



ATOMENERGOMASH
ROSATOM

POWER ENGINEERING DIVISION OF STATE ATOMIC ENERGY CORPORATION ROSATOM



ABOUT COMPANY



Atomenergomash

is a Power Engineering Division of the State Atomic Energy Corporation Rosatom. Global machine building holding company operates in the key industries.

- We assist our customers in delivering high performance, develop new technologies and modern technical solutions that ensure efficient and safe operation of equipment throughout its entire lifecycle.
- We combine leading scientific research, engineering, manufacturing centers in Russia, CIS and European Union countries.
- Our products are present in nuclear and thermal power, oil & gas industries, shipbuilding, special steel market, in small hydro generation and other economic and industrial sectors.
- We see our mission in constant work together with our partners and customers to improve the welfare of people today and tomorrow.

KEY NUMBERS

> 20

countries
is the geography
of our projects

3

**every third light
bulb in Russia**
is lit with our help

100%

**of all Russian-designed NPPs
around the world**
are equipped with our products

> 7 mln miles

passed by nuclear-powered ships
equipped with our reactor units



SUSTAINABLE DEVELOPMENT



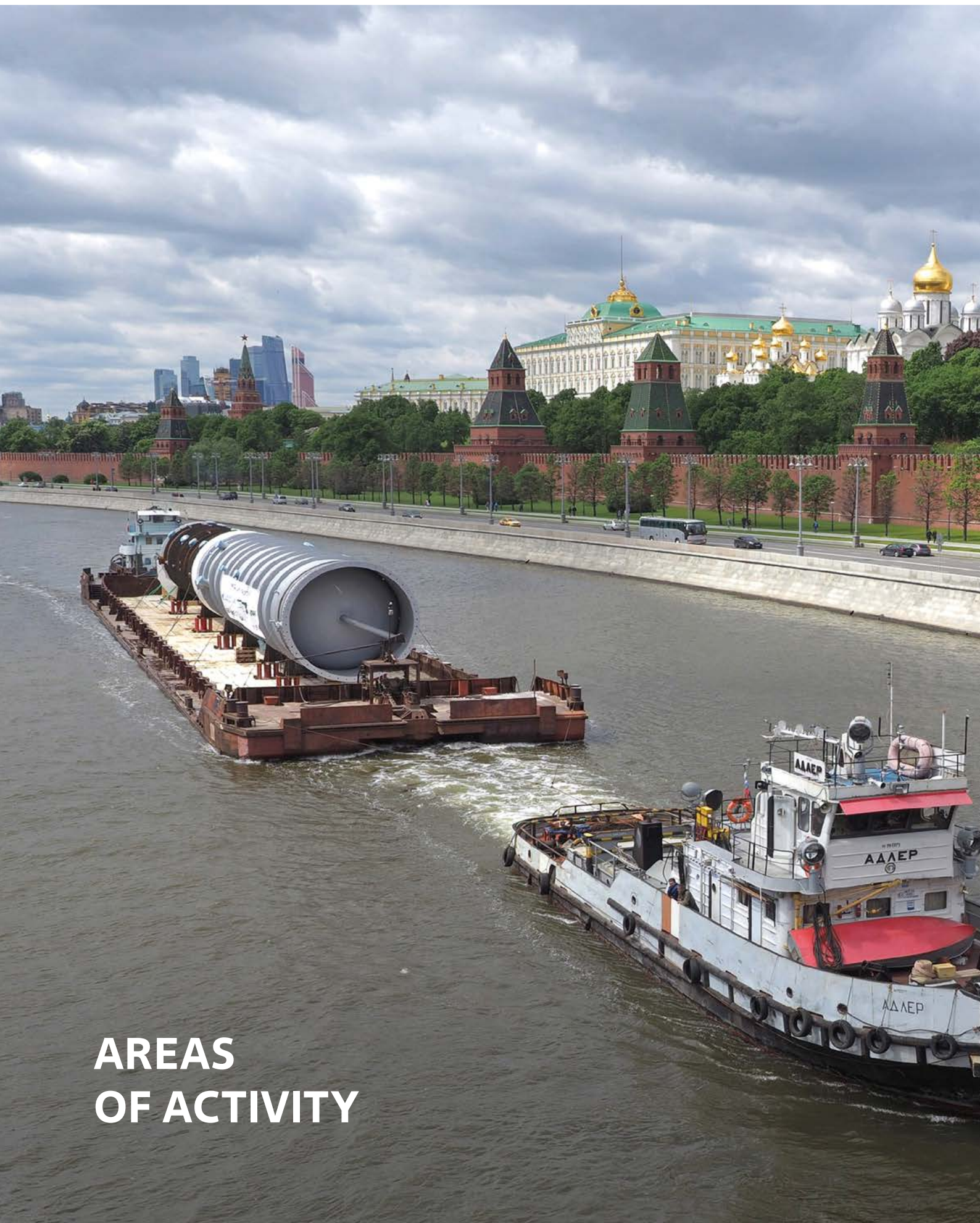
We strive to minimize our environmental impact and contribute to preserving the planet for future generations.

Safety is our main priority

We are constantly improving process safety mechanisms at enterprises and minimizing any opportunities for the occurrence of injury-risk situations.

Our technical solutions

The company's products allow customers and partners to work and develop and prosper in harmony with the environment, create comfort for people without any harm to nature and the environment.



**AREAS
OF ACTIVITY**



> 13.6 bln U.S. dollars*

**We have the largest
orders backlog**
among Russian companies
in the power engineering industry

*according to the public annual closing
of the company in 2021

The following economic and industrial
sectors use our technical solutions:

- nuclear power
- shipbuilding and transport shipboard power
- oil & gas industries
- LNG production
- thermal power, including equipment
for incineration plants
- small hydro generation
- special steels
- additive technology
- development of new materials

The largest corporations trust us

GE, RT-Invest, HZI, USC, RusHydro, NPCIL, Gazprom,
Gazprom Neft, Rosneft, Lukoil, NOVATEK
and other companies in Russia and abroad.



