



ROSATOM

Rosatom Latin America

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LAS/ANS Symposium

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ROSATOM AT A GLANCE



140.0 Bn USD
10-YEAR PORTFOLIO OF OVERSEAS ORDERS*

17.8 Bn USD
REVENUE*

RUSSIAN DESIGNED NPPs AVOIDED
213 M tonnes of CO₂eq

35 UNITS
OVERSEAS NPP PORTFOLIO

R&D INVESTMENT
4.5% of revenue

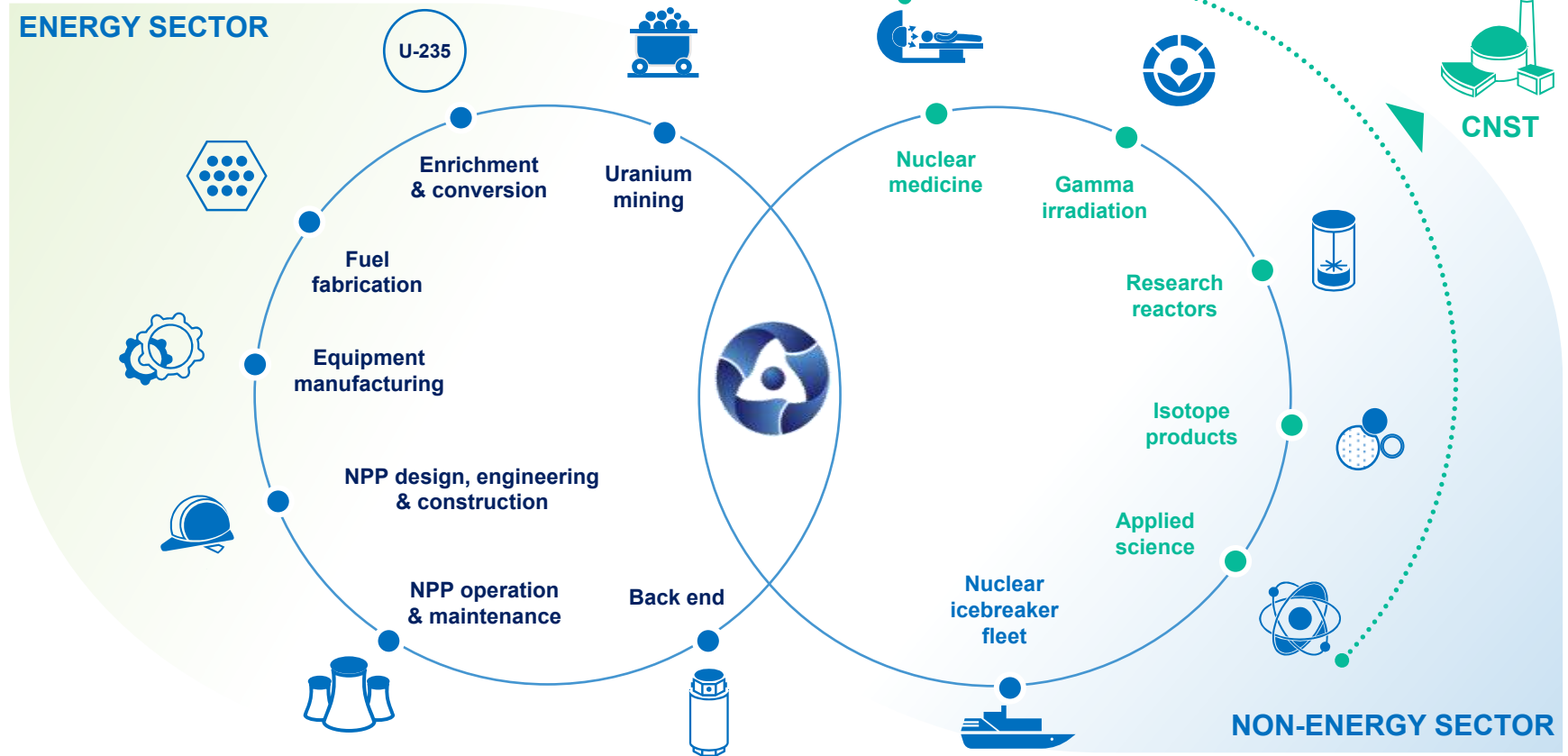
0 INES
LEVEL-2 INCIDENTS

>250 000
EMPLOYEES

GLOBAL FOOTPRINT -
> 50 countries



ROSATOM: ALL THAT IS NUCLEAR



NUCLEAR TECHNOLOGIES CONTRIBUTE TO UN SUSTAINABLE DEVELOPMENT GOALS



Contribution to the UN Sustainable development goals is a key principle for Rosatom activities.
In 2020 Rosatom became a member of the UN Global Compact network



