



## Resource Efficiency and Cleaner Production at ethylic alcohol producer BIOPETROL

Ethylic alcohol facility in Balti BIOPETROL has applied RECP measures to its production processes and in result has benefited from financial savings of 74742 €/year.

The identified RECP opportunities for this enterprise regards improvement in energy management patterns which yield annual reduction of electricity by 193800 kWh and 193392 m<sup>3</sup> of natural gas. The facility has also conserved 299 m<sup>3</sup> of fresh water per year; and transforms 3900 tonnes of its non-product output into a valuable by-product of distiller's dried grains with solubles (DDGS) which is used as animal fodder.

### Overview

Ethylic alcohol produce BIOPETROL has the capacity of alcohol production of 3,000 dekalitres per day and qualitative characteristics of alcohol are in compliance with European standards. The high quality of drinking alcohol is provided by use of selected cereals; employment of advanced technologies in the enzymatic hydrolysis of crops containing sugar and starch, followed by distillation and purification of ethanol of impurities; as well as effective control over the quality of raw materials, intermediate and final products using modern equipment.

The plant purchases raw materials as grains and corn from local producers. For ethanol production the fodder grains are used.

The major share of products is exported. The principal consumer is Ukraine. The plant develops and maintains durable relations of partnerships with its customers.

The company has a vast territory of circa 6 ha, where there are many buildings. Some buildings are rented out to other enterprises.

### Benefits

Resource Efficient and Cleaner Production evaluation has been performed for the ethylic alcohol producer, and a set of RECP opportunities for more efficient use of energy and waste reduction have been proposed and implemented by the plant.

Thus, the facility has managed to reduce its annual electricity consumption by 193800 kWh, improve practices for natural gas use which yields the important annual saving of 193392 m<sup>3</sup> of natural gas, conserve 299 m<sup>3</sup> of fresh water and add value to 3900 tonnes of its non-product output, which can be commercialised on the agricultural market as animal fodder. All these measures increase resource productivity, reduce pollution intensity of the facility operation and bring important economic benefit of 74742 €/year.

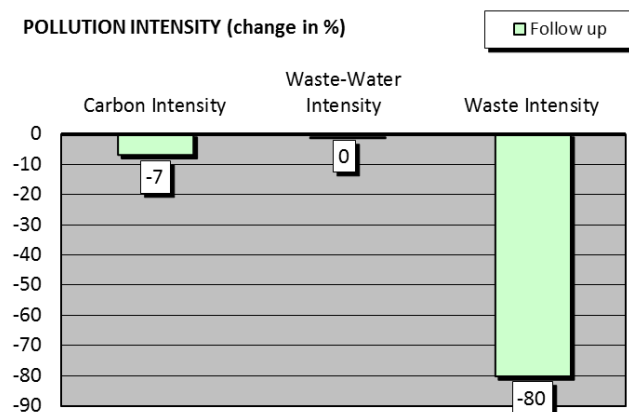
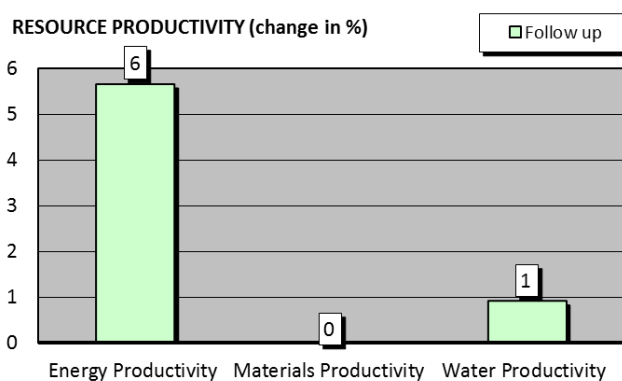


**Table 1: Results at a glance**

Absolute Indicator	Change (%)	Relative Indicator	Change (%)
	Follow up		Follow up
Resource Use		Resource Productivity	
Energy Use	-9	Energy Productivity	6
Materials Use	0	Materials Productivity	0
Water Use	-5	Water Productivity	1
Pollution generated		Pollution Intensity	
Air Emissions (global warming, CO2 eq.)	-11	Carbon Intensity	-7
Waste-Water	-4	Waste-Water Intensity	0
Waste	-81	Waste Intensity	-80
Product Output	-4		

**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 of Ethylic alcohol producer BIOPETROL



**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 pollution intensity decreases.



### Areas of improvement

The alcohol producer from Balti is an important energy and water consumer, since these resources are vital inputs into cereal fermentation, following the fermented raw materials.

In result of the detailed analysis of resource inputs and resource flow through technological stages of production, a set of RECP options have been developed and proposed for every production stages.

Thus, the system of fresh water distribution has been improved with frequency converter and pressure sensor with the limit of 6 bars for maximum pressure. When water is consumed, the pressure drops, the pressure sensor signals the converter and the converter assures variable speed of the pump depending on the flow rate of water consumed. This modification secures important saving of electricity which translates into 30842 kWh/year.