NUCLEAR
POWER

in 11**countries**

our solutions ensure
the operation of all
Russian-designed NPPs

15%**of the world's NPPs**

are operating
Russian-designed NPPs

Atomenergomash:

- Chief designer and packaged supplier of equipment for VVER- and BN-type reactor units;
- A packaged supplier of turbine hall equipment for VVER NPPs;
- A company with a full production cycle: research and development, design and engineering, semi-finished metallurgical products and special steels, production, supply, service.

We produce and supply
equipment for all Russian-designed
nuclear power plants under
construction in 11 countries.



VVER-1200 REACTOR FOR 3+ GENERATION NPP

VVER-1200 (PWR) - the most innovative and safe pressurized-water reactor. It has combined the best solutions and technologies of previous units. Compared to its predecessor, VVER-1000 is defined by greater power, twice as long service life, higher utilization coefficient (UC), resistance to external danger sources.



11 185 mm
Case height
(with upper unit
of 19 410 mm)

323 tons
Total case weight

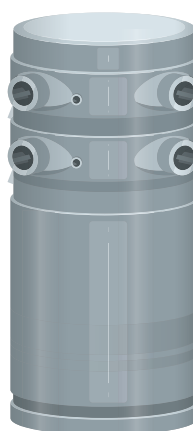
TECHNICAL FEATURES



Up to 70 MW · day / kg
Maximum fuel burnup



28 800 MW
of power is generated
per day by one power
unit within an 18-month
fuel cycle



- Water is used as a moderator and coolant
- The use of a steam generator eliminates the flow of radioactive coolant to the turbine



92%
UC



1200 MW
Electric Power



3200 MW
Thermal Power



60 years
Life cycle



35.9%
Efficiency



1.5 years
Interload period
duration
Four- and five-year fuel
cycles are also possible



Water is used
as a moderator
and coolant



163 pcs.
The number
of fuel assemblies

PRODUCTION



254 atmosphere
The pressure at
which the reactor is
tested for strength.
Equal to a water
column height of
2.5 km



