

atomstroyexport.com



New Clear Energy



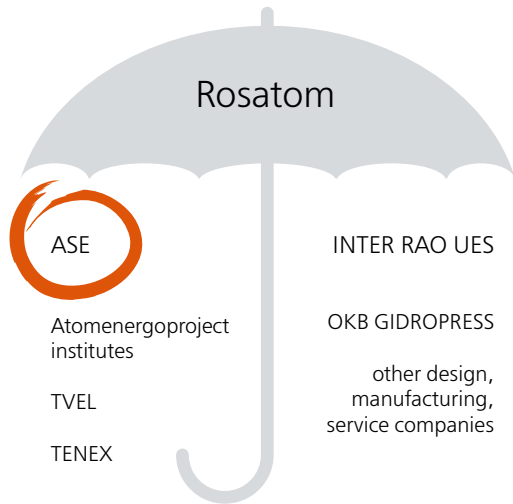
Modernized
International
Reactor

MIR





The Will and the Skill Tailored to our Customers' Requirements



Atomstroyexport JSC (ASE) is a Russian EPC-company going truly global. We offer our customers technological solutions for nuclear power generation backed by worldwide experience in the energy business.



Since the 1960-s 65 NPP power units with VVER-type water-moderated water-cooled reactors have been constructed. Their total capacity makes up more than 40 GW. 48 of those VVER power units were constructed outside Russia. Geography of our projects covers Armenia, Bulgaria, China, Czech Republic, Finland, Germany, Hungary, Slovak Republic. Nowadays NPPs with VVER-type reactors are being built in India and Iran.

ASE as a part of Rosatom State Corporation system acts as an EPC-contractor for NPP and other nuclear power facilities abroad. Company's activities comprise wide range of works in the field of knowledge intensive equipment and services for NPP whole life cycle: engineering, procurement, installation, commissioning, maintenance, repair and upgrading, and decommissioning.

ASE competence includes design, delivery and service of facilities for spent nuclear fuel and radioactive waste management. Thus we ensure mature products and services for environmentally sound forward-looking energy that respects the interests of the future generations.

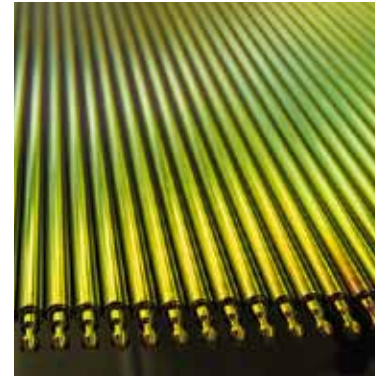
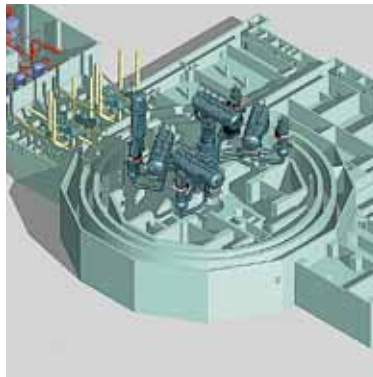


MIR Meets Current Challenges, Anticipates Future Needs

In 2006 a development of Modernized International Reactor with enhanced capacity of 1200 MW (MIR-1200) was launched. The design is based on the pressurized water reactor technology having strong reference features of VVER-440, VVER-640, and VVER-1000.

The integrity of MIR-1200 design is grounded on the following evolutionary technologies:

- optimized safety system configuration with active and passive elements on the diversity principle (four safety trains);
- digital Instrumentation & Control system;
- increased turbine plant efficiency;
- higher fuel utilization.



MIR-1200 is developed to operate in various climates and regions with seismic activity. MIR-1200 can also provide water desalination option.

High performance of MIR-1200 is achieved due to the following advantages:

- finalized design in full compliance with European rules and standards (the design integrates NPP life cycle management with equipment data base, 3D CAD, schedules, etc.);
- construction and schedule management enabling 54 month on-site works from the first concrete till the start-up;

- life cycle up to 60 years;
- serial and experience-proved equipment integration;
- maintenance outages – up to 18 days;
- overall repairs – once in 8-10 years and replacement of equipment according to its actual condition;
- possibility for plant operation under load following conditions.

Environmental considerations were of paramount importance during MIR-1200 design development and particular projects' implementation process. The external costs of coal and oil power plants (assessed according to the methodology of ExternE project carried out by the European Commission) are some ten times higher than for a NPP. MIR-1200 top priority is to contribute to the global greening, to minimize nuclear power externalities, and to establish base for environmentally friendly energy-mix development.



Developed on the Base of Evolutionary Improvements

MIR-1200 is developed on the base of evolutionary improvements and significantly increased technological safety and operational efficiency for our Customers.

Generation 1

VVER-440

Confinement is calculated for small break LOCA. Active safety systems.

1960

Generation 2

VVER-440
VVER-1000

Containment is calculated for large LOCA localization. Active safety systems.

1970

Generation 3

VVER-640
VVER-1000
VVER-1500

Severe accident risk reduction through the increase of the passive safety systems implementation.

