

# RECP Best Practice Catalogue

*Water recovery/reuse in a natural potato  
chips production line*

*Developed within the framework  
of MED TEST II*



UNITED NATIONS  
INDUSTRIAL DEVELOPMENT ORGANIZATION



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# Best Practice - Water recovery/reuse in a natural potato chips production line

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<b>SECTOR:</b>	<b>Food &amp; Beverage</b>
<b>SUBSECTOR:</b>	Processing and preserving of fruit and vegetables
<b>PRODUCTS</b>	Potato chips
<b>CATEGORY</b>	Process control or modification
<b>APPLICABILITY</b>	Process

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<b>COMPANY NAME</b>	NOT DISCLOSED
<b>COMPANY SIZE</b>	SME

# Best Practice - Water recovery/reuse in a natural potato chips production line

## Description of the problem (Base scenario):

The manufacture of Natural Potato Chips (NPC) requires considerable quantities of fresh water. For the plant being considered, the water consumption in the NPC line represents 36% of overall plant consumption. The specific water consumption for this production line amounts to 24 ltr/kg of product while the international benchmark for this industry is 16 ltr/kg of product, thus there is potentially much room for improvement.

Water consumption along the process is as follows expressed in percentage of overall consumption and resulting reject quality;

- De-soiling, de-stoning and rinsing of tubers: 33% of water usage, effluent has high concentration of suspended solids and to a lesser extent organic pollution.
- Peeling: 5.3% of water usage, effluent has high concentration of suspended solids and to a lesser extent organic loading
- Grading, slicing: 10% of water consumption, has high concentration of suspended solids and to a lesser extent organic loading
- Washing, blanching: 51.7% of water consumption, Washing effluent has high organic loading while blanching effluent has lesser organic loading. Discharge temperature at ~ 45°C.

Currently all effluents from the production line are discharged to drain. Two issues are involved, first is the high water consumption and second is the organic pollution with subsequent loading on the drainage system. (See figure 1 below for details)

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## Description of the solution

The proposal is to recover 6,500 m<sup>3</sup>/year of effluent from blanching and blend it with 4,000 m<sup>3</sup>/year of raw water in a buffer tank and immediately pump it to the de-soiling-destoning stage. In doing so the recovered water consists of 62% from blanching stage and 38% raw water. This will help reduce the temperature and the organic loading of the blended water to manageable levels for handling and re-use without risking organic deposits build up on the equipment.

The blended water will have a temperature of ~30°C and a TDS of 1700 PPM which is quite manageable. Around 30 minutes before stopping the production, only raw water will be introduced to the blending tank to wash out any organic matter stuck on the surfaces of the blending tank and de-soiling auger.

The recovered water will completely displace around 60% of the fresh water needed for de-soiling, de-stoning and final rinsing of tubers

This solution will reduce the specific water consumption of the NPC from 24 ltr/kg product down to 18 lt/kg product, quite nearer to the 16 lt/kg international benchmark.

See figure 2 below for details.

