

ISO 50001 Energy Management System Case Study

2020

Indonesia

PT Indofood CBP Sukses Makmur (ICBP) Tbk - Noodle Division

ICBP was the first in South East Asia certified with the ISO 50001 for its Noodle Factories. We smoothly achieved 10.7% energy reduction after strongly committed in the first three years of EnMS implementation.



Figure 1. ICBP Noodle Division - Production Process

Organization Profile & Business Case

PT Indofood CBP Sukses Makmur Tbk (“ICBP”) is an established and one of the market leading players in the consumer branded products sector. We have diverse business categories from each of our division, such as noodles, dairy, snack foods, beverages and many others. Our ICBP Noodle Division is one of the world’s largest instant noodles manufacturers, with an annual capacity of over 18 billion packs of noodles, produced in 17 factories across Indonesia and one factory in Malaysia.

Our Motivation & Drivers – As the leading and preferred brands in Indonesia, ICBP noodle products are well known for its excellent quality and taste. Indomie, Supermi and Sarimi are the prominent brands in the instant noodles segment, continues to be the market leader and have stayed top-of-mind among consumers for many decades.

Case Study Snapshot

Industry	Food and Beverages
Product/Service	Noodles
Location	· Pasuruan (East Java) · Semarang (Central Java) · Bandung (West Java)
Energy management system	ISO 50001
Energy performance improvement period	3 Years (2017-2019)
Energy Performance Improvement (%) over improvement period	10.7%, in aggregate
Total energy cost savings over improvement period	US\$ 830,400
Cost to implement EnMS	US\$ 50,850
Total Energy Savings over improvement period	154,707 GJ
Total CO₂-e emission reduction over improvement period	25,526 metric tons

However, ICBP competes with domestic and international companies for market shares and other opportunities. Such competition may affect our ability to maintain and/or increase our revenues. This was an impetus for us to take important measures, which include the reducing of our Cost of Goods Sold (“COGS”) significantly. At that point, we understand that reducing cost from COGS components such as raw material cost or manpower, might lead to greater risk. That condition drove us to confidently consider other options in reducing our COGS, which was the energy & utility cost, as the other main components. Fortunately, ISO 50001 provided us the opportunity to achieve the cost efficiency through the implementation of Energy Management System (“EnMS”). That decision also indirectly strengthened our corporate values to strive for excellence and continuous innovation in energy efficiency.

As a company in an F&B industry, we also confident that the implementation of EnMs will be an added value for our product quality and safety. Therefore, we implement ISO 50001 side by side with various international quality and food safety standards, including ISO 9001, ISO 17025, ISO 22000, FSSC 22000, HACCP and AIB International Standards. We integrated the ISO 50001 to imposed stringent controls across all stages of the manufacturing processes and reinforced by our Integrated Total Quality Management Program and Good Manufacturing Practices (GMP).

Energy & Climate Sustainability Efforts – We strive to ensure excellent energy management through various energy efficiency programs and utilization of more environmentally friendly energy sources. Based on that, our first EnMS implementation were driven and guided by our Corporate Sustainability, together with some support from external consultant and UNIDO’s Experts.

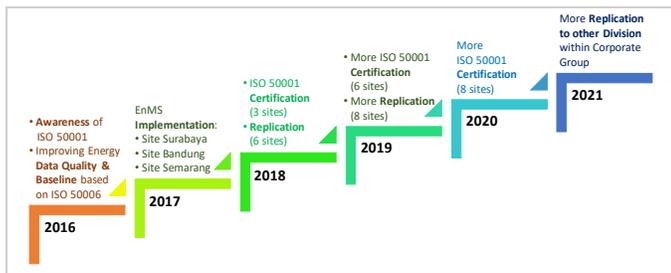


Figure 2. ICBP’s Roadmap on EnMS Implementation

We started by creating awareness on ISO 50001 to all of our factories while also improving our environmental data quality (including energy, water, waste and GHG emission) along with learning how to developed a baseline based on the ISO 50006 guidelines. In 2017, we initiated to implement the EnMS in 3 selected sites from a total of 17 sites from our Noodle Division. At the end, our goals were not only to get the ISO 50001 in all of our factories, but to overall achieve more cost efficiency, while contributing to the environment in a sustainable manner.

