





# **ZERO DISCHARGE -**CLEAN SEA







OFFSHORE PROJECTS

LUKOIL ECO PRINCIPLES

ZERO DISCHARGE PRINCIPLE







SAFETY MARGIN

HUMAN FACTOR

MONITORING DEMONSTRATES...



PLATFORM REEF



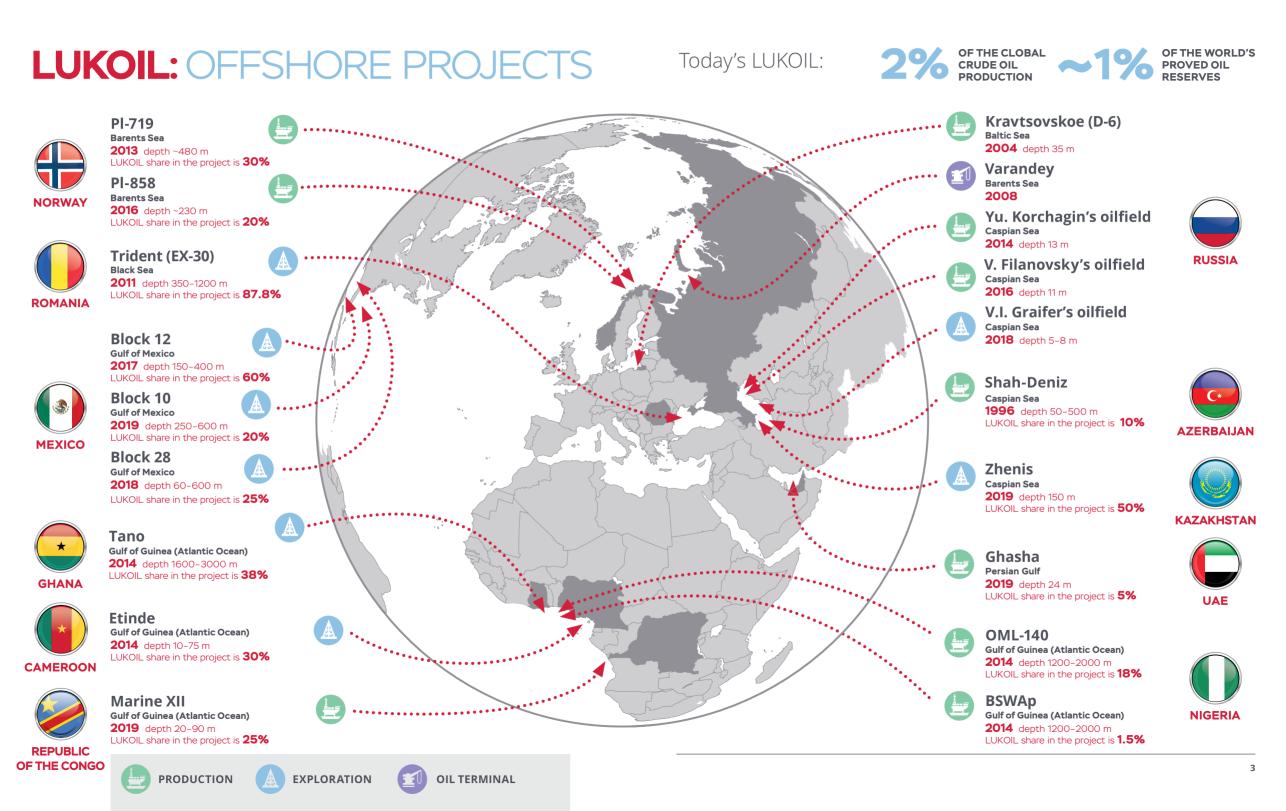
**FISH** 

SPOT



IN HARMONY WITH NATURE







### **SEA** PROJECTS

# **BALTIC SEA**

The Baltic Sea is where LUKOIL produced its first oil from an offshore oilfield. Kravtsovskoe (D-6) was discovered in 1983 and is now one of the largest oilfields in the Russian continental shelf in the southeast part of the Baltic Sea. Oil production is carried out from an offshore ice-resistance stationary platform D-6. It is the first Russian oil-producing platform designed and built by Russian design and engineering organizations using state-of-the-art technologies.