Nuclear power plants – clean and affordable energy, combat climate change, industry and economic growth



Nuclear Medicine & Isotope products – good health and well-being



Desalination and water treatment – clean water & sanitation



Multipurpose irradiation centers – zero hunger and good health and well-being



Centers for Nuclear Science & Technologies – innovation, infrastructure and industry development, good health and well-being and education



Source: Climate change and nuclear power 2018 IAEA

CONTRIBUTION TO CLIMATE SAVING

33,3

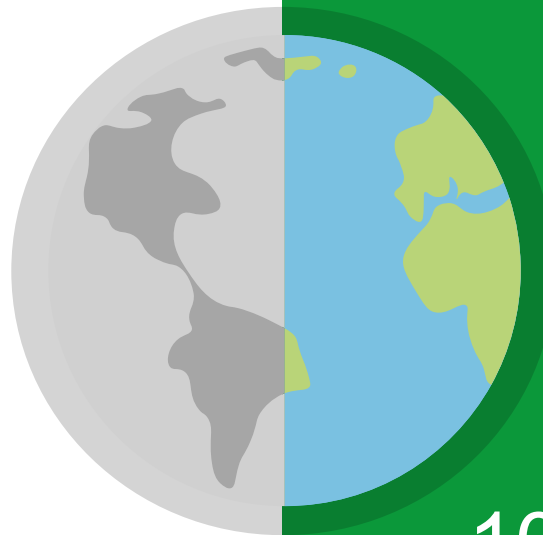
M hectares of forest

WILL ABSORB THE SAME
AMOUNT OF CO₂ IN A YEAR

11% OF FOREST AREA
IN THE USA

&

3 TIMES MORE THAN TOTAL
FOREST AREA IN GERMANY



ALL RUSSIAN-DESIGNED NPPs
SAVE:

213

M TONNES

CO₂eq on average per year

108 M TONNES CO₂eq DOMESTIC

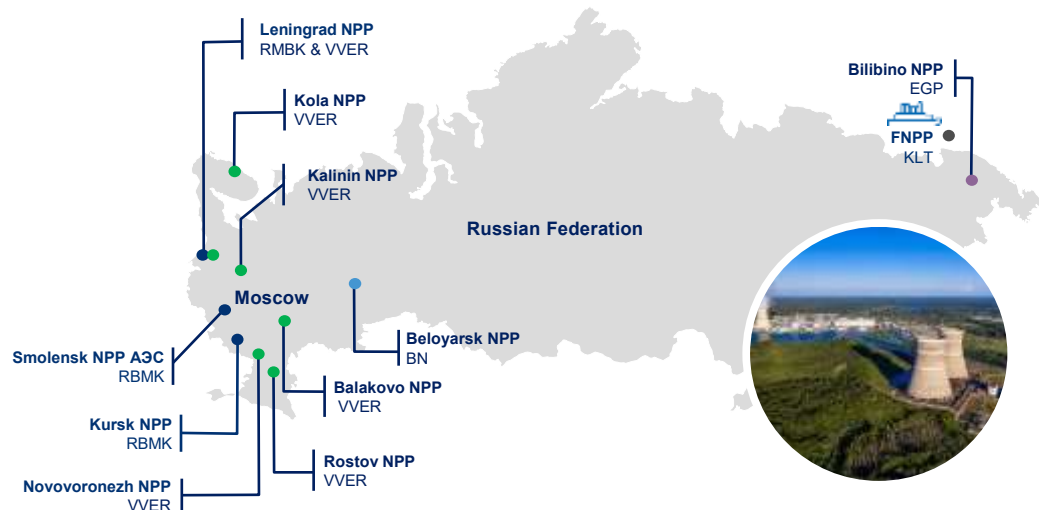
+

105 M TONNES CO₂eq ABROAD

SECOND NUCLEAR UTILITY GLOBALLY

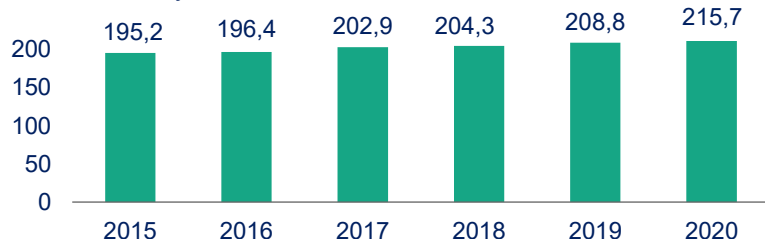


37 UNITS	in operation at 11 NPPs
29,4 GWe	total installed capacity (as of January 01, 2021)
20,3 %	nuclear in Russian power generation mix in 2020



