

International Efforts for Ensuring Peaceful Use of Nuclear Energy and Nuclear Nonproliferation, and Expectations for Japan

Olli Heinonen, Tokyo, 3 December 2014

The next NPT Review Conference, which is 5 months away, is facing several challenges. Iran, North Korea, and the Weapons of Mass Destruction Free Zone in the Middle East are top on the list of concerns. But we should also pay more attention to the increasing building of second-strike nuclear capability by India and Pakistan, which will change during the coming decade fundamentally the nuclear landscape in the region.

In Japan, much of the focus is in the cleanup activities in Fukushima, and hardening and starting up of some nuclear power reactors, but also the reassessment of the nuclear policy, and, in particular, the recycling of spent fuel, is approaching.

In terms of proliferation concerns, Iran and North Korea remain of serious concern and focus. Let me say a few words here on the Iran nuclear negotiations that have recently resulted in a further extension of talks.

Iran

Iran and the P5+1 (China, France, Germany, Russia, the United Kingdom, and the United States) have extended negotiations until end of June 2015 to try to achieve a comprehensive nuclear agreement. Whilst the wider political context to such an agreement is of importance, the challenge is to agree on key parameters for the Iranian nuclear program, which blocks all pathways to making nuclear weapons.

Such an agreement should have an effective verification regime, uranium enrichment and plutonium production capabilities need to be substantially limited and made to extent the possible irreversible, instill early detection and adequate time to respond to possible violations, and put in place verifiable dismantlement of elements related to military dimension.

The IAEA will play a key role in verifying the undertakings of Iran. In order to be able to achieve this, it has to provide prompt warning of violations, to determine the correctness and completeness of Iran's declarations, and to establish the accuracy of the scope of Iran's nuclear programme, including confirming the absence of undeclared nuclear activities and facilities. Further, the IAEA should be provided with additional legally binding authorities, e.g. through the UN Security Council Resolutions. Iran implementing a Comprehensive Safeguards Agreement and the Additional Protocol should be a baseline but effective verification requirements also need to extend beyond these safeguards elements for this case. In addition, the past 12 years have shown that a simple statement on nuclear transparency by Iran does not work.

In constructing the parameters under which Iran retains a civilian nuclear programme, the basis to operate on must also be to recognise that we do not have a full picture of the programme. Among other problems, the number of centrifuges operating in Natanz and Fordow are well known, but the IAEA has not been able to establish a full inventory of all types of centrifuges manufactured in Iran, and their current location. Therefore, the technical parameters will have to be crafted to limit ambiguities to a minimum. For example, agreeing to a higher number of centrifuges in Natanz, and compensating the attendant shortened break-out time with a smaller declared enriched uranium inventory, is not a credible solution when the total amount of uranium remains unverified and types and locations and inventories centrifuges are not known. It is also essential to understand the

past and possibly on-going military dimension of Iran's nuclear programme to set credible parameters.

What would be the Practical Parameters ?

The purpose of these measures would be to re-establish Iran's non-proliferation records, and allow for a pathway forward.

The starting point for any verification work is a detailed and expanded declaration of all aspects of its past and current nuclear programme.

Where Iran's Natanz uranium enrichment plant is to have 2000-4000 operable IR-1 centrifuges, all excess centrifuges and cascade piping are to be removed for IAEA monitored storage.

Its Fordow uranium enrichment plant is to be converted to a Research and Development installation, with infrastructure related to uranium enrichment removed.

Iran's inventory of enriched uranium is to be brought below one metric ton of UF₆, enriched up to 5% and the rest of enriched UF₆ converted to uranium oxides, and shipped abroad for fuel fabrication.

Iran is required to declare verifiable all manufactured centrifuge rotors and key components. Excess centrifuges and components will be subject to monitoring by the IAEA.

Arak heavy water reactor is converted to a light water research reactor by the replacement of some of the currently installed key nuclear components.

Iran must provide information on the production source material, which has not yet reached the composition and purity suitable for

nuclear fuel fabrication or for being isotopically enriched, including imports of such material.

Iran will provide information on imports and domestic production of single and dual-use items listed in the guidelines of the Nuclear Suppliers Group.