LUKOIL plans to continue production in the region due to the development of the new oilfields opened by the Company (the principal of which is oilfield D33).

# **CASPIAN SEA**

The North Caspian is one of the key regions of oil and gas production growth. In 1995-2016, the Company opened 10 oilfields with the total initial recoverable oil reserves of 7 billion barrels of oil equivalent. The concept of oilfields development effective to 2030 contemplates the construction of 25 platforms and 1.5 thousand km of pipelines, running predominantly under the sea surface. The first oilfield launched into operation was Yu. Korchagin's oilfield, and in 2016 LUKOIL started the commercial operation of V. Filanovsky's oilfield.

From 1996, LUKOIL also takes part in the development of offshore gas condensate oilfield Shah-Deniz in the Azerbaijan shelf of the Caspian Sea.

In 2019, Rakushechnoye gas condensate oilfield located in the Russian sector of the Caspian Sea was renamed the V.I. Graifer's oil field, after the Chairman of the PJSC LUKOIL Board of Directors, who significantly contributed to the oil production of Russia.



# **ARCTIC REGION**

In 2011, LUKOIL became the first Russian company to get a qualifying permit for the operation in the continental shelf off Norway as an operator company. Today, the Company is taking part in two offshore geological exploration projects in the Norwegian sector of the Barents Sea.

> In Russia, LUKOIL built a unique export terminal in the Barents Sea. Its unique character is primarily due to its natural conditions: the Barents Sea is ice-coated for 247 days a year on average with the ice thickness of 1.25-1.8 m.

# OTHER COUNTRIES

2019 was a year of success in participating in new foreign offshore projects for LUKOIL.

In October 2019, the Company purchased a share of "Ghasha" oil and gas production confession from Abu Dhabi National Oil Company ADNOC.

In April 2019, the Ministry of Energy of the Republic of Kazakhstan, JSC NC "KazMunaiGaz" and PJSC LUKOIL signed the Contract for Zhenis Block hydrocarbons development and production for 34 years.

In September 2019, PJSC LUKOIL completed the purchase of 25% share in the block "Marine XII" in the Republic of the Congo from New Age company. Besides, LUKOIL participates in the offshore projects in Nigeria, Ghana and Cameroon. The projects in Western Africa gave the Company experience in the deepwater fields development.

> Further, the Company participates in development of offshore projects in Mexico, Norway, Romania and Azerbaijan.



### **LUKOIL** ECO PRINCIPLES

#### **ZERO DISCHARGE PRINCIPLE**

The zero discharge principle underpins LUKOIL's environmental safety system as part of the offshore project implementation. The zero discharge principle implies absolute prohibition of any production and domestic waste discharge to the marine environment. As soon as the waste is collected and sorted out it is transported onshore for waste recycling. The zero discharge principle is strictly abided both during exploration and production drilling as well as during commercial hydrocarbon production.

#### SPECIAL PERSONNEL TRAINING

The task of LUKOIL specialized corporate training center is to train people to work at offshore oil and gas facilities. The skills of offshore industrial and personal safety are developed by means of unique simulators which imitate real-life environment. LUKOIL Group is consistently maintaining its capabilities in terms of emergency situation response. It is ensured by regular common exercises with the Russian Ministry of Emergency Situations and the Ministry of Transport, as well as maritime rescue fleet of neighboring countries and foreign experts.



#### OPERATIONAL INTEGRITY

LUKOIL's own scientific and technical background, as well as its production infrastructure make it possible to design, construct and operate unique multibay offshore fixed facilities compliant with the international industrial and environmental safety standards. High levels of engineering reliability are reached thanks to mathematical modeling of emergency situations and probability calculation techniques of risk management.

