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CASE STUDY
Resource Efficient and Cleaner Production Indonesia

PT HOP LUN INDONESIA

Textile Sector
PT HOP LUN INDONESIA
Semarang, Central Java, Indonesia

BACKGROUND

The need to decouple economic growth from environmental degradation is unquestionable as the effects of accelerating climate change and resource depletion continue to alter habitats, threatening livelihoods and ecological sustainability. UNIDO is at the forefront of efforts to build a sustainable system that allows growth while protecting the environment. It assists governments, institutions and industry to best adapt their production methods, move towards cleaner production systems and develop sustainable, efficient resource usage solutions. While it is essential that industry continues to grow and prosper, it is also worth considering changing the mindset of the way industrial sector does business and becoming more efficient and responsive to resource consumption and waste generation.

INTRODUCTION

Established in 2011, **PT Hop Lun Indonesia** is a private company and apparel manufacturing company that has 2652 employees and production facilities over 5.4 hectares of land in Semarang. Their production facilities are located in Kemasan, Semarang, Central Java.

Through the buyer's Environmental sustainability target programme and guided by buyer's professionals, PT Hop Lun Indonesia is driven to identify and implement resource efficiency measures with the introduction of the RECP programme, new energy-efficient options were identified and implemented, focusing on electricity and water key steps are outlined below

PROCESS DESCRIPTION

The case study is focusing on electricity and water. The major unit operation is shown on the process flow diagram in **Figure 1**.

During the entire process, large quantities of materials like garment, electricity are used and they generate emissions, raising both operation and waste management costs .

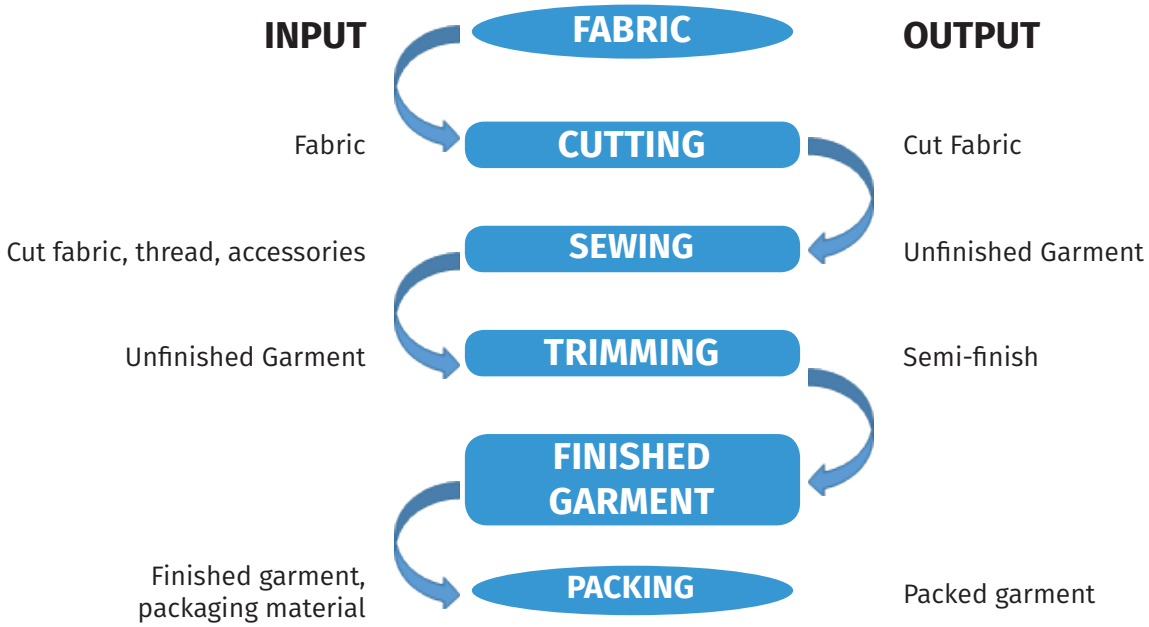


Figure 1: *Flow chart of garment production*

RECP POTENTIAL

In accordance with the company's corporate philosophy, PT Hop Lun Indonesia initiates several resource conservation options to move towards environmental and financial sustainability. After the company RECP team and external RECP experts determine the resource efficiency baseline. The company identify and implement the resource efficiency measures under the buyer's Environmental sustainability target programme and guided by buyer's professionals.

