



The IBR uranium, SWU and conversion Long Term Price Forecast (2014-2045)

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Introduction

The natural uranium, uranium conversion and enrichment markets are very closely related to the state and outlooks for global nuclear energy development and, besides, they exert influence on each other. The demand for natural uranium, uranium conversion and enrichment is rather stiffly pegged to the power of operating NPP. However, the stiffness of coherence between the need for natural uranium, uranium conversion and enrichment services and the power of operating NPP is to a certain extent affected by a number of factors, such as:

- Use of accumulated HEU for LEU production by downblending;
- Use of MOX fuel and, possibly, of high-density uranium-plutonium nitride fuel in future;
- Amount of reprocessed SNF and amount of Pu and reprocessed uranium, resulted from SNF reprocessing, and involved into fresh nuclear fuel production;
- National or corporate programs aimed at building up inventory of nuclear materials (natural uranium or LEU) and ready for service FA;
- Natural uranium / uranium enrichment price ratio.

Undoubted advantage and benefit of nuclear energy technologies consist in low specific value of fuel components in the cost of kW·h produced, which, depending on the country and operator, ranges from 6 to 12% of NPP energy sale price, regardless of SNF handling costs. As NPP is a high-value facility, its service life amounting to ~ 60 years, the planning of commercial and logistics aspects of NPP fueling in the long run is a crucial task both for operating organizations and state bodies engaged in the planning of national energy systems development in each country.

This study deals with forecast of prices for natural uranium, uranium conversion and enrichment services for a long enough period, i.e. through year 2045.

All current and forecasting prices given in the study in the prices of January 2014. Russian prices are calculated on the basis of 32 rubles for one US dollar.

1. Forecast of nuclear energy development through 2045

In the 2000-s the booming oil prices and awareness of the need for reducing greenhouse gas emissions along with somewhat subsided public resonance after the Chernobyl disaster, compelled certain countries to analyze the idea of intensive nuclear energy development. The USA, China, Russia and India made public their ambitious plans of new NPP construction with simultaneous life extension of the existing NPP. Japan, South Korea and Taiwan kept up with their construction plans. Developing countries also manifested interest towards NPP construction. No doubt, the Fukushima accident amended the global NPP development plans. World-wide safety inspections of the existing NPP made after the Fukushima NPP accident have not revealed any new fundamental faults of NPP safety. None of the countries exclusive of Japan discontinued operation of NPP. Germany made decision on speeded up NPP decommissioning, nonetheless, the decision to abandon nuclear energy over the long run had been made in Germany before the Fukushima accident. At this point the aftermath of the disaster actually was reduced to uncertainty of the future Japanese nuclear energy as such¹ and a certain delay in

¹ As of early 2014 there is quite a number of "messages" on the part of the Japanese Government that operation of an essential portion of NPP will be continued in Japan. The Japanese NPP under construction will also be completed. In the opinion of some competent Japanese experts, representing both utilities and companies supplying products and services for NPP, ~ 30 shut down nuclear reactors in Japan will be made operational in the period of 2014-2016.

Table 1.1
Forecast of the world nuclear energy development in the period of 2013-2045

Year	NPP installed capacity, MW(e)
2013	341 384
2014	353 644
2015	371 738
2016	391 094
2017	404 100
2018	411 335
2019	420 526
2020	432 671
2021	446 481
2022	451 788
2023	457 205
2024	462 756
2025	470 745
2026	479 419
2027	492 659
2028	505 944
2029	524 899
2030	533 310
2031	545 911
2032	562 275
2033	578 638
2034	595 002
2035	611 365
2036	627 729
2037	644 092
2038	660 456
2039	676 819
2040	693 183
2041	709 546
2042	725 910
2043	742 273
2044	758 637
2045	775 000