



**Status & Development Outlooks for the
Russian Nuclear Power & Nuclear Fuel Cycle up to 2035**

SC Rosatom Plans & IBR™ Forecasts

**International Business Relations, LLC (IBR™)
Department of Nuclear Power & Nuclear Fuel Cycle**

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ABOUT INTERNATIONAL BUSINESS RELATIONS, LLC (IBR™)

INTERNATIONAL BUSINESS RELATIONS, LLC (IBR™) was set up in 1991 by a group of researchers and engineers who previously worked at enterprises under the USSR Ministry of Atomic Power and Industry. IBR™ is specialized in rendering consulting and engineering services along with project management services in nuclear power and nuclear fuel cycle. Leading Russian and foreign companies, as well as state organizations, are constant clients of IBR™. The IBR™ successful activities are based on high professionalism of the company staff, which implies:

- Deep knowledge of technologies and operational experience in nuclear power engineering and nuclear fuel cycle;
- Knowledge of the tools for economic and investment analysis of nuclear technologies;
- Experience in successful management of “nuclear” projects.

IBR™ strives for expansion and intensification of cooperation with its constant clients and welcomes collaboration with new clients in the interests of further improvement of safety and economic efficiency of nuclear technologies.

ABSTRACT

This report contains:

- Comprehensive critical analysis of the formal strategies, programs and plans of the Russian nuclear power and nuclear fuel cycle development up to year of 2035;
- IBR™ forecast of the actual rates of the Russian nuclear power and nuclear fuel cycle development up to 2035, bearing in mind the existing and predicted restrictions (political, technical, production, economic and financial ones).

STATUS & DEVELOPMENT OUTLOOKS FOR THE RUSSIAN NUCLEAR POWER & NUCLEAR FUEL CYCLE UP TO 2030. SC ROSATOM PLANS & IBR™ FORECASTS

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ABBREVIATIONS

IFA	Irradiated Fuel Assembly
FA	Fuel Assembly
JSC	Joint-Stock Company (open type)
MOX	Mixed-Oxide Fuel (U-Pu fuel)
NTP NP	New Technological Platform of Nuclear Power
NFC	Nuclear Fuel Cycle
PCO	Pilot commercial operation
PDC	Pilot-Demonstration Center
RBMK SNF Storage-2	“dry” storage facility for SNF RBMK-1000 at MCC
SC “Rosatom”	State Corporation for Atomic Energy “Rosatom”
SNF	spent nuclear fuel
SFUE	State Federal Unitary Enterprise
VVER SNF Storage-1	“wet” storage facility for SNF VVER-1000/1200/1200M at MCC
VVER SNF Storage-2	“dry” storage facility for SNF VVER-1000/1200/1200M at MCC

EXECUTIVE SUMMARY

1. A conceptual and program base for nuclear power and nuclear fuel cycle development for the period up to 2030 was formed in Russia in 2006-2008.
2. In 2009-2016 years, SC “Rosatom” updated programs for development approved in 2006-2008 under the impact of the world economic and financial crisis of 2008-2010, Fukushima accident, Russian financial and economic crisis started in 2014, and as a result of reassessment of its own capabilities and market requirements.
3. SC “Rosatom” plans for Russian nuclear power and nuclear fuel cycle development dated by 2006 and 2016 correspondently are presented in Table S.1 and S.2.
4. IBR™ made a forecast of the actual rates of the Russian nuclear power and nuclear fuel cycle development up to 2035 in view of the existing and predicted restrictions (political, technical, production, economic, financial and marketing ones) – Table S.3.
5. According to IBR™ analyzing, comparison of ROSATOM's plans with the predicted results has shown that ROSATOM's plans, dated 2016, seem – in general – more realistic as against those made up in 2006-2008. However, in some positions relating to the nuclear fuel cycle (e.g. mining of natural uranium or growth of uranium enrichment capacities), ROSATOM's plans are still overestimated.
6. The revision of the Russian nuclear power and nuclear fuel cycle development programs that took place in 2009-2016 years, confirms correctness of IBR™ conclusions made in the previous reports on essential overstatement of the development programs target figures dated 2006-2008.

Table S.1

SC “Rosatom” plans (2006) for the Russian nuclear power and nuclear fuel cycle development up to 2030

Parameter	Year		2030 vs. 2006
	2006	2030	
Installed electric capacity (gross) of the Russian NPPs, GW	23.2	82.3	3.5
Uranium production, tons/year	3,190	21,100	6.6
Installed capacity of the conversion industry, tons/year	25,000 ¹	45,000 ²	1.8
Nominal capacity of the enrichment industry, mln. SWU/year	23.5	50.5	2.1
Installed capacity of the nuclear fuel production (fuel pellets), THM per year	1,890	3,400 ³	1.8
Installed capacity of FA fabrication for the VVER-1000/1200/TOI, pieces per year	2,700	4,260 ⁴	1.6
Installed capacity of the RBMK-1000 SNF central storage facility, FA pieces	-	235,620	-
Installed capacity of the VVER-1000/1200 SNF central storage facilities, FA pieces	18,392	53,236	2.9
Installed capacity of the SNF reprocessing plants, THM per year	400	1,800	4.5

¹25,000 – Stands for the frequently quoted maximum capacity of the Russian uranium conversion industry corresponding to the 80s of the 20th century (refer to comments in the text of report below).

