A Dream Comes True

Rooppur Nuclear Power Plant

Contents

BACKGROUND

There are complex correlations between economics, energy and the environment. Economics, jobs and standards of living are inexorably tied to the availability of affordable energy. There are disparities in the distributions of the world's energy demand growth and resources. It is a reality that world energy demand increase would be inevitable and global warming issue would become more and more serious in coming decades. For a sustainable future of our planet, we should take on challenge to realize a low carbon society. As adopted in COP21 Paris Agreement, we have to keep a global temperature rise this century well below 2^{0}C above preindustrial levels. In addition to economic and environmental dimensions of energy, the energy security is strongly linked with national security issue.

Nuclear power is stable, reliable, large scale and available today. Nuclear generating capacity additions began in the 1950s. The nuclear power plant (NPP) has been contributing a significant proportion to the world's electricity supply as reliable and amenable base-load power over the last fifty years. As of November 2016, 30 countries world wide are operating 450 nuclear power plants and they are providing about 12% of the world's electricity supply. Sixteen countries depend on nuclear power for at least a quarter of their electricity. France gets around three-quarters of its power from nuclear energy, while Belgium, Czech Republic, Finland, Hungary, Slovakia, Sweden, Switzerland, Slovenia and Ukraine get one-third or more. South Korea and Bulgaria normally get more than 30% of their power from nuclear energy, while in the USA, UK, Spain, Romania and Russia almost one-fifth is from nuclear. Japan is used to relying on nuclear power for about 30% of its electricity and the nation is striving restart its nuclear power plants, mindful of the lessons learned from the accident at the Fukushima Daiichi nuclear power station. The government of Japan has determined that its share within the power generation expected to be not less than 20-22% by 2030.

Nuclear power is positioned as an important based-load power source. It is a safer and secured and responsible technology for energy supply assurance and reduction of CO_2 emission. It is difficult to imagine for those nations which hardly have significant amount of indigenous energy resource building much base-load electricity generation capacity without any contribution from nuclear power.Nuclear power is operationally as safe as, or safer than, most alternatives, it can provide electricity in an affordable manner and meet the local and global challenges to the environment from over use of fossil and other organic fuels without major economic disruption.

All major international reports on energy future suggest an increasing role for nuclear power as an environmentally benign way of producing electricity on a large scale. Presently, 60 more reactors are under construction in 15 countries. According to the World Nuclear Association, over 45 countries around the globe are giving "serious consideration" to introducing a nuclear power capability. Nuclear Power generation is gradually shifting to Asia and it appears as an emerging trend to those nations that are rising to the global economic super power, namely India and China. India expects to have 14.6 GWe on line by 2024 and 63 GWe by 2032. It aims to supply 25% of electricity from nuclear power by 2050. The China is aiming to increase capacity to at least 200 GWe by 2030 and 400 GWe by 2050, respectively. In Asia, the South Korea, Pakistan and UAE have also ambitious nuclear programme. In the year 2016, ten new nuclear reactors connected to the grid – five of which were in China, and one each in India, Pakistan, Russia, South Korea and the U.S.

Nuclear power contributes to the diversification of electricity resources. The energy security advantages of nuclear power gives a desirably diversity of fuel supply, avoid potential conflicts. It contributes to the stability of energy supply-demand structure; it has low and stable operational cost and an important source of energy for sustainable development. Implementation of nuclear power projects generate and establish a network of very well-qualified scientists and engineers that will enhance significantly the technological capacity of the country in many sectors. The development of nuclear power helps in development of local industrial sector such as construction, fabrication of components, engineering, safety and security, quality control and quality assurance, to the most stringent industrial requirements of the country that exist today. Nuclear power generates not just a reliable source for base-load electricity, but also brings added value for a society through indirect impacts throughout the life cycle

The Government of Bangladesh is committed to elevate the country to the status of a middle income by 2021 and a front-ranking developed nation by 2041.

The availability of energy in the form of electricity in a secured and affordable manner is the critical input parameters for materializing the country's Vision 2021 and the Vision 2041 through socioeconomic development of all societies, improving quality of life of the population, proper urbanization and industrialization. The indigenous resources of primary energy would be inadequate to meet the entire incremental demand on a sustainable and long term perspective. The energy security is another dimension that needs attention continually, especially to help mitigating effects of any possible regional and global energy crisis of the future. Moreover, the energy production cost should be reasonable for ensuring its availability to all cross-sections of the population.

Considering international experience on energy policy implies consideration of balance between three basic elements: diversification, economics and environmental protection. Bangladesh has given the utmost priority on diversified fuel mix and new technologies integration to provide safe, reliable, cost effective and value-for-money electricity for a long-term basis. The country has decided to draw up and implement nuclear power programme to produce base load, safe, environmentally benign and affordable electricity and to reduce over dependence upon imported energy and to increase diversity of energy resources for ensuring energy security.

BRIEF HISTORY OF ROOPPUR NUCLEAR POWER PROGRAM OF BANGLADESH

Bangladesh first conceived building a nuclear power plant in 1961. Since then several feasibility studies have been conducted and based on those studies the nuclear power project at Rooppur has been identified to be a viable option. The safety is assumed as the number one priority for construction of NPP in every circumstance. Since the site was selected earlier, it has become essential to perform comprehensive studies to reconfirm the conformity of the Rooppur NPP project site with the IAEA guidelines and new international practices, techno-normative requirements of the vendor country as well as applicable the domestic regulatory requirement to obtain the required materials for the substantiation of the site applicability for the NPP location. The deliverables of the comprehensive studies of site characterization, environmental impact assessment and feasibility evaluation of the natural environment of Rooppur NPP site conducted in 2013 - 2015 have clearly determined the suitability of the site for construction of nuclear power plant with regard to safety. JSC Atomstroyexport of Russian Federation have been made to build a Generation III+ reactor at Rooppur NPP with two VVER reactor units (2x1200 MW(e) capacity), which has enhanced level of safety with supplementary safety enhancements based on the lessons learned from Fukushima accident and must be protected against terrorism using aeroplane. The country is considering to build the second NPP at the southern part of the country.

Major Milestones of National Nuclear Power Programme and Rooppur NPP Project are as follows:

1961: Initiative to build a Nuclear Power Plant.

1962-1969:

- Rooppur, a site on the bank of the river Padma in Pabna district was selected as the site for the country's first NPP project.
- Several feasibility studies were carried out those affirmed the technical and economic feasibility of Rooppur NPP.
- The then government gave formal approval for 70 MW, 140 MW and 200 MW in different years during the period 19963 – 1969.
- Several countries submitted proposals for construction of Rooppur NPP and agreed to provide loan in order to reduce the interest rate.

1971-1980:

- Soon after independence the Father of the Nation Bangabandhu Sheikh Mujibur Rahman took decision to set up a 200 MW(e) nuclear power plant at Rooppur site.
- Feasibility study was conducted by M/S Sofratome, France which confirmed the early implementation of Rooppur NPP.
- 125 MW(e) Nuclear Power Plant Project approved by the ECNEC

1980-1986:

- Government decided to build 2x150 MW(e) plant at Rooppur.
- NNC (UK) showed interest to construct a 300 MW(e) plant because of better cost economics and supply position of reactors of this Site.

1987-1988:

- Further feasibility study was conducted by LAHMEYER International, Germany and Motor Columbus of Switzerland which justified that Site is technically, economically and financially feasible for 300-500 MW(e) NPP.

1995-1996:

- The first National Energy Policy (NEP) of Bangladesh was formulated in 1996 by the Ministry of Power, Energy and Mineral resources identified nuclear energy as an option for power generation.

1997-2001:

- Pre-implementation phase activities under a development project were initiated focusing on construction of 600 MW(e) NPP
- Site related data were updated and development of human resources for Rooppur NPP project implementation initiated under an annual development project.
- Bangladesh Nuclear Power Action Plan (BANPAP) was approved by the government in 2000.