“Compared to other certification systems, ISO 50001 is the only certification which surely able to bring cost reduction from the beginning.”

— Yoseph Rumawan, GM Manufacturing ICBP Noodle Div.

Business Benefits

When we started to implement the first ISO 50001, we spent around US\$ 50,850 for external training and consultation along with third party certification and never expected too much in return. Surprisingly, that initial cost was quite small compared with the impact and all benefits, both direct and indirect, including:

Monetary Benefits

Energy Cost Saving – We achieved a US\$ 135,100 energy cost saving in the first year and continue to a total of US\$ 830,400 in three years cumulative saving.

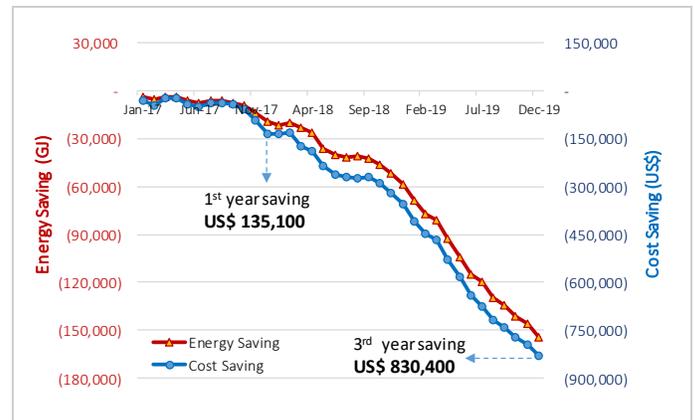


Figure 3. Cumulative Energy Cost Saving

We determined the energy cost saving by firstly measuring the energy performance from each of our factories and calculated the energy performance based on differences between actual energy consumption with the predicted energy consumption in accordance with our predetermined baseline. The differences were displayed in the cumulative of sum (CUSUM) and clearly described our energy performance as shown in Figure 3.

COGS Reduction – Our accounting department has validated that energy (as the biggest part of utility cost) have contributed to our COGS reduction. We underline that our utility cost was decreasing 13% from US\$ 44.6/ton FG in 2016 to US\$ 38.9/ton FG in 2019.

Environmental Benefits

Energy Efficiency – Not only reducing our energy intensity, but we also impressively reduced our absolute energy consumption while our production increasing steadily, in average 3,2% per year.

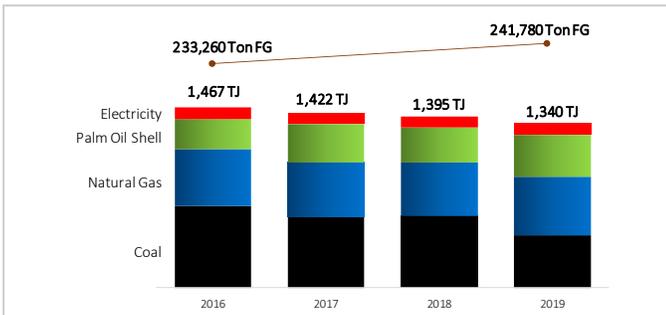


Figure 4. Energy Consumption (TJ) vs Finished Goods (Ton)

By cumulative, we conserve energy 154,7 TerraJoule (TJ), which by calculation, the amount is indirectly equivalent to an opportunity of more than 11,000 households having access to electricity for their homes.

Increased of Renewable Energy (RE) Portion – The EnMS implementation not only guided us in managing our energy use, but also becoming a serious consideration to manage our energy sources. Our site in Semarang is confidently switching their primary fuel for the boiler, from coal to palm oil shell, without replacing the existing boiler. Our renewable energy portion have increased to 25%, along with a clear contribution to minimize air pollution effect to surrounding community.