A challenge for the company is to provide the necessary temperature level for production processes. The distillation process requires the cooling to be done average level of 22 – 27 °C. Therefore, the company has modernised its cooling system by proper forces with the help of own engineers. Two new cooling towers have been assembled with the capacity of 150 m<sup>3</sup>/h. Many pumps have been replaced and connected to frequency converters, which has allowed considerable energy saving. In result the volume of water in the cooling system has been reduced from 599 m<sup>3</sup> to 300 m<sup>3</sup>.

Steam for fermentation is generated with the help of natural gas. On average, 9.5 m<sup>3</sup> of fresh air are required to burn 1 m<sup>3</sup> of natural gas. The fresh air is supplied by a ventilator. Based on instant steam demand, the gas supply is adjusted by air volume. This adjustment process has been improved by automated control instead of manual control by operator. A frequency converter for the system of air supply to the burner is now used. Owing to correct adjustment of burning process the company has managed to reduce the consumption of natural gas for 1 tonne of steam from 119 m<sup>3</sup> to 102 m<sup>3</sup>, which means a saving of natural gas by 14% or the annual conservation of 193392 m<sup>3</sup> of natural gas.



**New pump for fresh water distribution**



**New cooling tower**



**The system of air supply to the burner**



**Table 2: RECP options to improve resource efficiency at ethylic alcohol production plant in Balti**

RECP option	Benefits			
	Economic		Resource use	Pollution generated
	Investment, €	Savings, €/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)
Use of frequency converters for pump connection scheme for household water circulation of the company	1227	2664	Electricity: 30842 kWh/year	Reduced maintenance costs for fresh water distribution unit Reduced CO2 emissions by 30.5 tonnes
Replacement of large-sized pumps and motors with energy efficient ones with installed power based on actual loads	455	2674	Electricity: 30958 kWh/year	Reduced CO2 emissions by 30.6 tonnes
Modernisation to cooling system	13636	11727	Electricity: 132000 kWh/year Water: 299 m <sup>3</sup> /year	Reduced CO2 emissions by 131 tonnes Waste water: 299 m <sup>3</sup> /year
Use of frequency converter on the ventilator that feeds air to the burner	15455	54677	Natural gas: 193392 m <sup>3</sup> /year	Reduced CO2 emissions by 364 tonnes
Production of distiller's dried grains with solubles (DDGS) as fodder	n/a	≈ 3000	DDGS: 3900 tonne/year	Reduced amount of solid waste by 3900 tonne/year
<b>TOTAL</b>	<b>≈ 30773</b>	<b>≈ 74742</b>	<b>Electricity: 193800 kWh/year;</b> <b>Water: 299 m<sup>3</sup>/year;</b> <b>Natural gas: 193392 m<sup>3</sup>/year</b> <b>Animal fodder DDGS: 3900 tonne/year</b>	<b>Emissions 556 t CO<sub>2</sub> eq.</b> <b>Reduced amount of solid waste by 3900 tonne/year</b>



### Approach taken

The management of the ethylic alcohol producer from Balti BIOPETROL took very active participation in RECP assessment process and willingly implemented proposed improvement into the stages of production. The necessary data have been timely provided, the NCPP national experts were welcome to production facilities, all necessary clarifications have been provided. Moreover, required investments into most feasible RECP options have been secured. This approach has assured high rate of return on investment and have delivered important environmental and resource saving benefits to the enterprise.

### Business case

The set of RECP measures for the most resource consuming processes of the alcohol fermentation plant has allowed notable improvements in process efficiency without considerable investments with reasonable payback which does not exceed 1 year, thus allowing decreasing product costs and reducing environmental impact, which makes the plant products more competitive and attractive to the consumers.



### About NCPP-Moldova

NCPP-Moldova aims to improve resource productivity and environmental performance of enterprises and organisations from Moldova by implementation of Resource Efficient and Cleaner Production (RECP).

### About EaP GREEN Program

The Greening Economies in the European Union's Eastern Neighbourhood (EaP GREEN) Program is carried out in six countries of Eastern Partnership (Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine) with financial assistance of the European Union, with co-financing from the Government of Slovenia, the Development Bank of Austria (DBA) and the implementing Organizations: the Organisation for Economic Co-operation and Development (OECD), the United Nations Economic Commission for Europe (UNECE), the United Nations Environment Programme (UNEP), and the United Nations Industrial Development Organization (UNIDO).

Under EaP GREEN Program RECP Demonstration component, UNIDO is supporting the implementation of Resource Efficient and Cleaner Production (RECP) demonstration projects in the food, chemicals and construction materials sectors in the Republic of Moldova through the National Cleaner Production Programme assisting regional enterprises in reducing the water/materials/energy consumption per unit of production

(<http://www.unido.org/eapgreen.html>).