#### INTEGRATED AND ENVIRONMENTED MONITORING

The monitoring of human impact on the environment is contributing to the development of new environmental programs and the adjustment of existing ones, as part of the preventive safety measures. Satellite, marine, onshore and coastal monitoring implies studies of the sea surface, geological and geochemical, hydrologic and hydrochemical observation, hydrobiological and ornithological observation, analysis of meteorological data, control over seismic conditions, etc.



### **ZERO DISCHARGE** PRINCIPLE

## 1. SORTING OUT and collection of waste

- cuttings (sludge)
- solid industrial waste
- solid domestic waste
- oil-contaminated (formation) water
- drilling waste water
- drill mud
- domestic waste water
- storm drains

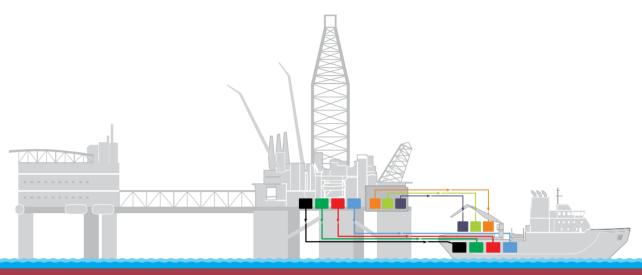
## 2. LOADING and onshore transportation of waste

- containers are used for solid waste transportation
- each container with drilling sludge receives registry number and is sealed before transportation
- liquid waste is transported by tankers
- liquid waste is pumped out by separate pipelines, which makes its mixing impossible
- support vessels have the ice class and the draft suitable for shallow waters

### **3.** WASTE RECYCLING

- CUTTINGS: stabilized industrial soil, road construction, reclamation, manufacturing of construction materials
- DRILLING WASTE WATER: technical water, process needs
- OIL-CONTAMINATED WATER: technical water, process needs
- DOMESTIC WASTE WATER: water, process needs, watering of vegetation plantations

#### THE PRINCIPLE OF «ZERO DISCHARGE»



LUKOIL is guided by the zero discharge principle both during exploration and production drilling as well as during commercial hydrocarbon production. The standards used by LUKOIL to comply with the «zero discharge principle» as part of offshore projects are taken as the basis for the HELCOM (Helsinki Commission) recommendations for the countries operating at the Baltic shelf.

### **SAFETY** MARGIN

#### CUTTING-EDGE GLOBAL ENGINEERING SOLUTIONS HAVE BEEN INTRODUCED TO THE VARANDEY TERMINAL

The Varandey settlement located at the Barents Sea coast in the Nenets Autonomous Okrug can be regarded as one of the polygons where LUKOIL tests its innovative engineering know-how and technologies. The design specifics of the Varandey oil export terminal were determined by severe climatic and ice conditions of the Arctic Circle region, the peculiarities of permafrost soil ("permanent frost"), high tundra vulnerability, proximity of deer pastures, etc. The unique facility that has no rivals in the world, has become the key one as part of the oil transportation system at the Arctic Ocean shelf.



#### KEY SAFETY FEATURES AND ENGINEERING SOLUTUIONS

Utilization of special cold-resistant steel for the structures of the fixed ice-resistant shipping berth.



Three protection levels and autonomous operation of the environmental safety system at the shipping berth.

Steel double-walled containers with extra leakproof protection at the onshore terminal facilities (the "glass-in-glass" principle).



A special thermal stabilization system of artificially frozen foundation soils down to a 6-m depth under the shore tank pads the onshore terminal facilities (the "glass-in-glass" principle).

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Reinforced-concrete guard rail of the tank battery optimized for the dynamic effect of the breakthrough wave in case of unexpected tank destruction.



Continuous oil heating that makes it impossible for it to freeze in the pipeline, due to the laying of two subsea pipeline strings.