840 days
Production time

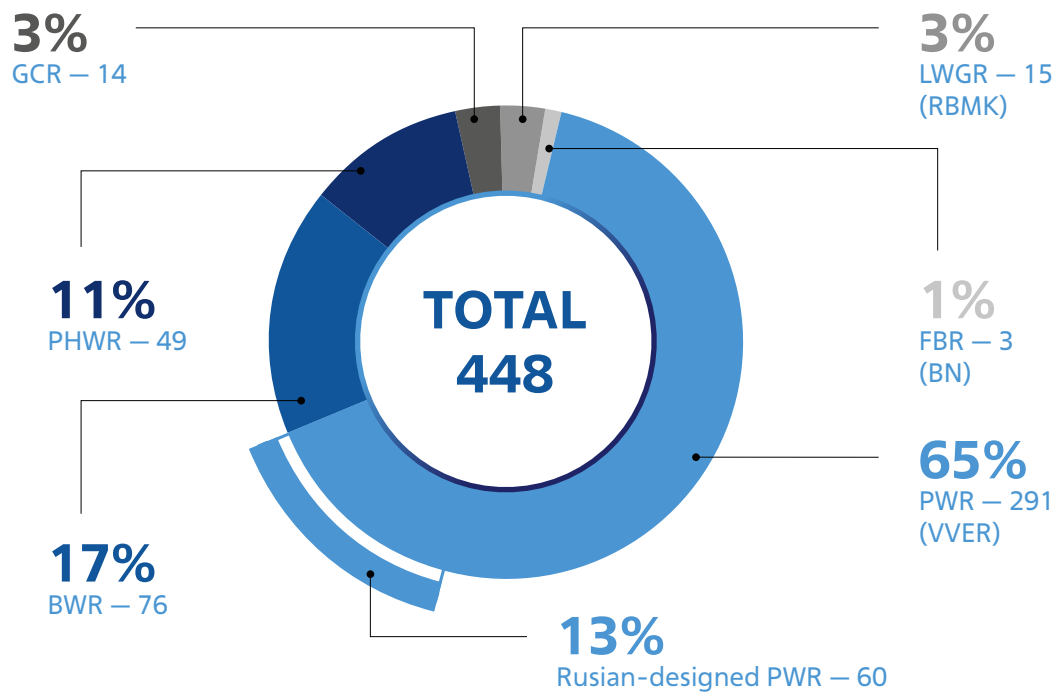


315 points
Of quality control

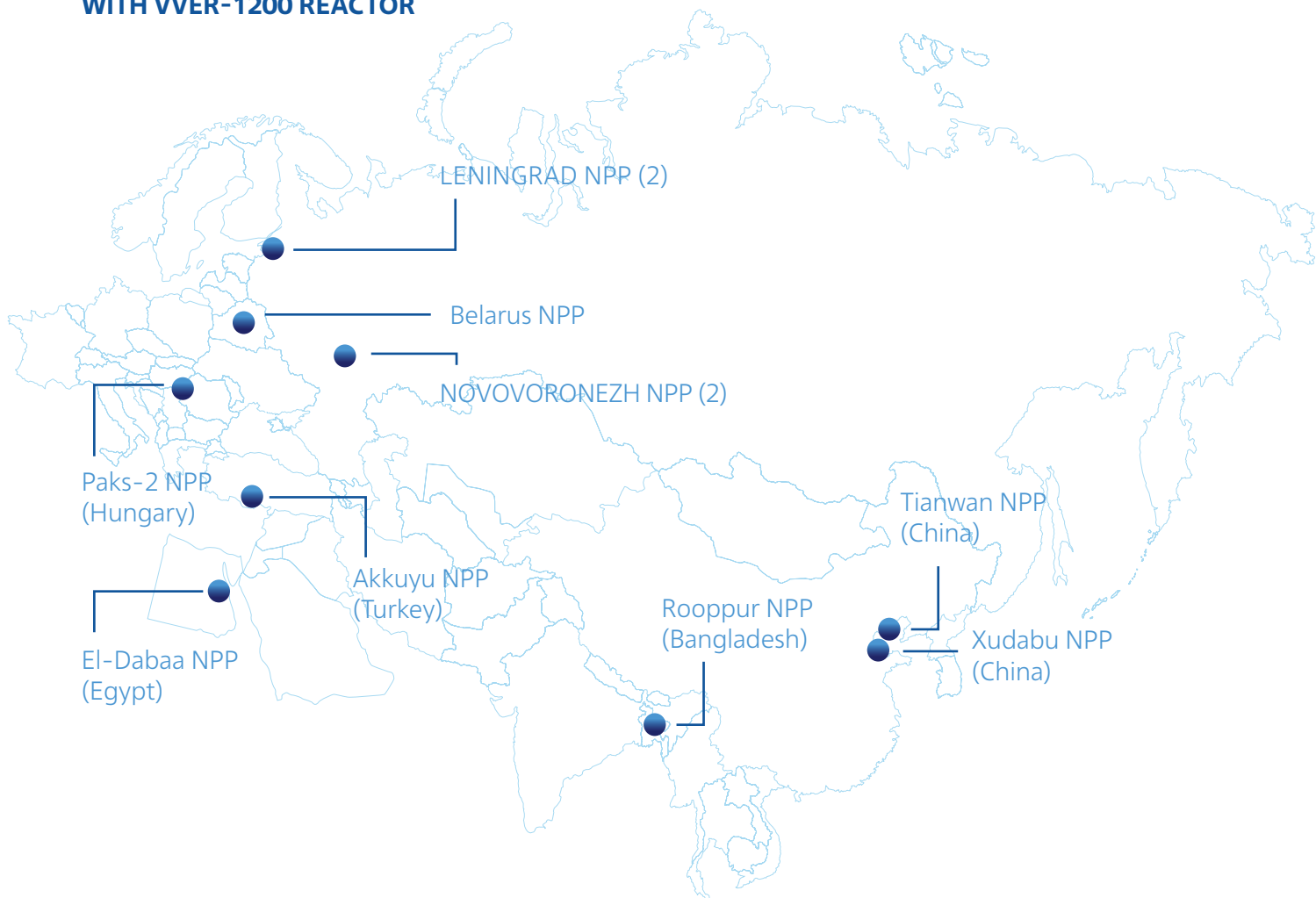


768
Production
operations

RATIO OF REACTORS OPERATING WORLDWIDE, PCS.



OPERATING AND WORK-IN-PROGRESS POWER UNITS WITH VVER-1200 REACTOR





SHIPBUILDING TRANSPORT (MARINE AND SHIPBOARD POWER SUPPLY) AND FNPPS (FLOATING NUCLEAR POWER PLANTS)



We create reactor units for all ships with a nuclear power unit and low power capacity.

200 mln tons

of cargo for various purposes

were transported with the help of our reactor units along the Northern Sea Route during the entire use period of ice class nuclear ships

We have developed the latest generation of RITM reactor units, which will become the basis for the creation of floating nuclear power plants (FNPPs), both onshore and offshore.

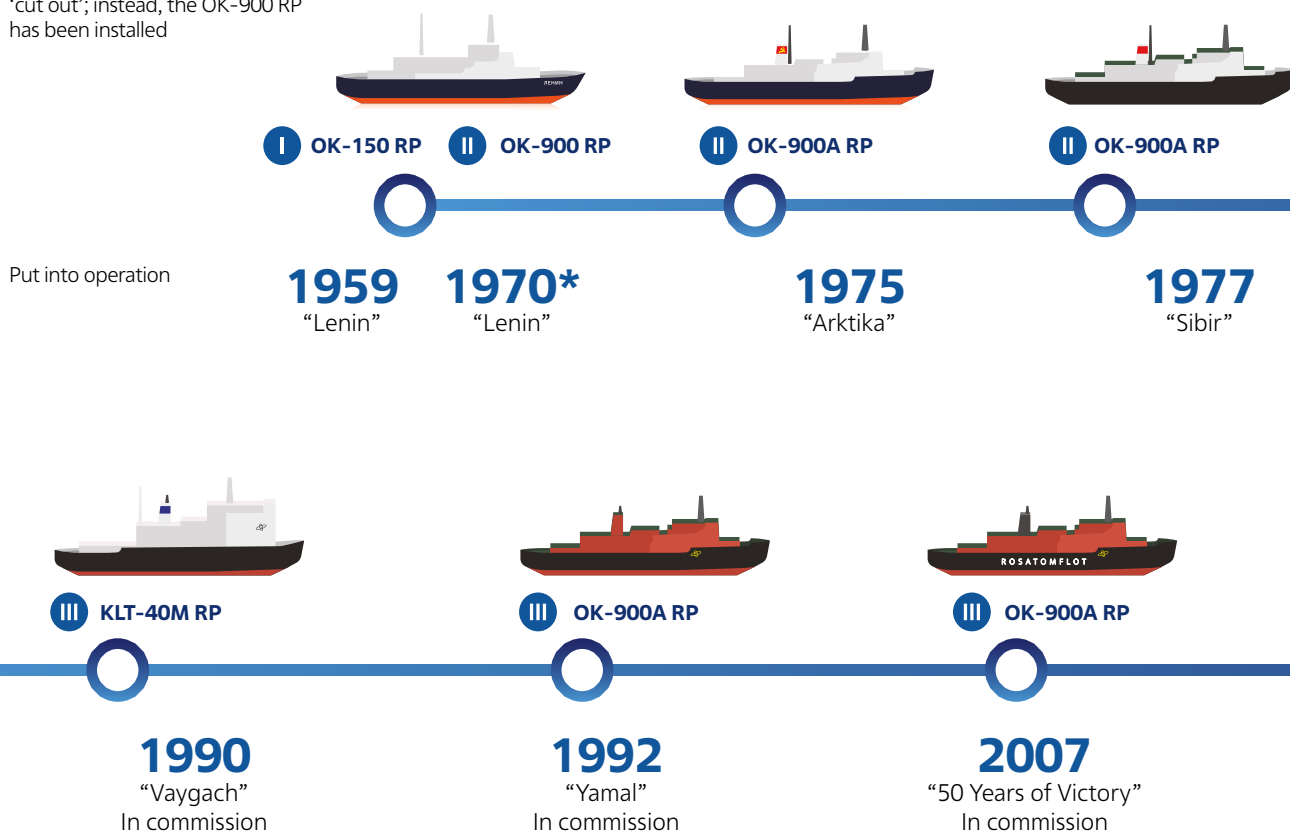
1

unit of FNPP

with an electric capacity of up to 100 MW can replace the combustion of 140 thousand tons of coal per year at TPPs