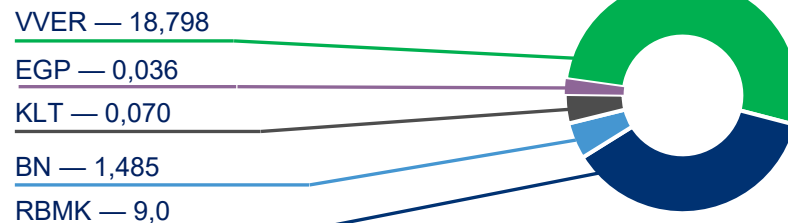
NPP power generation in Russia

Generation dynamics, TW-h



Technologies in operations portfolio

Installed capacity, GWe



IMPRESSIVE PORTFOLIO OF SUCCESSFUL PROJECTS



106

RUSSIAN-DESIGNED NPP UNITS HAVE BEEN BUILT GLOBALLY



80

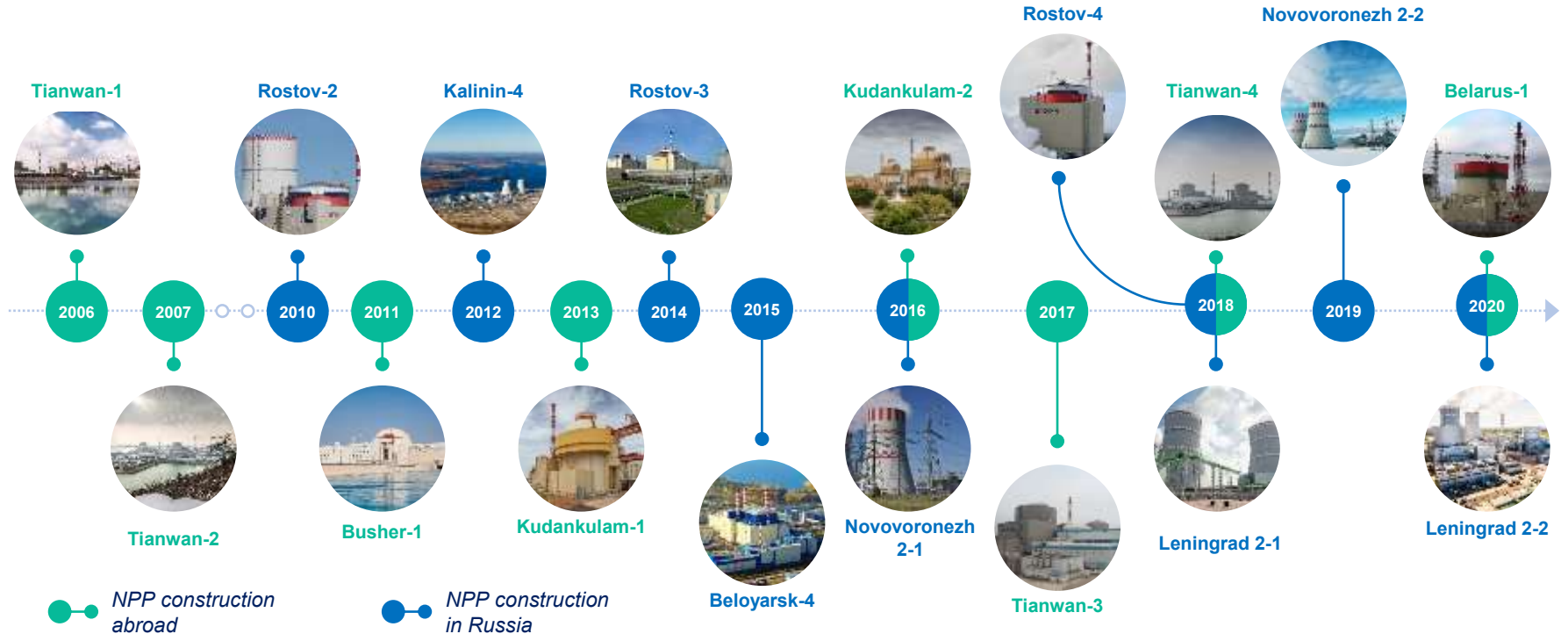
OF WHICH VVER NPP UNITS



THE ONLY COMPANY IMPLEMENTING SERIAL NPP CONSTRUCTION GLOBALLY



➤ **17 NPP UNITS IN 15 YEARS CONNECTED TO THE GRID**



ROSATOM: KEEPING THE PACE



ROSATOM SUCCESS STORY:

