Development as a Vendor

NPP Construction in Russia

NPP Construction Abroad

In 2012 the Integrated Company performed operations on designing and construction of generating units of nuclear power plants in India, Iran, Belarus, Slovakia, Turkey, China, Ukraine, Vietnam and Bangladesh (see Table).

This included construction of 7 generating units as follows: Bushehr NPP generating unit 1; Kudankulam NPP generating units 1 and 2; Belarusian NPP generating units 1 and 2; and Tianwan NPP generating units 3 and 4.

Table 3.4. List of NPP Generating Units Being Constructed and Designed by the Integrated Company Abroad, and Status of Work

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Projects	Status of Work as of the End of 2012
Bushehr NPP Generating Unit 1 (Iran)	Construction
Kudankulam NPP Generating Unit 1 (India)	Construction
Kudankulam NPP Generating Unit 2 (India)	Construction
Belarusian NPP Generating Unit 1 (Belarus)	Construction
Belarusian NPP Generating Unit 2 (Belarus)	Construction
Kudankulam NPP Generating Unit 3 (India)	Design and survey work
Kudankulam NPP Generating Unit 4 (India)	Design and survey work
Akkuyu NPP Generating Unit 1 (Turkey)	Design and survey work
Akkuyu NPP Generating Unit 2 (Turkey)	Design and survey work
Akkuyu NPP Generating Unit 3 (Turkey)	Design and survey work
Akkuyu NPP Generating Unit 4 (Turkey)	Design and survey work
Tianwan NPP Generating Unit 3 (China)	Construction
Tianwan NPP Generating Unit 4 (China)	Construction
Khmelnitskaya NPP Generating Unit 3 (Ukraine)	Initial project preparation
Khmelnitskaya NPP Generating Unit 4 (Ukraine)	Initial project preparation
Ninh Thuan-1 NPP Generating Unit 1 (Vietnam)	Initial project preparation
Ninh Thuan-1 NPP Generating Unit 2 (Vietnam)	Initial project preparation
Ruppur NPP Generating Unit 1 (Bangladesh)	Initial project preparation
Ruppur NPP Generating Unit 2 (Bangladesh)	Initial project preparation
Metsamor NPP New Generating Unit (NGU) (Armenia)	Initial project preparation
BN-800 Generating Unit (China)	Design and survey work

Iran. Bushehr NPP, Generating Unit 1

Project description. In 1976 the contract was concluded with the German trust Kraftwerk Union A. G. (Siemens/KWU) on construction of Bushehr NPP generating unit 1. The project construction was launched in 1995. The Customer of th

e project was the Atomic Energy Organization of Iran (AEOI). In October 2010 ASE obtained the license for NPP commissioning. The scope of responsibility of the Integrated Company in respect of this project includes commissioning.

The Bushehr NPP is constructed on the basis of VVER-446 project; all operations are carried out in accordance with the international standards, legislation, and non-proliferation regime, and are controlled by IAEA. It is planned to complete the project in 2015.

2012 results. 52 percent of annual work plan was completed according to the Bushehr NPP construction schedule. As of December 31, availability of Bushehr NPP generating unit 1 amounted to 99.85%, and the contribution of 2011 to the level of the project availability was only 0.16%. On August 30, 2012 Bushehr NPP generating unit 1 was launched at 100% of design capacity.

2013 arrangements. Field trial of the unit is scheduled for 2013.

India. Kudankulam NPP, Generating Units 1 and 2

Project description. In accordance with the cooperation agreement on construction of a nuclear power plant in India signed 1988 between the USSR and the Republic of India, the Russian Federation renders technical support to India in construction of two generating units of the Kudankulam NPP with VVER-1000 reactor units. It is planned to construct a total of 6 generating units at this NPP. In 2001 designing work was launched, in 2002 construction began.

After consolidation of NIAEP and ASE, execution of the Agreement on Construction of Kudankulam NPP Units 1 and 2 is performed by the Integrated Company on the Russian part and the Nuclear Power Corporation of India Limited (NPCIL) on the Indian part. The customer of the project is NPCIL.

