

# BIOSPHERA ENVIRONMENTAL COMPLEX UNIQUE COMPLEX OF BIOLOGICAL TREATMENT FACILITIES FOR OIL REFINERIES

## ESTABLISHING TECHNOLOGICAL LEADERSHIP

One of the key goals of the modernization of the oil refineries of Gazprom Neft PJSC is to enhance the eco-friendliness of the manufacturing of petroleum products. In 2017, the Moscow Oil Refinery commissioned the unique Biosphera complex of biological treatment facilities.

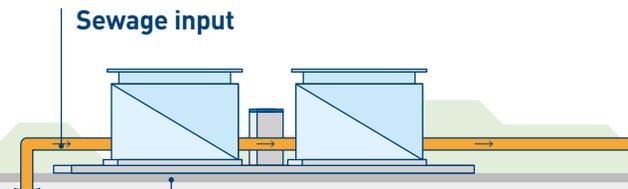
The complex has capacity for wastewater treatment of 1,400 m<sup>3</sup> per hour with the ability for an increase to 2,000 m<sup>3</sup> per hour under high power conditions. The water in the treatment plants undergoes multi-stage

purification: mechanical, physical, chemical, and biological as well as filtration through a system of carbon filters and the removal of salts.

Wastewater treatment efficiency at the oil refinery rose to 99.9% as a result of the launch of Biosphera. Modern technologies provide a closed cycle of water consumption. Biosphera enabled the Moscow Oil Refinery to reduce the intake of river water by 60%. Roughly 75% of the treated effluents are returned to production, while the remaining



Even rainwater is collected and purified in the storm sewer system



**Tanks**  
collection and treatment of plant wastewater

water, whose quality is monitored according to 32 parameters, enters the Mosvodokanal system.

Concurrently with the commissioning of the Biosphera system at the Moscow Oil Refinery in 2017, the Company launched an even larger project to build a similar purification system at the Omsk Oil Refinery. The capacity of the new treatment facilities at the Omsk Oil Refinery will expand by 20% compared to the existing facilities and amount to 3,450 m<sup>3</sup> per hour. The construction of the Biosphera facility will make it possible to reduce the area occupied by treatment facilities by more than 94% (from 159 to 9.2 hectares). The Omsk complex's features include gas-convection chambers for cleaning off-gases and a nitrogen pad to prevent evaporation into the atmosphere.

### Membrane bioreactor

#### Technology E.1

**> 50%**

RUSSIAN-PRODUCED EQUIPMENT

**33,000 t**

OF WATER ACCOMMODATED BY THE BIOREACTOR

**3,000 t**

MEMBRANES IN THE FILTRATION SYSTEM

**The membrane bioreactor** is a key component of the complex. It mixes the wastewater with the active silt – a group of microorganisms that use oil refining waste as a nutrient medium. They are grown specifically for Biosphera at the Luberetsk sewage treatment plant of Mosvodokanal.

**Active sludge** is the ideal solution for removing sulphides, phenol, benzene, petroleum products, ammonium nitrogen, and thiosulphates from the water. The spent sludge that has passed through membrane filters with a pore size of 0.03-0.1 µm (thinner than human hair) may be reused.

All off-gases are cleaned at photoionization stations that guarantee the complete removal of odours. The air is first cleaned using filters, then disinfected with ultraviolet light.

# 99.9

PERCENTAGE OF EFFECTIVENESS OF WASTEWATER TREATMENT AS A RESULT OF LAUNCHING THE BIOSPHERA COMPLEX

## BIOSPHERA AT THE MOSCOW OIL REFINERY

# 9

RUB BN INVESTMENT

# 2017

commissioning

# 1,400

M<sup>3</sup> PER HOUR capacity

## BIOSPHERA AT THE OMSK OIL REFINERY

# 19.3

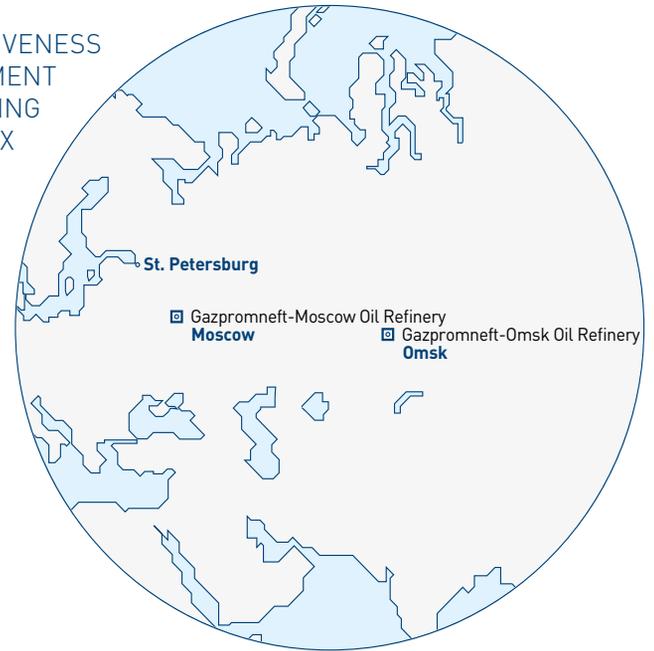
RUB BN INVESTMENT

# 2020

commissioning

# 3,450

M<sup>3</sup> PER HOUR capacity



This system has no analogues for now among Russian oil refineries