2007- 2008:

- The Bangladesh delegation to the General Conference of the International Atomic Energy Agency (IAEA) of 2007 had made request the DG of the IAEA to support and provide assistance for implementation of the decision of Bangladesh government in implementation of Rooppur NPP.
- A high-level mission from Bangladesh visited the IAEA Headquarter in May, 2008 to identify the areas of the agency's technical support for implementation of Rooppur NPP project.
- An IAEA Mission on a Holistic Approach for establishing nuclear infrastructure in Bangladesh conducted in November, 2008 to provide recommendations in establishing national nuclear infrastructure development.
- A commitment was made for the implementation of Rooppur NPP project by all the leading political parties of Bangladesh in their Election Manifestoes of the National Parliamentary Election of 2009.

2009:

- BAEC started implementation of the annual development project entitled "Accomplishment of Essential Activities to Implement Rooppur Nuclear Power Plant" to carry out pre-project activities in light with international requirements with the involvement of national institutions.
- A MOU signed on 13 May 2009 between BAEC and ROSATOM, the State Atomic Energy Corporation, Russian Federation on cooperation of peaceful use of nuclear energy.
- A high-level decision making team, led by the State Minister, Ministry of Science and Technology visited Russian Federation in October, 2009 to get realistic ideas on implementation, funding and administration and organisational structure of the NPP project.
- A technical assistance project entitled "Establishing Nuclear Power" approved by the IAEA for extension of the IAEA cooperation in establishing national nuclear infrastructure to support Rooppur NPP project.

2010:

- A Framework Agreement on cooperation in the field of the use of nuclear energy for peaceful purposes signed on 21 May 2010 between Bangladesh and Russian Federation.
- Steps toward establishment of Bangladesh national nuclear power infrastructure in light of the IAEA Milestones document. The Nuclear Energy Programme Implementing Organization (NEPIO) was formed in the form of high level governmental committees.
  - A National Committee on 'Rooppur NPP' under the leadership of the Hon'ble Prime Minister was formed to provide directives for proper implementation of the Rooppur NPP project and establishment of national nuclear power infrastructure.
  - A Technical Committee on 'Rooppur NPP' headed by the Hon'ble Minister, Ministry of Science and Technology was formed to coordinate, monitor and supervise the progress of the activities of Rooppur NPP project activities and infrastructure development and also provide recommendations for the National Committee.

- A Working group on 'Rooppur NPP' headed by Secretary, Ministry of Science and Technology was formed to coordinate and monitor the activities of different ministries/organization for the development of Rooppur NPP project and national nuclear infrastructure based on the IAEA guidelines.
- Eight Sub-Working Groups were formed to monitor, coordinate and address the conditions of specific infrastructure issues according to the IAEA guidelines for national nuclear infrastructure development.

- The National Parliament of Bangladesh adopted a decision on 10 November 2010 for immediate implementation of nuclear power project.

Parliamentary Decision on NPP Construction

- Hon'ble DG of IAEA, Mr Yukiya Amano visited Bangladesh on December 2010 and assured his kind support for implementation of Rooppur NPP project.

Hon'ble Prime Minister Sheikh Hasina with DG, IAEA Mr. Amano in Dhaka

2011:

- The 1st meeting of the National Committee on Rooppur NPP Headed by the Hon'ble Prime Minister held on 2 March 2011; decision on implementation of Rooppur NPP project under government ownership has been taken.
- IAEA Preparatory Mission for Site Evaluation visited Rooppur NPP site in 10-14 July 2011 and provided recommendations for characterization of Rooppur site.

IAEA Preparatory Mission for Site Evaluation

- The INIR mission of the IAEA conducted during the period 09-15 November 2011 to review and provide recommendations for the national nuclear power infrastructure focusing on the Phase-I and Phase-II activities of the IAEA Milestones documents.

IAEA INIR Mission 2011

Signing of Agreement Between Russian Federation and Bangladesh Government on Cooperation Concerning the Construction of Rooppur NPP.

- An Inter-Governmental Agreement (IGA) between the Government of the People's Republic of Bangladesh and the Government of the Russian Federation on cooperation concerning the construction of Rooppur NPP signed on 2 November 2011. The IGA appointed BAEC as the Customer and JSC Atomstroyexport as the Contractor of Rooppur NPP.

2012:

- An Inter-Agency Agreement between the Russian nuclear regulatory body Rostechnadzor and Ministry of Science and Technology, Bangladesh signed on 27 February 2012.
- The 2nd Meeting of the National Committee on Rooppur NPP Headed by the Hon'ble Prime Minister held on 14 June 2012; a decision on implementation approach and funding & financing mechanism of Rooppur NPP project has been taken.
- An Integrated Work Plan (IWP) for Bangladesh nuclear infrastructure development for the period 2012- 2015 developed in May 2012 based on the INIR mission findings and the scope of IAEA cooperation for implementation with the IWP identified.
- Bangladesh Government passed Bangladesh Atomic Energy Regulatory Act, 2012 in the National Parliament on 19 June 2012 is to regulate the atomic energy and its management in Bangladesh.

2013:

- An Intergovernmental Credit agreement signed between the Government of the People's Republic of Bangladesh and the Government of the Russian Federation on 15 January, 2013 for provision of a $500 million Russian credit loan for financing the preparatory phase activities of Rooppur NPP.

Hon'ble Prime Minister of Bangladesh Sheikh Hasina and Hon'ble President of Russian Federation Vladimir Putin During the Signing of Financial Agreement

- An Independent nuclear regulatory authority, "Bangladesh Atomic Energy Regulatory Authority" formed on 12 February 2013.
- The Annual Development Project "Construction of Rooppur NPP (First Phase)" Project approved in 2 April 2013 for preparatory stage construction activities of Rooppur NPP.

- BAEC and JSC Atomstroyexport signed the First Contract on the Feasibility Evaluation, Site Engineering Survey and Environmental studies and Environmental Impact Assessment of Rooppur NPP on 27 June 2013.
- The 3rd Meeting of the National Committee on Rooppur NPP Headed by the Hon'ble Prime Minister held on 7 August 2013; a decision for acquisition of additional 800 acre land for Rooppur NPP project has been taken.
- Nuclear Industry Information Centre inaugurated at Bangabandhu Sheikh Mujibur Rahman Novo Theatre campus on 1 October 2013 to provide information on atomic energy to the general people.
- Hon'ble Prime Minister of Bangladesh Sheikh Hasina laid the foundation stone for the Construction of Rooppur NPP (1st Phase) Project on 2 October 2013.

Hon'ble Prime Minister Sheikh Hasina Laid the Foundation Stone for the Construction of Rooppur NPP

- BAEC and JSC Atomstroyexport signed the Second Contract for development of the design documentation, first priority working documentation and necessary engineering survey for Rooppur NPP signed on 2 October 2013.

2014:

- Bangladesh Atomic Energy Commission and JSC Atomstrouexport signed the Third Contract "Performance of First Priority Works for the Preparatory Stage of. Rooppur NPP Construction" on 5 June 2014.
- The first meeting of Joint Coordination Committee (JCC) under the IGA between the governments of the Russian Federation and Bangladesh held on 22-23 July 2014 in Moscow; decisions to start consultations for signing General Contract for Rooppur NPP Construction and Inter Governmental Credit Agreement has been taken.
- The first-round consultation on the framework of the General Contract between BAEC and JSC Atomstroyexport held in Dhaka in December 2014.

2015:

- Bangladesh Nuclear Power Plant Ordinance was passed on 26 September 2015 to set up the Nuclear Power Company of Bangladesh as the NPP operating Organization including Rooppur NPP.
- Nuclear Power Plant Company Bangladesh Limited (NPCBL) started functioning through its first board meeting on 23 August 2015.
- Bangladesh Nuclear Power Plant Act, 2015 was passed in National Parliament on 16 September 2015.
- Bangladesh Atomic Energy Commission and JSC Atomstroyexport signed General Contract for Rooppur NPP Construction on 25 December 2015. The contract price is $12.65 billion in which 90% funded by a loan from the Russian government.

Signing of General Contract for Rooppur NPP Construction Between BAEC and JSC ASE

2016:

- The 4th Meeting of the National Committee on Rooppur NPP Headed by the Hon'ble Prime Minister held on 3 February 2016; decisions for establishing Physical Protection System of Rooppur NPP, Communication System, transportation infrastructure has been taken.

