
2. Commitment for continuous improvement and
3. Commitment to use the energy saving devices for machinery used in the company

The company learnt that the cost of energy is increasing each year. The government setup the law and regulation to support national program of energy efficiency. Energy is not a national matter, it is a global issue.

If the company doesn't adapt to the situation and condition, then it is hardly to see the company growing. It might fail.

The energy cost will always increasing as the common source of energy, fossil fuel, is limited and will run out in the next several decades. Global warming as a result of the fossil fuel burning also have side effects to the environment that affect global community.

Company's main buyer, as well as global market also demand for more greener product and greener company, PT. KMK Global Sports decided to have Energy Management System certification as an evidence that the company had implemented the system. The ISO 50001:2011 certification was awarded to PT. KMK Global Sports on March 2015.

The government of the Republic of Indonesia has several regulation related to energy management and saving, such as :

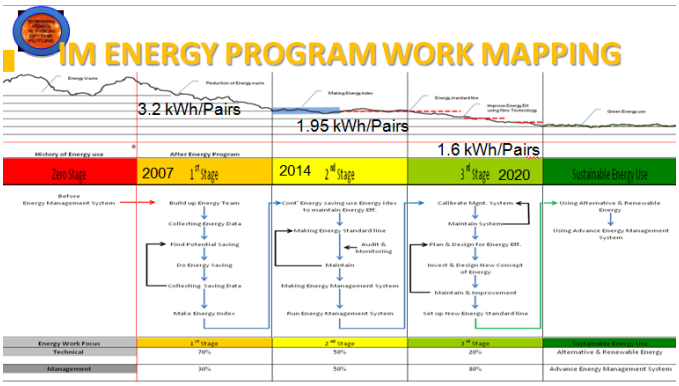
1. Act No. 30 year 2007 about Energy
2. Government Regulation No. 70 year 2009 about Energy Conservation
3. Presidential Regulation No. 61 year 2011 about National Action Plan for Reducing Green House Gases
4. Presidential Regulation No. 71 year 2011 about National Green House Gas Inventory
5. Ministerial Regulation No. 14 year 2012 about Energy Management
6. Ministerial of Energy and Mineral Resources Regulation No. 15 year 2012 on Soil Water Saving
7. Ministerial of Manpower Decree No 321/ Men/XII/2011 on Energy Manager Competency Standardization

Government of Republic of Indonesia required that any company consume energy more or equivalent with 6,000 ton oil equivalent (TOE), the company shall implement Energy Management System. This regulation was made in the year 2009. Nowadays, PT. KMK Global Sports consumes energy less than 3,000 TOE. However there's possibility that the limit will be lower in the coming future and additional requirement implemented. Management consider that it is necessary to prepare in advance.

PT. KMK Global Sports had long term energy goal. It begin from 2007 until year 2020. Energy index goal is reduced from 3.2 kWh/pairs in 2007 become less than 1.6 kWh/pairs in the year 2020.

The goal was divided into 3 stages:

a. Stage 1 : Year 2007 ~ 2014
b. Stage 2 : Year 2014 ~ 2020
c. Stage 3 : Year 2020 ~ beyond



In the early stages, PT. KMK Global Sports merely conduct energy saving based on project. There's no systematic approach.

However, when the company actively participated on trainings and several pilot projects sponsored by **Indonesian Ministry of Energy and Mineral Resources, UNIDO and DEG KFW** – Germany, the company starts to do a systematic approach by determining significant energy used.

The Management Representative (MR) and Energy Manager (EnMgr) had been officially certified as Energy Manager by Indonesian Professional Certification Body – LSP HAKE in 2015. This is also an evidence that the

management had strong commitment towards implementation of Energy Management System.

Pic. Energy Manager Certification from Indonesian Professional Certification Body – LSP HAKE

Keys to Success

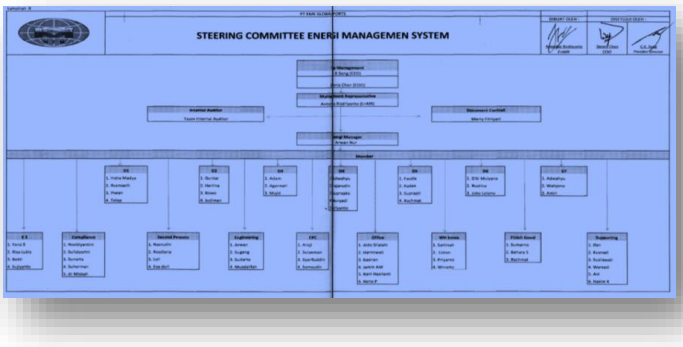
- Management Commitment
- Expertise and certification
- Employee Awareness
- Team Work
- Empowerment

EnMS Development and Implementation

Implementing the Energy Management System will lead the company to systematically approach for energy saving, well documented and tracked performance on energy and become the global player for making better place.

