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Multilateral Approaches to the Nuclear Fuel Cycle
The First Practical Experiences
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This document is a summary of the forthcoming study of the same name by Anton Khlopkov. It will be available on UNIDIR's website at www.unidir.org.

The dual nature of nuclear energy—the fact that it can be used for both peaceful and military purposes—became clear in the 1940s. In June 1946, Bernard Baruch, US representative to the UN Atomic Energy Commission, urged governments to hand over control and ownership of civil nuclear activities and materials to the International Atomic Development Authority. From the 1950s through the 1980s repeated attempts were made, primarily in the framework of the International Atomic Energy Agency (IAEA), to study the possibility of putting into practice proposals on setting up international centres offering nuclear fuel cycle (NFC) services as an alternative to national programmes. In addition, some states, especially the United States, promoted the idea of multinational NFC facilities instead of national ones. For example, during consultations in the 1970s, the United States insisted that Iran should internationalize its project to build a spent nuclear fuel reprocessing plant and invite Pakistan to join the project. But all such initiatives remained on paper for a variety of reasons, chief among them the inability of states to agree on the specific terms of multilateral approaches. There was little taste for relinquishing the national right to develop some elements of the nuclear fuel cycle enshrined in the Nuclear Non-Proliferation Treaty (NPT).

Amid renewed interest in nuclear energy and the widely predicted nuclear renaissance, over the period of May 2006 through October 2007 several states, groups of states, commercial companies and a non-governmental organization have come up with a total of 12 complementary proposals on multilateral arrangements for the guaranteed provision of NFC services. Most of these proposals focus on assured access to the front end of the NFC.[1]

In January 2006 Vladimir Putin, Russia's second president, put forward the initiative of setting up a system of international NFC centres specializing in four key areas: uranium enrichment, spent fuel management, nuclear training, and nuclear energy research and development. As the first step Russia proposed the creation of an international uranium enrichment facility. In May 2007 Russia and Kazakhstan signed an intergovernmental agreement on creating the International Uranium Enrichment Centre (IUEC). The aim of the project was to provide assured access to uranium enrichment to interested parties without the transfer of any sensitive technology. The role of the IUEC is to cater to the interests of nuclear "newcomer" states, which are only just beginning to develop nuclear energy and whose demand for uranium enrichment services is fairly limited. Participation in the IUEC does not entail any restrictions on the development of national NFC programmes, which the member states are free to pursue within the limits of their NPT obligations.

The purpose of the IUEC is not to offer uranium isotope separation services on a large commercial scale for the subsequent marketing of enriched uranium product. The centre will rely on the existing enrichment capacity of the Angarsk Electrolysis Chemical Complex

1 For information on these proposals see Y. Yudin, *Multilateralization of the Nuclear Fuel Cycle: Assessing the Existing Proposals*, UNIDIR, 2009.

(AECC). As of late 2010, the IUEC had reserved 600,000 SWU[2] of the AECC's annual separation capacity for its own needs. That is enough to refuel five or six 1,000MW light water reactors every year. Ukraine and Armenia have now joined Russia and Kazakhstan as members of the IUEC.

In June 2007, in the context of article 7 of the agreement on setting up the IUEC and in response to IAEA Director General's initiative on assurances of supply of nuclear fuel, Russia put forward another nuclear initiative. It proposed the creation of a guaranteed reserve of low-enriched uranium (LEU) under IAEA control. The idea was to put in place a backup mechanism under IAEA auspices: states which find themselves unable to procure LEU on the open market for political reasons can use the guaranteed reserve as a supply of last resort to keep their reactors running.

In December 2008 the IUEC made delivery on a pilot contract for enriched uranium product. In December 2010 Russia completed the formation of a guaranteed reserve of LEU. The IUEC and the IAEA-controlled LEU reserve are the first proposals on nuclear fuel supply assurances to have been put into practice since the first ideas to that effect were aired in the 1950s.

One of the goals behind the creation of the IUEC and the guaranteed LEU reserve was to overcome the existing scepticism about the feasibility of putting such initiatives into practice, to remove an important psychological barrier that hampers the creation of international NFC centres. In addition, it is safe to say that the IUEC and the guaranteed LEU reserve could provide valuable experience in building practical mechanisms of assured access to NFC services. That experience could be very useful in the future. In fact, some of the solutions developed for the LEU reserve are already being used as part of the project to establish the IAEA nuclear fuel bank, including the eligibility criteria for receiving material from the bank, the transfer of liability for any nuclear damage, etc.

The IUEC can also serve as a prototype for regional NFC centres amid growing interest in nuclear energy among newcomer states and entire regions, such as the Middle East and Southeast Asia. Most of the states in these regions have neither the technology nor indeed the economic need to build their own uranium isotope separation plants, as their individual national markets for enriched uranium will be relatively small. The IUEC could be an attractive model for securing assured LEU supply by means of establishing regional NFC centres, based on existing enrichment plants or new ones.

Let us recall that the IUEC was created as part of the Russian presidential initiative to set up a network of international centres offering NFC services. The IUEC, being a pilot project, can be used as a test bed for a range of solutions that would need to be developed for the international NFC centres. Apart from the uranium enrichment centre, the initiative envisions three other types of centres specializing in spent fuel management, the training of nuclear specialists, and nuclear energy research and development.

In the context of nuclear disarmament, the launch of the IUEC offers possible principles and mechanisms for placing under international control those facilities in nuclear-weapon states that were previously involved in weapons programmes. The AECC, whose uranium isotope separation capacity the IUEC relies on, first ended its involvement in high-enriched uranium production for nuclear weapons; then it was included on the list of Russian nuclear sites available for IAEA safeguards procedures; then one of the facilities on the territory of the AECC (the IUEC nuclear storage) was actually selected by the IAEA for conducting those procedures. In addition, there are plans to allow the IUEC to acquire a stake in the AECC at some point in the future.

Last but not least, the implementation of the Russian initiative on NFC supply assurances has resulted in greater transparency of the Russian nuclear industry and enabled the IAEA to step up its safeguards activities in the country. As part of the IUEC project, in 2007 Russia put its first uranium enrichment plant on the list of nuclear sites available for IAEA safeguards procedures.

2 Separative Work Unit—a measure of the effort needed to separate the U^{235} and U^{238} atoms in natural uranium in order to create a final product that is richer in U^{235} atoms. It takes on the order of 100,000–120,000 SWU of enriched uranium to fuel a typical 1,000 megawatt commercial nuclear reactor for a year. For more details see www.usec.com/whatisaswu.htm.