

# Water and wastewater management



**THE GLOBAL GOALS**  
For Sustainable Development



The economic use of water resources at the LOTOS Group is based on relevant water use and integrated permits. Analyses of the environmental impact of our water abstraction activities confirm that they do not significantly affect any protected sites or areas of environmental value, and that the amount of water withdrawn is substantially below permitted volumes.

## Total water withdrawal by source

No.	Total volume of water withdrawn by the organization by source	Total volume [m <sup>3</sup> ]
1	Water from rivers	4 007 379 ✓
2	Seawater	334 002 ✓
3	Ground water	328 810 ✓
4	Water supplies from a third party	322 492 ✓
<b>TOTAL</b>		4 992 683 ✓

Companies included in the calculations: Grupa LOTOS, AB LOTOS Geonafra, LOTOS Oil, LOTOS Petrobaltic, Energobaltic, LOTOS Infrastruktura, LOTOS Kolej, LOTOS Asfalt, LOTOS Serwis, LOTOS Paliwa, LOTOS Ochrona, LOTOS Straż, LOTOS Terminale, LOTOS Lab, LOTOS Biopaliwa, RCEkoenergia.

Processes consuming large quantities of water	Water demand [m <sup>3</sup> ]	Company
CHP plant - utilities production	3 123 762	Grupa LOTOS
Refinery - circulatory cooling water	1 356 650	Grupa LOTOS
Injection of seawater into reservoir	334 002	LOTOS Petrobaltic
Production of decarbonized water	214 039	LOTOS Infrastruktura
Water consumption at the CHP plant (heating and process steam generation, cooling system)	152 365	RCEkoenergia
FAME production — circulating cooling water	41 754	LOTOS Biopaliwa
Technological processes of washing locomotives and tankers	35 094	LOTOS Kolej
Fire safety purposes	7 453	LOTOS Terminale
Production of fatty acid methyl esters (FAME)	6 714	LOTOS Biopaliwa
Water consumption at the treatment plant	3 612	RCEkoenergia

<b>Water treatment unit (water for heating systems)</b>	3 498	Energobaltic
<b>Cooling</b>	1 754	LOTOS Oil
<b>Fire safety purposes</b>	1 200	LOTOS Straż




## Percentage and total volume of water recycled and reused

Total volume of water withdrawn by the organization	7 879 566 m <sup>3</sup>
Volume of water recycled or reused	3 901 647 m <sup>3</sup>
Share of water recycled or reused in the total volume of water withdrawn by the organization	50%

Companies included in the calculations: Grupa LOTOS, LOTOS Asphalt, LOTOS Paliwa, LOTOS Biopaliwa. Total volume of water withdrawn by the companies was calculated as the volume of water that would have to be abstracted from the environment to satisfy the Company's needs (i.e. actual water withdrawal + reused water).

For years, Grupa LOTOS has maintained a high quality of treated wastewater. Regular monitoring has confirmed that the wastewater discharged meets the required parameters, with the majority of indicators below 50% of the maximum levels defined in our permit.

## Total volume of wastewater by quality and destination

<b>Wastewater discharge destination</b>	<b>Volume (m<sup>3</sup>)</b>
To surface water (lakes, rivers, etc.)	5 788 064 
To third-party plants (including municipal utilities)	256 820 
<b>Total wastewater volume</b>	<b>6 044 884 </b>

<b>Wastewater treatment</b>	<b>Volume (m<sup>3</sup>)</b>
<b>Through the Organization</b>	5 788 064 
<b>Through the treatment plant</b>	256 820 
<b>Total wastewater treatment</b>	<b>6 044 884 </b>

Companies included in the calculations: Grupa LOTOS, AB LOTOS Geonafra, LOTOS Oil, LOTOS Petrobaltic, Energobaltic, LOTOS Kolej, LOTOS Asphalt, LOTOS Serwis, LOTOS Paliwa, LOTOS Terminale, LOTOS Infrastruktura, LOTOS Ochrona, RCEkoenergia, LOTOS Biopaliwa.

# Wastewater discharged by Grupa LOTOS (mg/dm<sup>3</sup>)

BZT<sub>5</sub> (pięciodobowe biologiczne zapotrzebowanie na tlen) = 2.97

COD=44.53

suspended solids = 5.08

phenols = 0.001

ether extract = 0.54

petroleum hydrocarbons = 0.12

N<sub>og</sub> (Total Nitrogen) = 4.5

P<sub>og</sub> (Total Phosphorus) = 0.75

sulphides = 0.022

Ni (Nickel) = 0.0013

V (Vanadium) = 0.0039

Al (Aluminium) = 0.0703

petroleum = 0.12

Phenols, ether extract, hydrocarbons, nickel, vanadium and aluminium are typical pollutants in the refining industry. The other substances are very important for environmental protection in general. Wastewater discharged by Grupa LOTOS to the environment meets by a wide margin the parameters defined in the integrated permit granted to the company.

## Formation water

Until recently, formation water separated from the formation fluid as part of LOTOS Petrobaltic's operations used to be purified of oil components to a level below 15 ppm ("parts per million") and discharged into the sea. At present, in line with the requirements of the Baltic Sea Action Plan, developed by the Helsinki Commission (HELCOM) and approved in 2007 by the Environmental Protection Ministers of the Baltic States, the 'zero discharge' principle applies to offshore activities in the Baltic Sea. Therefore, a special water injection system was installed on the Baltic Beta platform to inject water back into the rock mass. This has a positive effect on the environment and raises the reservoir pressure, improving efficiency.

## Volume and disposal method for formation water and water produced in the oil extraction process

Share of water produced in the oil extraction

Disposal method	Volume of formation water and water produced in the oil extraction process [m³]		process	
	LOTOS Petrobaltic	AB LOTOS Geonafta	LOTOS Petrobaltic	AB LOTOS Geonafta
<b>Re-injection into reservoir</b>	183 518.2	249 449	98.63%	99.09%
<b>Other</b>	2 546.4	2 291.5	1.37%	0.91%
<b>TOTAL</b>	<b>186 064.6</b>	<b>251 740.5</b>	<b>100%</b>	<b>100%</b>

In 2015, formation water produced in the process of oil extraction from the B8 field was loaded into a tanker together with the oil. As production from the field was launched on September 30th 2015, the content of water in the formation fluid was negligible (1%). Once the Petrobaltic rig (currently undergoing conversion), with the formation water injection system installed, is placed on the B8 field, water will be injected back into the field.

In 2015, LOTOS Geonafta produced 251,741 cubic metres of formation water. The water was injected back into the formation and therefore is not subject to any specific requirements in terms of hydrocarbon content or salinity. The company intends to maintain the concentration of hydrocarbons in formation water below the level of 40 mg/litre. In 2015, 2,291.5 cubic metres of the produced brine was supplied to municipal utilities.