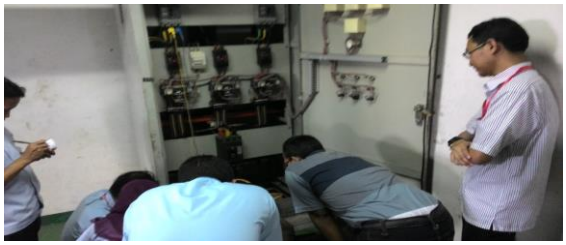
To successfully implementing the Energy Management System, it is necessary to involve all parties in the company. The most important is Top Management support and commitment. Thus it is necessary to develop an integrated team with interdepartmental coalition:

The organization of energy in PT. KMK Global Sports consisted of Top Management, Management Representative, Energy Manager, Document Control and involved each department head and their selected member. Once the team is setup, training was commenced for team member to have similar level of



understanding towards energy management system. The team consisted of CEO, COO, Management Representative, Energy Manager and all department head and team to support the energy management implementation.

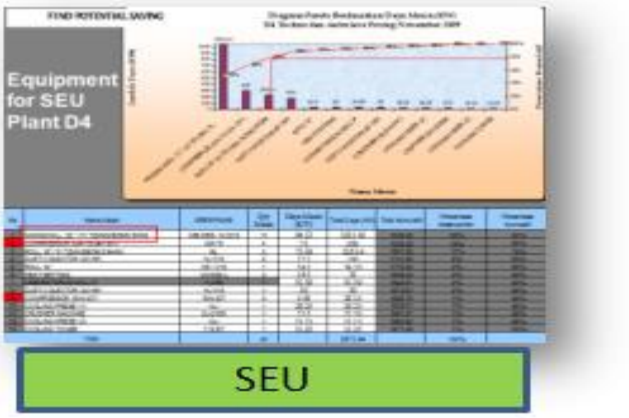
Pic. Energy Management Review 2015



Pic. Energy Audit 2015

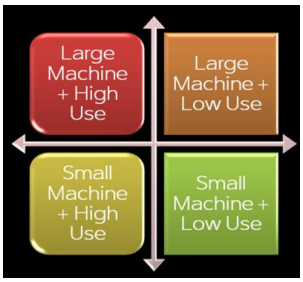
First step to determine the priority of energy program is conducted by mapping the energy consumption. Energy mapping will determine the area and the machine which has the highest energy consumption.

Using statistic can make the energy mapping easier to understand. One of the method used is pareto. Below are some examples how our company determined the focus area for energy saving potential saving implementation :



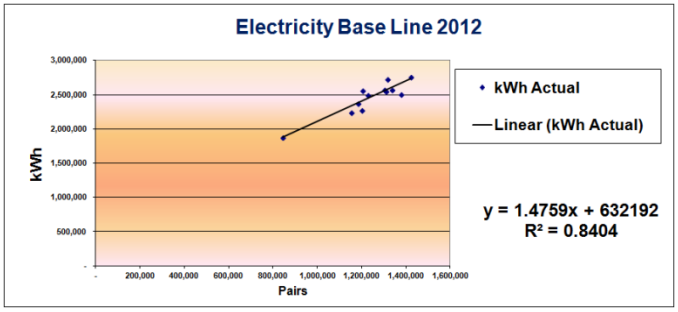
The biggest plant for energy consumption is plant D4.

There are **two focus area** for the company to do the energy saving, as described on the below picture :



PT. KMK Global Sports is focusing on the left quadrant of the picture above for the energy saving target. As labor intensive company, there are machine with small watt but high use, which means dominating the type of the machine and lots of them. For example stitching machineries.

Determining the baseline is also part of statistical method which is important to support the tracking and comparison of energy saving and progress.



In determining Baseline and its supporting data tracking, the Energy Team of PT. KMK Global Sports had assistance and guide from both International Expert and National Expert from UNIDO program which also supported by Ministry of Energy and Mineral Resources.

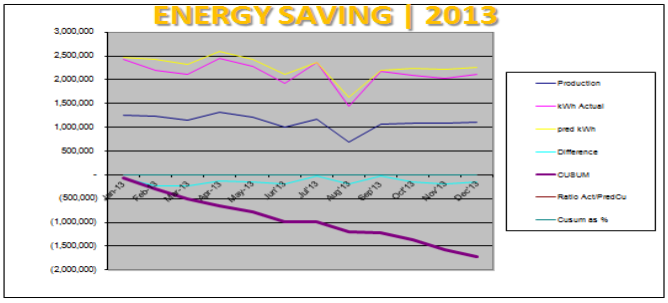
The energy team also participated on several technical training provided on UNIDO Energy Projects such as CASO (compressed air system optimization), PSO (pump system optimization).