The specific resource consumption presented in **Table 1** indicates that specific energy consumption in the company is higher compared to the industrial benchmarks. As reported by management and experts, higher consumption of resources is caused by several factors, for example; compressor pressure setting, compressed air distribution leaking, low efficiency motors.

Table 1: *Baseline Data and Potential of RECP in The Unit*

Compo-nents	Unit	Baseline Before RECP	RECP poten-tial	Savings Potential USD/year	Remarks
Production*	Piece/ year	7,615,629	9,000,000	--	production data based on 9.000,000 pieces/year
Total electrical energy	MWh/ year	885*	795 (10%)	-------	
Specific electricity consumption (SEC)	kWh/ piece	0.12	0.10 (16.7%)	19,800	9,000,000 pcs & 0.11 USD/ kWh
GHG emissions*	T/year	914	802 (12.3%)		GHG reduction 112 T/year
Water consumption	L/ piece	2.1	1.8 (14.3%)	540	Water cost $ 0.2 /m³
TOTAL				**20,340**	Saving USD 0.0023/piece

POTENTIAL OF RESOURCE EFFICIENT AND CLEANER PRODUCTION

Table 1 presents the existing consumption and the potential for savings that can be obtained by implementing RECP measures. For ease of comparison and in accordance with benchmarking studies, resource consumption is calculated per piece of product output.

A total of 28 RECP options were identified during the study and after pre-screening 17 were selected for detailed feasibility analysis and subsequent implementation of techno-economically viable and environmentally desirable RECP solutions.

During the initial stage of implementation, particular attention was paid to those measures which could be carried out at low and medium cost to the unit. Thus far, the unit has implemented 11 RECP options as part of RECP implementation and others options are into consideration. The RECP team and project team estimated the potential for RECP savings USD 20,340 per year, which are presented in **Table 1**.

The results achieved from implementation of 11 techno-economic viable options with an investment of USD **120,650** are compiled in **Table 2**. The management also decided to continue RECP activities in the company even after the completion of the project activities in order to identify and implement additional techno-economically viable RECP options for garment manufacturing.

THE IMPLEMENTATION OF RECP OPTIONS AT PT HOP LUN INDONESIA

One of the most effective ways of creating more efficient resource usage is to ensure the optimized management of resource use through a dedicated, structured framework that improves performance

and maximizes resource consumption and reduce waste generation over time. Number of RECP options were identified during the RECP assessment in PT Hop Lun Indonesia and feasibility analysis was conducted by RECP team of PT Hop Lun Indonesia. Some of the selected and implemented options are listed below in **Table 2**.

Table 2: *RECP Options Implemented by PT Hop Lun Indonesia*

No	RECP Options that already implemented	Investments
1	Repair compressed air leakage	Low Cost
2	Optimize pressure set point from 7.0 to 6.5 bars	No Cost
3	Install air pressure control unit in spot cleaning	Low Cost
4	Optimize the motor by tightening and checking the bearing	No cost
5	Replace tube lamps with LED lamps	US$ 35,400
6	Install automatic sensor control in some areas with enough sun light	Low cost
7	Install electrical switch in every sewing line and cutting	Low cost
8	Replace clutch motors with servo motors	US$ 39,600
9	Utilize rain water harvesting.	US$ 9,650
10	Replace fresh water to treated sewage for landscaping	Low cost
11	Replace compressor capacity 30 hp to 75 hp	US$ 36,000
Total investment		**US$ 120,650**

It was reported that the company has made an investment on approximately US$ 120,650 to implement the measures above, resulting in an average 8 percent reduction in energy consumption as well as a reduction of over 73 tons of GHG emissions per year. Savings in water consumption was achieved by 10 percent as presented in **Table 3**.