Figure 1: Actual water use in NPC production line

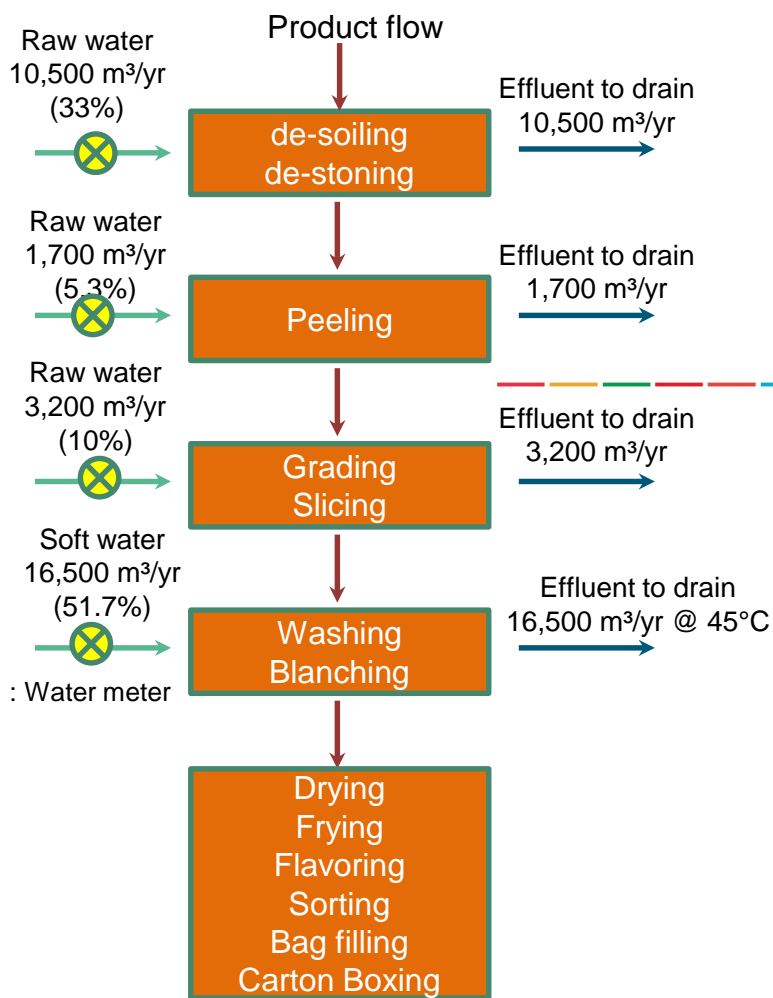
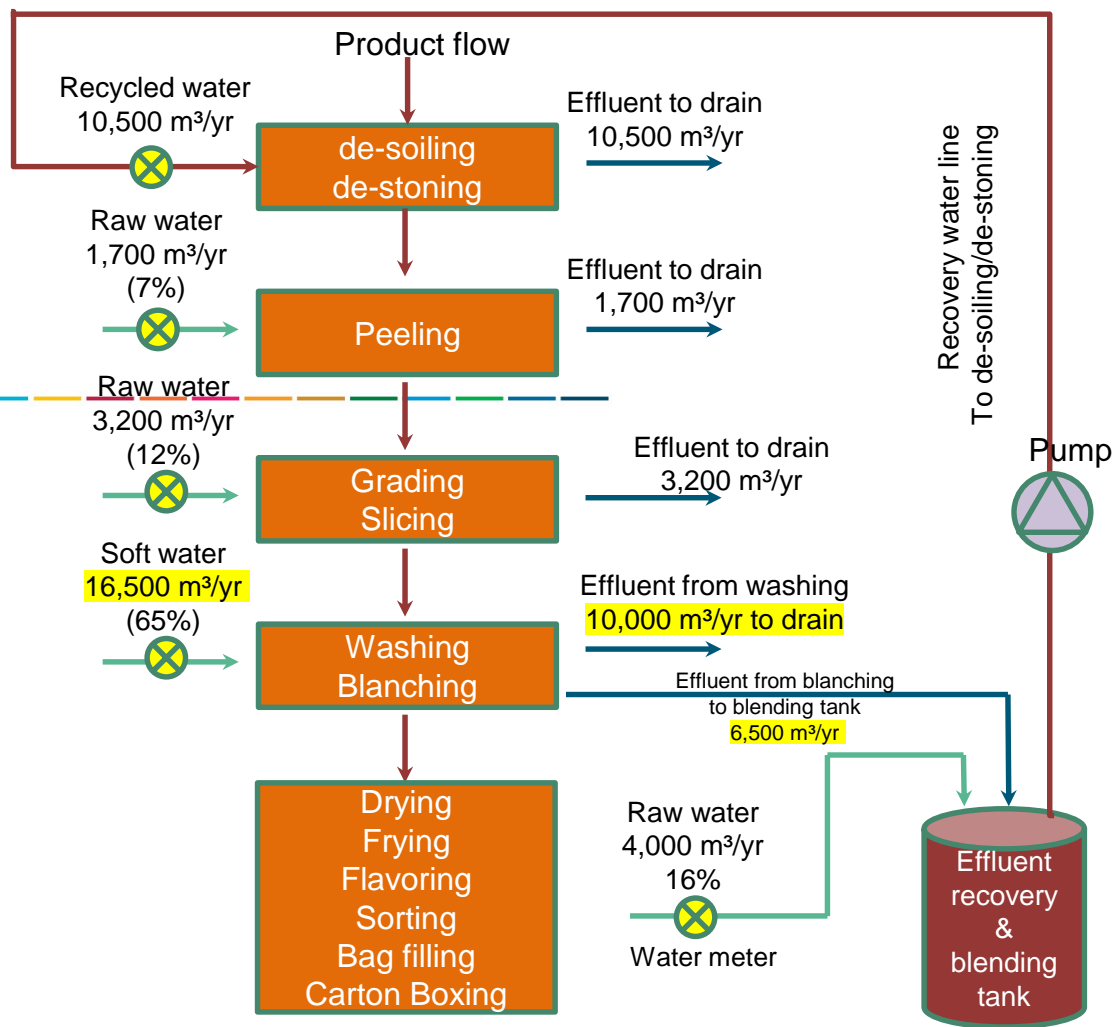