Belarus, Belarus NPP,
VVER-1200



Bangladesh, Rooppur
NPP, VVER-1200



Turkey, Akkuyu NPP,
VVER-1200



India, Kudankulam NPP,
VVER-1000



Hungary, Paks II NPP,
VVER-1200



Finland, Hanhikivi-1 NPP,
VVER-1200



Egypt, El-Dabaa NPP,
VVER-1200



China, Tianwan NPP,
VVER-1200



35 UNITS

OVERSEAS NPP
PORTFOLIO

12

COUNTRIES

ADVANCED GENERATION III+ NUCLEAR TECHNOLOGY



VVER-1200* – FUSION OF TECHNOLOGICAL HERITAGE AND INNOVATION



ADVANCED PWR TECHNOLOGY

meets all the IAEA safety standards and requirements

**in commercial operation since Feb, 2017*

1 st	gen III+ reactor in operation
1200 MWe	nominal output
60+ years	lifecycle
> 90%	availability factor
1500	reactor years of safe operation
Active & Passive	combination of safety systems

MODERN SMR SOLUTIONS



Floating NPP

Electrical capacity	100 MW
Refueling cycle	up to 10 years
Design life	60 years
Displacement	16 680 tons
Length	112 m
Beam	30 m
Draught	5 m



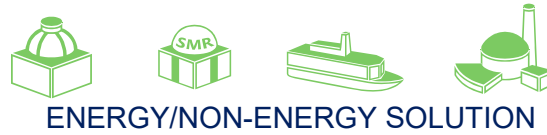
Land-based solution



Electric capacity	>110 MW
Refueling cycle	up to 6 years
Design life	60 years
Plant area	0,06 km ²
Construction period	3-4 years



INTEGRATED OFFER



NUCLEAR INFRASTRUCTURE
DEVELOPMENT



PUBLIC
ACCEPTANCE

BACK END



HUMAN RESOURCES
DEVELOPMENT

OPERATION AND
MAINTENANCE



INDUSTRIAL SOLUTION
LOCAL INDUSTRY
INVOLVEMENT

FUEL SUPPLY



NEW PRODUCTS



NEW PRODUCTS ARE BEING LAUNCHED IN THOSE SEGMENTS WHERE ROSATOM'S ORGANIZATIONS HAVE THE MOST INNOVATIVE AND INDUSTRIAL POTENTIAL



Composite Materials



Additive Technologies



Wind Power



Nuclear Medicine



Power Storage Units



Digital Solutions



Waste Management



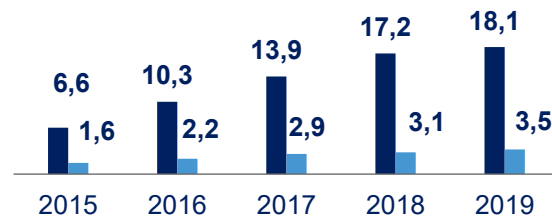
International Logistics



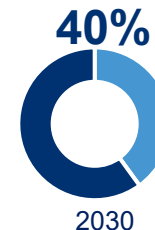
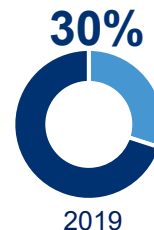
Urban Environment Solutions

