



ROSATOM

THE STATE ATOMIC ENERGY CORPORATION ROSATOM

ROSATOM: NUCLEAR AND BEYOND

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Rusatom Overseas
ROSATOM Group**

2019

Nuclear technology has passed a long way from pure science to multifunctional solution



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2020: 75 YEAR ANNIVERSARY OF RUSSIAN NUCLEAR INDUSTRY



1946:

THE FIRST NUCLEAR REACTOR

was constructed
and triggered
nuclear research
in various fields

Nuclear as
SCIENCE FIELD



**THE FIRST
NUCLEAR REACTOR**

F-1

© National Research Center «Kurchatov Institute»
<http://eng.nrcki.ru/pages/eng/history/index.shtml>

1954:
THE FIRST
NPP in the world
was commissioned
and connected
to the grid
in Russia

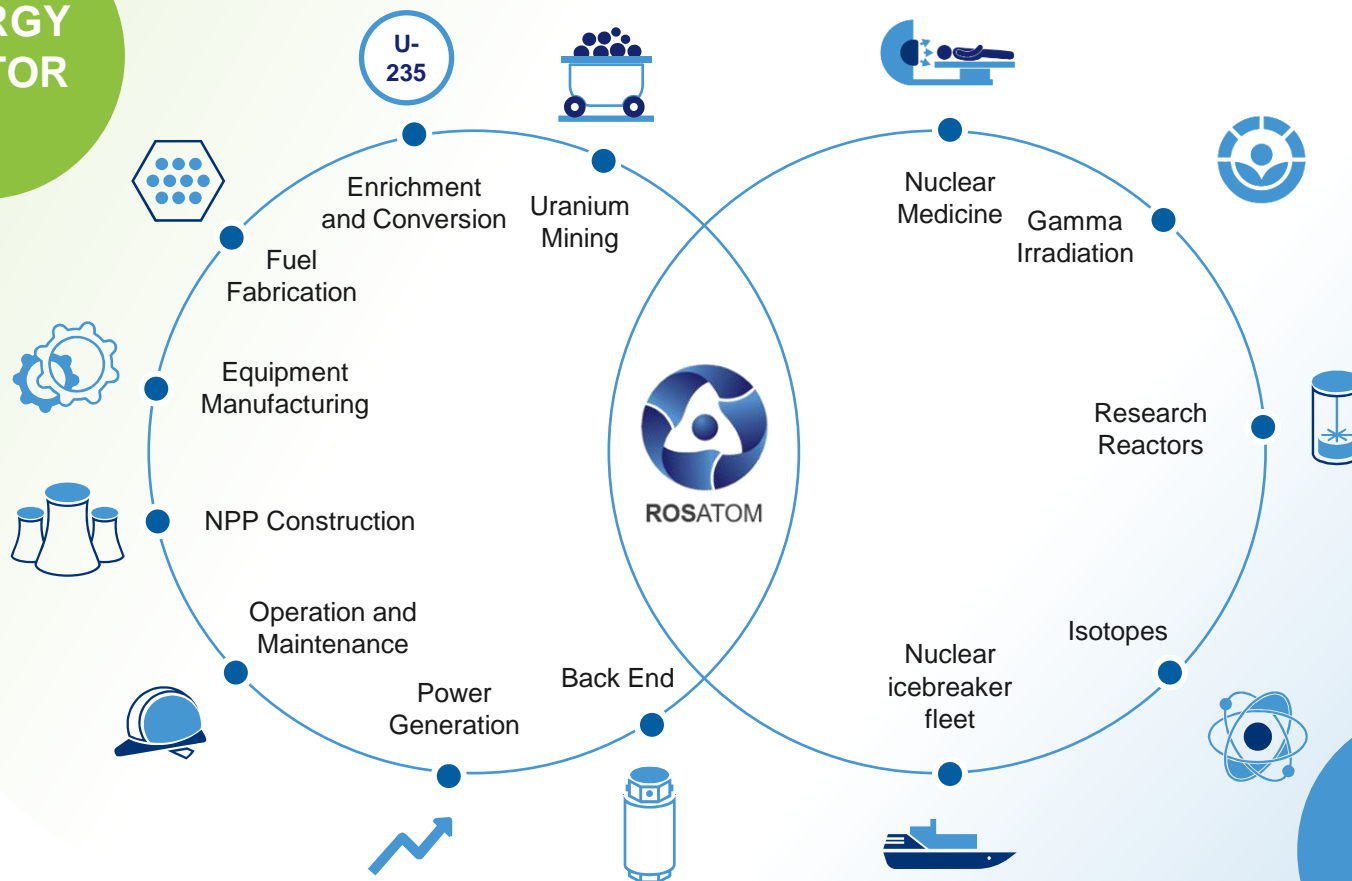