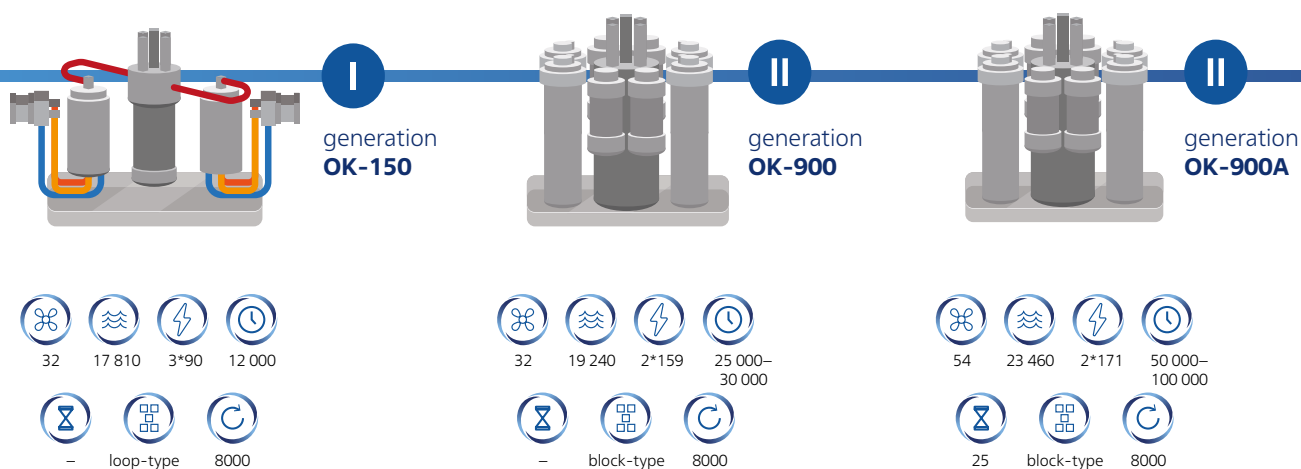
THE DEVELOPMENT OF NUCLEAR ICEBREAKERS IN RUSSIA

* The old RP (reactor plant) from the nuclear icebreaker "Lenin" was 'cut out'; instead, the OK-900 RP has been installed



GENERATIONS OF SHIP REACTOR UNITS

At the moment, 4 generations of reactor units for the civilian nuclear fleet have been developed.





II OK-900A RP

1985

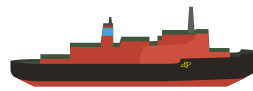
"Russia"
In commission



III KLT-40 RP

1988

"Sevmorput"
In commission



II OK-900A RP

1989

"Sovetskiy Soyuz"



III KLT-40M RP

1989

"Taymyr"
In commission



IV RITM-200 RP

2020

"Arktika"



IV RITM-200 RP

testing

"Sibir" and "Ural"



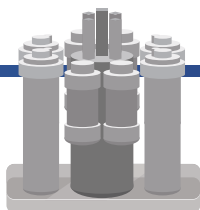
IV RITM-200 RP

designing

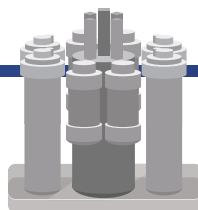
"Lider"

constructing

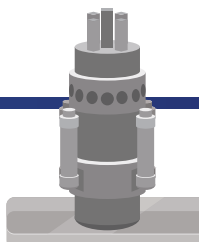
"Yakutiya" and "Chukotka"



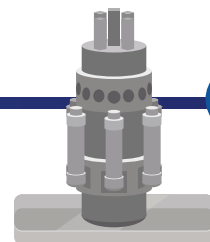
III
generation
KLT-40



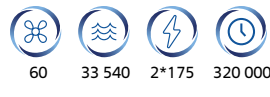
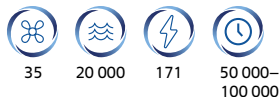
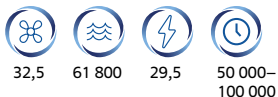
III
generation
KLT-40M



IV
generation
RITM-200



IV
generation
RITM-400





**THERMAL
POWER**

40%

of thermal power
plants in Russia
use our equipment

250 bln kWh

of electricity
is generated annually in Russia
with the use of our equipment

> 800

boiler units of various capacities
and parameters produced by
our enterprises

for

> 150

domestic and foreign power plants
with a total capacity of over 66 GW,
including more than 16 GW for export





in 20

countries around the world,
power plants equipped with
our boilers are operating

Services

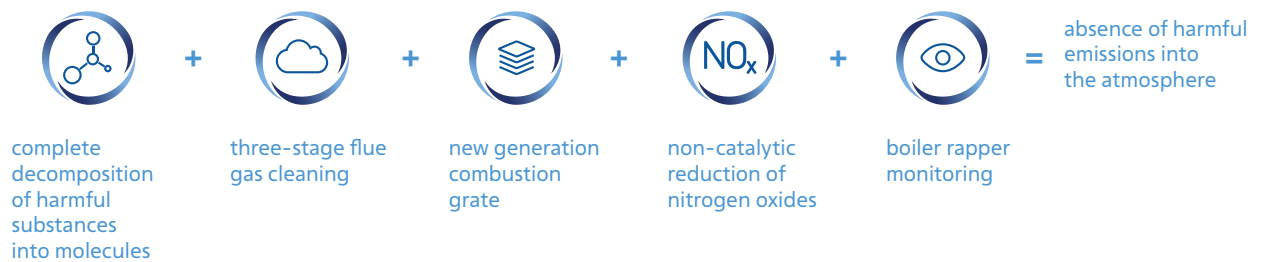
- engineering
- complete supply for TPPs
- complete supply for WIPs
- project management
- commissioning
- modernization

Nowadays Russia is moving towards zero waste disposal. This activity is implemented in two directions: the first is the processing of waste to obtain secondary raw materials for reuse; the second is the thermal processing of waste into energy. Currently Atomenergomash in cooperation with a technology partner is a key supplier for plants providing thermal processing.