Fourth National Committee Meeting

Hon'ble Prime Minister Observing the Model of Rooppur NPP Residential Village

- IAEA conducted a follow-up INIR mission in Bangladesh to assess the progress and assist in prioritizing further infrastructure development activities based on recommendations and suggestions provided by the 2011 INIR mission from 10-14 May 2016.

Follow-up INIR Mission of IAEA in Dhaka, Bangladesh 2016

- Bangladesh Atomic Energy Regulatory Authority Issued Siting Licence of Rooppur NPP on 21 June 2016 for the Rooppur Nuclear Power Plant.

Siting Licence Ceremony for Rooppur NPP

- The second meeting of JCC under the IGA between the governments of the Russian Federation and Bangladesh held on 21-22 June 2015 in Dhaka; a time bound decisions for signing General

Contract for Rooppur NPP Construction and Inter Governmental Credit Agreement has been taken.

- Bangladesh and Russian governments signed the Intergovernmental Credit Agreement amounting to 11.38 billion USD (Eleven Billion Thirty Eight Million) for the construction of the Rooppur NPP against the total cost of 12.65 billion USD on 26 July 2016.

Second Joint Coordination Committee Meeting at Dhaka

Signing of State Export Credit Agreement between the Government of the Russian Federation and the Government of the People's Republic of Bangladesh

- The Executive Committee of the National Economic Council (ECNEC) approved "Construction of Rooppur NPP" Project on 6 December 2016 with an estimated cost of Taka 1,13,092.91crore.

ECNEC Approved the Construction of Rooppur NPP Project

2017:

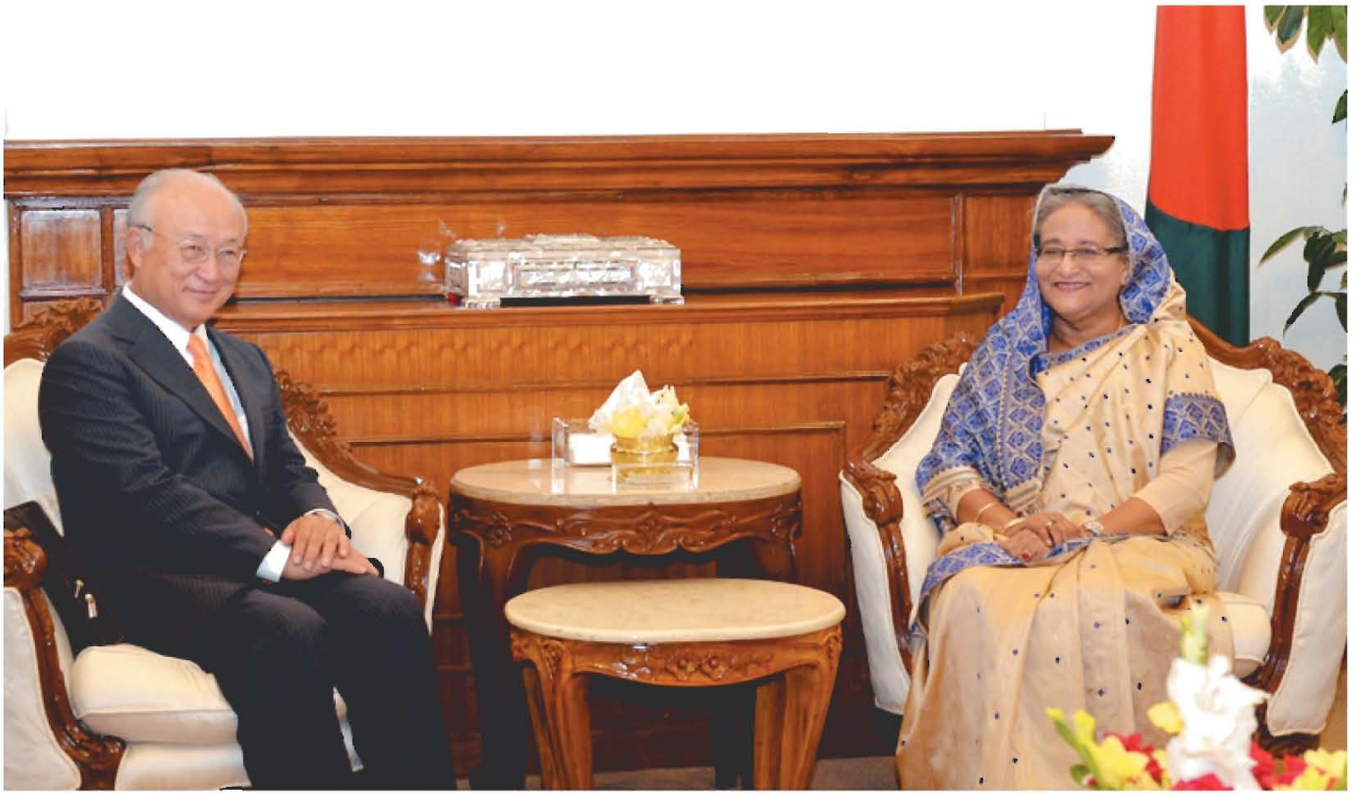
- Agreement between the government of the Russian Federation and the government of the people's republic of Bangladesh on "cooperation concerning return of spent nuclear fuel from Rooppur nuclear power plant to Russian Federation" has been signed on 30 August 2017.

Signing of Agreement Concerning Return of Spent Nuclear Fuel from Rooppur NPP to Russian Federation

- An inter-governmental agreement between the government of the people's republic of Bangladesh and the government of the republic of India on "cooperation in the peaceful use of nuclear energy" and an inter-agency agreement between Global Centre for Nuclear Energy Partnership (GCNEP), department of atomic energy, the government of India and Bangladesh Atomic Energy Commission (BAEC), ministry of science & technology, the government of the people's republic of Bangladesh on "cooperation regarding nuclear power plant projectsin Bangladesh" have been signed on 8 April 2017.
- Hon`ble Prime Minister H.E. Sheikh Hasina addressed the opening session of "Conference on the IAEA Technical Cooperation Programme: 60 years and Beyond- Contributing to Development" on 30 May 2017 in Vienna, Austria.

Hon`blePrime Minister Sheikh Hasina in Vienna to Deliver Opening Speech in IAEA TC Conference

- Director General of the International Atomic Energy Agency (IAEA) H.E. Mr. Yukiya Amano paid a visit to the site of the Rooppur NPP project in Pabna, Bangladesh on 03 July 2017. Mr. Yukiya Amano expressed his satisfaction over compliance in implementing RooppurNPP Project adding that Bangladesh is constructing the plant considering high standard security measure. During his four-day official visit, the IAEA Director General called on the Hon`ble Prime Minister Sheikh Hasina and Hon`ble Foreign Minister AH Mahmood Ali. Mr. Amano also held talks with Hon`ble Minister for Science and Technology Architect Yeafesh Osman.



IAEA Director General Yukiya Amano called on the Hon`ble Prime Minister Sheikh Hasina During Visit in Bangladesh

IAEA Director General Yukiya Amano Visited the Rooppur NPP Project Site

PREPARATORY STAGE ACTIVITIES OF ROOPPUR NPP CONSTRUCTION

The introduction of nuclear power into a country is accompanied by the need to build appropriate nuclear infrastructure for construction and operation of NPP in order to comply with the obligations for the peaceful uses of nuclear energy with regard to safety, security and safeguards.

BAEC conducted Site Investigation of Rooppur NPP project for confirming its suitability through involving national institutions during 2009 - 2012. The Site Report of Rooppur NPP for prepared based on the site specific issues, namely demographic, transport, electric grid conditions, geotechnical, meteorological, morphological and hydrological features of the site.

The baseline data for environmental assessment were prepared. The IAEA Siting Mission (July 2011) was provided with the site reports and the mission recommendations for detailed investigations of the geotechnical aspects and geomorphology, hydrological hazards and river morphology based on the IAEA guidelines. After Fukushima NPP accident, it is given special emphasis on the site safety aspects and engineering solutions to increase resistance of plants to extreme events and cliff edge effects are required. The vendors are encouraged to revise safety features-into their designs with adequate features to increase robustness of their designs to extreme natural events. The site reports were also informed to the vendor organization of the Russian Federation.