Russian PWR designs unified as per the main equipment (640, 1000, 1500 MW) provide a possibility for operation in different power grids.

1990

Generation 3+

VVER-1000
MIR-1200

2006

Generation 4

Development of new technologic platform

Transition to nuclear engineering innovation development:

- closed nuclear fuel cycle;
- inherent safety of NPP;
- increase of ecological sustainability;
- advanced economic indicators.

2014

ASE Core Principle is to Provide Safe Technology

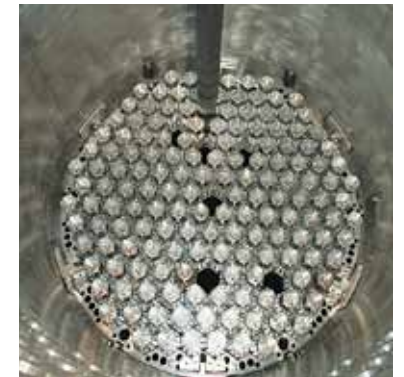


The MIR's self-defence principle is maximized through innovative technologies of passive safety systems being used alongside with active ones. Thus MIR's passive heat removal system via steam generators prevents core melt in the case of beyond design basis accident (BDBA), such as plant blackout, complete loss of feedwater, loss-of-primary coolant small-break accident (i.e. to prevent BDBA transition to a severe phase), and reduces radioactive consequences derived from the primary-to-secondary circuit leak accident. The containment heat removal system of MIR-1200 provides long-term heat removal from the containment in the case of any BDBA, including those associated with blackout and spray system failure.



MIR is also equipped with Core Melt Localizing Facility (CMLF) – corium catcher. CMLF is developed for localization of a severe accident with core relocation beyond the reactor pressure vessel. This facility performs a function of melt retention and cool-down in the ex-vessel stage thus reducing loads on containment, providing heat absorption and minimizing gas release. The first CMLF was implemented at Tianwan NPP (China) by ASE in 2001.

All these MIR-1200 design improvements are recognized as those which enhance safety of the power unit under BDBA in a very efficient manner.



MIR-1200 is the evolutionary design complying with all current international requirements to the NPP safety. MIR-1200 addresses wide spectrum of accidents within design extension conditions (EUR approach) or severe accident management field (IAEA approach).

The state-of-the-art safety conception of MIR-1200 design is based on the principle of "multi-barriers protection in depth" that guarantees non-release of fission products into the environment under severe accidents conditions, including core melting. Availability of a double containment secures reactor facility from such external impacts, as a shock wave, aircraft crash, floods, etc.

Open Partnership and Localization is MIR Grounds for Success

Doing business in a multi-national environment ASE is very well aware of its responsibility for implementing purely international projects. ASE strategic approach is to develop, consolidate and diversify own and affiliated resource base. Allying with the new partners, broadening the technological and organizational base of cooperation with the traditional ones provides full fledged network of alliances and JVs working for MIR.

Such a far-sighted partnering strategy coupled with highly advanced Russian industry contributes to MIR's flexible supply-chain management. MIR's customers can be sure that through the multi-vector cooperation ASE mitigates the production capacity bottlenecks and provides stable series supplies.



Thus implementing of wide-scale MIR projects ASE develops powerful diversified infrastructure that includes scientific, engineering and production cooperation of the countries-partners as well as new entities and production lines set up.



First stage



At the first stage of NPP project and design configuration development the target electricity Market determines the Financial partners. The latter provides risk minimization in the precise market.

Second stage



The requirements of the Market and the Financial partners may demand special Technologic cooperation. An international consortium of Customers and Consumers can be established with various share capital structure and long-term Power Purchase Agreements. Localization options are settled at this stage.

Third stage

Market requirements and Technological cooperation (developed during international tender or preliminary qualification) define NPP project and design configuration.



What is Our Product

Be Decided by Our Customers

ASE strives for competitive adaptation to specific needs of our Customers. That approach is underlying not only the technological advantages but also organizational and financing support arrangements.

ASE is ready to provide products with different package solutions. Thus our Customers depending on their contract strategy and administration approach can obtain any kind of NPP technology package starting from Nuclear Steam Supply System (NSSS), through Nuclear Island (NI) up to whole NPP on the turn key basis. As to the preliminary and preparatory activities for MIR projects, they are all also performed by ASE: NPP site assessment, feasibility study, investigation of the engineering potential of the Customers' country for localization, etc.



Beyond core EPC business ASE now offers financial arrangements and funding solutions including those of public-private partnership, electricity off-takes, and BOO/BOT schemes (Build – Own – Operate / Build – Own – Transfer). Diversification in related segments allows ASE to achieve additional advantages which are optimization of risks' distribution between Customer and Vendor as well as stability of electricity trade business. Development format in this respect is strategic alliances establishment; development targets are optimized financing structure which is tailored for particular Customers' and Projects' needs. ASE key partner is INTER RAO UES JSC which is also integrated in the Rosatom group.

ASE service package also comprises different consultancy service for national infrastructure development of the nuclear power branch starting from the legislative and regulatory level up to organizational structure and personnel training issues. Here ASE is working closely with IAEA, WNA, WANO and other international organizations.



