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## RECP Experiences at Cassava Starch Industry (Anning)

The efficient and environmentally sound use of materials, energy and water - coupled with the minimization of waste and emissions - makes good business sense. Resource Efficient and Cleaner Production (RECP) is a way to achieve this in a holistic and systematic manner. RECP covers the application of preventive management strategies that increase the productive use of natural resources, minimize generation of waste and emissions, and foster safe and responsible production. Benefits are eminent in many enterprises, regardless of sector, location or size, as demonstrated by the experiences of Anning Starch Co., Ltd. in China.

### Achievements at a Glance

Resource Efficient and Cleaner Production (RECP) implementation in Anning Starch Co., Ltd. led to annual savings and increasing benefits of around RMB 14,000,000 (USD 2,258,200), and improved product quality. The RECP programme also enabled the company to increase its starch recovery rate by more than ten percentages, and water productivity by 90%, while decrease wastewater intensity by 45%.

Anning Starch Co., Ltd. has proved that the promotion of cleaner production is a better option for Chinese backward industries to meet stricter environmental requirement and realize higher resource efficiency and economic benefits.



Note: new equipment installed at the plant

### Overview

Anning Starch Co., Ltd. a company producing native starch, modified starch and alcohol in China, was established in 1998. Its production capacity of native starch is 20,000 t/a, of modified starch is 20,000 t/a, and of alcohol is 30,000 t/a. The company has 237 workers, covers an area of 50,000 m<sup>2</sup> and has fixed assets of around RMB 85,000,000 (USD 13,710,500).

The main target of the RECP programme implemented at Anning Starch Co., Ltd. was to achieve the reduction of freshwater consumption, waste-water generation, COD generation, and the increase of starch recovery rate through improving production technologies. The CP production process implemented at Anning Starch Co., Ltd. allows the company to significantly improve its resource efficiency, minimize generation of waste and emissions.

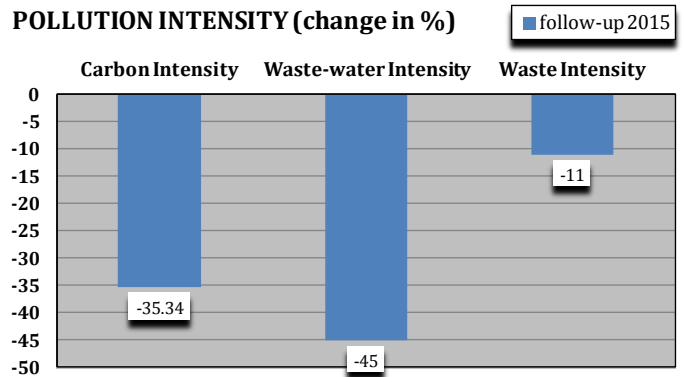
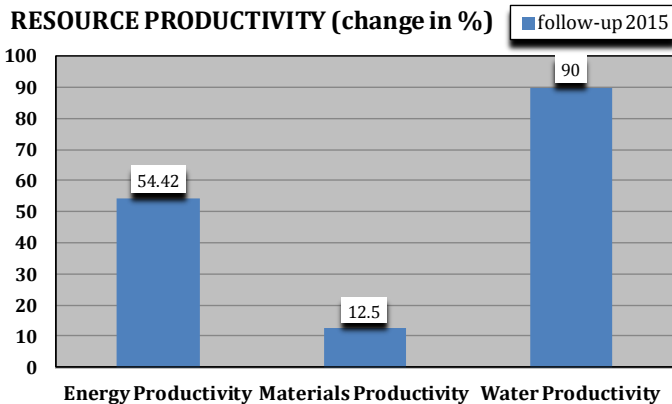
## Benefits

The RECP programme was mainly focused on improving the native starch production process. RECP not only enabled Anning Starch Co., Ltd. to achieve savings from the decreased use of energy and resources, but also made it possible for the company to decrease their pollution and to act in a more responsible way.

Absolute Indicator	Change (%) Year 1	Relative Indicator	Change (%) Year 1
<b>Resource Use</b>		<b>Resource Productivity</b>	
Energy Use	-35.24	Energy Productivity	54.42
Materials Use	-11.11	Materials Productivity	12.5
Water Use	-47.37	Water Productivity	90
<b>Pollution Generated</b>		<b>Pollution Intensity</b>	
Air emissions (global warming, CO <sub>2</sub> equivalent)	-35.34	Carbon Intensity	-35.34
Waste-water	-45	Waste-water Intensity	-45
Waste	-11	Waste Intensity	-11
<b>Production Output</b>	20,000t/a		

Note: The *absolute indicators* provide a measurement of how much resource use/pollution output has changed in absolute terms e.g. units of energy used or tons of waste generated. A negative percentage indicates a decrease and a positive percentage indicates an increase. The *relative indicators* provide a measurement of changes in resource use/pollution in relation to production output. *Resource productivity* provides a measurement of how much product output can be produced per unit of resource use, from a sustainability perspective, productivity should increase. *Pollution intensity* provides a measurement of how much pollution is generated per unit of production output, from a sustainability perspective, intensity should decrease.