10-Year portfolio of orders and revenue for new products

■ Portfolio of orders, Bn USD ■ Revenue, Bn USD



Share of new businesses, % from revenue

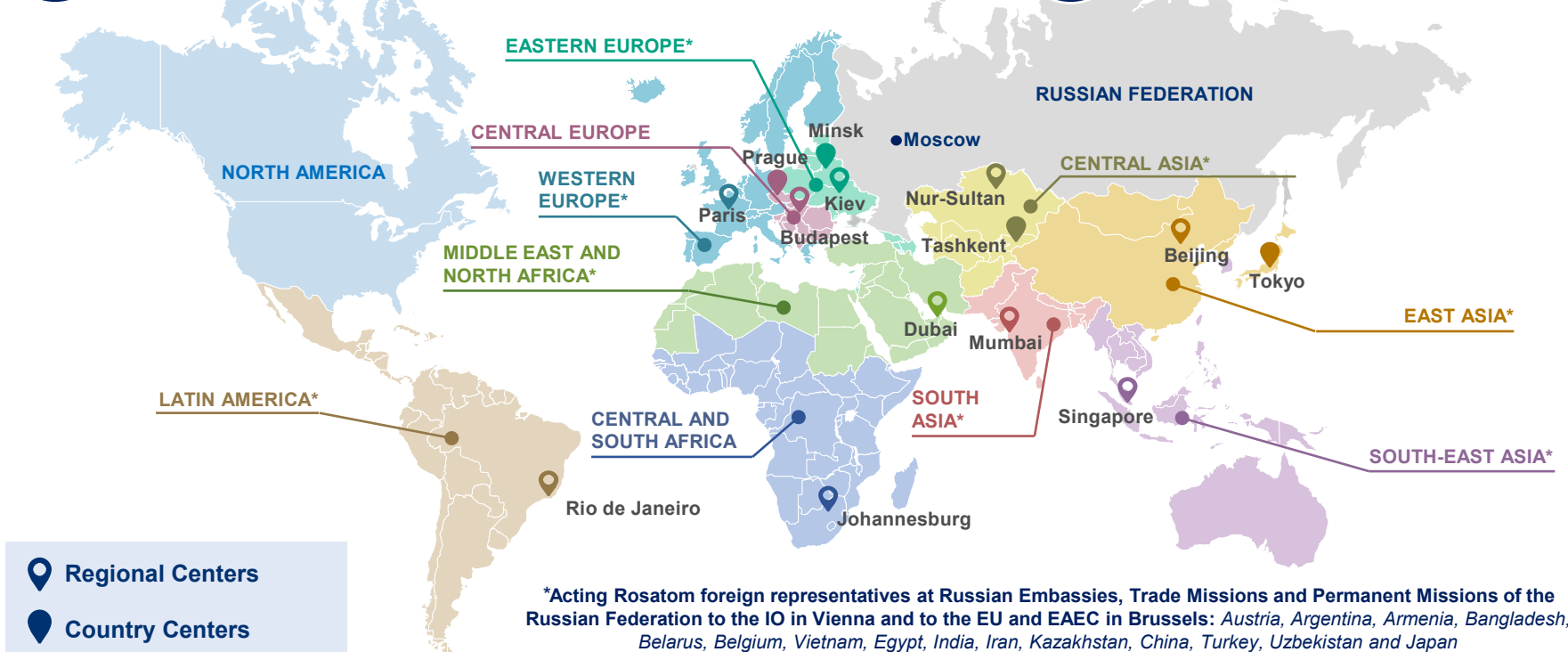


ROSATOM – BEING LOCAL GLOBALLY



14 REGIONAL & COUNTRY CENTERS

17 FOREIGN REPRESENTATIVES



LATIN AMERICA: ROSATOM PRESENCE AND EXPERTISE



ECUADOR

- Framework MoU (2009)

PERU

- Framework IGA (2006)

BOLIVIA

- Construction of CNST
- Framework IGA (2016)
- MoU on personnel education and training (2016)
- MoU on public acceptance (2016)
- MoU on cooperation in lithium projects (2019)

CHILE

- Framework IGA (2005)
- MoU on personnel education and training (2018)
- MoU on cooperation in lithium sphere (2019)

ARGENTINA

- Framework IGA (2014)
- MoU on NPP (2015)
- MoU NFC (2015)
- MoU Uranium mining (2018)

MEXICO

- Uranium products supply
- Isotope supplies
- Framework IGA (2013)

CUBA

- Isotope supplies
- Framework IGA (2016)
- MoU on irradiation technologies (2018)
- MoU on personnel education and training (2019)

DOMINICAN REPUBLIC

- Framework MoU (2019)

VENEZUELA

- Framework IGA (2008)

BRAZIL

- Isotope supplies
- Uranium products supply

PARAGUAY

- Framework IGA (2017)



NPP



SMR



CNST



ISOTOPES



RESEARCH REACTOR



NUCLEAR FUEL CYCLE

NEW PARTNERS IN LATIN AMERICA



- **DOMINICAN REPUBLIC**

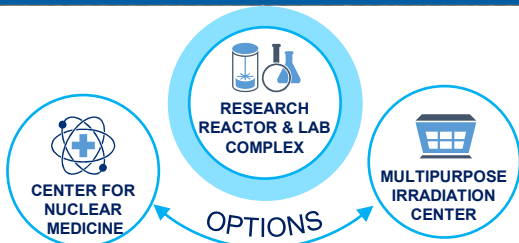
September 17, 2017 – Rosatom and the Ministry of Energy and Mines of the Dominican Republic signed in Vienna, on the sidelines of the 63rd Session of the IAEA General Conference, a Memorandum of Understanding on cooperation in the field of peaceful uses of nuclear energy.

- **COSTA-RICA**

On June 3, 2021, Rosatom and y Atomic Energy Commission of Costa Rica signed están en el proceso de aprobación del Memorandum of Understanding on cooperation in the field of peaceful uses of nuclear energy.