Rosatom is the world's only company of a complete nuclear power cycle



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ENERGY
SECTOR



NON-
ENERGY
SECTOR

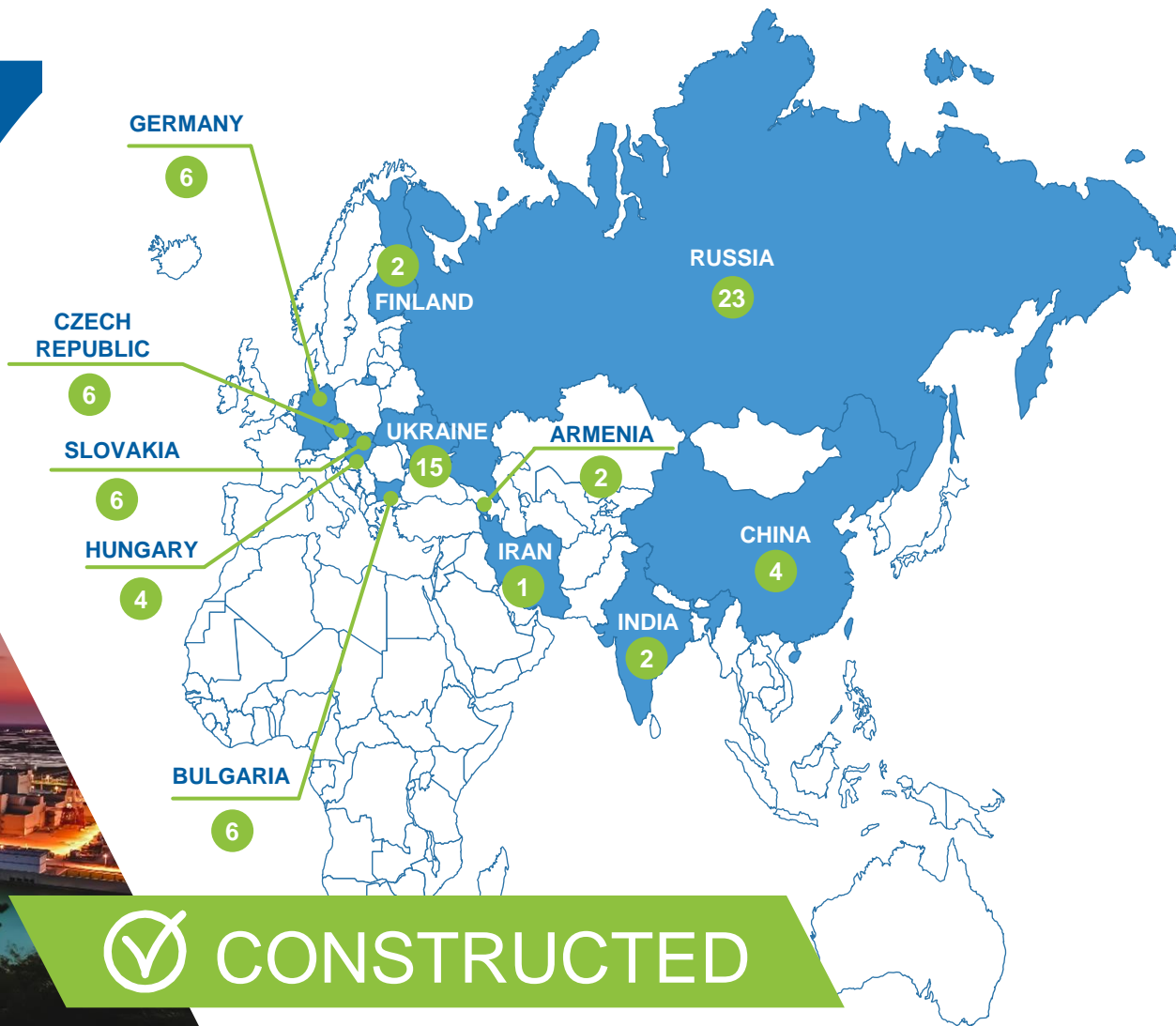
Rosatom global: VVER success story



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77


VVER UNITS






36 VVER UNITS




 Belarus, Ostrovets NPP
VVER-1200

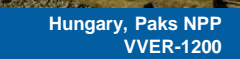


 Turkey, Akkuyu NPP
VVER-1200

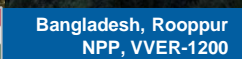


 China, Tianwan NPP
VVER-1200

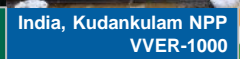


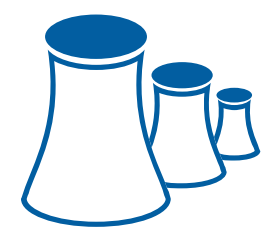
 Hungary, Paks NPP
VVER-1200



 Bangladesh, Rooppur NPP, VVER-1200



 India, Kudankulam NPP
VVER-1000



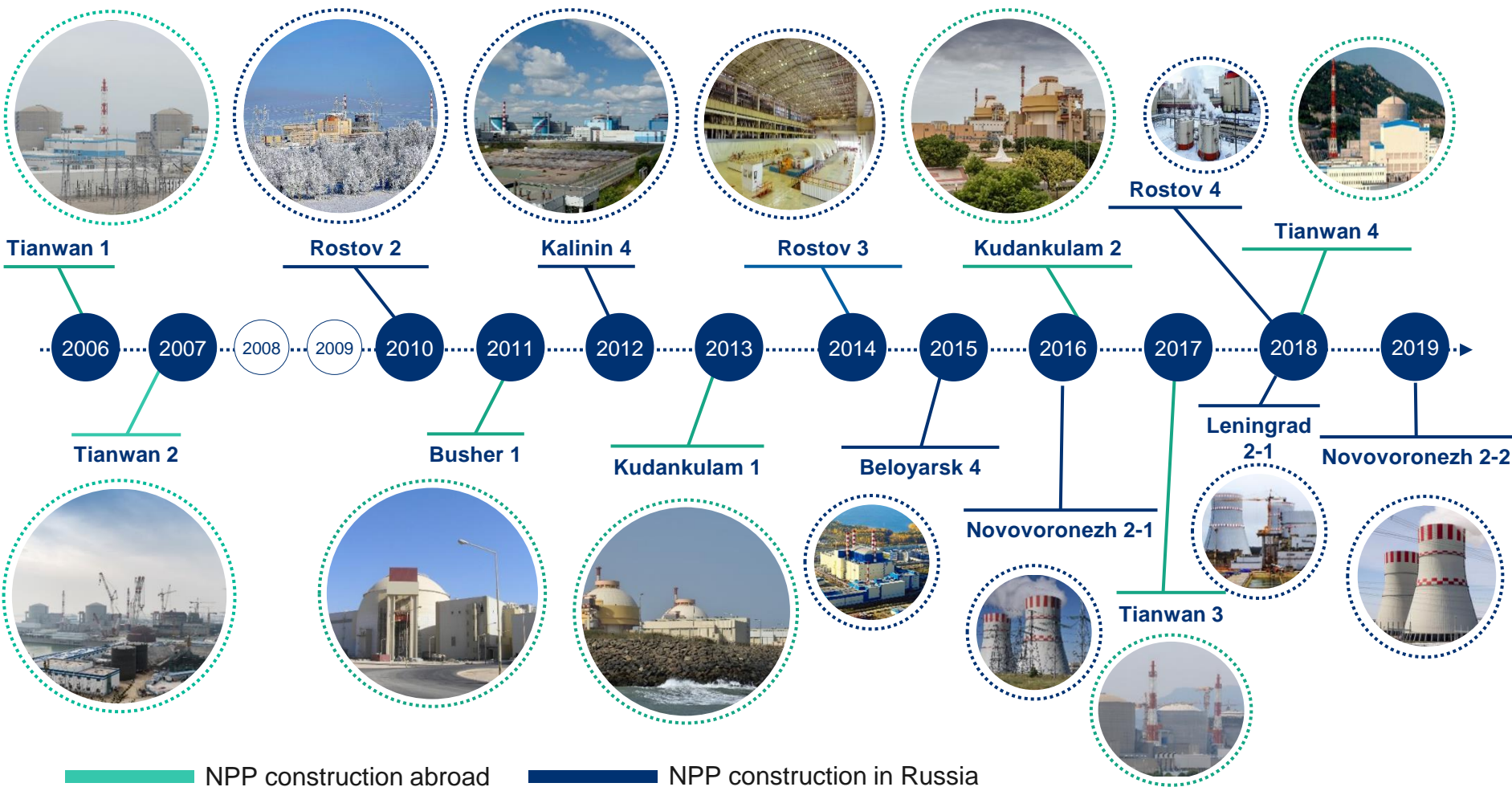