The most significant preparatory stage activities of the NPP project are site characterizations and environmental studies, Environmental Impact Assessment (EIA) and comprehensive feasibility study of NPP project/feasibility evaluation (FE). These studies are performed based on relevant domestic acts, regulations and guidelines, the techno-normative requirements the vendor country and the IAEA guidelines with regard to safety assurance of the construction site.

The JSC Atomstroyexport of Russian Federation was assigned responsibilities for performance of these studies based on the techno-normative requirements of the Russian Federation, the applicable rules and regulations of Bangladesh and the IAEA Siting Mission recommendations and IAEA guidelines. The seismic monitoring station, aero-meteorological and chemical monitoring stations were installed at the project site. JSC Atomstroyexport performed necessary studies/ surveys to obtain the reliable input data on the natural and anthropogenic conditions of the construction area and site for elaboration of Feasibility Evaluation, including EIA, and carrying out site engineering survey and environmental studies for the development of the package of the documentation, which were used by BAEC for obtaining licenses required for Rooppur NPP.

The documentations and materials obtained through these studies were used for developing the detailed reports for the investment project for construction of Rooppur NPP. The results of the studies are used for space planning and design solutions for the most complicated and safety related NPP buildings and structures and their protection engineering, as well as on "Rooppur" NPP components layout. The obtained materials and data will be used to produce and maintain a validated, referenced bank of data that can be used during the life time of the Rooppur NPP.

Rooppur NPP Site at Pre-Project Time

The JSC Atomstroyexport also assigned for the development of the design documentation of Rooppur NPP including Preliminary Safety Analysis Report (PSAR); Probabilistic Safety Analysis (PSA) Report and QA Programme and the first priority design and construction documentation and first priority working documentation for Rooppur NPP. The detailed site engineering and environmental studies for the design stage were performed to evaluate the site specific seismic design basis parameter and other site specific parameters particularly, relating to floods, temperatures, winds and other meteorological parameters as well as man-induced hazards for finalization of NPP layout drawings (general location plan and general layout); finalization of principal layout and structural solutions for the most complicated and safety related buildings/structures of the NPP and their engineering protection; assessment of impact of the NPP buildings and structures on the environment and population (natural environment, underground waters and water eco-system) at the design stage, first priority working documentations, elaboration of PSAR chapters and elaboration of necessary documentation. A Technical Assignment (TA) for elaborate design documentation of Rooppur NPP Unit-1 and Unit-2 based on AES-2006 type (Novovoronezh NPP-2) NPP with VVER-1200 reactors

has been developed by the General Designer of the Rooppur NPP and the Contractor, JSC Atomstroyexport bears all responsibility for implementing the safety requirements in the design documentation. The TA establishes the scopes, requirements and provisions for development of design documentation for construction of Rooppur NPP, Units 1 and 2. BAEC submitted to Bangladesh Atomic Energy Regulatory Authority (BAERA) the relevant documentations on principal layout and structural solutions for the most complicated and safety related buildings/structures and their engineering protection, PSAR Chapters, PSA Reports, QA documents and training policy documents for the operator and maintenance personnel required for obtaining of license(s) for construction of the Rooppurt NPP.

Meeting for Design Documentation Review

BAEC also appointed JSC Atomstroyexport for performance of first-priority construction and erection works of preparatory stage prior to the "First concrete" and completion of the works for the preparatory stage of Rooppur NPP construction. Working documentation for Pioneer and Construction-Erection Base-1 (CEB-1) and Industrial base developed and first-priority working documentation including documentation for provision of the "first concrete" developed. The physical works of the preparatory stage are civil and construction works at pioneer base and CBE-1 which are mainly land development temporary motor roads, office and administrative buildings, engineering buildings, integrated parking area, storage area for equipment and materials, garage, domestic building, truck mounted mixer and motor transport washing station, domestic fire water pipeline etc. The other works include the development of pit for Unit 1 and Unit 2 is completed.

Special Moment after Completion of Pit Development for Unit 1 and Unit 2

Soil improvement works for main buildings of nuclear island and turbine island of Unit-1 & 2 and development of the other industrial base is on th way of completion.The target of the First Concrete of the Unit 1 is the October 2017. In addition to the civil and construction works at the Rooppur NPP site, the construction of accommodation facilities for contractor personnel and customer personnel, electrical and service facilities are also in line with construction schedule. Works are being performed with participation of Russian and Bangladeshi subcontractors.

Mechanical Workshop Facility

Pioneer Base Area (Surveyor Base)

Residential Area (Green City) for Russian Experts

CONSTRUCTION OF ROOPPUR NPP (2016-2025)

BAEC signed a General Contract for Rooppur NPP Construction with JSC Atomstroyexport, Russian Federation on 25 December 2015. The Subject of the General Contract is the construction of the Rooppur nuclear power plant which will be an AES-2006 type (Novovoronezh NPP-2) NPP consisting of two power Units (Unit 1 and Unit 2) with VVER-1200 reactors. Under the provisions of the General Contract for Rooppur NPP construction, the Contractor will perform the following activities:

- Detailed design and working documentation required for construction of Rooppur NPP Unit 1 and Unit 2;
- Equipment and materials supply and transportation up to construction Site and establishment of jetty ;
- Civil and erection Works for the construction of the NPP Units, including the Works for the installation of the Equipment and process systems;
- Tests, Start-up and Adjustment Works, development of the required adjustment documentation, commissioning, technical support during the Guarantee period of the NPP operation ;
- Engineering works for Project Management of the NPP Units construction;
- Warranty operation;
- Supply of initial load and two reloads of nuclear fuel supply;
- Training of Rooppur NPP operation and maintenance personnel;
- Development of NPP industrial site and erection and assembly base-2;
- Establishment of radiation monitoring and emergency response requirements;

The contractor is responsible for supply of equipment, devices, instruments and materials of equipment, nuclear fuel and also for providing training to the project management team and the NPP operational and maintenance personnel. The Project Management Unit of the General Contractor will execute the project activities in accordance with the Calendar time. The schedule of the construction of Rooppur NPP is as follows:

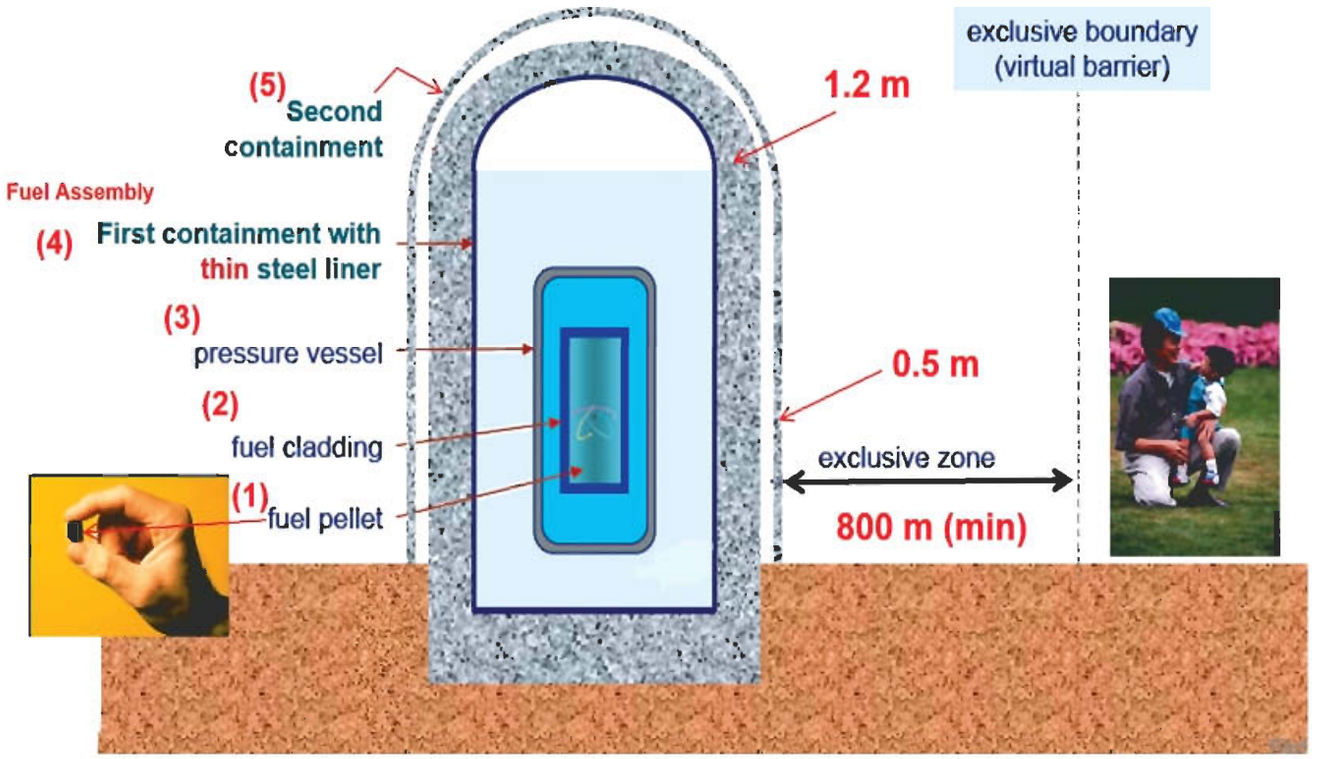
Schedule of Licensing for Construction of Rooppur NPP (Unit-1 and Unit-2)

