



IRC MBIR
ROSATOM

MBIR

Multipurpose Fast Neutron Research Reactor

Consortium Leader of MBIR Reactor International Research Centre, LLC



About the Project

MBIR (Multipurpose Fast Research Reactor) is Gen 4 multipurpose scientific research reactor operating on fast neutrons. It is actively being constructed in Dimitrovgrad, Russia. When commissioned, MBIR will become the most high-flux research reactor in the world.

MILESTONES

- 2023** ● installation of the reactor vessel in the design position
- 2025** ● turbine unit final assembly
- 2027** ● first criticality
- 2028** ● **planned power start-up & commissioning**



2023 MBIR pressure vessel is installed into design position

Mission and Goals

MISSION

- ✓ Creation of an international scientific platform, which will be able to meet topical challenges in the field of innovative nuclear technologies
- ✓ Providing the complete cycle of high-tech services: pre-irradiation, in-pile and post-irradiation research of materials and elements



Functioning of the International Research Center MBIR goes in line with the UN Sustainable Development Goals

GOALS



To create a worldwide center of competence for fast-neutron reactors research



To launch international scientific research programs



To establish the synergy of schools of science and technologies from all over the world



To provide remote access to the experimental studies databank



To conduct fundamental and applied studies



To study technologies of the Generation IV nuclear reactors



To launch educational programs

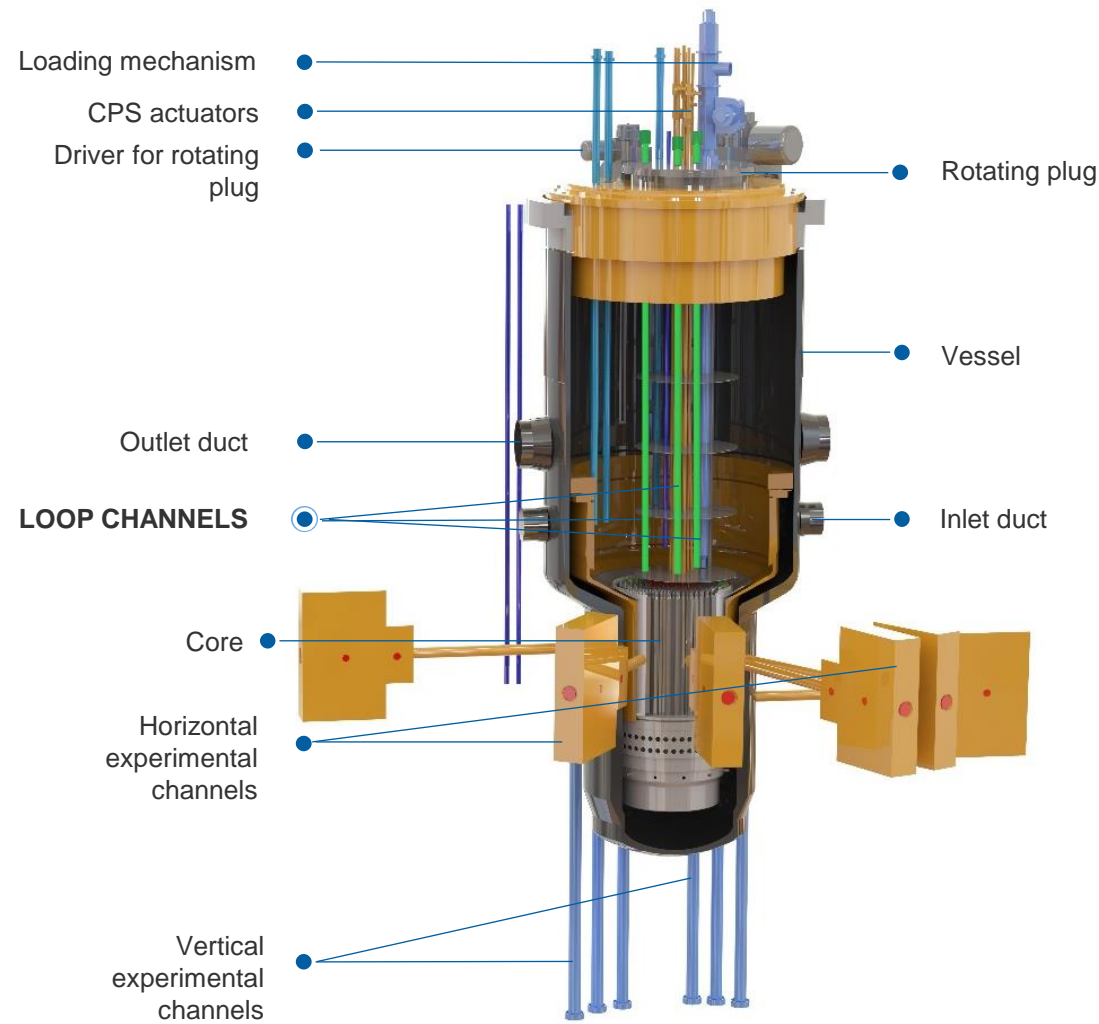


To study new technologies of nuclear waste management and closed nuclear fuel cycle operation