The scope of responsibility of the Integrated Company within the project includes elaboration of project, start-up and maintenance documentation, supply of equipment and materials, rendering technical support during NPP construction, mounting and commissioning, as well as training of Indian staff.

2012 results. In 2012 construction of generating units 1 and 2 was carried out at the Kudankulam NPP. The work plan on construction of the generating units was completed 100 percent. Availability of generating unit 1 amounted to 100% and of generating unit 2 to 98%. Contribution of the reporting period to the project availability is 2 to 3%. The volume of work performed amounted to 51 million USD. The following results were achieved in the reporting period:

Work on generating unit 1 in accordance with the 2nd revision program completed;
Work on generating unit 1 in accordance with the reactor start-up program launched;
Process systems of generating unit 2 washed and hydro-tested;
Functional testing of equipment of generating unit 2 started.

2013 arrangements. The expected 2013 contribution to the level of project availability is 2 percent. The following types of operations are scheduled for 2013:

Launch of generating unit 1 at minimum controllable power;
Synchronization and first network connection of the unit 1 generator;
50, 75, and 100% power testing of generating unit 1;
Operations on the program of hydraulic testing and circulation flushing on generating unit 2;
Hot operational testing of generating unit 2;
Launch of operations within the reactor start-up program on generating unit 2.

Generating Units 3 and 4

Project description. Generating units 3 and 4 of the Kudankulam NPP will be also designed on the basis of VVER-1000 platform. The scope of responsibility of the Integrated Company within this project includes designing, supply of equipment and delegation of specialists for technical support.

2012 results. In 2012 initial project work was carried out including adjustment of technical and commercial proposal and conclusion of general framework agreement with the project customer.

2013 arrangements. Designing of generating unit 3 is scheduled for 2013. The key activities scheduled for 2013 include:

Final approval of the technical and commercial proposal for construction of Kudankulam NPP generating units 3 and 4;
Conclusion of the General Framework Agreement.

Belarus. Belarusian NPP. Generating Units 1 and 2

Project description. In 2011 the intergovernmental agreement was concluded between Russia and Belarus onconstruction of the Belarusian NPP. According to the agreement, ASE was appointed general contractor of the Belarusian NPP construction project, and the State Enterprise Nuclear Power Plant Construction Directorate (GU DSAE) acted as the customer. The Belarusian NPP will include two generating units with VVER-1200 reactors (V-491) with a capacity of up to 1,200 MW each. The gross installed capacity will amount to 2,400 MW. The commissioning of generating unit 1 is scheduled for 2018 and of unit 2 for 2020.

2012 results. In 2012 work was launched on designing of the Belarusian NPP. By the end of the year, 963 people worked on the project, number of construction machines engaged amounted to 260 units. By the end of 2012, availability of the project equaled to 10 percent, and 65% of the project documentation was elaborated. The following results were achieved in the reporting period:

Designing of the foundation pit for generating unit 1;
Initial designing of the foundation pit for generating unit 2.

2013 arrangements. The following operations are scheduled for 2013:

Completion of work on concrete foundation arrangement for generating unit 1;
Completion of soil excavation for the foundation pit and waterproofing of main buildings and structures of generating unit 2;
Completion of work on concrete foundation arrangement for generating unit 1.

Turkey. Akkuyu NPP, Generating Units 1–4

Project description. In 2010 the intergovernmental agreement was signed between Russia and Turkey on cooperation in the field of construction and operation of the nuclear power plant. ASE was appointed general contractor of the project, and Akkuyu NGS A.S. acted as the customer.

In 2011 work was started on execution of the Akkuyu NPP project which includes construction of 4 generating units of AES-2006 type with VVER-TOI platform and total capacity of 4,800 MW.

2012 results. The scope of the work performed within the project amounted to 39 million USD. 84.3 percent of the annual work plan was completed. The 2011 contribution to the level of the project availability amounted to 0.02 percent, and the level of availability was 0.25% by the end of 2012.

