



PT. WAHYU PRADANA BINAMULIA



## Industrial Sector

### PT. Wahyu Pradana Binamulia Makassar, Indonesia

## BACKGROUND

*Industrialization is vital for economic development and has helped bring millions out of poverty in recent decades. But as more countries industrialize, growing consumption, rapid urbanization and unsustainable use of natural resources is exacerbating climate change and polluting the ecosystems on which we depend (UNIDO 2017) The pattern of current production and consumption, scale and speed of resource use has almost reached the limit of what planet can offer and sustain. 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

PT Wahyu Pradana Binamulia located in Makassar industrial zone was established in 1990, with the installed production capacity is around 80 ton per month/ 1000 T/ year. During 2015 actual production was 362 tons. The raw materials are procured from suppliers in South Sulawesi and its surrounding. The main products are octopus, fish fillet, and frozen whole fish. In 2017, the production was dominated by octopus which had a share of 90% of the total production, while the rest was fish.

The company joins RECP Programme involving the production coordinator to work with the local expert and the RECP team. RECP team collected the baseline data and compared with the sectoral benchmarks to estimate the potential of RECP. The RECP audit focus of the company team for the first phase is to improve the management of cold storage utilizing optimum capacity to reduce energy consumption.

## PROCESS DESCRIPTION

The company can process many kinds of products depending on market demand, having more or less same operation and the major difference is water consumption and partly energy consumption. Compared to Octopus processing in the fish filleting resource consumption is reported to be higher.

## RESOURCE EFFICIENCY & EMISSION REDUCTION POTENTIAL

**Table 1** presents the baseline data on resource consumption before RECP programme and potential of savings both economic and environmental. RECP Programme focuses on main areas described as follows.

### ➤ Water consumption

Production process in fish industry is generally using an excessive amount of water on the pretext of Hygiene. Since the company does not have a water flow meter, thus, water consumption could not be measured and as per RECP team estimated to be around 9500 m<sup>3</sup> per year. With the total 806T raw material processed in 2016, it was calculated that that the company has consumed around 11.79 m<sup>3</sup> per ton of raw materials and has significant potential for water conservation. One of the reason for higher water consumption is the low price of water from Water Utilities (PDAM) only 0.5 USD per m<sup>3</sup>. This situation might have leads to the lack of awareness and importance of water saving. The company should install a water flow meter to calculate their own water consumption and record it regularly. In addition, water reuse and recycle could be seen as the potential action to reduce the high amount of water consumption. Water from second washing can be reused for initial washing for the next production process.