Figure 2: Proposed water recovery/re-use in NPC production line



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<p><b>Economic Benefits</b></p>	<p>Base case water consumption of NPC line: 32,000 m<sup>3</sup>/year            Expected water savings after improvement: 10 ,500*0.62 = 6,500 m<sup>3</sup>/year            Expected water consumption of NPC line after improvement: 32,000- 6,500 = 25,500 m<sup>3</sup>/year            Market price of water: 2.5EUR/m<sup>3</sup>            Base case water costs at market prices for NPC line: 32,000 x 2.5 ~ 79,000 EUR/year            Expected water savings at market price after improvement: 6,500 x 2.5 ~ 16,000 EUR/year            Expected water costs at market prices after improvement: 79,000 – 16,000 = 63,000 EUR/year            Expected increase in electricity consumption after improvement: 3,500 Kwhre            Electricity cost at plant: 0.14 EUR/Kwhre            Expected maintenance costs for installed equipment after intervention: 100 EUR/year            Expected increase in electricity and maintenance costs: 3,500*0.14 + 100 ~ 600 EUR/year            Expected net savings after improvement: 16,000 – 600 = 15,400 EUR/year</p>
<p><b>Environmental Benefits</b>  <b>Environmental negative impacts</b></p>	<p>Base case water consumption of natural potato chips line: 32,000 m<sup>3</sup>/yr            Expected water savings after improvement: 6,500 m<sup>3</sup>/year (20% reduction)  <b>Specific CO<sub>2</sub> emissions electricity: 1 kg CO<sub>2</sub>/Kwhre</b>  <b>CO<sub>2</sub> emissions due to increased electricity use: 3,500*1 = 3,500 kg/year</b></p>
<p><b>Health and safety impact</b></p>	<p>Not applicable</p>

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**Capital investments & financial indicators**      Cost of intervention: EUR 7,500  
Return on investment (simple payback): 0.5 year

**Suppliers**      None (no special equipment required)

**Other aspects**

- The market cost of water is considered and not the official utility cost which is much less.
- The cost of intervention shown above includes the cost of the information system to implement a Performance Monitoring and Verification Plan for that intervention.
- Accurate consumption and savings figures were obtained thanks to the information system installed by the company at the start of the project at the request of the MED TEST II team. Water meters were installed respectively at 1) de-soiling/de-stoning 2)peeling, 3) grading/slicing and 4) wash/blanching stages.  
Readings were taken on a daily basis.
- Above calculations are based on production period between October 2016 and October 2017.

**Implementation**      Measure has been retained by company for final study, implementation not expected before 2019.