	Duration (m)	Start	Finish	2017 Q1	Q2	Q3	Q4	2020 Q1	Q2	Q3	Q4	2021 Q1	Q2	Q3	Q4	2022 Q1	Q2	Q3	Q4	2023 Q1	Q2	Q3	Q4
Licensing	88	31.07.16	07.10.23	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Dev. & Sub of Doc required for Construction License																							
Obtaining Construction License (U1&U2)	12	31.07.16	31.07.17	■	■	■	■																
Dev. & Sub of Doc required for Operation License (U1)	12	14.10.20	08.10.21									■	■	■	■								
Obtaining Operating License (U1)	12	09.10.21	03.10.22													■	■	■	■				
Dev. & Sub of Doc required for Operation License (U2)	12	18.10.21	12.10.22													■	■	■	■				
Obtaining Operating License (U2)	12	13.10.22	07.10.23																	■	■	■	■

Rooppur NPP Unit 1 and Unit 2 has been designed based on AES-2006 (VVER-1200) with elaboration of construction, commissioning and operation experience of Novovoronezh-II by adopting site specific safety features. The design basis for safety features and for the design of all other items important to safety that are necessary for preventing such conditions from arising; or, if they do arise, for controlling them and mitigating their consequences has been defined.

The technical provisions for the safety features (both active and passive system) is implemented in Rooppur NPP Unit-1 and Unit-2 design to meet the acceptance criteria established for design extension conditions. These provisions ensure back-up for all safety functions needed to prevent the progression of beyond design basis accidents to Fukushima-like scenarios.

Containment Building is the Single Most Inportant Part of the Multiple Barriers Provided Against Radioactive Release



5 Layer of Safety Barriers

IAEA COOPERATION FOR NATIONAL NUCLEAR INFRASTRUCTURE DEVELOPMENT

Government of Bangladesh has attached top most priority to generation of electricity in order to achieve the goals of socio-economic development of the country. Through the IAEA supported projects for the long-range national power and energy planning Bangladesh completed national studies by employing the IAEA methodology and tools. On the basis of the studies conducted so far, Nuclear Power has been identified a viable option for generation of electricity and a component of overall generation mix in Bangladesh. Bangladesh has targeted to generate at least 4000 MW electricity from nuclear sources by 2030, which will be about 10% of our total targeted electricity generation (40,000 MW) by that time. In order to achieve that target construction of Rooppur NPP, the first NPP of the country, has been started under bilateral cooperation arrangements with the Russian Federation. Bangladesh is introducing nuclear

energy, a safe, environment-friendly and economically viable source of electricity generation, to meet the increasing demand of electricity and thus unlock our development potentials through enhanced productivity and sustained growth.

The nuclear power programme needs to be supported by the required infrastructures which cover a wide range of issues such as legal and regulatory framework, management, reactor technology, electric grid, strategy for nuclear fuel cycle, management of radioactive wastes, human resources development, financing of the project, nuclear security etc. In order to address those issues, IAEA has developed Milestone guidelines, a very broad and logical approach for building national nuclear infrastructure which is necessary for introduction of nuclear power. Bangladesh adopted the IAEA Milestone guidelines for national nuclear power infrastructure development and strictly followed the recommendations and suggestions of the IAEA.

Nuclear safety is a top priority for Bangladesh. Soon after Fukushima accident in March 2011, Bangladesh gave emphasis on safety issues focusing on site selection and assessment, design of structures, systems and components against site external hazards. The IAEA Preparatory Mission for Site Evaluation of 'Rooppur NPP' site was conducted on 10 -14 July 2011. The mission revealed that the geotechnical aspects and geomorphology, hydrological hazards and river morphology were key aspects for the assessment of Rooppur NPP site. Bangladesh participated in several IAEA events on siting and site evaluation for NPP and had a good opportunity to develop necessary knowledge of site evaluation as well as IAEA safety requirements in the preparation of site evaluation report, which is one of the pertinent supporting documentation in the Site License application. Site engineering survey and environmental investigations of 'Rooppur NPP' site had been conducted. The design basis for natural and human induced external events: design basis earthquakes, design basis floods, design basis meteorological events, aircraft crash and other transportation hazards, explosion, fire, etc. and the radiological impact on the population and on the territory during normal and accidental conditions were analyzed. These studies were conducted based on the IAEA guidelines and preparatory Siting Mission recommendations as well as applicable domestic regulations and techno-normative requirements of the Russian Federation. The codes, guides and standards of the IAEA have been made mandatory in designing, construction, commissioning and operation and maintenance of the Rooppur NPP.

Under the IAEA cooperation, an INIR mission was conducted during 09-15 November 2011 to review the infrastructure issues for the development of national infrastructure for nuclear power programme for both Phases 1 and 2. The mission made 50 recommendations and 20 specific suggestions for developing appropriate infrastructure to build Rooppur NPP in a safe and secured manner. An IWP for the period 2012-2015 was developed that provided the framework for defining all IAEA assistance to national nuclear power development activities, tailored to national needs and reflecting national plans as well as recommendations from IAEA missions. All possible activities/programmes correspond to each recommendation/suggestion and each of the 19 infrastructure elements were included in the IWP focusing on future areas of bilateral assistance of the IAEA. Another IAEA mission on the country's new nuclear power programme visited Bangladesh in October 2013 and met with senior officials and experts from the BAEC and the BAERA to review and update the IAEA/Bangladesh IWP for nuclear power infrastructure development. The team expressed satisfaction and viewed that Bangladesh had responded well to the IAEA recommendations made during the INIR mission in November 2011.

Since 2009 Bangladesh has been implementing the relevant IAEA TC projects for establishing nuclear power and developing infrastructure for the first NPP. Under these TC projects, the IAEA has provided fellowships, scientific visits, training programmes in the areas of project management, technology assessment, funding and financing management, EPC contract development and workforce planning for NPP, etc. Bangladesh participated in various IAEA events, technical meetings, workshops and training courses in different aspects of nuclear infrastructure, namely national position for new nuclear power and the pre-feasibility studies; industrial involvement and localization for new NPP Construction; energy assessment and pre-feasibility/feasibility, financing of NPP, NPP technology assessment; development of EPC contract documents for NPP construction, etc. These activities helped Bangladesh to become knowledgeable customer.

IAEA-BAEC Workshop on Reactor Technology Assessment10-13 March 2014

IAEA-BAEC Workshop on Management of the Nuclear Power Plant in Bangladesh 22-26 June 2014

Bilateral Meeting with DG, IAEA and Minister, Ministry of Science and Technology during IAEA General Conference 22-26 September 2014

IAEA Expert Mission on Management System for NEPIO and Future Operator 4 -7 October 2015

The PC-based generic VVER-1200 training simulator facility has been established at Rooppur NPP project office, Dhaka with the help of IAEA. A two week (19-30 June 2016) long training and site acceptance test was held that enabled the project personnel to operate and maintain the facility independently. Presently, this facility is being used for education programme of nuclear Engineering Department of Dhaka University and training programme of the fresh professional of Rooppur NPP project.