FROM TONS OF WASTE THE PLANT WILL DERIVE:

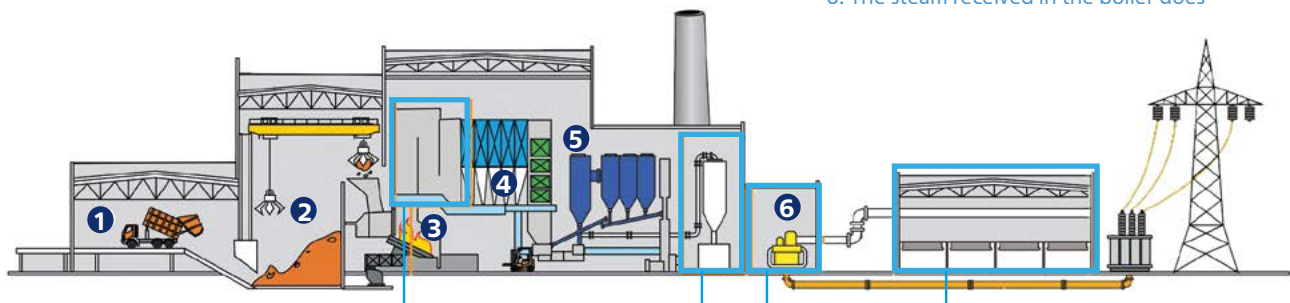


ADVANTAGES



Waste processing stages:

1. Reception and sorting of waste.
2. Waste fragmentation.
3. Burning at 1260 °C.
4. Purification, cooling and distribution of slag.
5. Gas purification facility.
6. The steam received in the boiler goes



One plant includes:

3 boilers weighing 2 450 tons and a steam output of 95.2 t / h each

3 condensate preheaters to increase boiler efficiency

3 condensate preheaters to increase boiler efficiency

1 air condensing unit with a thermal capacity of 135 MW



700 thd tons
The amount of waste processing by a plant per year



485 mln kWh
Electricity output by a plant per year



**OIL & GAS
INDUSTRY**

~ 700

**units of equipment per year
are produced by our enterprises
for the processing of oil,
gas and gas condensate, as well
as for refineries and LNG plants**

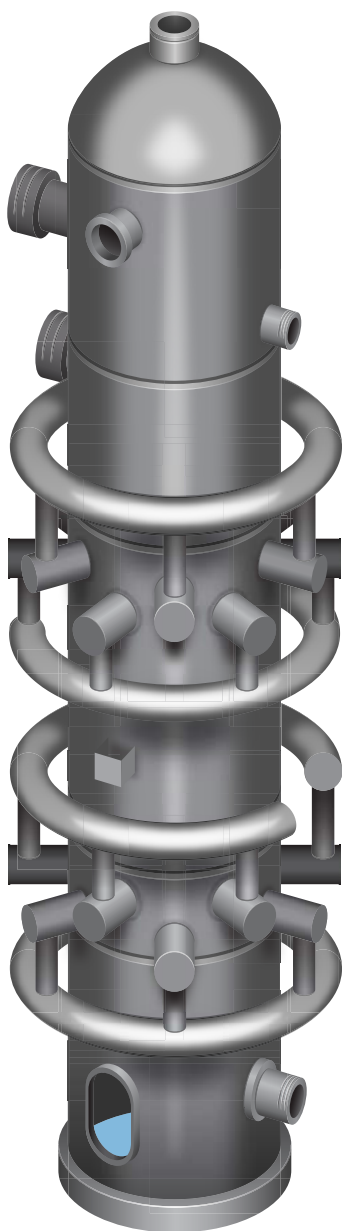


In 2021, Atomenergomash commissioned the Europe's first facility for testing medium and large-scale LNG equipment.

We developed the first Russian LNG pumps and heat exchange equipment. They are part of the fourth line in the Yamal LNG project.

Atomenergomash enterprises are manufacturers of the first domestic equipment for natural gas liquefaction.

ETHANE EVAPORATOR



The height of the evaporators is 15 meters, like a five-story building



Weight is from 61 to 86 tons for example, a southern right whale weighs the same

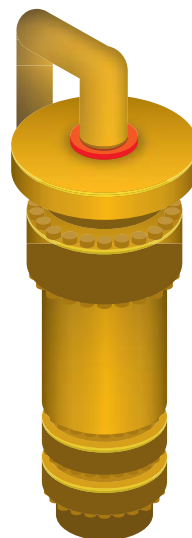
Up to 2.6 meters Diameter

From minus 155 °C
The equipment operates at ultra-low temperature conditions

3800 heat-exchange pipes with a total length of **over 70 km** were installed inside the equipment unit

- Afrikantov OKBM manufactures LNG pumps and liquid expanders
- ZiO-Podolsk manufactures ethane evaporators and flash evaporation tanks