IN IMPLEMENTATION PORTFOLIO OVERSEAS

Rosatom is the only company implementing serial NPP construction at home and abroad



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15 NPPs IN 14 YEARS CONNECTED TO THE GRID



NPP construction abroad

NPP construction in Russia

Out of 5 NPP first concrete's globally, 3 were implemented by Rosatom



Rosatom: 2018-2019 connection to the grid



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Leningrad 2-1 NPP



Tianwan-4 NPP



Rostov-4 NPP



Novovoronezh 2-2 NPP

GENERATION III+ synergy of technological heritage and innovations



**FIRST CLASS PWR TECHNOLOGY,
COMPLIANT WITH ALL POST-FUKUSHIMA
SAFETY REQUIREMENTS**



GENERATION III+

TECHNICAL PARAMETERS

Nominal output*	1 200 MWe
Life cycle	60+
Safety systems	active + passive
Turbine	low speed/ high speed

2017: NOVOVORONEZH II UNIT 1
THE FIRST COMMISSIONED
GENERATION III+ NPP IN THE WORLD

2018: LENINGRAD NPP II UNIT 1
WAS LAUNCHED

**IN IMPLEMENTATION
OVERSEAS:** BELORUSSIA, TURKEY, EGYPT,
FINLAND, HUNGARY, CHINA,
BANGLADESH

World's first floating nuclear power plant FNPP Akademik Lomonosov



AKADEMIK LOMONOSOV FNPP

COMMISSIONING DATE:
2019



FIRST-OF-A-KIND FLOATING NUCLEAR POWER PLANT



Onshore NPP based on RITM Series SMR



2 × 57 MW(e) – 114 MW(e)

2 RITM-200 Reactors ✓ Modularity available

TECHNICAL PARAMETERS

Electrical capacity 114 MW (2 x 57 MW)

Thermal capacity 330 MW (2 x 165 MW)

Refueling cycle up to 6 years

Design life 60 years

Availability factor 90%

Plant area 15 acres (0.06 km²)