CENTER FOR NUCLEAR SCIENCE AND TECHNOLOGY (CNST)

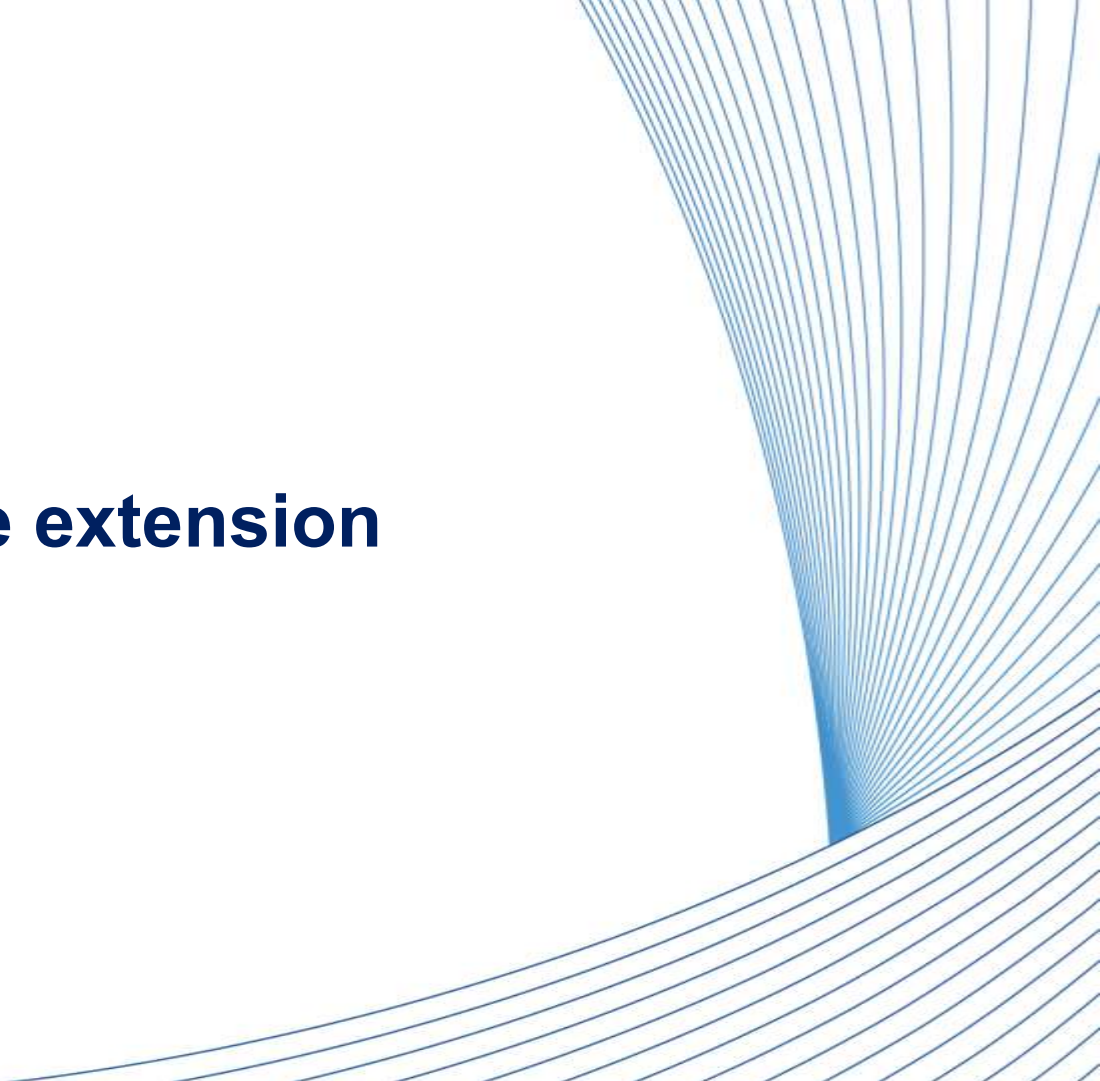


- A regional scientific and educational hub
- A national center of isotope production
- A center for nuclear medicine for domestic and regional operation



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NPPs life extension



MODERNIZATION OF THE POWER PLANT AND ITS MAIN SYSTEMS



Implementation of a complex of works on research, survey, design, equipment supply, construction and installation works, commissioning works

Product components or technical solutions

- Survey and project development
- Removal of equipment from the site
- Equipment troubleshooting
- Registration of permits, preparation of design and working documentation
- Manufacturing, delivery, installation and assembly of equipment and spare parts
- Testing and delivery of the products to the customer
- Delivery of the equipment to the customer and installation support

Modernization objects: cooling towers, boiler equipment, turbines, auxiliary equipment, cooling systems, transformers, etc.