LNG-PUMP



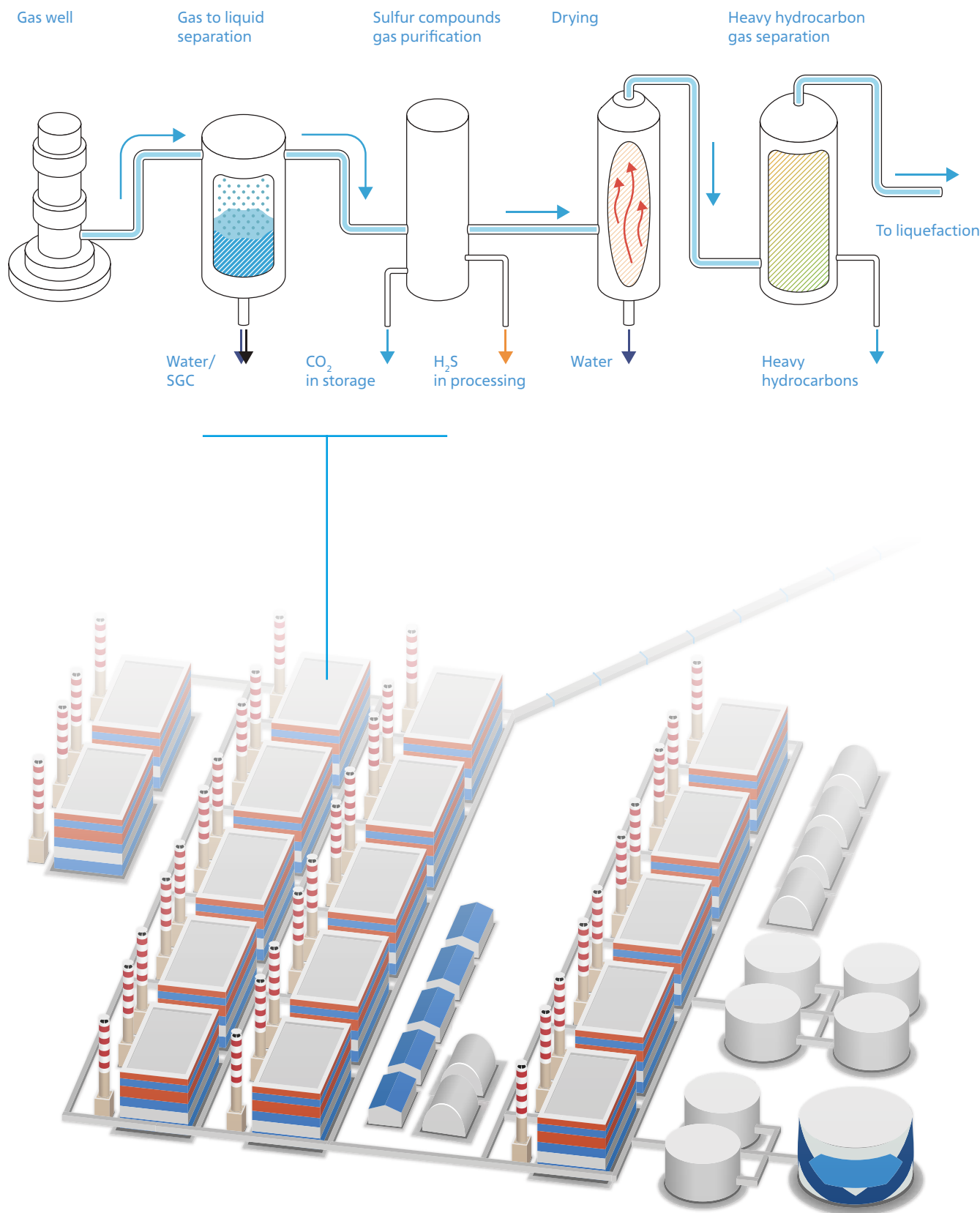
Up to 1mW Capacity



Lift is up to 500 meters
This is slightly less than the height of the Ostankino television tower

Up to 2000 m³ / h Pumping

NATURAL GAS LIQUEFACTION





SPECIAL STEELS



~ **37** thsd tons

of semi-finished products,
rolls and other products for
energy, metallurgy, shipbuilding,
aircraft building and other
industries is shipped annually
by our enterprises

> **400** tons

each giant ingot weighs,
which we cast for the
manufacture of reactor shells



**NEW MATERIALS
AND SERVICE OFFERS**

>70

**different laboratories work
at our enterprises.**

The laboratories have Russian and international accreditations, including the ILAC MRA mark of the international standard ISO / IEC 17025 of the ILAC organization (International Laboratory Accreditation Cooperation).



Atomenergomash engineers
developed the first domestic
3D-printers for metal products.