GHG Emission Reduction – Through better energy management practices and additional RE utilization, we reduce 21% of our carbon footprint from 121,725 tCO_{2e} in 2016 to 96,199 tCO_{2e} in 2019.

Water Conservation – Our factories located in areas with possibility to water scarcity. The EnMS implementation successfully guide us indirectly to use water responsibly. Our effort in operational control are contributed in conserving water up to 7,400 m³ per year.

Hazardous Waste Reduction – The reduction of coal consumption in our Bandung site, along with switching coal to palm oil shell in Semarang site, significantly reduced the amount of Fly Ash & Bottom Ash which is categorized as hazardous waste up to 26%, as well as reduced our waste handling cost.

Beyond Monetary Benefits

- Contributed to Sustainable Development Goals (SDGs), particularly in “Affordable & Clean Energy” and National Strategy on SDGs as mandated by the President of the Republic of Indonesia.

- We are recognized as a role model in the National F&B industry, for great concern in energy efficiency.
- Greater amplification benefits when replicated to other factories and divisions.
- Winner in National Energy Efficiency Award for Energy Management in Industry.
- Achieving Green-Rating (Beyond Compliance) in National Program for Assessment Performance Rating in Environmental Management (“PROPER”).

Multiple Sites Benefits

We selected 3 sites as the pilot implementation based on some unique consideration; first, they are the biggest factories among others, each of them also using different types of energy (natural gas in Pasuruan, palm oil shell in Semarang, and coal in Bandung), and they are able to represent all of our factories located from East to West region. A year after their successful implementation story, they became hosts for other factories to learn and replicate the ISO 50001 implementation.



Figure 5. EnMS Pilot & Replication Site on ICBP Noodle Division

Other benefits from our multiple sites:

- The ideas for energy saving opportunity are enriched from discussion or brainstorming with many people from different factories.
- The leadership role from energy manager from those pilot factories growth as they became role models for other factories.
- There is almost no cost for replication, since external expert are not necessarily required.
- Long term agreement with certification body to certified 17 units from Noodle Division only, during 2018-2020, reduced the total cost of certification up to 50% from initial offering.

Plan

Top Management Commitment – Our top management believes that EnMS is a life-time journey, and therefore committed to support EnMS activities in the long run as they also believe that EnMS is one key to achieve sustainable competitive advantages. In the first year commitment, they allocated budget for pilot EnMS implementation for 3 pilot factories and made an upfront agreement with certification body to certifies 17 factories, regardless the result of pilot implementation. In the next years, top management also provides budget for energy audit equipment, completed level 2 and 3 metering (both for steam and electrical) and any required energy efficient equipment.

Energy Review – When we first started implementing EnMS, we understand that the quality of energy data is very crucial. At the time, unfortunately we didn’t have the luxury of metering on each of energy equipment’s used, so we were depending heavily on metering provided by the energy suppliers. So we sent them a letter mentioning that we were currently progressing on the ISO 50001 and asked them to calibrated their instruments, which surprisingly, were agreed. For a comprehensive data result, we also calibrated our own instruments. Later in the second year, we invested on more advance digital metering with real time monitoring. Furthermore, all of our energy data are collected and processed into our Sustainability Electronic In parallel, we conducted energy audit to develop energy review which include analyzing energy use and consumption, identifying Significant Energy Use (SEU), along with observation on Energy Conservation Opportunities (ECO). We conduct energy review and audit annually, since we owned at least 2 (two) certified energy auditors in each of our factories.

Energy Baseline & Energy Performance Indicator (EnPI) Based on energy review, we know that 85% of our energy is in the form of thermal energy from our boiler fuel, while the rest is in form of electrical energy. Therefore, we set two baselines based on regression analysis that have >90% correlation between thermal and electrical energy with finished goods (as the driver). We also set

2016 as the baseline due to minimum data normalization and considered to be the best year performance before EnMS implementation.