Construction period 3 - 4 years



ELECTRICITY



HEAT



DESALINATION

H₂

HYDROGEN

FLEXIBLE, TAILOR-MADE SMALL NPP SOLUTION BASED ON RITM SMR IS DESIGNED TO ADDRESS A WIDE RANGE OF CUSTOMER DEMANDS



FNPP: optimized mobile solution for coastal areas power supply



POCATOM



2×RITM-200M

OPTIMIZATION RESULTS COMPARED WITH
FNPP AKADEMIK LOMONOSOV

by **28 m** – length reduction

by **5 m** – beam reduction

by **9 000 t** – displacement reduction

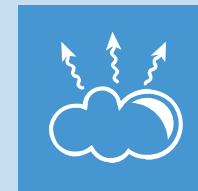
30% – capacity increase

TECHNICAL PARAMETERS

Electric capacity	100 MW
Refueling cycle	up to 10 years
Design life	60 years
Displacement	12 000 tons
Length	112 m
Beam	25 m
Draught	4.5 m



Electricity



Heat



Desalination



Every **6th** power reactor
in the world runs on
ROSATOM nuclear fuel

**ROSATOM provides
nuclear fuel for**

78 power
reactor units

Research
reactors in

in **15** countries

9 countries

NEW STEPS: Rosatom will be ready to test **ACCIDENT TOLERANT** fuel on commercial reactors by **2021**



Endure the loss of active cooling in a reactor core for much longer than the current fuel



Improve nuclear plant performance with fuel that lasts longer



Widen the existing safety margin for nuclear plants



Reduce operational and maintenance costs

ROSATOM PROVEN SUCCESS:

- The fast neutron reactor **BN-600** has been in successful operation since **1980**
- The fast neutron reactor **BN-800** was commissioned in **2015**
- Next Step:
BN-1200 NPP