Iran will address fully the IAEA concerns regarding the military dimension and decommission, dismantle or convert to non-nuclear or peaceful use in a verifiable and irreversible manner nuclear related equipment, materials, facilities and sites that contradict the provisions of the safeguards agreement or the spirit of Article III of the Non-Proliferation Treaty (NPT). It must allow long-term monitoring of any installations previously involved in nuclear weapons research to ensure that the activities are not restored as an additional requirement.

Iran must provide the IAEA with unconditional and unrestricted access to any and all areas, facilities, equipment, records, people, materials including source materials, which are deemed necessary by the IAEA to fulfill its monitoring and safeguards implementation requirements.

It is important that the technical terms are made in clear terms to minimize ambiguities, inconsistencies and grey areas.

Implications of the Agreement

It goes without saying that the negotiations are being followed closely particularly by countries in the Middle East, and by North Korea, which is widely known for its nuclear brinkmanship. The unfortunate fact that Iran is in non-compliance with its undertakings, and gets a nod to maintain its uranium enrichment capacity can set a precedent for future proliferators.

There are already signs of nuclear “awakening” in the Middle East. Highly respected Saudi officials have publicly stated that what Iran gets, they will get. There is no need for additional nuclear threshold states in the already volatile Middle East.

Will this make it easier to achieve an agreement with North Korea to de-nuclearize? Likely not. Certainly conditions are different in terms of economical situation, but North Korea has repeatedly stated that it is not going to trade away its nuclear program and deterrence. However, North Korea will likely not get that support e.g. from the Non-Aligned Movement, which Iran has been able to rally behind its cause in past years.

Now let me turn to a different topic on nuclear energy.

Japan – Time to Revisit the Nuclear Policy

Much of the debate inside Japan understandably concentrates on the safety aspects of nuclear power, and consequently also on the future role of nuclear power in its energy mix.

This process also provides an opportunity to rethink and adjust the front and back end fuel cycle policies.

Although there is substantial excess uranium enrichment capacity in the world, Japan has continued to invest in uranium enrichment. Japan has practically no uranium resources, which has been an argument for spent fuel recycling. Uranium enrichment as such does not provide assurances about nuclear fuel supply, but limited enrichment can be seen in the light of taking with a longer term the advantage of reprocessed uranium.

The key question is the spent fuel policy, and presently existing substantial stocks of already separated plutonium in Japan and abroad.

Firstly, I would like to mention that much of that plutonium is not ideal for a nuclear arsenal. One can build nuclear explosives from that, but weapon designers would opt for true weapons grade plutonium. Therefore, it is essential to explain the future use of plutonium from some of the spent fuel of Joyo and Monju.

But the big question is what to do with the vast spent fuel inventories in Japan. Rokkasho reprocessing plant can only handle part of it. Is it time to think about other options such as direct disposal of spent fuel?

There have been suggestions to dispose separated plutonium as a waste to deep boreholes instead of recycling it in LWRs. This would in practice mean the development and licensing of a vitrification process, designing relevant final disposal canisters and repositories, which will certainly take more than a decade to accomplish. By using plutonium in MOX fuel, those inventories would have, during that same period of time been burned in reactors without any necessity to develop new technologies. The best way to deal with Japanese plutonium in overseas storages is likely to convert it into MOX fuel, but fabrication capabilities appear to serve, at least, in short term as a bottle neck.

In the light of current plutonium inventories, there is no urgent need to start reprocessing in Rokkasho, but there may be some technical reasons to do that within the next few years. Limited spent fuel storage capacity is one of them, but beyond that, very often people forget the need to maintain skilled labor, which is essential for safe operation. Any resumption of reprocessing has to be synchronized the progress of JMOX.

Other developments

There is one more development worth of noting. During the next decade we will see nuclear newcomers, who will tap into nuclear energy for the first time. Some of them have very little nuclear background, and have therefore to rely heavily on technology providers. New regulatory bodies will be likely overwhelmed with the tasks ahead. This is why the old timers, particularly those with long traditions with independent regulators, need to assist them so that nuclear energy is used in a safe manner and for peaceful purposes only. Japan, and its industry, has an indispensable role to play in that endeavor.

In sum, nuclear energy continues to have a future and work should be done to allow for effective, safe and secure nuclear power consumption