To validate the safety of the operation of nuclear facilities

Reactor Layout and Key Parameters



PARAMETER	VALUE
Thermal power, MWe	150
Electric power, MWe	55
Max / average neutron flux density in the core, $n^*cm^{-2}s^{-1}$	$5.3 \times 10^{15} / 3.1 \times 10^{15}$
Fuel	MOX
Reactor fuel campaign, no less than, days	100
Reactor configuration	Loop-type
Number of loops for heat transfer	2
Number of heat removal circuits	3
Coolant Flow	Bottom – up
Coolant: I and II circuits / III circuit	Sodium / Water
Pressure in the I circuit, MPa	Up to 0.6
Coolant temperature of the I circuit, °C	330-512
Capacity utilization coefficient	0.65
Designed lifetime, years	50
Commissioning, year	2028

Experimental Capabilities

Closed NFC technologies

Minor actinide burning, fuel reprocessing



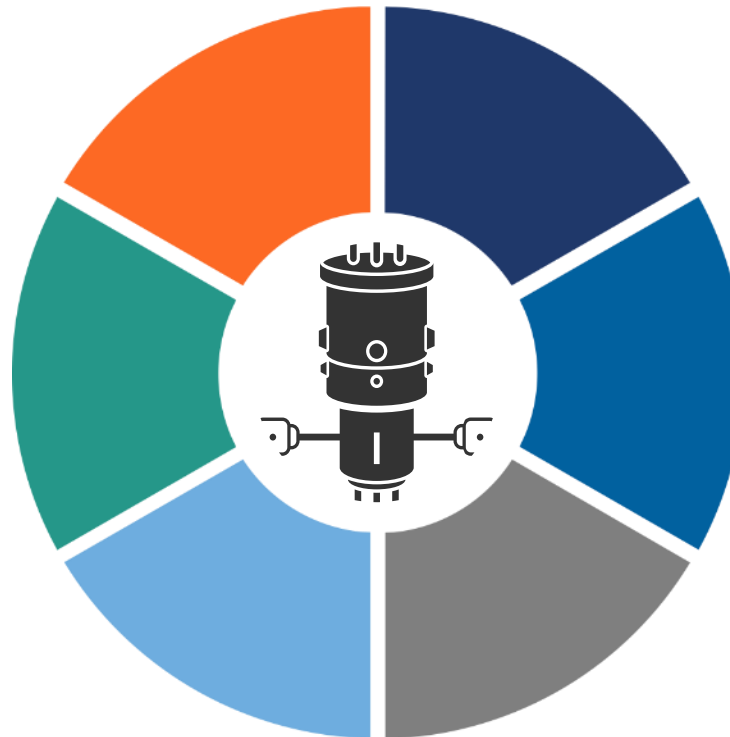
Isotope production

Mo-99; Co-60; Gd-153; Sr-85,89; I-125,131; Xe-127



Non-energy applications

Nuclear medicine, education, radiation technologies, nuclear facilities engineering



Structural materials

Testing of dispersion-hardened materials, ferritic-martensitic and austenitic steels



Basic research

Including ultracold neutrons



Fuel testing

Different ceramic compositions, metal fuel

MBIR will facilitate common efforts on the way to clean and comfortable future



Construction and Scientific Progress 2023



On January 18, 2023 the reactor pressure vessel installed into design position



Construction of the reactor unit up to the +34 m mark



~ 1 400 people involved in the construction process



The reactor dome will be installed until the end of 2023.
The overall height will amount to 52 m

In 2023 MBIR joined the BRICS-GRAIN Research Infrastructure Platform



International Research Center

An International Research Center is being created based on MBIR. The Center's activities will be carried out within the Consortium "International Research Center based on the MBIR reactor" formed for this purpose.