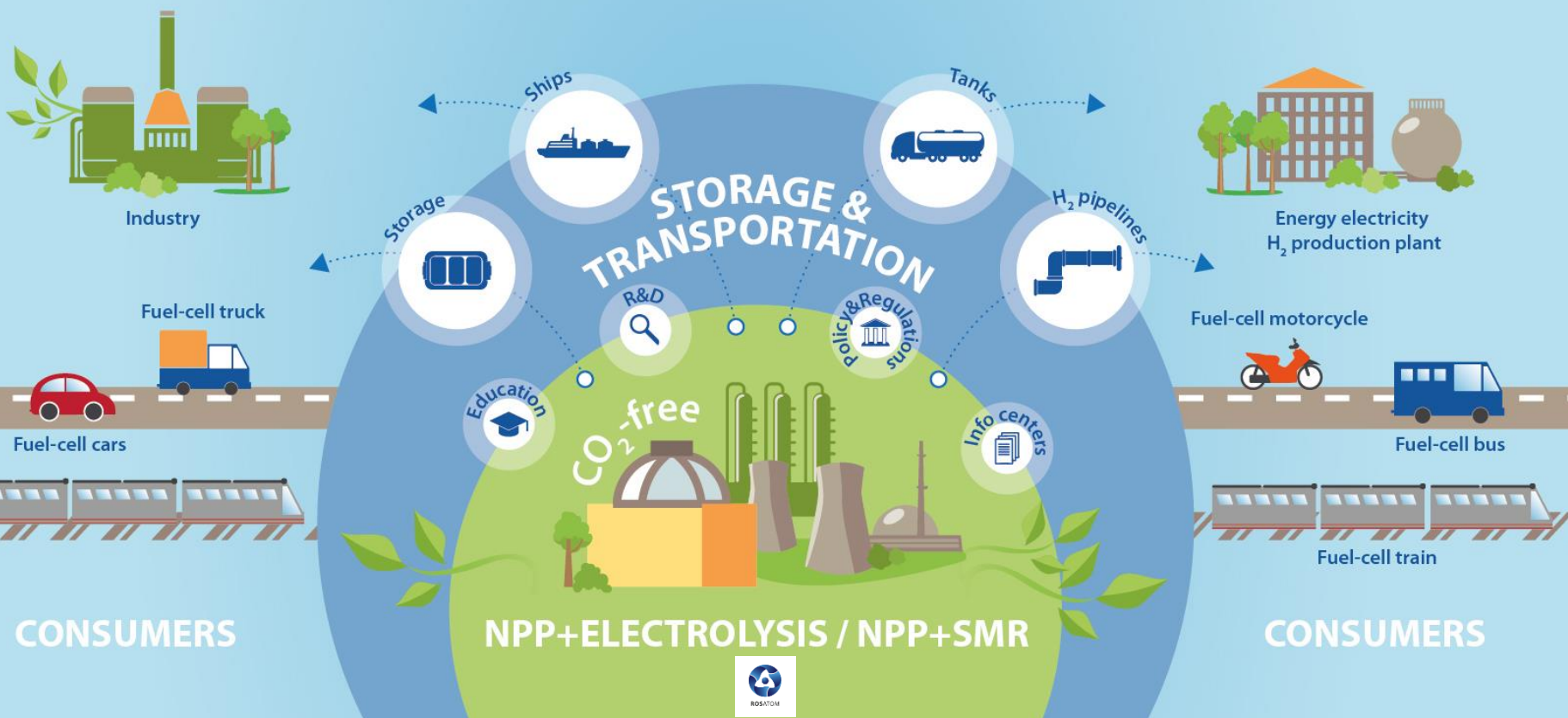


Beloyarsk-4 NPP

Rosatom's approach to hydrogen production




Hydrogen is universal, environmentally friendly and efficient energy carrier and storage, with a potential to become **THE KEY TO THE BALANCED ENERGY SYSTEM**








COOPERATION WITH GLOBAL AND REGIONAL PARTNERS



- The leader on NPP construction market
- Has strong competencies in the development of electrolysis technologies, hydrogen storage and fuel cell storage
- Has long-term and trust-based partnerships with leading players on international energy market

-  Global and regional coverage
-  Strong competence in H₂ supply chain
-  Strong commitment to clean H₂ production and environmental goals

PARTNERS

Solutions for advanced technological development



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CNST FACILITY BUILT
IN PARTNER COUNTRY