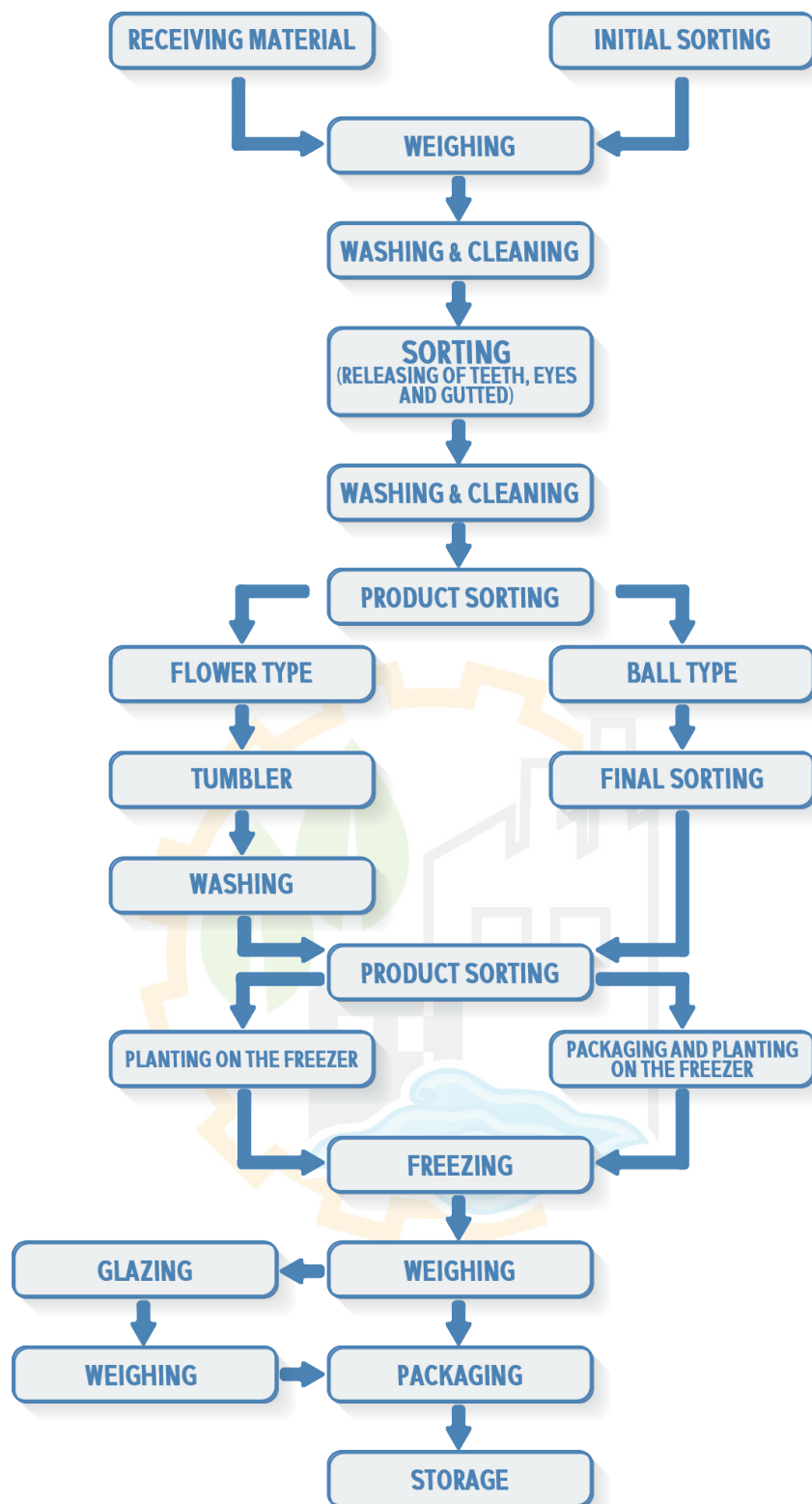


Figure 1: Flow diagram of frozen Octopus production process

#### ➤ Energy consumption

The electricity is supplied from PLN. The usage is mainly for the cold storage, air blush freezer, and contact flat freezer, as well as other office activities. As per benchmark for fish processing (mixed product) including freezing and storage energy consumption is less than 1000 kWhr/t compared to 1610 kWhr presently. Though specific energy consumption depends on product and production quantity, however, it was identified as major area for RECP implementation.

The energy consumption could be decreased by optimizing the cold storage capacity utilization and production planning..

#### ➤ Solid waste

When RECP assessment started more than 50% of raw materials used were generated as solid waste from mixed product and there is no specific treatment or usage for solid waste generated. The waste is stored at the same place as the products to avoid biodegradation and foul smell. The solid waste generated should be stored in a separate place and disposed of as early as possible or find opportunities to convert waste to by-product.

**Table 1: Baseline data and potential of RECP in PT Wahyu Pradana Binamulia**

No.	Components	Unit	Baseline before RECP	RECP potential	Saving potential US\$/year	Remarks
1	<b>Total production</b>	ton production	362	1000	NA	Based on demand*
2	<b>Specific energy consumption</b>	kWh/ton	1610	1000	61,000	Electricity price USD 0.1/kWh
3	<b>GHG emission</b>	ton CO <sub>2</sub> /T of product	1.09	0.68	410 ton CO <sub>2</sub>	Emission factor 0.677 ton CO <sub>2</sub> /MWh
4	<b>Specific water consumption</b>	m <sup>3</sup> /ton	11.79	7.0	2,395	Water price USD 0.5/m <sup>3</sup>
5	<b>Specific wastewater generation</b>	m <sup>3</sup> /ton	9.43	5.5	3,150	Assumed wastewater is 80% of water consumption treatment cost USD 0.7/m <sup>3</sup>
6	<b>Solid waste specific generation</b>	ton/ton production	0.40	0.30	800	Waste disposal cost USD 2/ton
	<b>TOTAL</b>				<b>USD 67,345</b>	

\*calculated at 1000T/annum production

## RECP OPTIONS IMPLEMENTED

The company has implemented only no cost identified RECP options ranging from the maintenance good housekeeping, to energy management in the cold storage. The company has implemented the scheduled and regular preventive maintenance which make it easier to detect any damage of the equipment's they are using (e.g. cold storage, freezer, and compressor) as early as possible. Management control to open the cold storage by optimizing loading and unloading practices and air blast freezer has been restricted to related process personnel's. In addition, the opening and closing of the gate of cold storage is also restricted at certain times to reduce losses from loading/unloading. First in first out (FIFO) system has been applied so that the raw materials received could be processed on the same day and the cold storage could be used more efficiently. The company is reusing water from second washing for the initial washing process and help in minimizing water consumption. The RECP measures implemented by the company are summarized in **Table 2**.