Rosatom invites international partners to participate in the research and offers:

- favorable conditions for joining at various stages of project implementation: during construction or operation
- various forms of partnership: conducting their own research and/or participating in international cooperation

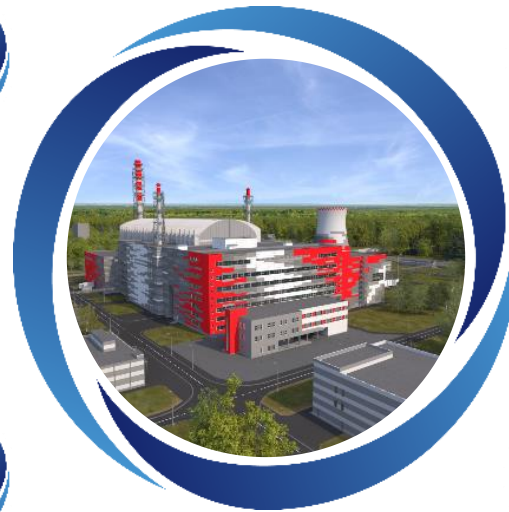
World center of competence for fast reactors under the auspices of international organizations.



An international scientific platform in the field of innovative nuclear technologies.



Extensive collaboration involving international experts.



Contribution to the technological and scientific development of participating countries.

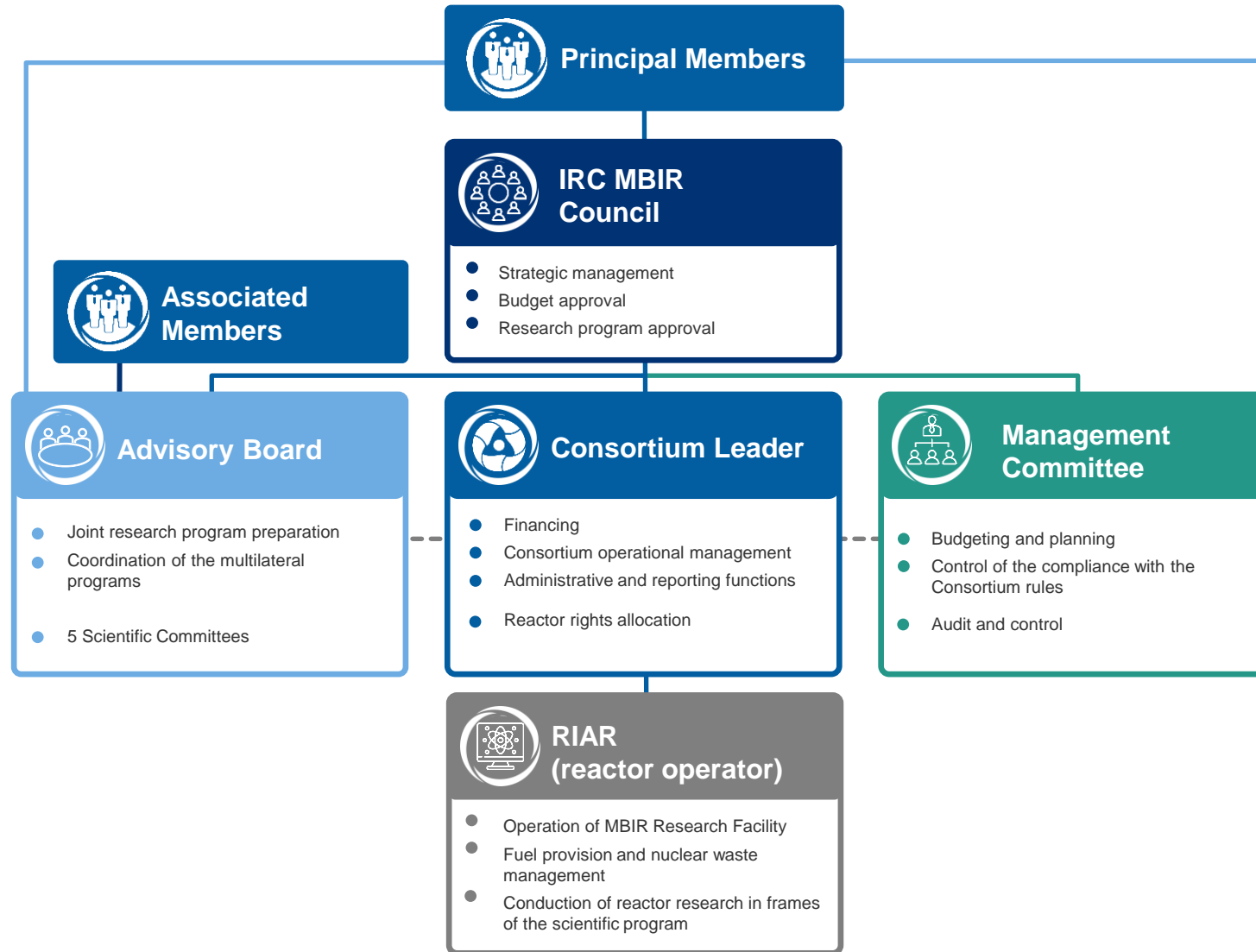


Unique experimental base for implementing various tasks.