In 2011, LUKOIL'S Varandey fixed offshore ice resistant shipping terminal (FOIRST) was recorded in the Guinness Book of Records as the world's most northerly continuously operating oil terminal, namely, 69 degrees 03 minutes 11 seconds of the northern latitude.

The LUKOIL personnel, a number of its subsidiaries and contractors were awarded with the RF Government Prize in Science and Technology for development and commercial introduction of innovative methodological and engineering solutions as part of establishment of the oil transportation system in the seas of the Arctic Ocean.





### **HUMAN** FACTOR

LUKOIL HAS BUILT THE **FIRST RUSSIAN CORPORATE TRAINING CENTER TO PROVIDE THE HIGH-SKILLED PERSONNEL TO WORK AT OFFSHORE OIL AND GAS FACILITIES** 

The corporate training center (Ilyinka settlement, Astrakhan Oblast) provides education in 95 training programs including advanced training. The training programs provide for practical exercises with different simulators that reproduce real working conditions at offshore oil and gas facilities under standard conditions, and in extraordinary and emergency situations, as well as in the conditions of possible fire outbreaks (fire fighting in case of gas leaks and inflammation at pressurized process units, fire extinguishment of a burning helicopter, working in smoke chamber). Personnel is also trained in evacuation from a helicopter that has come down in the water (helicopter cabin simulator and rescue hoist),

evacuation from offshore platform into the open sea and survival in the open water (individual survival kit, lifeboat, rescue raft). About 100 exercises and training sessions aimed at emergency oil and petroleum spill response are conducted annually. The large-scale exercises at the Company's offshore facilities are traditionally attended by the crews from the Russian Ministry of Emergency Situations and the Ministry of Transport, as well as maritime rescue fleet of neighboring countries, the

countries of the Arctic Council

experts.

and other foreign observers and

LUKOIL CORPORATE TRAINING CENTER:

Oנר ז fire safety

sea rescue and survival skills

emergency response

THE CENTER IS CAPABLE OF **TRAINING MORE THAN 2000 PERSONS** PER YEAR

#### INTERNATIONAL CERTIFICATES

#### Accreditation of the international non-profit organization OPITO (Great Britain).

The OPITO International Petroleum Industry Training Organization sets educational standards and requirements to personnel training for offshore commercial oil and gas production.

#### Accreditation of the international JOIFF organization (Ireland) specializing in training of emergency fire fighting brigades, rules of respiratory system utilization. etc.

IOIFF exercises control over fire hazardous situations on a global scale, as well as sets its own standards for fire fighting personnel and emergency rescue team training.



LUKOIL boasts more than a decade of accident-free operations at its offshore facilities (marine terminals, oil and gas production platforms, sub-sea pipelines, and other similar infrastructure).



"Marine Rescue Service")



rescue teams (ERT)



### **MONITORING** DEMONSTRATES...

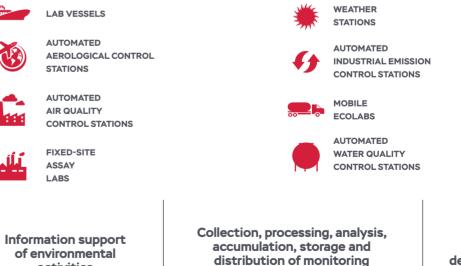
PRESERVATION OF FAVORABLE **ENVIRONMENTAL CONDITIONS** IS AMONG LUKOIL'S TOP PRIORITIES

MODEL STRUCTURE OF LUKOIL'S OPERATIONAL **ENVIRONMENTAL MONITORING SYSTEM** 



#### **INFORMATION MEASUREMENT NETWORK (IMN)**

information



activities

Managerial decision-making

A set of measures aimed at environmental protection is developed on the basis of system-based environmental monitoring in the vicinity of LUKOIL's offshore facilities and comprehensive analysis of satellite images, the data of vessel environmental surveys and fixed observation, coastal routes and stations. A specialized geographical information system (GIS) is used for data visualization and analysis.