**Table 2: Resource efficiency measures implemented by Tjoekir Sugar Mill**

No.	Implemented RECP options	Investment
1	Scheduled and regular preventive maintenance on equipments.	No investment
2	Limitation of the access to cold storage, air blast freezer, and machine room has been restricted to the authorized persons.	No investment
3	Applied first in first out (FIFO) system to optimize the cold storage capacity.	No investment
4	Reused the water from second washing for the initial washing process.	Investment not reported

After joining the RECP Programme, the company achieved moderate results which presented in **Table 3**. It is shown that the total production in year after RECP has increased significantly, which, could also be a reason for reduction

in specific energy consumption and water consumption. The results also showed moderate decrease in water consumption and wastewater generation which were not measured figures. The significant reduction in energy and related GHG emission is also partly due to the change of product mix mainly from fish fillets to octopus which has more weight, thus, the company could maximize the capacity of cold storage room which resulted in reduction in specific energy consumption. Results achieved in energy conservation is more than potential and there could be several reasons for that viz. due to change in production mix tonnage of production has increased making the optimum usage of cold storage.

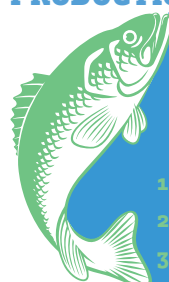
**Table 3: Results of RECP measures implemented by the company**

No.	Components	Unit	Before RECP	After RECP	Savings (US\$/year)	Remarks
1	<b>Total production</b>	ton production	362	964		Assumed 1,000 ton of production
2	<b>Specific energy consumption</b>	kWh/ton	1610	670	94,000	Electricity price USD 0.1/kWh
3	<b>GHG emission</b>	-GHG/T product -GHG ton/year	1.09 1090	0.52 454	636 T/year	58% reduction
4	<b>Specific water consumption</b>	m <sup>3</sup> /ton	11.8	7.3	2250	Water price USD 0.5/m <sup>3</sup>
5	<b>Specific wastewater generation</b>	m <sup>3</sup> /ton	9.4	5.8	2520	Assumed WW is 80% of water consumed WWT cost USD 0.7/m <sup>3</sup>
6	<b>Solid waste generation</b>	ton/ton production	0.40	0.36		No disposal cost reported
	<b>TOTAL</b>				<b>98,770</b>	

## CONCLUSION

RECP assessment and implementation in PT Wahyu Pradana Binamulia with almost no investment and using better operating practices and maintenance resulted in a significant decrease of specific energy consumption, water consumption and waste water generation. The GHG emission in line with energy conservation reduced by 58% in tune 636 ton CO<sub>2</sub> per year. However, the reduction in specific resource consumption is also related to change in product having more weight and better utilization of cold storage capacity utilizing maximum energy.

## RESOURCE EFFICIENT AND CLEANER PRODUCTION



### Highlights of RECP implementation

1. Reduced energy consumption
2. Reduced water consumption
3. Reduced GHG emissions

The Resource Efficient and Cleaner Production (RECP) programme has long been a central element in the work of UNIDO on the environment. This flagship initiative, run jointly with the United Nations Environment Programme



(UNEP) and funded principally by Switzerland, delivers services to improve resource productivity and environmental performance in 63 developing countries and economies in transition, targeting governments, civil society and businesses, with a particular focus on SMEs.

Resource Efficient Cleaner Production (RECP) is a new and creative way of thinking about products and the processes that make them. It is achieved by the continuous application of strategies to minimize the generation of wastes and emissions. RECP strategy which comprises of following eight techniques were applied in this case study:

- 1. Good House Keeping (GHK):** appropriate provisions to prevent leaks and spills (such as preventative maintenance schedules and frequent equipment inspections) and to enforce the existing working instructions through proper supervision, training, etc.
- 2. Input Material Change (IMC):** replacement of non-renewable inputs by low carbon renewable feed stock.
- 3. Better Process Control (BPC):** modification of the working procedures, machine instructions and process record keeping in order operating the processes at higher efficiency and lower rates of waste and emission generation.
- 4. Equipment Modification (EM):** modification of the production equipment and utilities (for instance through addition of measuring and controlling devices) in order to run the processes at higher efficiency and lower rates of waste and emission generation.
- 5. Technology Change (TC):** replacement of the technology, processing sequence and/or synthesis pathway in order to minimize the rates of waste and emission generation during production.
- 6. On Site Recovery/Reuse (RR):** reuse & recycle of the 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 the 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 the resource usage and associated environmental impacts of the product during or after its use (disposal) or to minimize the environmental impacts of its production.

**For more information, please contact:**

**Permod Kumar Gupta**  
Chief Technical Advisor, UNIDO  
P.Gupta@unido.org  
www.recpindonesia.com

**PT. Wahyu Pradana Binamulia**  
Phone : +62 411 510256  
Email : sales@wahyupb.com  
www.wahyupb.com



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