In 2012 the general contractor performed the following operations within the Akkuyu NPP project:

Engineering explorations at the design stage;
Survey of the site’s rocky soils to determine the possibility of their application for preparation of

building materials during NPP facilities construction;
Turkey market analyses;
Survey of the existing site infrastructure;
Elaboration of draft design for camp construction for operational staff;
Tender for selection of contractor for excavation and site relief arrangement at the first stage.

2013 arrangements. The expected 2013 contribution to the level of the project availability will amount to 0.43%. The list of key scheduled operations includes:

Signing of a contract with contractor on preparatory stage works (off-site access routes, complex of off-site facilities of potable water supply of Akkuyu NPP, temporary inhabited area for Akkuyu NPP constructors, building and installation facilities for Akkuyu NPP construction, cargo terminal);
Engineering surveys and production of design and operational documentation for the facilities of preparatory stage (off-site access routes, complex of off-site facilities of potable water supply of Akkuyu NPP, temporary inhabited area for Akkuyu NPP constructors),
Termination of temporary infrastructure facilities repair on site, including system of reliable energy supply,
Start of engineering surveys of the stage ''Operational Documentation'',
Monitoring of Akkuyu NPP site.

China. Tianwan NPP (TNNP), Generating Units 3 and 4

Project description. Generating units 3 and 4 refer to the second stage of the Tianwan NPP, are located on the NPP site in Jangsu Province (China) and border with TNNP generating units 1 and 2 (first stage) which were commissioned in 2007 and transferred to the Chinese customer after trial guarantee operation on April 15, 2010. The Tianwan NPP second stage (TNPP-2) is being constructed in accordance with the General Contract on the TNPP Generating Units 3 and 4 Construction which entered into force in 2011. The customer of the project is Jangsu Nuclear Power Corporation (JNPC). The service supplier is NIAEP-ASE Integrated Company. In accordance with the General Contract on the TNPP Generating Units 3 and 4 Construction, the Integrated Company is obliged to elaborate design and supply equipment for nuclear island (NI), and also bears general technical responsibility for the NPP project in whole.

The planned term of commissioning of the generating units: generating unit 3 in February 2018, generating unit 4 in December 2018.

2012 results. In 2012 the Company performed elaboration of technical design documentation packs, including technical specifications for procurement of equipment in China and third countries, as well as documents for obtaining the permits required to launch construction of generating units 3 and 4 of TNNP. In December 2012 JNPC obtained the permit for construction of TNNP-2 generating units 3 and 4. In 2012 the total cost of work on construction and designing of TNPP generating unit 3 amounted to 14.8 million euro. 100% of the annual work plan was completed. The TNNP-2 availability level amounted to 5.19 percent by the end of 2012, the contribution of the previous year to the level of the project availability equaled to 1.21%.

The key 2012 activities on construction of TNNP generating units 3 and 4 include:

Procurement of building permit for construction of both generating units;
Start of construction (first concrete casting) of generating unit 3.

2013 arrangements. Generating unit 4 construction shall start on October 20, 2013. The expected 2013 contribution to the TNPP-2 availability level shall equal to 4.77%. In this connection

the main plans for 2013 include:

Final transfer of the first-priority NF working documentation for generating units 3;
Supply of equipment for first concrete casting on generating unit 4;
First concrete casting on generating unit 4.

Ukraine. Khmelnitskaya NPP, Generating Units 3 and 4

Project description. In 2010 the Government of the Russian Federation and the Cabinet of Ministers of Ukraine concluded an agreement on cooperation in construction of Khmelnitskaya NPP generating units 3 and 4. According to the agreement ASE was appointed general contractor and State Enterprise GP NAEK Energoatom acted as the customer of the construction of generating units 3 and 4 of Khmelnitskaya NPP. The signing of contract is scheduled for 2014. To ensure the delivery of an agreement dated 09.02.2011 between ASE and GP NAEK Energoatom a contractual arrangement was signed for the development of technical project (TP) of reactor plant (RP) VVER-1000/B-392 and the equipment supply of RP for generating units 3 and 4 of the Khmelnitskaya NPP, which is marked by frame character and provides a phased signing of series of contracts by parties.