MODERNIZATION OF THE POWER PLANT AND ITS MAIN SYSTEMS: REFERENCES



Armenian NPP (turbine island)

- Supply of the replaceable units of the "block-modular" condenser of the steam turbine
- Dismantling, installation and commissioning works during the modernization, reconstruction and / or replacement of systems (system elements) of the power generation unit
- Works related to the operational control of the equipment of power unit No. 2 of the Armenian NPP

Kozloduy NPP

- Modernization, extension of the service life of the main equipment of the turbine island





ROSATOM

NPPs life extension

Armenian NPP life extension

ARMENIAN NPP MODERNIZATION AND LIFETIME EXTENSION

Modernization of two turbogenerator sets with increased capacity

(replacement of turbines, condensers, moisture separator-reheaters, turbogenerators, condensate extraction pump, excitation systems)

Spray system, FEED and ECCS (Emergency Core Cooling System) equipment

FEED and equipment of Measurement and calculation System, ITS, In-core Instrumentation and Technological Control System, Reliable Power Supply Section)

Justification of reactor plant lifetime extension

Examination and metal inspection of reactor plant and other SSCs (structures, systems and components)

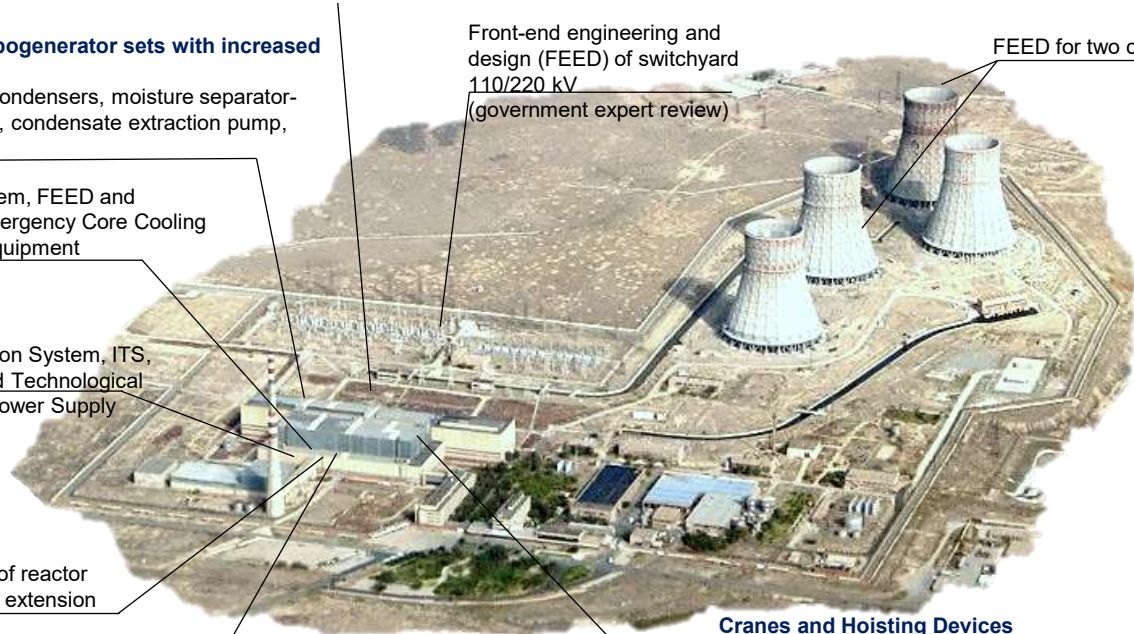
Front-end engineering and design (FEED) of switchyard 110/220 kV (government expert review)

FEED for two cooling towers

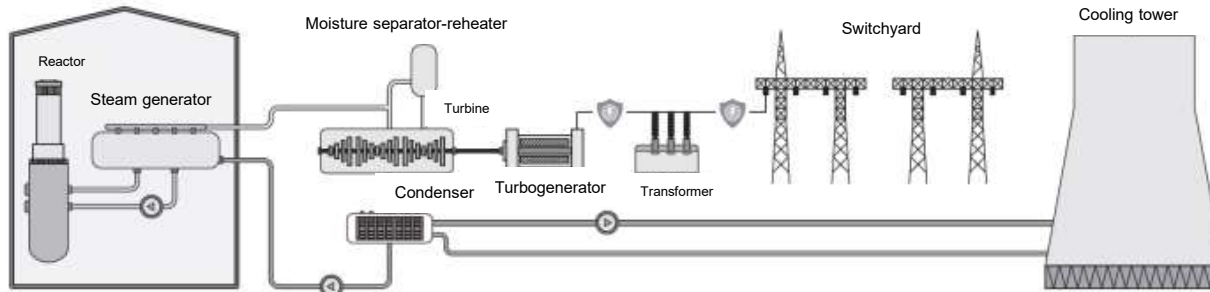
Cranes and Hoisting Devices

- FEED for 7 cranes;
- Construction & installation works, commissioning works for 2 turbine hall cranes;
- Equipment for 2 reactor hall cranes