Since then PT. KMK Global Sports can utilize baseline and monitor the energy saving trend for benchmark and continuous improvement

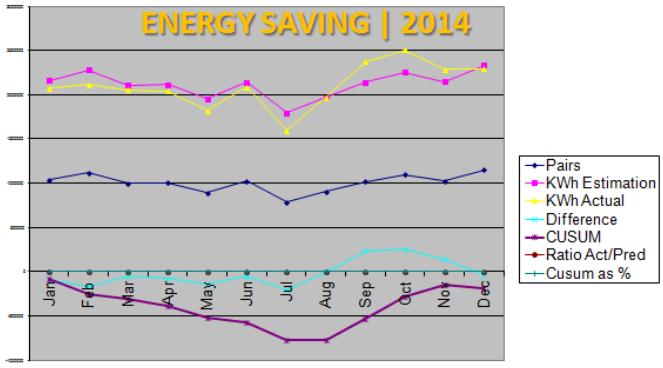
Monitoring and Validating

Each year, the energy performance was tracked, recorded and reviewed during management review session. Using the baseline comparison starting from the year 2013 ~ 2015, PT. KMK Global Sports compare the achievement of cumulative saving (CUSUM) to find out whether or not the energy performance improved.

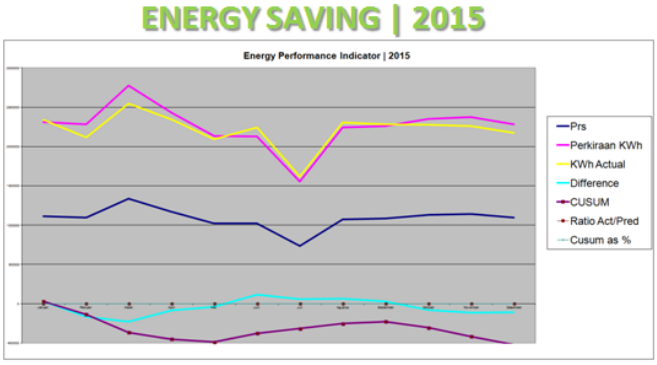
Below are the **energy performance** monitoring graph since 2013 which is made base on the baseline and some other parameter as trained by UNIDO :



The energy saving performance in the year 2013 was **6%** based on 2012 baseline.



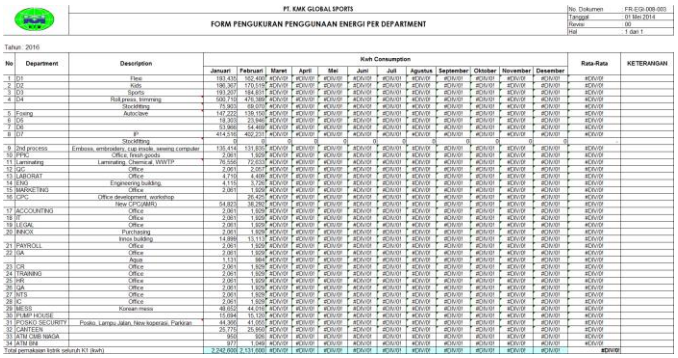
The energy saving performance in the year 2014 was **3%** based on 2013 baseline. In 2014 there was lesser saving since September, due to the model change of the shoe and additional machine which not producing shoe but mainly additional process.



The energy saving performance in the year 2015 was **2.5%** compare to the 2014 energy baseline.

The energy saving performance since 2013 is increased by 3.8%. This is the average calculation from the last 3 years. The result had been validating by comparing the production result and energy used.

The energy audit result conducted each year since 2013 showed that the energy consumption is reduced**. As evidence the energy consumption measured internally is similar with record bill charged by State Electrical Company (PLN).**