## RECP Profile



Note: The RECP profile provides a visual overview of resource productivity and pollution intensity shown as change in % compared to the baseline values. Environmental performance is improved when resource productivity increases and when pollution intensity decreases.

## Resource Efficient and Cleaner Production (RECP)

**Resource Efficient and Cleaner Production (RECP)** entails the continuous application of preventive environmental strategies to processes, products and services to increase efficiency and reduce risks to humans and the environment.

RECP addresses three sustainability dimensions individually and synergistically:

*- Production efficiency*

- > Through improved productive use of natural resources by enterprises

*- Environmental management*

- > Through minimization of the impact on nature by enterprises

*Human development*

- > Through reduction of risks to people and communities from enterprises and supporting their development



### Success Areas

The results were achieved through the implementation of the following measures:

- Improving production processes with the purpose of reducing losses.
- Recycling water from different processes.
- Reducing the use of water in the extraction unit by using horizontal centrifugal screen
- Reducing the use of water in the refining unit by applying multi-stage hydrocyclone station
- Increasing the starch recovery rate by using rasper in the crushing unit.
- Realizing automated management.
- Reducing the use of cassava roots and the generation of pollutants by increasing resource utilization.

TABLE 2: OPTIONS IMPLEMENTED

Principal Options Implemented	Benefits			
	Economic		Resource Use	Pollution generated
	Investment [USD]	Cost Saving [USD/yr]	Reductions in energy use, water use and/or materials use (per annum)	Reductions in waste water, air emissions and/or waste generation (per annum)
Hammer mill + vertical centrifugal screen is replaced by hammer mill + rasper + horizontal centrifugal screen 1. Reducing the consumption of clean water 2. Improving the crushing effect of cassava root 3. Reducing the loss of starch in the residues	0.43 million	0.149 million	Reduction of cassava roots consumption by 1080 t Reduction of water usage by 123,400 m <sup>3</sup>	123,400 m <sup>3</sup> water reduced 48 t of waste (dry basis) reduced
The disc centrifuge is replaced by the multi-stage hydrocyclone station 1. Reducing the consumption of clean water 2. Reducing the loss of starch 3. Improving the product quality	0.19 million	0.79 million	Reduction of cassava roots consumption by 8920 t	3,220 t of COD will be reduced 396 t of waste (dry basis) reduced

### Approach taken

The managers of Anning Starch Co., Ltd. were worried about that the factory could not meet the requirements of increasingly strict environmental protection regulations due to the huge generation of pollutants. In this context, the managers wanted to improve the production process and eliminate backward equipment of the factory, thus raise the starch recovery rate and reduce



# RECP Experiences



the water usage and waste-water generation. The company got the support from the Cleaner Production Special Funds (a fund supported by the Ministry of Industry and Information Technology, MIIT, and the Ministry of Finance, MoF) in 2013 to implement these improvements. So, with the support of the CPSF as well as its own fund, several advanced Cleaner Production technologies and equipment were implemented in the factory.

RECP is a great cost-saving tool that has enabled the company to reduce the waste of raw materials and energy. Through the implementation of measures, the company has been able to improve the operating efficiency of the plant, improve product quality and recover a part of materials that were wasted. The work at the company illustrates the principle of Pollution Prevention Pays especially since the investments needed to achieve improvements had short payback times (a few months to 2 year).

## Business case

Although the programme was mainly focused in improving resource efficiency, minimize generation of waste and emissions, a direct positive consequence was also obtained in the product quality, which has increased the price of the final products. RECP not only allows companies to achieve savings from decreased resource use and benefits from increased product value, but also decreases pollution to the environment.

<b>Testimony Box</b>
<b>China National Cleaner Production Centre (China NCPC)</b>
The China National Cleaner Production Center (China NCPC) was established in December 1994, by the Ministry of Environmental Protection and today provides not only comprehensive support for CP activities in China, but also technical support for CP training and consulting in the Asia-Pacific region and other neighboring developing countries. In addition, the China NCPC also supports the Ministry of Environmental Protection (MEP), the National Development and Reform Commission (NDRC) and the Ministry of Industry and Information Technology (MIIT) in policy advice and promotion of CP in China.
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<b>English Abstract (where applicable)</b>
N/A

## ABOUT RECP EXPERIENCES

Through the joint Resource Efficient and Cleaner Production (RECP) Programme, the United Nations Industrial Development Organization (UNIDO) and the United Nations Environment Programme (UNEP) cooperate to improve the resource productivity and environmental performance of businesses and other organizations in developing and transition countries. The Programme is implemented in partnership with the Global Network for Resource Efficient and Cleaner Production (RECPnet). This series of enterprise success stories documents the resource productivity, environmental and other benefits achieved by enterprises in developing and transition countries through the implementation of RECP methods and practices.

These successes were achieved with the assistance of the National Cleaner Production Centres, which are part of RECPnet established with support of the UNIDO and UNEP. The success stories employ the indicator set described in *Enterprise Level Indicators for Resource Productivity and Pollution Intensity*, UNIDO/UNEP, 2010. The primer with accompanying calculator tool and further case studies are available at [www.recpnet.org](http://www.recpnet.org), as well as on [www.unido.org/cp](http://www.unido.org/cp) and [www.unep.fr/scp/cp](http://www.unep.fr/scp/cp).