The IAEA organized a workshop on developing inspection programme and QC and QA system for construction of NPP, 14-17 May 2017 in Dhaka. These activities will help in implementation of the Rooppur NPP project.

Training and Site Acceptance Test of Generic VVER-1200 Training Simulator

IAEA-BAEC Workshop on Developing Inspection Programme and QC and QA System for Construction of NPP

A follow-up INIR mission was conducted during 10-14 May 2016, to assess the progress of Bangladesh in the requirements and suggestions provided previously. The follow-up mission report concluded that Bangladesh had made a notable progress in implementing the recommendations and suggestions provided by the INIR mission. The IWP for national infrastructure development were updated for the period 2015-2019 with support and cooperation of the IAEA and the areas of cooperation of the Agency for implementation of the IWP were also identified.

Hon`ble Prime Minister H.E. Sheikh Hasina addressed the opening session of "Conference on the IAEA Technical Cooperation Programme: 60 years and Beyond- Contributing to Development" on 30 May 2017. This event highlighted the role of the TC programme in sustainable development, discussed future partnership opportunities and examined the way forward for the TC programme.

Hon`ble Prime Minister Sheikh Hasina focused on the role of IAEA Technical Cooperation (TC) Programme in building technical capacity of Bangladesh on nuclear power, achieving socio-economic development and Sustainable Development Goals (SDGs).

Hon`ble Prime Minister said that Bangladesh regard nuclear energy as a safe, environment friendly and economically viable source of electricity generation to meet the ever-increasing demand of electricity of 160 million people of the country and thus unlock the development potentials through enhanced productivity and sustained growth.

Hon`ble Prime Minister Sheikh Hasina and IAEA Director General Yukiya Amano in Vienna during IAEA TC Conference

Prime Minister also highlighted various pragmatic programmes undertaken by the government for building a science-based 'Digital Society' through proper use of science, technology and innovation.

Hon`ble Prime Minister Sheikh Hasina Visited Bangladesh Exhibition Stall in IAEA (HQ)

IAEA Director General Mr. Yukiya Amano Visited Bangladesh. During his visit Mr Amano said Bangladesh is making significant progress in the construction of its first nuclear power plant. In his courtesy call on the Hon`ble Prime Minister Sheikh Hasina, Mr Amano appreciated the strong political commitment, the public support, and the cooperation by Russia as important indications of the advances made at power plant.

Yukiya Amano said the overall steps relating to the nuclear power plant are much more advanced than he thought about.

The Hon`ble Prime Minister stressed the need for more electricity for the development of Bangladesh and expressed her vision to expand the country's nuclear power programme.

Mr. Amano underscored the IAEA's commitment to assist Bangladesh in achieving sustainable development using nuclear science and technology, in particular the safe and secure use of nuclear energy.

H.E. Yukiya Amano and Minister, MoST Observing the Core Sample of Soil Stabilization Work During Rooppur NPP Project Site Visit

Foreign Minister Mahmood Ali hands IAEA Director General Yukiya Amano a copy of an instrument of acceptance of the Amendment to the Convention on the Physical Protection of Nuclear Material.

DG, IAEA and Minister, Ministry of Foreign Affairs in Dhaka, Bangladesh

DEVELOPMENT OF NATIONAL NUCLEAR POWER INFRASTRUCTURE

1. National Nuclear Power Infrastructure and Formation of Nuclear Energy Programme Implementing Organization (NEPIO)

The introduction of NPP is accompanied by the development and implementation of a wide range of nuclear infrastructure. Nuclear power infrastructure includes all the activities and arrangements needed to set up and operate a nuclear power in order to comply with the national and international obligations for the peaceful uses of nuclear energy with regard to safety, security and safeguards. Bangladesh has a clear understanding about the national obligations and the recommendations, guidelines and obligations of the IAEA for introduction of nuclear power. The country adopted the step-by-step approach for the development of national infrastructure for nuclear power. Bangladesh has already established NEPIO (Nuclear Energy Programme Implementing Organization) in the form of high level committees to coordinate the work of the organizations involved in infrastructure development; created legislative and regulatory framework and established Bangladesh Atomic Energy Regulatory Authority (BAERA), appointed Bangladesh Atomic Energy Commission (BAEC) as the NPP Owner Organization, developed Rooppur NPP Project Management Unit (PMU) for implementation of the project and established Nuclear Power Plant Company Bangladesh Ltd. (NPCBL) as NPP operating organization, introduced nuclear engineering educations at undergraduate and graduate levels in the reputed academic institutions, establishment of nuclear energy information center. The nuclear regulatory authority is undertaking its responsibilities; it is developing the required competency to fulfill its oversight duties in ensuring the highest standards of safety and security. The PMU has experienced in managing the preparatory stage activities of Rooppur NPP and establishing its management systems based on the IAEA guidelines and presently, developing its competency to become a competent one and more responsible and accountable for the management of the Construction of Rooppur NPP. All other newly established departments/organizations have started their activities. The National Committee Chaired by the Hon'ble Prime Minister of the country has assigned responsibilities for providing necessary directives on the ownership pattern, project execution approach, funding mechanism, national nuclear safety and legislative infrastructure development, capacity building of the owner/operator organization and fulfillment all national and international obligations. Besides, the National Committee, a Technical Committee headed by the Minister, Ministry of Science and Technology (MOST) and a Working Group and eight Sub-Groups are also formed under the MOST to monitor and coordinate the activities of the concerned ministries/organizations. A special wing called 'Nuclear Power' to coordinate, implement and monitor the project activities of Rooppur NPP have been formed in the MOST.

There is still considerable work to be done for national nuclear power infrastructure development before the Rooppur NPP is completed and connected to the grid. The key organizations: government (NEPIO), BAEC, PMU, NPBCL, BAERA and relevant organizations are further reviewed the required national infrastructure preparedness and drawn up an action plan on the basis of the past action plan of the 2000; recommendations and suggestions of the INIR Mission of the IAEA in November 2011; the IAEA Milestones document and the revised IAEA Milestone Documents; the Intergovernmental Agreement between the Government of the People's Republic of Bangladesh the Russian Federation for construction of NPP in the territory of Bangladesh signed on 2 November 2011 and the interagency agreement for cooperation in the areas of nuclear safety regulation between Russian Organization and the Ministry of Science and Technology in 2012 and the recommendations of the follow-up INIR mission in May 2016. The specific actions and activities as well as the responsible agencies/ministries were identified for establishing appropriate nuclear infrastructure so as to facilitate implementation of the Government's

decision to generate nuclear electricity by 2022- 23 from the Rooppur NPP. The major specific actions are identified for the following aspects:

1. Development and implementation of the Construction of Rooppur NPP Project
2. Strengthening of National Legislative and Regulatory Infrastructure
3. Establishing nuclear security infrastructure
4. Development of Human Resources for National Nuclear Power Programme
5. Competency development of Nuclear Power Plant Company Bangladesh Limited, the NPP Operating Organization of Bangladesh
6. Establishing Technical Support Organizations
7. Bilateral and International Cooperation

2. Legislative and Regulatory Framework

Bangladesh Atomic Energy Regulatory Act 2012 (BAER Act) was passed by the parliament and signed by the president on 19 June 2012. Based on this Act Bangladesh Atomic Energy Regulatory Authority was established in 12 February 2013. The senior executives namely, Chairman and Members are appointed by the Government. The regulatory body is legislatively and functionally independent and presently, acquiring competence and recruiting manpower. An agreement has been signed between ROSTECHNADZOR and the Ministry of Science and Technology on cooperation in the field of nuclear and radiation safety regulation in the peaceful use of atomic energy on 27 February 2012. In addition, BAERA is also going to start cooperation with AERB, India under bilateral agreement between India and Bangladesh.