Opportunity to provide Consortium members with a full range of high-tech scientific services.

IRC MBIR management structure



Advisory Board as a platform for international scientific cooperation

CHAIRMAN



Stepan Kalmykov

Vice-president of the Russian Academy of Science (RAS), academician, scientific director of the Faculty of Chemistry of the LMSU, Doctor of Chemical Science, chairman of the Shenzhen MSU-BIT University's Board of Directors

DEPUTY CHAIRMAN



Alexander Tuzov


First Deputy General Director for technology production and development at JSC "Science and Innovations"
Director of JSC "SSC RIAR"

MEMBERS



FUNCTIONS

- Consolidation and prioritization of the participants' scientific proposals and applications
- Coordination of the multilateral programs
- Joint research program preparation

 **July 12-13, 2022, RIAR, Dimitrovgrad, Russia** – First meeting of the Advisory Board Committee.
Participants: **56 expert from 13 foreign organizations**

Advisory Board Committees



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SAFE USE OF NUCLEAR TECHNOLOGIES

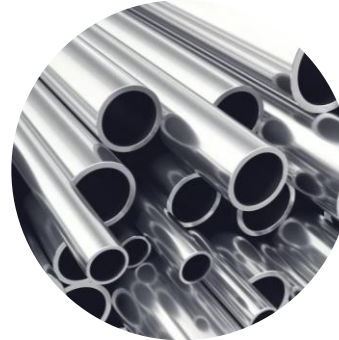
Justification of reliability and operability

Chairman:
Strizhov V.
IBRAE RAS

CODE VALIDATION

Process simulation
Transition and emergency modes
Calculation codes

Chairman:
Mosunova N.
IBRAE RAS



MATERIALS AND FUEL RESEARCH

MOX, Metal, CER-MET, UAl, Nitride, Thorium, UN, UC, UMo, CER-CER

Chairman:
Karyuk L.
VNIINM, JSC

🕒 **SCHEDULED**
September 6, 2023
Moscow, Russia
– the first Meeting

NFC CLOSING

Minor actinides burning
Multiple reuse

Chairman:
Petrov V.
LMSU

🕒 **SCHEDULED**
October 9-10, 2023
Saint-Petersburg, Russia – the first Meeting



NON-POWER APPLICATIONS OF NUCLEAR TECHNOLOGIES

Nuclear medicine and isotope production, nuclear education

Chairman: Bespala E. TPU

📍 **December 16, 2022**
Tomsk, Russia
– the first Meeting

📍 **May 26, 2023**
Tashkent, Uzbekistan
– the second Meeting

🕒 **SCHEDULED**
Autumn 2023
Dubna, JINR

Consortium IRC MBIR – a legal platform for the interaction of IRC MBIR participants and access to the MBIR reactor resource



	Principal Member	Associated Member
Joining the project	At the construction stage	After commissioning
Access to the reactor resource	For the reactor designed lifetime	For the contract period
Access to the irradiation services	At a lower price	At a market price
Multilateral Research Program	Program development and participation	Limited participation in frames of the contract tasks
Permanent seats in the IRC MBIR Board	Yes	No
Making key decisions on the development of the IRC MBIR	Yes	No
Promotion of your interests in the agenda of research programs	Yes	No

participants will receive a **set of advantages** when **joining** the Consortium IRC MBIR **at the construction stage**



*To join the Consortium IRC MBIR, it is necessary to sign an NDA, define the preferred type of participation (principal, associate), the need for reactor resource, and sign Dead of Adherence to the Consortium Agreement

Benefits of joining the IRC MBIR Consortium at the Construction Stage



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01

TECHNICAL

- Priority to choose the structure of the reactor's load (if acquiring a significant share)
- Access to the world's most powerful high flux research reactor for the whole operation period (50 years)
- Guaranteed access to the channels and exact units of the core
- Cutting-edge scientific research (astrophysics, ultracold neutrons, etc.)
- Access to vertical and horizontal experimental channels

02

SCIENTIFIC

- Joint MBIR-based work with JINR, the Kurchatov Institute, as well as the leading research institutes in Russia, China, Korea Rep., Algeria and other member-states
- Membership in all governing bodies of the Consortium and involvement into the decision-making processes
- Participation in the development and implementation of the multilateral research program

03

FINANCIAL

- Price for services two times lower than for Associated Members (joining at the operation stage)
- Deferred payment option
- Option of purchasing additional resource rights at a discounted price
- Option of accumulation of reactor resource rights

Thank you for your attention!

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