² In case JSC “NAC “Kazatomprom” will construct the uranium conversion plant in Kazakhstan, then the value Russian uranium conversion industry installed capacity that has been planned, should be decreased at 10,000-15,000 tons.

³ 2020 year.

⁴ 2020 year.

Table S.2

SC “Rosatom” plans (2016) for the Russian nuclear power and nuclear fuel cycle development up to 2035

Parameter	Year		2035 vs. 2015
	2015	2035	
Installed electric capacity (gross) of the Russian NPPs, GW	26.3	43.4	1.7
SC “Rosatom” uranium production assets ⁵ , ton/year	7,800	12,000	1.5
Installed capacity of SC “Rosatom” conversion industry, ton/year	14,200	34,000	2.4
Nominal capacity of SC “Rosatom” enrichment industry, mln SWU/year	27.7	44.8	1.6
Installed capacity of SC “Rosatom” nuclear fuel (fuel pellets) fabrication ⁶ , THM per year	2,600	3,400	1.3
Installed capacity of SC “Rosatom” plants engaged in FA fabrication for VVER-1000/1200/TOI and PWR ⁷ , pieces per year	3,500	5,000	1.4
Installed capacity of SC “Rosatom” SNF centralized storage facilities for the RBMK-1000 FA, pieces of FA	235,620	235,620	1.0
Installed capacity of SC “Rosatom” SNF centralized storage facilities for the VVER-1000/1200 and PWR FA, pieces of FA	53,236	53,236 ⁸	1.0
Installed capacity of SC “Rosatom” SNF reprocessing plants, THM per year	400	1,500 ⁹	3.7

⁵ 100% of natural uranium production by SC “Rosatom” foreign assets is included. Actual output produced by SC “Rosatom” foreign assets, which may be available for SC “Rosatom”, is less than its physical production output.

⁶With regard for 100% of CJSC “Nuclear Fuel Fabrication Plant” (Ukraine) installed capacity.

⁷With regard for 100% of CJSC “Nuclear Fuel Fabrication Plant” (Ukraine) installed capacity.

⁸With due regard for 100% holding capacity of SNF SF-1 (21,680 FA), to be made operational by 2035.

⁹ In view of the RT-1 plant decommissioning by 2030.

Table S.3

IBR™ forecast (2016) of the Russian nuclear power and nuclear fuel cycle development up to 2035

Parameter	Year		2035 vs. 2015
	2015	2035	
Installed capacity (gross) of SC “Rosatom” NPP, GW	26.3	39.4	1.5
SC “Rosatom” uranium production assets ¹⁰ , ton/year	7,800	9,700	1.2
Installed capacity of SC “Rosatom” conversion industry, ton/year	14,200	20-27,000	1.4-1.9
Nominal capacity of SC “Rosatom” enrichment industry, mln SWU/year	27.7	35.2	1.2
Installed capacity of SC “Rosatom” nuclear fuel (fuel pellets) fabrication ¹¹ , THM per year	2,600	2,600	1.0
Installed capacity of SC “Rosatom” plants engaged in FA fabrication for VVER-1000/1200/TOI and PWR ¹² , pieces per year	3,500	4,260	1.2
Installed capacity of SC “Rosatom” SNF centralized storage facilities for the RBMK-1000 FA, pieces of FA	235,620	235,620	1.0
Installed capacity of SC “Rosatom” SNF centralized storage facilities for the VVER-1000/1200 & PWR FA, pieces of FA	53,236	53,236 ¹³	1.0
Installed capacity of SC “Rosatom” SNF reprocessing plants, THM per year	400	1,000 ¹⁴	2.5

¹⁰ 100% of natural uranium production by SC “Rosatom” foreign assets is included. Actual output produced by SC “Rosatom” foreign assets, which may be available for SC “Rosatom”, is less than its physical production output.

¹¹With regard for 100% of CJSC “Nuclear Fuel Fabrication Plant” (Ukraine) installed capacity.

¹²With regard for 100% of CJSC “Nuclear Fuel Fabrication Plant” (Ukraine) installed capacity.

¹³With due regard for 100% holding capacity of SNF SF-1 (21,680 FA), to be made operational by 2035.

¹⁴ In view of the RT-1 plant decommissioning by 2030.