KEY MARKETS AND PROJECTS



Nuclear power

Kurchatov, Russia
KURSK NPP

Makarovka, Russia
KURSK NPP-2

Balakovo, Russia
BALAKOVO NPP

Sosnovy Bor, Russia
LENINGRAD NPP
LENINGRAD NPP-2

Novovoronezh, Russia
NOVOVORONEZH NPP
NOVOVORONEZH NPP-2

**Zarechny, Sverdlovsk
oblast, Russia**
BELOYARSK NPP

Volgodonsk, Russia
ROSTOV NPP

Polyarnye Zori, Russia
KOLA NPP

Desnogorsk, Russia
SMOLENSK NPP

Udomlya, Russia
KALININ NPP

Ostrovets, Belarus
Belarus NPP

Metsamor, Armenia
Armenian NPP

El Dabaa, Egypt
El-Dabaa NPP

Gulnar, Turkey
Akkuyu NPP

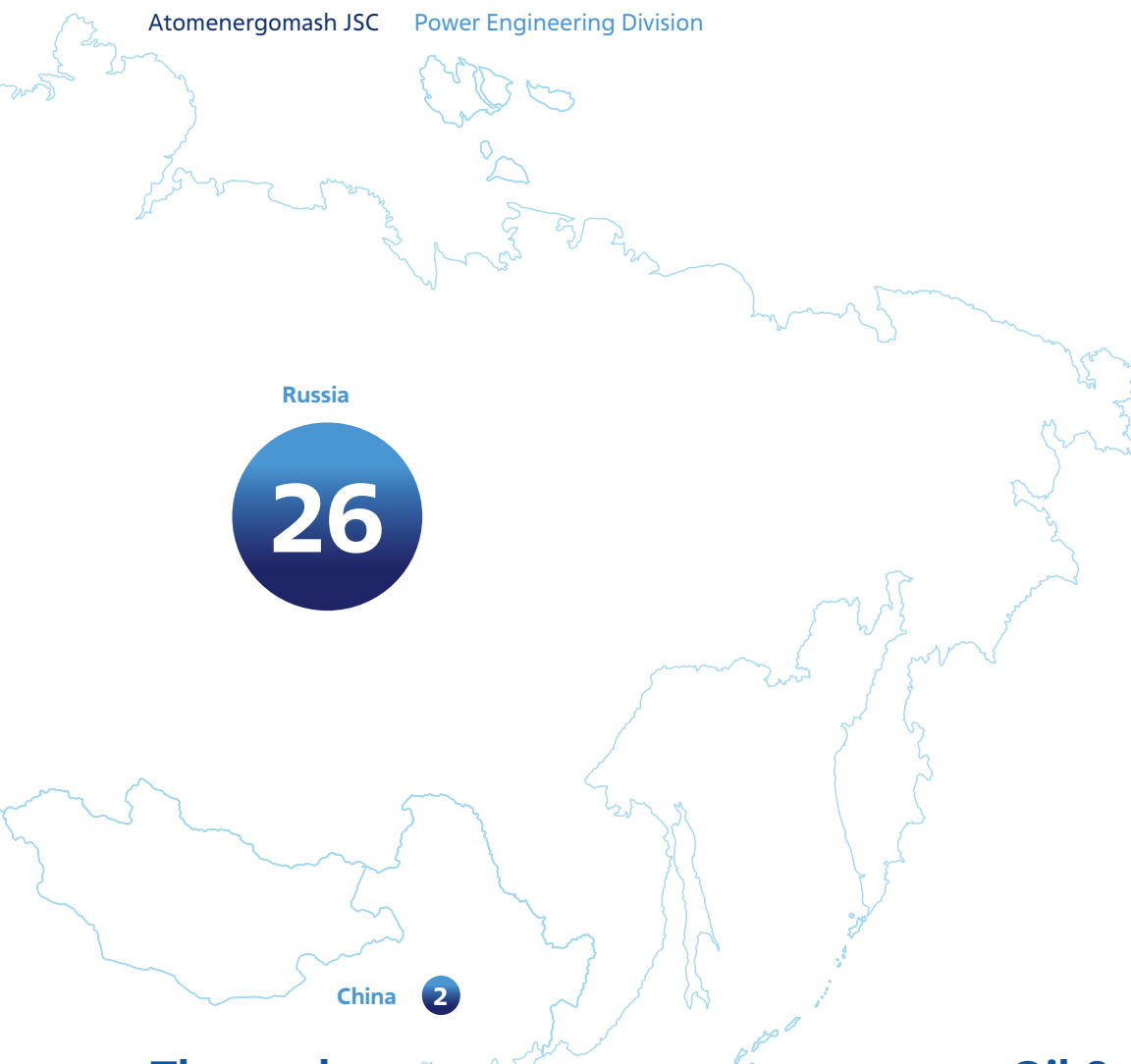
Paks, Hungary
Paks-2 NPP

Pabna, Bangladesh
Rooppur NPP

Kudankulam, India
Kudankulam NPP

Tianwan, China
Tianwan NPP

Liaoning province, China
Xudabu NPP



Thermal power

Nazarovo, Russia
Nazarovskaya GRES

Sharypovo, Russia
Berezovskaya GRES

Verkhniy Tagil, Russia
Verkhnetagilskaya GRES

Novomoskovsk, Russia
Novomoskovskaya GRES

Reftinsky, Russia
Reftinskaya GRES

Izluchinsk, Russia
Nizhneartovskaya GRES

Saint-Petersburg, Russia
Centralnaya TPP

Arkhangelsk, Russia
Arkhangelskaya TPP

Yaroslavl, Russia
Yaroslavskaya TPP

Kaliningrad, Russia
Pregolskaya TPP

Svetly, Russia
Primorskaya TPP

Aksu, Kazakhstan
Aksu TPP

Taraz, Kazakhstan
Zhambylskaya GRES

Topar, Kazakhstan
Toparskaya GRES

Oil & Gas

Omsk, Russia
Omsk Oil Refinery

Moscow, Russia
Moscow Oil Refinery

Kaliningrad, Russia
Varnitsa, OOO

Tobolsk, Russia
West Siberian Complex for
Deep Processing of Hydrocarbon
Raw Materials (HRM)