All works at the operating unit during the scheduled outage



LIFETIME EXTENSION AND SAFETY ASSURANCE



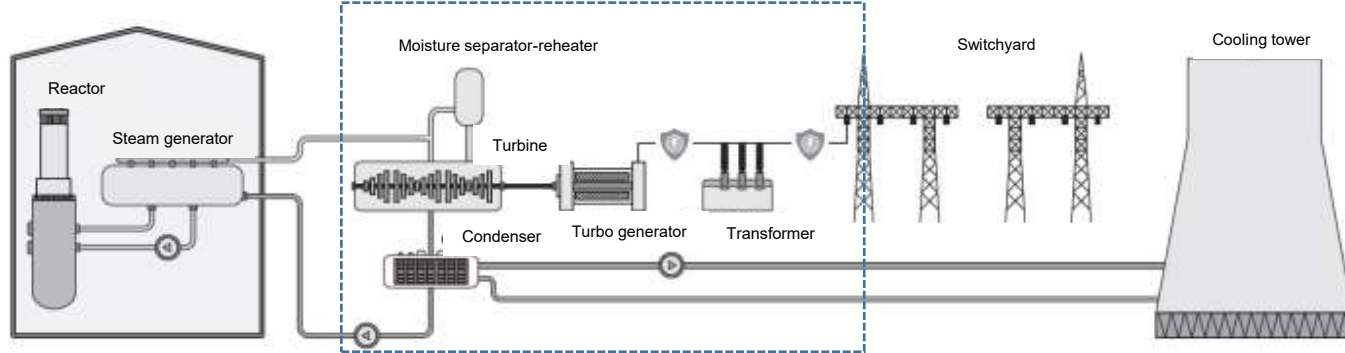
Justification of further operation of the reactor plant and ~ 5000 pcs. of equipment:

- R&D complex: inspection, calculations (thermal hydraulics, strength, etc.), physicometallurgical research, non-destructive testing of metal;
- 3 years, more than 20 specialized organizations

Modernization of NPP safety systems and automated control systems for nuclear power plants:

- inspection, modernization design;
- equipment supply;
- installation, commissioning, testing, recommissioning of the reactor zone automatic cooling and spray systems;
- Installation and commissioning of ventilation&air-cooling systems
- Installation and commissioning of reliable power supply system
- Reactor pressure vessel annealing

MODERNIZATION OF GENERATION EQUIPMENT



Turbine equipment modernization (two units):

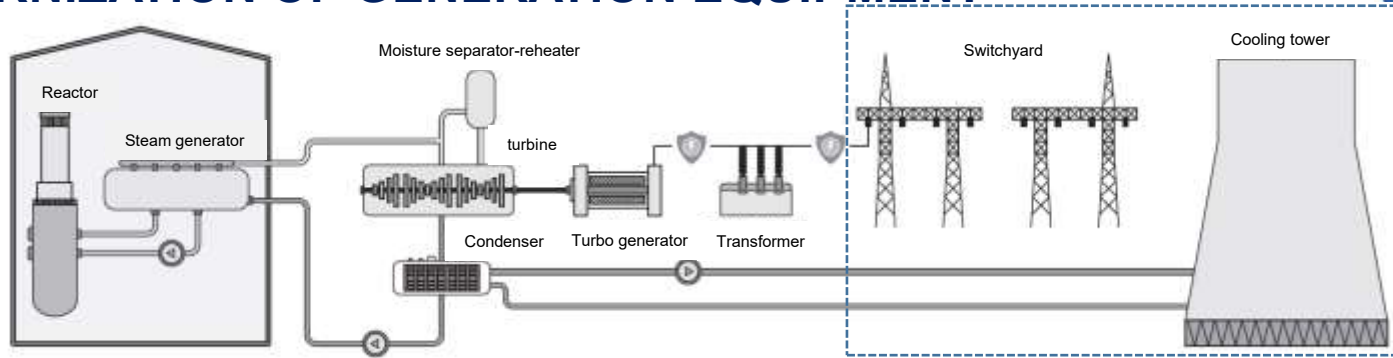
- turbines (replacement of 2 low-pressure pumps, high-pressure pumps, major repairs of control systems);
- turbogenerator (replacement of 2 turbogenerators with auxiliary systems and excitation systems);
- block transformer (replacement, including conductors of generator voltage, relay protection and automatic equipment of the generator-transformer);
- condenser (complete replacement from conduits to adapter pipe);
- moisture separator-reheater;
- condensate pumps

Turnkey works: inspection, design, equipment supply, construction, installation, commissioning, testing.

Construction and installation work and commissioning work:

2 years, the average number of staff - 400 people.

MODERNIZATION OF GENERATION EQUIPMENT



Design of switchyard 110 and 220 kV on a new site:

- site investigation, design and Armenian government expert review;
- interaction with local regulators
- Next step - on-site development

Modernization of two cooling towers:

- inspection;
- design of cooling towers modernization
- Next step - on-site development



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Thank you for attention!

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