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### **ZERO DISCHARGE -** CLEAN SEA

ZERO DISCHARGE – CLEAN SEA



#### NOT A SINGLE SPILL FROM OIFP D-6 OR UNDERWATER PIPELINE WAS REVEALED

MOST OF THE OIL SPILLS WERE CONCENTRATED AT THE ROADSTREAD OF THE BALTIYSK PORT AND ALONG MAJOR NAVIGATION ROUTES

#### INTEGRATED COASTAL VESSEL SURVEY

WATER SAMPLING AT COASTAL MONITORING STATIONS

DATA COLLECTION AND ANALYSIS ALONG SUBSEA PIPELINE ROUTES

#### FIXED-SITE SURVEYS

METEOROLOGICAL DATA COLLECTION AND ANALYSIS

WATER SAMPLING AT OFFSHORE FACILITIES

SURFACE FLOW ANALYSIS

SEISMIC STATE CONTROL

#### SATELLITE MONITORING

IDENTIFICATION OF POSSIBLE OIL SPILLS USING THE EUROPEAN SPACE AGENCY METHODOLOGY

PROPAGATION PREDICTION OF HYPOTHETIC OIL SPILLS (DIRECTION, TRAJECTORY AND TRANSFER RATE) IN VIEW OF THE HYDROMETEOROLOGICAL CONDITIONS

#### INTEGRATED OFFSHORE VESSEL SURVEY

WATER SAMPLING

BOTTOM SEDIMENT SAMPLING

#### VISUAL MONITORING

ONSHORE AND COASTAL FAUNA EN ROUTE ANALYSIS (SPECIES COMPOSITION, QUANTITY, MIGRATION, ETC.)

POLLUTION MONITORING ALONG COASTAL WALKING ROUTES

#### VESSEL TRAWLING SURVEYS

FISH FAUNA SAMPLING

LAB TESTS PHYSICAL CHEMICAL BIOLOGICAL

#### MANY YEARS OF OBSERVATIONS WITHIN THE AREA OF COMPANY'S RESPONSIBILITY PROVE THAT ITS OFFSHORE FACILITIES HAVE NO NEGATIVE ENVIRONMENTAL IMPACT

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## PLATFORM REEF -SEAL HOUSE

ONE OF LUKOIL OFFSHORE PLATFORMS (AT THE YU. KORCHAGIN'S FIELD) ACTUALLY IS AN ARTIFICIAL REEF. ITS SUBSEA FOUNDATION BECOMES OVERGROWN WITH SEAWEEDS AND SERVES AS A SUITABLE GROUND FOR FASTENING OF SHELLFISH, ARTHROPODS OR OTHER KINDS OF INVERTEBRATES. THE ESTABLISHED STRUCTURE BECOMES INHABITED BY DIFFERENT CRUSTACEANS, AND THE FISH THAT FINDS FOOD, REFUGE AND A SPAWNING AREA HERE. THE FISH IS FOLLOWED BY CASPIAN SEALS. AN ARTIFICIAL REEF IS A SUBSEA BOTTOM LANDSCAPE ELEMENT, WHICH HELPS ENHANCE BIO AND FISH PRODUCTIVITY OF THE WATER BODY. ARTIFICIAL REEFS ARE BIO FRIENDLY CONSTRUCTIONS. THEY TURN THE DEAD BOTTOM INTO OASES OF SUBSEA LIFE. THE GREATER BIODIVERSITY IS, THE HIGHER IS THE CHANCE OF THE SEA OR A WATER BODY TO RESPOND TO POLLUTION AND TO RECOVER ITSELF.