**Yamalo-Nenets
Autonomous Okrug, Russia**
Yamal LNG



**SPECIALIZATION
OF ENTERPRISES**

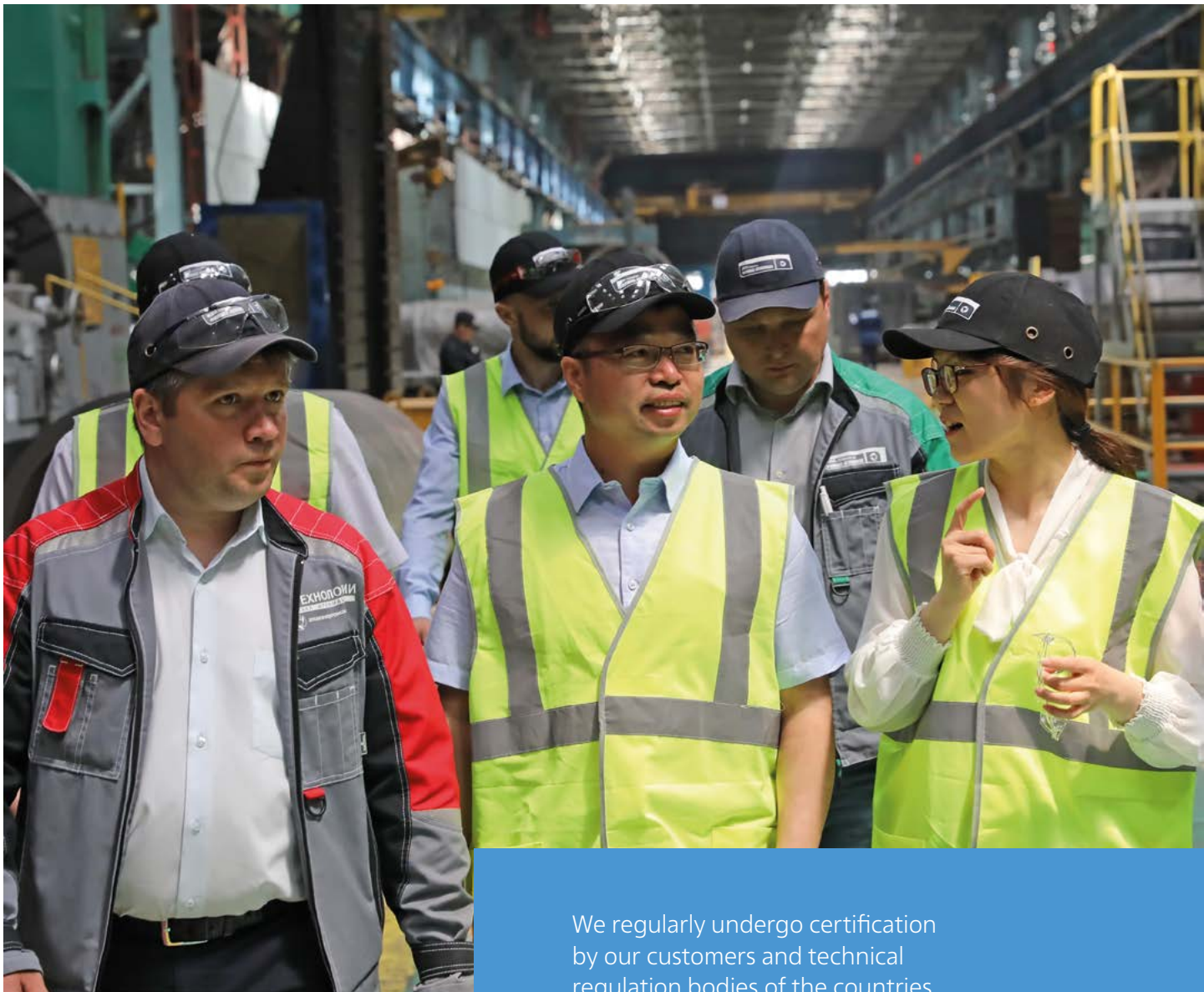
Division enterprises	AEM-TECHNOLOGY ROSATOM	ZIO-PODOLSK ROSATOM	CDBMB ROSATOM	OKB GIDROPRESS ROSATOM	AFRIKANTOV OKBM ROSATOM	ARAKO ROSATOM	SCERI ROSATOM	GANZ ROSATOM	AAEM ROSATOM	ATOMENERGOMASH AEM-PROPULSION ROSATOM	ATM ROSATOM	CHITMASH ROSATOM
Nuclear power	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Shipbuilding		✓			✓	✓				✓		
Transport, marine and shipboard power supply		✓		✓	✓							
Thermal power		✓				✓	✓	✓			✓	✓
Oil & gas industries	✓	✓			✓	✓		✓			✓	
Special steels	✓											✓
General machines		✓			✓							
Radioactive Waste / Spent Nuclear Fuel	✓		✓		✓		✓					
Small hydro generation								✓				
Research and industrial reactors	✓			✓	✓							



QUALITY

The certified quality management system of our enterprises meets the requirements of the ISO 9001 standard.

We are certified by top international accreditation bodies, including Lloyd's Register Quality Assurance, AFNOR Certification, DQS GmbH, TUV Thuringen, Bureau Veritas.



We regularly undergo certification by our customers and technical regulation bodies of the countries where our equipment is delivered.

Moscow, Russia**CNIITMASH**

+7 (495) 675 83 02
www.cniitmash.ru
cniitmash@cniitmash.ru

Atomtruboprovodmontazh

+7 (495) 540 10 86
www.atom-tm.ru
atom@dol.ru

Podolsk, Russia**OKB GIDROPRESS**

+7 (495) 502 79 10
www.gidropress.podolsk.ru
grpress@grpress.podolsk.ru

ZiO-Podolsk

+7 (495) 747 10 25
www.aozio.ru
kd@eatom.ru

Nizhny Novgorod, Russia**Afrikantov OKBM**

+7 (831) 241 87 72
www.okbm.nnov.ru
okbm@okbm.nnov.ru

Saint-Petersburg, Russia**AEM-technology**

+7 (812) 457 05 88
www.aemtech.ru
info@aemt.su

**The branch of AEM-technology
IZHORA**

+7 (812) 322 80 00
www.aemtech.ru
info@aemtech-iz.ru

**The branch of AEM-technology
AEM-SPECIAL STEELS**

+7 (812) 322 84 38
www.aemtech.ru
info@aemtech-st.ru

CDBMB

+7 (812) 676 63 63
www.ckbm.ru
postbox@ckbm.ru

Turbine Technology AAEM

+7 (812) 635 81 19
www.aaemturbines.com
info@alstom-aem.com

**The branch of Atomenergomash
AEM-PROPULSION**

www.aem-group.ru

Yekaterinburg, Russia**SverdNIikhimmash**

+7 (343) 263 90 91
www.sverd.ru
niihm@ural.ru

Petrozavodsk, Russia**The branch of AEM-technology
Petrozavodskmash**

+7 (814) 271 69 20
www.pzm.su
info@pzm.su

Volgodonsk, Russia**The branch of AEM-technology
ATOMMASH**

+7 (863) 929 20 79
www.atommash.ru
office@atommash.ru

Budapest, Hungary**Ganz EEM LLC**

+36 1 872 58 00
www.ganz-eem.com
info@ganz-eem.com

Opava, Czech Republic**ARAKO spol. s. r. o.**

+420 (553) 694 111
www.arako.cz
arako@arako.cz

Atomenergomash JSC

**115184, Moscow,
Ozerkovskaya nab. 28, bldg. 3
+7 (495) 668 20 93**

www.aem-group.ru
aem@aem-group.ru
www.facebook.com/aemgroup

NOTES