The expected years of commissioning of Khmelnitskaya NPP generating units 3 and 4 are 2020 and 2021 accordingly.

2012 results. The conditions of draft contract on elaboration of detailed design of the VVER-1000 reactor units of B-329 project and contracts on manufacturing and supply of equipment for reactor units with prolonged manufacturing cycle were approved.

2013 arrangements. Further work on concept design of generating units 3 and 4, approved by the parties is planned for 2013.

Vietnam. Ninh Thuan 1 NPP, Generating Units 1 and 2

Project description. In 2010 Russia and Vietnam concluded an intergovernmental agreement on cooperation in nuclear power plant construction in the territory of Vietnam. The Integrated Company is the general contractor of the project. The customer is Electric Energy Corporation of Vietnam (EVN). The Nihn Thuan 1 NPP will include two generating units with a capacity of 1,000 MW each.

2012 results.

In October 2012 NIAEP-ASE Integrated Company elaborated and approved the Nihn Thuan 1 NPP

directive construction schedule at the level of joint working group. The schedule will be submitted for approval to competent authorities of Russia and Ukraine by the end of March 2013.

2013 arrangements:

Elaboration and approval by the joint team of a Nihn Thuan 1 NPP construction schedule and submission thereof for approval to relevant competent Russian and Vietnamese authorities till the end of March 2013;
Collection of initial data for preparation of contracts for elaboration of NPP and construction site detailed designs in 2014.

Bangladesh. Ruppur NPP, Generating Units 1 and 2

Project description. In 2011 Russia and Bangladesh signed an intergovernmental agreement on cooperation in nuclear power plant construction in the territory of Bangladesh. The Integrated Company is the general contractor of the project and will manage all operations on project construction.

2012 results. In 2012 initial project preparation was carried out: elaboration and approval by the customer of preparatory stage contracts on JOI and EIA elaboration, survey work, contracts on detailed design elaboration, and first-priority construction and mounting operations on site.

2013 arrangements:

Launch of operations on designing and construction of Ruppur NPP generating units 1 and 2.

Armenia. Armenian NPP, New generating unit (NGU)

Project description. In 2010 an intergovernmental agreement on NGU Construction was signed. The engineering company CJSC Metsamorenergoatom (CJSC MEA) acts as the customer of the project and in future will become the owner of the nuclear power plant. The CJSC MEA founders are CJSC ASE on the Russian part and the Ministry of Energy and Natural Resources of the Republic of Armenia on the Armenian part.

2012 results. NIAEP-ASE Integrated Company has developed and presented to the customer projects of licensing plan and technical specifications for NGU, processes of preliminary period of NGU construction and pre-design proposition of In 2012 work was carried out on establishment of legal basis of the project, as well as arrangement and technical activities. The prepared international legal basis is sufficient for preparat ion of the project’s contract basis.

China. Fujian Sanming NPP with Fast Reactors of BN-800 Type (NPP-FR)

Project description. Cooperation of Russia and China under the project on construction of the Fujian Sanming NPP started after conclusion of the memorandum between State Corporation ROSATOM and China National Nuclear Corporation (CNNC) on October 28, 2008. The document stipulates construction of two generating units in China within the frames of the project on expansion of the Tianwan NPP and of one demonstration commercial fast reactor within the two generating units with BN type reactors with electric capacity of 800 MW each. The customer of the project is Fujian Sanming Nuclear Power Co Ltd (FSNPC). Initial project preparation was carried out from 2009 to 2012.

2012 results. On November 29, 2012 NIAEP-ASE Integrated Company, FSNPC and China National Nuclear Corporation signed a contract on preparatory work for the framework contract on

construction of the Fujian Sanming NPP with fast reactors.

2013 arrangements:

Elaborate materials for framework contract preparation;
Send the elaborated materials to the customer.