SPECIAL ATTENTION IS PAID TO THE STATE OF BIOTA, A HISTORICALLY ESTABLISHED CLUSTER OF SPECIES THAT LIVE IN THE VICINITY OF LUKOIL'S OFFSHORE LICENSE BLOCKS PHYTOPLANKTON BACTERIAL PLANKTON ZOOPLANKTON ICHTHYOPLANKTON FISH FAUNA MACROZOOBENTHOS BOTTOM WEEDS BIRD FAUNA ANIMALS



#### ERO DISCHARGE - CLEAN SEA K

### FISH SPOT

**FINANCING OF COMPENSATION EFFORTS ON THE REPRODUCTION OF** FISH RESOURCES BY THE COMPANY IN 2019

≈ RUB 118 MLN

STURGEONS, A RELICT SPECIES THAT SURVIVED **MILLIONS OF YEARS OF EVOLUTION, WHICH ADAPTED** TO THE MOST DIVERSE ENVIRONMENTAL CONDITIONS **ARE INCLUDED INTO THE ENDANGERED SPECIES** LIST (RED LIST). IT IS A KNOWN FACT THAT MOST OF THE WORLD'S STURGEON STOCK (MORE THAN 90%) IS LOCATED IN THE CASPIAN BASIN. THEREFORE **COMMERCIAL REPRODUCTION OF STURGEONS TO** PRESERVE THEIR POPULATION AND BIODIVERSITY IS **GAINING IN IMPORTANCE** 

#### Environmental culture has long become an integral part of LUKOIL's production activities. Repopulation of valuable fish species is a separate activity area as part of the Company's environmental program.

#### WERE RELEASED **INTO THE** WATER BODY

**OVER 35 MLN** OF PRIME **FISH FRY** 

2019



THE MEASURES TO PRESERVE BIODIVERSITY ARE INCLUDED INTO THE DEVELOPMENT PROGRAM TO BE JOINTLY IMPLEMENTED BY THE UN AND THE GLOBAL ENVIRONMENTAL FACILITY

> WHILE LOOKING AT 15-CM LONG YOUNG STERLETS ONE CAN HARDLY BELIEVE THAT IN SOME THREE YEARS THEY WILL BE HALF A METER LONG AND TURN INTO A TRUE DECORATION OF THE RIVERS **BELONGING TO THE CASPIAN BASIN**

#### **ACIPENSERRUTHENUS**

#### Sterlet (Acipenserruthenus)

is the smallest representative of sturgeons. Its size is 1.25 m, it weighs 16 kg, its life span is 27 years. It inhabits the basins of the Black. Azov, Caspian, White, Barents and Kara Seas. In the wild it feeds on water maggots, small shellfish, other fish eggs.

#### **ENVIRONMENTAL MEASURES TO MINIMIZE THE NEGATIVE EFFECT ON THE FISH FAUNA**

- 🚯 water intake stations at offshore facilities are equipped with fish protection systems
- 6 offshore pipeline routes bypass specially protected natural areas
- subsea pipeline construction operations are conducted inview of the sturgeon spawning migration routes
  - 🚯 participation in young sturgeon reproduction measures



## **CONSERVATION** OF BIODIVERSITY

#### LUKOIL'S PROGRAM OF BIODIVERSITY CONSERVATION

In 2015, LUKOIL approved its Program of Biodiversity Conservation in pursuance of the instructions given by the President of the Russian Federation in regard to the effective and safe development of the Arctic Region.

The Program was developed in line with statutory and other applicable requirements concerning the preservation of biodiversity and the joint recommendations of the Project UNDP/GEF-Ministry of Natural Resources and Environment of Russia "Mainstreaming Biodiversity Conservation into Russia's Energy Sector Policies and Operations" and Russian WWF.

The Program outlines LUKOIL's principles and approaches to the preservation of biodiversity and the requirements to documentation drafting, assessment of environmental impact and development of activities aimed at the preservation of biodiversity for the Company' offshore production facilities in the Arctic Region of the Russian Federation. The Program incorporates the expertise gained in the process of oilfield development in the shelf area of the Baltic and Caspian Seas, where LUKOIL makes significant investments into environmental safety.