3. Nuclear Power Plant Company Bangladesh Limited – the Operating Organization of the NPP in Bangladesh

Nuclear Power Plant Company Bangladesh Limited (NPCBL) has been formed following the Nuclear Power Plant Ordinance, 2015/enactment of the Nuclear Power Plant Act, 2015 (Act No. 19 of 2015). According to the Nuclear Power Plant Act, Bangladesh Atomic Energy Commission is the owner of the NPPs. The NPCBL assumes the responsibility for commissioning and operation of the Rooppur NPP and implementation of other nuclear power projects of the country. The owner (BAEC) and the operator, NPCBL are functioning independently.

The company will provide qualified staff to work at nuclear power plants in Bangladesh including Rooppur NPP. In case of Rooppur NPP, a programme for human resource development has been developed in consultation with the General Contractor and necessary steps have been taken for recruitment and provide them with necessary training in Bangladesh and Russian Federation for work at Rooppur NPP. All manpower will be trained up and made available before commissioning of the first unit.

The company will maintain the physical protection, nuclear safety and radiation protection practices in and around the plant so as to ensure the safety of the plant's employee and public as well environment around the site in accordance with domestic laws, regulations and international practices. It will establish an appropriate emergency plan and maintains necessary response preparedness in this connection as per domestic laws, regulations and IAEA requirements.

4. Human Resources Development for Rooppur NPP Project and Rooppur NPP Operating Organization

4.1 Manpower of Rooppur NPP Project Management Organization

Annual development project for Construction of Rooppur NPP was approved by ECNEC on 06 December 2016. Manpower for project management unit (PMU) for construction and erection work, commission and start-up of Rooppur NPP has been identified in table below.

Manpower for Project Management Unit

Description of category	No of Personnel
Officer	117
Sub Assistant Engineer& Technician	41
Supporting Staff	66
Security Personnel	145
Total	369

A considerable portion of the posts relating to project management is being filled up by engaging experienced personnel working at BAEC and currently involved in the Construction of Rooppur NPP (First Phase) through attachment. They will perform as the key personnel for project management during NPP construction and erection works, commissioning and operational stages of Rooppur NPP. Presently, about 80 personnel of different categories are involved for managing the activities

of the Project. During preparatory stage of construction activities, necessary measures have been taken for developing and strengthening the competency of the utility project management setup of Rooppur NPP project through adopting the utility project management approach and implementation of the integrated project management system of the IAEA. Steps have taken for recruitment the required manpower of the project management.

4.2 Rooppur NPP Operating Organization

The NPCBL will be the Operating organization for Rooppur NPP. The recruitment and training programme for Operating Organization of Rooppur NPP (starting from Commissioning stage to operation and maintenance of the Plant) has been developed for 2017-2022.

Category-Wise Personnel for Rooppur NPP

Category	Description of Categories	No of Personnel	No of Personnel
Key personnel to be trained by the Contractor (Russian Federation) in the frameworks of the General Contract.	Personnel to be licensed for operation and maintenance	116	1424
	Personnel who provide reactor plant operation, perform the works related to fuel handling, radioactive waste and substances handling	372	
	Common-industrial personnel who provide production electrical and thermal energy.	936	
Common industrial personnel as well as general supporting staffs will be trained by the Bangladesh Atomic Energy Commission's (BAEC) trained instructors in Bangladesh as required.	Common-industrial personnel who provide the NPP functioning, production of electrical and thermal energy.	572	1111
	Administrative personnel	236	
	General Supporting Staff	303	
Sub-Total		**2535**	**2535**
Personnel for Head quarter of NPCBL		165	
Total		**2700**	

Total 2700 personnel will be recruited and trained for NPCBL year by year and perform the project management, commissioning and operation & maintenance. Among them 2535 personnel will be engaged to operation and maintenance at Rooppur NPP site and a small group will be worked in Headquarter of NPCBL.

Human Resources for Future Operating Organization

Year-wise recruitment and training programme has been developed under General Contract. Steps has been taken for recruitment of necessary technical personnel for project management and future operating organization, following the time-bound training schedule, as Executive Training (ET). After successful completion of training, the ET will be appointed as a regular employee of NPCBL.

Key personnel (License, Fuel-handling, Safety and Operational) will be trained by the Contractor (Russian Federation) in the frameworks of the General Contract wherein required personnel will obtain license in compliance with Regulatory body .

Administrative and common industrial personnel as well as general supporting staffs will be trained by the Bangladesh Atomic Energy Commission's (BAEC) trained instructors in Bangladesh as required. Instructors will be trained in Russian Federation under the General Contract.

A Joint Training Advisory Commission (JTAC) was formed by both parties (Bangladesh and Russia) for the selection of candidates, arrangement of exams, assignment of positions, quality assessment, training of personnel for Rooppur NPP. Several JTAC meetings will be conducted every year for smooth implementation of the training programme. 59 personnel are identified for the first phase of 2017. Among them 19 for Capital Construction, 24 for Training Centre and 16 for Operation;

4.3 Manpower for National Nuclear Infrastructure Development

From the very early phase of NPP in Bangladesh, IAEA provided different fellowships, scientific visits, training etc. to the development of human resources for implementation of national nuclear power programme. More than 300 participations were made from BAEC in the area of project management, state governance and regulation in NPP, infrastructure policy in the technical area, contracting, public communication, human resources and trained under IAEA programme.

A higher education programme for nuclear physics engineering have been developed and being

implemented. About 50 students were sent to Russian Federation to study Nuclear Engineering at MEPhI (Moscow Engineering Physics Institute) under financial support of Government of Bangladesh. More students will be sent this year. They will work for nuclear power programme of Bangladesh after their return.

Dhaka University has established the Department of Nuclear Engineering which began its journey in January 2012. This Department is the first of its kind in Bangladesh. The missions of the Nuclear Engineering Department are to develop high quality nuclear engineers and scientists from undergraduate through the doctorate level who are capable of contributing valuable engineering skills and knowledge toward the design, building and running of Bangladesh's nuclear power plants and to be Bangladesh's center of excellence in nuclear engineering education and research, and to lead Bangladesh's effort to develop its nuclear infrastructure, and to introduce nuclear power as a part of its energy mix.

The Department of Nuclear Science & Engineering of Military Institute of Science and Technology (MIST) has started nuclear engineering education at undergraduate and graduate level.

88 BAEC personnel have been completed Foundation Course on Nuclear Energy (FCNE) in India for Rooppur NPP project and national nuclear power program. Most of them are working in Rooppur NPP project through attachment from BAEC. This program will be continued.

The Training Institute of BAEC is regularly organizing Basic Orientation Course on Nuclear Science and Technology for newly recruited professionals and some Advanced Courses on NPP Technological Areas in collaboration with international experts.

Training Institute, AERE, Savar, Dhaka.

5. Public Communication Strategy and Stakeholder Involvement

Information and communication on nuclear power development is an important task that should be carried out systematically, frequently, continuously in long term to raise proper awareness, public consensus, to develop safety culture to contribute to the success of nuclear power development programme. Development and enforcement of a national nuclear public information policy and establishment and realization of a national long term and systematic public communication strategy are critical issues for successful implementation of nuclear power project. Bangladesh addresses the nuclear power public information policy issue in the Bangladesh Atomic Energy Regulatory Act of 2012. Bangladesh Nuclear Power Communication Strategy 2015-2021 has been formulated in collaboration with the vendor country and IAEA assistance for stakeholder management as well as implementing programme on popularizing basic knowledge of nuclear power development, the features, nature and socio-economic benefits of nuclear power; the history, achievement, experience, trend and status of nuclear power development in the world; the need of developing nuclear power. The information and communication activities are being conducted in accordance with the progress of the Rooppur NPP Project and the future nuclear power projects.

A communication plan for 2014-15 and 2015-16 were developed and implemented. The implemented programmes were focused on popularizing basic knowledge of atomic energy and nuclear power at schools Rooppur NPP area. A short term communication plan for the period 2017-2018 has been developed and is being implemented. The main targets of this plan are promoting and expanding the activities of the programme on information and communication on nuclear power development to meeting the requirements of construction stages and commissioning of the Rooppur NPP Unit 1 and Unit 2.