Factory	SEU	Baseline Equation	EnPI
Pasuruan	Gas Fired Boiler	$y = 132.01x + 76862$	m3 Gas / ton FG
	Electricity	$y = 91.748x + 226880$	kWh / ton FG
Bandung	Coal Fired Boiler	$y = 0.1943x - 285.26$	ton Coal / ton FG
	Electricity	$y = 95.073x + 118777$	kWh / ton FG
Semarang	Oil Palm Shell Boiler	$y = 0.3278x + 92652$	ton Shell / ton FG
	Electricity	$y = 78.25x + 200491$	kWh / ton FG

Figure 6. Energy Baseline and EnPI

Energy Target & Action Plans – The first energy audit report shown 20% of energy saving potential, yet our top management only sets 1% of energy saving target to give some flexibility in the first year of implementation, and later increased to 3% per year for the next years. Later on, our results were always achieved beyond the target.

Indicators	Score: 1	Score: 2	Score: 3	Score: 4
Investment Cost	> US\$ 40,000	US\$ 18,000 - 40,000	US\$ 4,000 - 18,000	< US\$ 4,000
Cost Saving	< 0.5%	0.5 - 1%	1 - 3%	> 3%
Technical Difficulties	Totally new technology	Required External Party	Required inter department	Engineering & Utility team
Completion Time	> 1 year	6 -12 month	3 - 6 months	< 3 months
Production Disruption	All production lines stopped > 24 hours	Production line stopped 3 - 24 hours	Production line stopped < 3 hours	Production line stopped < 1 hour
Impact to Product Quality	Process re-standarization	Required external analysis	Required internal organoleptic	No impact

Figure 7. ECO Matrix Scoring for Action Plan

However, prior to achieving the target, the energy team formulated action plans based on the available ECO list. We always put every opportunity in thermal energy as top priority as they are primary SEU although we are not ignoring other opportunity from electrical energy. Furthermore, we created ECO Matrix Scoring to determine total highest score from each ECO which will be prioritized and selected for action plans.

Development for Multiple Sites – The nature of noodle production in each of our factories are quite similar. However, different characteristics in manpower required us to create a main procedure to smoothly implement the EnMS within all our factories. Therefore, our 3 pilot factories together with the Manufacturing Team from our Head Office (“HO”) formulated the procedure and

details of working instructions, so they can implement the EnMS effectively, and replicate the same procedure to other factories in the future.

Do, Check, Act

Implementation & Operation – The action plan in each factory also quite typical since we also encouraged to have experience and knowledge sharing for each other. Each factory has their own action plan and implemented it independently. However, all the action plan and implementation results will be coordinated under GM Manufacturing in the Head Office (“HO”). Each factory will monitor, measure and report their energy performance using the ISO 50015 guidelines and validated by the Factory Accounting Manager before second validation by GM Accounting in HO. Typical action plan during first years’ implementation, mostly comes from ECO with no/low cost since it was calculated automatically to be priority under ECO Matrix Scoring. However, the cost saving then re-invested by our top management to support more action plans or any continuous improvement for its EnMS.

Time Period	Action Plan	Investment Cost (US\$)	Cumm. Cost Saving (US\$)
2017	Optimizing Boiler load operation by shutdown redundant Boilers	-	15,860
2017	Recover condensate water from Cup Noodle process to FW Boiler	-	35,560
2017	Reducing excess air by setting O ₂ content in flue gas	-	54,450
2018	Modify Boiler headers to set pressure for different steam users	22,300	32,700
2018	Installing steam flow meter in @ boiler with real time monitoring	88,900	23,580
2018	Installing Variable Speed Drive in cooking process	51,900	63,210
2019	Installing Feedwater Economizer	207,500	65,200
2019	Replace old compressed air system	266,700	10,560
	Total	637,300	301,120

Figure 8. Example of Action Plan & Implementation (Pasuruan Factory)

Furthermore, not only providing budget for training program for our energy team, our top management were also very eager to participate in the training, although it was very technical. They were also not hesitated to provide monetary reward for any energy efficiency innovation and additional rewards for champions in our Continuous Improvement & Productivity Award (CIPTA). EnMS implementation also brought the chance for operating staff level to show more of their capabilities by presenting new ideas related with operational control

improvement, including how to narrow the upper or lower limit in some critical operation parameters.