Table 3: *Results of RECP Measures Implemented (as on July 2019)*

No	Components	Unit	Before RECP	After RECP	Savings (US$/ year)	Remarks
1	***Production***	Piece/ year	7,615,629	8,584,523	NA	Demand-based
2	***Electricity Consumption***	kWh/ pieces	0.12	0.11 (8%)	9,443	Electricity cost= 0.11 USD/kwh
3	***Water Consumption***	L/ piece	2.1	1.9 (10%)	343	Water cost = USD 0.2/ M^3
5	***GHG emissions****	T/year	914	841 (8%)		Computed from energy use. GHG reduction 73 T/year
TOTAL					**9,786**	Saving USD 0.0011/ piece

The reduction achieved so far implementing RECP options are approximately 48.1 percent of estimated savings potential and 65.2 percent GHG emissions reduction. RECP is sustainable when it becomes internalized, which has been the case at PT Hop Lun Indonesia due to management support and proactive RECP team. During the current RECP assessment, several additional measures were recommended by an international RECP expert, which will be assessed and implemented in accordance with a company review in the future. In the next phase, it is important to continue to collect information on future improvements.

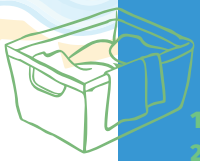
ADDITIONAL RECOMMENDATION FOR RECP MEASURES BY PROJECT

1. Use reflector lamp to reduce lighting consumption
2. Installation of skylight/daylight using transparent roofing sheets to natural daylight in several sheds production areas
3. Continuous capacity building of employees and involvement of shop floor staff in RECP
4. Use blower instead of compressed air for dust cleaning

CONCLUSION

The implementation of energy-efficiency measures contributes a significant enhancement of profit margins, reduce GHG emissions and improve the workplace environment, for example in reducing air emissions discharge, better working conditions and improved production quantity and quality. As part of the project implementation, a monitoring programme undertake a feasibility analysis of identified options and documented improvements. Following this success, the company is now aiming for a market expansion by diversifying its product range.

Highlights of RECP implementation



1. **Reduction of water 10%**
2. **Reduction of GHG emissions 8%**
3. **Reduced electricity consumption 8%**
4. **Improved working environment and Occupational Health and Safety**

RESOURCE EFFICIENT AND CLEANER PRODUCTION

Resource Efficient Cleaner Production (RECP) is a new and creative way of thinking towards products and the production processes. It is achieved by the continuous application of preventive strategies to minimize the generation of wastes and emissions. RECP strategy comprises the following eight practices, which are also applied in the demonstration of RECP at PT Hop Lun Indonesia:

1. **Good Housekeeping (GHK):** appropriate provisions to prevent leaks and spills (such as preventative maintenance schedules and frequent equipment inspections) and to enforce existing working instructions through proper supervision, training etc
2. **Input Material Change (IMC):** replacement of non-renewable inputs by low carbon, renewable feedstock.
3. **Better Process Control (BPC):** modification of working procedures, machine instructions and process record-keeping to operate processes at higher efficiency and lower rates of waste and emission generation.
4. **Equipment Modification (EM):** modification of production equipment and utilities (for instance through the addition of measuring and controlling devices) in order to run processes at higher efficiency and lower rates of waste and emission generation.
5. **Technology Change (TC):** replacement of technology, processing sequence and/or synthesis pathway in order to minimize rates of waste and emission generation during production.
6. **On-site Recovery/Reuse (RR):** reuse and recycling of wasted materials and energy (thermal energy) in the same process or for another useful application within the company.
7. **Production of Useful By-Product (BP):** transformation of wasted material into a material that can be reused or recycled for another application outside the company.
8. **Product Modification (PM):** modification of product characteristics in order to minimize resource usage and associated environmental impacts of the product during or after its use (disposal) or to minimize the environmental impacts of its production.

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Published in August 2019