#### LUKOIL GROUP ENVIRONMENTAL SAFETY PROGRAM

LUKOIL has developed and approved the Environmental Safety Program for 2019–2021, which contemplates over 900 activities with the total cost about RUB 106.5 billion with RUB 38.6 billion spent in 2019. This Program incorporates a subprogram **«BIODIVERSITY CONSERVATION»** as a distinction from past programs.

In 2019, LUKOIL joined the Ministry of Natural Resources and Environment of the Russian Federation working group (the Working Group) on creation and development of the "Business and Biodiversity" Initiative within the federal project "Preservation of biological diversity and development of eco-tourism" within the framework of "Ecology" National Project.



#### TRAINING IN PREVENTION OF ANIMAL DEATHS IN CASE OF EMERGENCY OIL SPILLS

In 2017, at the Naryan-Mar base of LUKOIL Group companies LLC Varandei Terminal and LLC LUKOIL-Komi the training on the prevention of animal deaths in case of emergency oil spills was held. The event was organized by the international SEA ALARM Foundation together with the Ministry of Natural Resources and Environment of Russia and the Project UNDP/GEF- Ministry of Natural Resources and Environment of Russia «Mainstreaming Biodiversity Conservation into Russia's Energy Sector Policies and Operations».

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## IN HARMONY WITH NATURE

COOPERATION WITH WORLD WIDE FUND FOR NATURE (WWF)

**WWF** is one of the largest independent international conservation organizations uniting about 5 millions of regular supporters and present in over 100 countries.

#### In 2015, WWF and **LUKOIL entered** into a cooperation agreement regarding the exchange of information, according to which the parties carry out bilateral consultations, working meetings, exchange information about the environment protection measures and projects. Each year, the parties approve and sign the Roadmap of the actions to be implemented under the Agreement.

#### WWF Rating

It is the 6th year running the Company has been participating in the Environmental Transparency Rating of Oil and Gas Companies Operating in Russia. LUKOIL Group was ranked the 4th among 20 oil and gas companies in the result of 2019 performance. The Company was awarded the diploma for "Transparency Achievements". The level of potential environmental impact of the participating companies is evaluated by the WWF Russia and the CREON analytical group. The environmental performance of the fuel and energy companies is assessed by a number of criteria such as environmental management, scale of impact on the environment and transparency.

WWF INTERNATIONAL ECOREGION PROGRAMS AIMED AT THE PROTECTION OF ARCTIC AND BALTIC MARINE ECOSYSTEMS OPERATE SINCE 1990S. WWF BALTIC PROGRAM WITH A HEADQUARTER IN STOCKHOLM (SWEDEN) UNITES 9 COUNTRIES INCLUDING RUSSIA.



Introduction of the Zero Discharge

approach through the corporate

standards system. We should work

by other companies which operate in

ecologically or biologically significant

marine areas (EBSAs) described by the

Convention on Biological Diversity (CBD)

be formalized in legislation which would

include the responsibility to eliminate

depositing and discharge into marine

environment of waste and raw waste

shelf hydrocarbons production.

water resulting from Russian continental

in many Arctic and Far East seas in Russia. The zero discharge principle should also

principle by LUKOIL is an example of how

oil&gas companies can ensure ecosystem

toward that this principle is implemented



#### THE EXPEDITION FOR STUDYING THE ATLANTIC WALRUS OF THE SOUTHEAST PART OF THE BARENTS SEA

As a part of the dialog between LUKOIL and WWF and with participation of the Russian public organization Marine Mammals Council, an expedition was organized in 2016 for studying the Atlantic walrus in the southeast part of the Barents Sea, in the area of operations of LLC Varandey terminal. It included the monitoring of walruses' movement and dynamics of their breeding grounds formation with satellite transmitters and photorecorders, and examination of animals' tissues for toxicants.





#### WWW.LUKOIL.RU