They also have initiatives to develop and install their own Programmable Logic Control (PLC) together with real time monitoring system.



Figure 9. Self-initiatives from operative staff to advancing EnMS tools

Our EnMS implementation have also redefined some of our procurement process. The energy team must first create Lifecycle Cost Analysis (LCCA) before procuring new equipment with cost more than US\$ 100,000. We also made stricter requirement for our coal supplier, so that we can use only higher quality of fuel to maintain our efficiency.

Monitoring, Measurement & Analysis – Most of our action plan is related with improvement in operational control. While our 1st tier baseline are on the monthly basis, we developed another 2nd and 3rd tier baseline for weekly and daily basis to get more details in each of our SEU-equipment performance. PIC in each action plan must evaluate the implementation progress using common Gantt Chart, while analyzing the results via CUSUM graph. If we found 50% deviation in one point of result, we shall determine the cause and decided whether we need to normalize the data if some un-regular event occurs, like new machine trial and additional production for limited special project.



Figure 10. Cumulative Energy Performance (aggregate result from 3 sites)

Our energy performance during reporting period not only improved significantly, but also achieved beyond

the target. By the end of 2019, the energy performance from 3 factories are increasing cumulatively at 10.7%.

We also use SEDS as one of the tools to help us collect and analyze our energy performance more easily. We also developed knowledge management system, which is used to share ideas and lessons related with EnMS and other environment via website (www.thinksustainable.id).



Figure 11. Our Sustainability Electronic Data System (SEDS)

The energy team from one factory were encouraged to be EnMS auditor in other factories to give more independent and constructive results during internal audit. We proudly certified 3 of our pilot factories in 2018 by TUV Nord and successfully replicated and certified 6 other factories in 2019 while 9 others are planned to be certified by 2020.

Transparency

Our effort and result in achieving the ISO 50001 are shown or published in many channels, including through:

- ICBP’s Annual Report and Sustainability Report.
- Indofood’s Sustainability Performance Report to Indofood Corporation and its subsidiaries.
- Online Energy Management Reporting (POME) to Indonesian Ministry of Energy (“ESDM”)
- PROPER assessment to Indonesian Ministry of Environment and Forestry (KLHK).

- National Energy Efficiency Award to ESDM.
- Indonesian Food & Beverages Association (GAPMMI).
- Indonesian Low Carbon Emission Network (JIRE).
- Announcement letter to all energy supplier/vendors.

“We keen to share that the implementation of ISO 50001 is a sweet spot for achieving our operational efficiency and environmental stewardships.”

— S. Indrayana, Head of Corporate Communication Div.

Lessons Learned

- We fully understand that the ISO 50001 will always give positive impact to our company as the more factories we certified, the more benefit we will gain in the future. However, since we have many factories and want to certify them together in timely manner, then we should have collaborated with more than one certification body. This might speed up the process and provide us with improved ideas to implement the EnMS.
- During the process we realized that the procurement authority in our factories have their administrative limitation. The problem was solved after we discussed the matter together with external expert and Corporate Procurement and Engineering (“CPE”). Based on that, it would have been more effective if we engaged our CPE from the beginning.
- The whole process also thought us that we didn’t actually have to wait for a perfect energy data to start implemented the EnMS, as ISO 50001 provide a clear guidance how to establish the system based on any existing condition and capabilities. ICBP could have started earlier, while continuously improving within the next years.

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.