RESEARCH
REACTOR & LAB
COMPLEX



CENTER FOR
NUCLEAR
MEDICINE



MULTIPURPOSE
IRRADIATION
CENTER

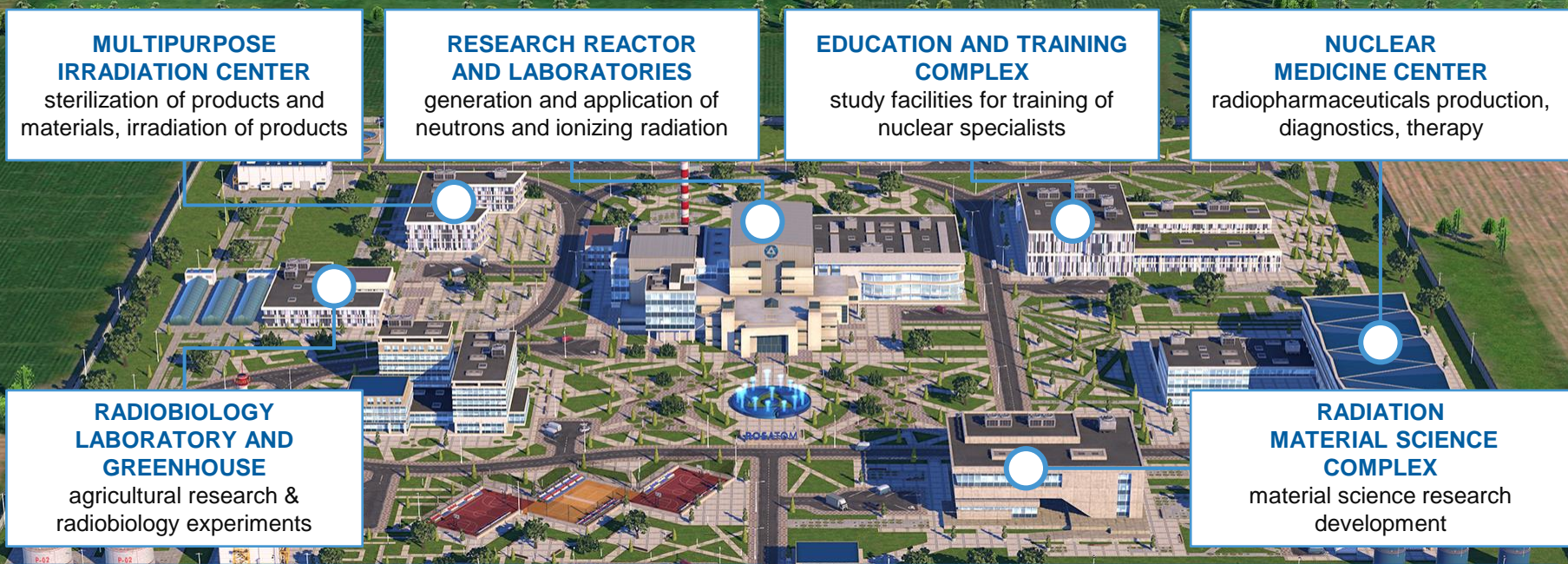
Research Center MBIR

International cooperation
in **ADVANCED** research in international
USER CENTERS in Russia

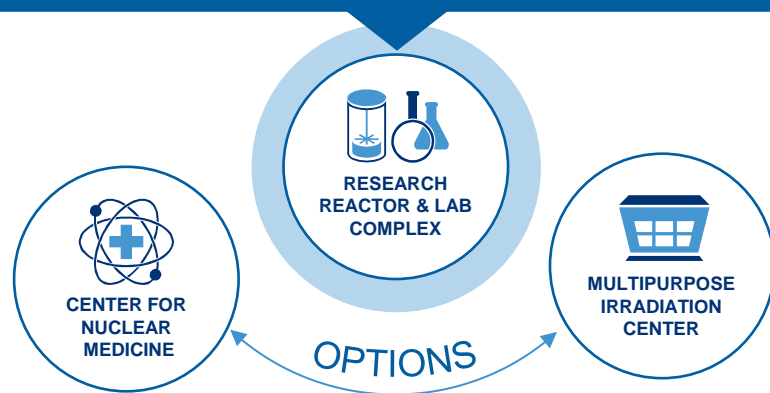
Research Center PIK

INTERNATIONAL
PARTICIPATION




Center for Nuclear Science and Technology: in-country solution for developing non-energy nuclear technology



CNST IS COMPOSED OF



WITH CNST COUNTRY BECOMES

-  A regional scientific and educational hub
-  A national center of isotope production
-  A center for nuclear medicine for domestic and regional operation

Regional and global CNSTs and international user centers



Regional and global CNSTs unite the scientific teams of all countries, ensuring joint research and development



Balanced distribution of scientific tasks within the region and cost optimization due to the joint research and production base



Governments, commercial institutions, science and academia work together efficiently within CNST



Assess to international unique research facilities

Nuclear to contribute to all key pillars of the sustainable development



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SUSTAINABLE DEVELOPMENT 3 KEY PILLARS:



ECONOMIC GROWTH

Incorporating nuclear energy and research results in **NATIONAL ECONOMY BOOST** and **GDP GROWTH**



SOCIAL INCLUSION

Nuclear projects boost innovation development and **PROMOTES EDUCATION AND R&D ACTIVITIES**



ENVIRONMENTAL PROTECTION

Nuclear energy and non-energy applications contribute to climate change mitigation and ecosystem protection

NUCLEAR TECHNOLOGY IS AN EFFICIENT SOLUTION FOR COUNTRIES TO BOOST ALL THE SECTORS

NUCLEAR IS A DOORWAY TO ACHIEVE SUSTAINABLE DEVELOPMENT GOALS SET BY THE UNITED NATIONS



New comprehensive ecosystem



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