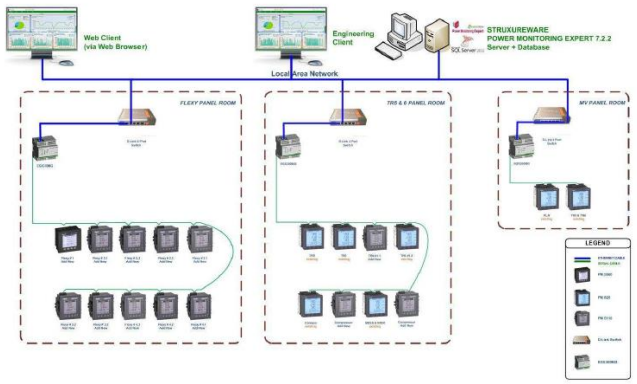
PT. KMK GLOBAL SPORTS

FORM PENGUKURAN PENGGUNAAN ENERGI PER DEPARTMENT

No	Department	Description	Kwh Consumption											Rata-Rata	KETERANGAN
			Januari	Februari	Maret	April	Mei	Juni	Juli	Agustus	September	Oktober	November	Desember		
1	D1	Flexi	191.436	162.468	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
2	D2	Kids	186.367	170.116	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
3	D3	Sports	193.207	184.837	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
4	D4	Roll press, trimming	593.710	476.388	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
		Stockfitting	75.903	69.070	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
5	Fusing	Autoclave	147.222	139.150	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
6	D5		18.303	21.940	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
7	D6		33.966	54.468	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
8	D7	IP	414.516	402.237	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
		Stockfitting	0	0	0	0	0	0	0	0	0	0	0	0		
9	2nd process	Emboss, embroidery, cut inside, sewing computer	135.414	131.835	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
10	PPIC	Office, finish goods	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
11	Laminating	Laminating, Chemical, WWTP	76.598	72.835	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
12	QC	Office	2.061	2.061	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
13	LABORAT	Office	4.710	4.455	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
14	ENG	Engineering building	4.110	3.726	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
15	MARKETING	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
16	CPC	Office development, workshop		26.420	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
		New CPC(MRP)	54.823	38.280	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
17	ACCOUNTING	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
18	IT	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
19	LEGAL	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
20	PROC	Purchasing	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
		Insu building	14.896	13.117	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
21	PAYROLL	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
22	GA	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
		Aqua	1.131	966	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
23	CS	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
24	TRAINING	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
25	HR	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
26	GA	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
27	NTS	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
28	SC	Office	2.061	1.928	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
29	MES	Korean mess	48.612	44.016	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
30	PUMP HOUSE		15.084	15.120	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
31	PUSAO SECURITY	Pos4o, Lampu Jalan, New koperasi, Parkiran	44.366	41.552	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
32	CANTEEN		25.775	24.150	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
33	ATM CIMB NIAGA		953	926	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
34	ATM BNI		971	1.048	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	
		Total pemakaian listrik seluruh KT (kwh)	2.242.606	2.131.666	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

Energy saving need involvement from all of the department in the company. To make the end user aware of their energy usage, the company setup periodic report and share to all user the energy consumption in the last month. The sample report is shown as below :

And to make it easier for real-time energy monitoring, PT. KMK Global Sports is developing the real-time energy monitoring system. The principle of realtime is described below. This system is still under trial and monitoring on one production line.



"Use energy wisely and efficiently, for we need to keep environment friendly."

—Arwan & Anton, Energy Team

Lessons Learned

Implementation of energy management system will work when all parties: top management, mid management and operator (team member) provide support. And support need understanding and knowledge. It is very important to keep promoting on energy saving to all of employee and management as well.

It is important when replacing the machinery due to model changes or expansion, to choose the machinery which had energy saving features at the beginning because it will be more difficult to convince management later on for changing the machine again.

Others

PT. KMK Global Sports also commit for the prevention of environment pollution and to minimize the waste generation. Solid waste that generated during the shoe manufacturing process was sent to HOLCIM for energy recovery program. Those are the waste which has certain calory value, such as rubber. While the hazardous waste was sent to PPLI (The Government-Approved Hazardous Waste Treatment Plant) for proper treatment.

PT. KMK Global Sports also have sister company, which main business is to regrind the recyclable solid waste. This company received all recycleable solid waste from all Nike manufacturing companies in Indonesia, regrind it and send the result to be re-used as raw material or utilized as part of the play-ground cover, synthetic soccer field or jogging track that provide softer response to the player or athletes.

PT. KMK Global Sports also on project for wastewater recycling program. The domesti wastewater generated was sent to WWTP and then discharge. All parameters was checked periodically and meet the requirement of effluent discharging. As the effluent was quite significant, the company is developing recycle system to utilize the effluent of the wastewater and treated again to be clean water and use on the toilets. This could save lots of water. The saving of this project could reach 75% cost of purchasing raw water from water supplier.

The government recognize the effort and PT. KMK Global Sports received BLUE Rating for PROPER (The Environmental Rating) from the Ministry of Environment of Republic of Indonesia.

In the year 2013, PT. KMK Global Sports was 3rd winner of National Energy Efficiency Awards from Ministry of Energy and Mineral Resources of Indonesia.

The 3rd Winner of National Energy Efficiency – 2013.

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.

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