Bangladesh established and putting into operation the nuclear industry information centre at Novo Theatre campus on 1 October 2013 for direct information and communication on atomic energy to the general people.

Inauguration of Nuclear Industry Information Centre on 1 October 2013

Steps have been taken to establish the Counselling Office of Rooppur NPP near the construction site. There will be a head of the Counselling Office and visitor relations manager. The key tasks of the office are to provide answers to the questions about Rooppur NPP construction and nuclear energy in general; provide information and assistance with an exchange of opinions on NPP safety, security, radiation and environmental protection, management of radioactive waste and spent fuel management and organize a range of educational activities and events for the local community.

Decision has been taken to establish Public Council involving civic organizations in the policy making process for nuclear power utilization, environmental protection and radiation safety. The Council includes scientists and academicians, members of civic and environmental organizations and local and national journalists, prominent figures all of whom participate on a voluntary basis. A preliminary structure of the Public Council has been formed headed by the Minister, Ministry of Science and Technology.

- An international seminar on "Nuclear Power: A Chance of Successful Economic and Socio-political Development" was held on 29-30 May 2013 in Dhaka, Bangladesh.

An international Seminar Inaugurated by Hon'ble Prime Minister

- Rooppur NPP project personnel participated the Power and Energy fair on 10-12 December 2015 organized by ministry of power energy and mineral resource, Bangladesh to introduce nuclear energy to general people.
- An art competition and photo exhibition on 'Children & Atom' was held in nuclear energy information centre, Dhaka on 28 March 2016.

Rooppur NPP Booth in Power and Energy Fair 2015

Art Competition and Photo Exhibition on Nuclear Energy

- Regular visits and open dialogues have been arranged for media personnel to inform about the development of prioritized project of prime minister. Recently on 9 April 2016 a tour of a media team comprising journalists of more than 85 print, electronic and online media was organized. The media personnel visited Rooppur NPP site to see the construction activities and exchanges views with project management personnel.

Rooppur NPP Site Tour of Media Personnel

- A series of site visits and open dialogue with project management team have been organized for national and local government officials, head of the business and industries, media and leaders of non-governmental organizations.

Rooppur NPP Site Visit of High-Level Decision Makers

Novovoronezh NPP Visit of Senior Secretaries and Secretaries of Different Ministries of the Government (10-15 May 2016)

- Regular visits of nuclear power plants have been organized for high officials from different ministries and relevant organizations. Recently several high level teams comprising responsible personnel of different ministries visited reference plant of Rooppur NPP (Novovoronezh NPP) to get clear idea on over all

features (Safety, Security, Safeguard etc.) of NPP which is being implemented in Bangladesh.

Novovoronezh NPP visit of Senior Secretaries and Secretaries of Different ministries of the Government (15-20 May 2016)

Visit of Project Personnel under IAEA Scientific Visit and Fellowship Programme, June 2016 Rosatom CICE&T, Obninsk, Russian Federation.

MEPhI Student Visited Rooppur NPP Site on 20 August 2017

- Several group of mass media personnel visited Novovoronezh NPP to gather knowledge regarding reference plant of Rooppur NPP so that they can enhance public awareness about benefits of nuclear power.
- Rooppur NPP project participated exhibition stall in 11th National Rover Moot held in Tungipara and Gopalganj from 25-31 January 2017 for the awareness to nuclear power programme in the country.

A Group of Rover Scouts Ready for Facing their Challenge

- Regula visits for university students are arranged to know practically about the activities of Rooppur NPP project.

Students from the Department of Nuclear Engineering, University of Dhaka Visited Rooppur NPP Project Site on 29 March 2017.

- Regular programme to encourage and involve the local people in the activities under the awareness programme of Rooppur NPP project are arranged. A colorful rally of Pohela Boishakh (14 April 2017) was arranged by the students of Rooppur high school.

A Colorful Rally Arranged by the Students of Rooppur High School

6. Security and Physical Protection

Nuclear "Security & Physical Protection System (PPS)" for Rooppur NPP is the national responsibility. Bangladesh has taken necessary steps to implement, maintain and sustain a Nuclear Security Infrastructure (NSI) for an effective and appropriate nuclear security regime. A program for Security and PPS for Rooppur NPP has been established. A Working Group (WG) comprising experts from various national security & law enforcement agencies has been formed to develop Design Basis Threat (DBT) following the IAEA guidelines, BAERA provisions as well as applicable other domestic regulations. The DBT documents has been finalised and approved by the appropriate authority. This DBT document is the policy document for developing PPS system for Rooppur NPP. The Conceptual Design of the PPS of Rooppur NPP has been developed based on DBT document which is approved by the Government. Based on the DBT and Conceptual Design of PPS, the construction of PPS for Rooppur NPP will be established. A separate cell namely-Nuclear Security & Physical Protection System Cell (NSPC) from Bangladesh Army has been formed for implementing the construction phase of PPS for Rooppur NPP. NSPC is performed as a coordinator for developed Interim Response Force of Rooppur NPP. The PPS of Rooppur NPP will be fully functional before the loading of first fuel rods for Unit 1 at Rooppur NPP.

7. Formation of Local Monitoring Team

A local monitoring team headed by the Divisional Commissioner of Rajshahi has been formed by the Government to monitor and resolve various local issues for smooth implementation of the project. In addition, this team is also looking after the local security aspects and raising public awareness for Rooppur NPP.

BILATERAL COOPERATION WITH INDIA

An inter-governmental agreement between the government of the people's republic of Bangladesh and the government of the republic of India on "cooperation in the peaceful use of nuclear energy" and an inter-agency agreement between Global Centre for Nuclear Energy Partnership (GCNEP), department of atomic energy, the government of India and Bangladesh Atomic Energy Commission (BAEC), ministry of science & technology, the government of the people's republic of Bangladesh on "cooperation regarding nuclear power plant projects in Bangladesh" have been signed on 8 April 2017. Following scope of services are identified under the agreement:

- Department of Atomic Energy (DAE) through GCNEP would provide training services to BAEC personnel for supervision of design, construction, commissioning, quality assurance, operation and other related activities of Rooppur Nuclear Power Plant (Rooppur NPP) project;
- GCNEP would also provide consultants and owner's engineers for different agreed activities related to Construction of RooppurNPP Project as per the requirement of BAEC;
- Services will be provided by GCNEP to BAEC on cost basis and on non-profit principles, for which BAEC will reimburse to GCNEP expenses related to institutional overheads incurred in the course of implementing this Inter Agency Agreement (IAA);
- An empowered Programme Management Board (PMB) will steer the implementation of this IAA. The PMB will have equal members from both Parties and will be authorized to take all decisions related with operationalization of this IAA;

OTHER NON-NUCLEAR INFRASTRUCTURE

- Power Grid Company of Bangladesh (PGCB) is engaged to carry out grid studies for the modification and upgrading of the grid system specifically related to the inclusion of the NPP with the assistance of Russian concerned organization.
- Bureau of Economic Research (BER), Dhaka University worked for socio economic impact assessment of Rooppur NPP.
- Bangladesh Inland Water Transport Authority (BIWTA), Bangladesh Railway and Roads and Highway department are engaged to improve communication system for the transportation of equipment to Rooppur site according to transportation plan.
- Public Works Department (PWD) is assigned to construct the residential village at Rooppur NPP site.
- Bangladesh Telecommunication Company Limited (BTCL) has been working to set up external communication system for Rooppur NPP.

Photographs of Recent Development

General View of Rooppur NPP Project Site

A Part of Construction and Assembly Base-1

General Contractor's Office Building in CAB-1

Construction Laboratory at CAB-1

Engineering and Personnel Facilities Building for 400 Persons at CAB-1

Sand Blasting, Painting and Anti-Corrosion Shop at CAB-1

Construction Embankment (800 Acre Land) of CAB-2

Soil Mass Stabilization Work at Industrial Base Under Unit 1

Industrial Base (Excavation of Pit-2)

Concrete Bedding of Unit 1

Rooppur NPP Residential Village

Rooppur Nuclear Power Plant Project Brochure, September 2017

Prepared by Mohammad Shawkat Akbar, Project Director
Construction of Rooppur Nuclear Power Plant (First Phase) Project and
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