Science Diplomacy Case Studies

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Resumption of International Civil Nuclear Cooperation

A Diplomatic Triumph based on Strength in Science

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Forum for Indian Science Diplomacy

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CASE STUDY

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1. Introduction

Energy is the driver for economic growth, and of the various options available for carrying energy, electricity is the best from the consideration of convenience of end use. As compared to the size of its population, India is poor in energy resources. Domestic production of crude and gas is very modest, therefore, coal is the mainstay of electricity generation. Considering growing electricity demand, early in this century, it was realised that coal is not going to last beyond this century and it is necessary to look for alternate sources for electricity generation. This realisation was quantified, based on a study by the Department of Atomic Energy, in a report in 2004, which was later published (Grover and Chandra 2006). The study concluded that generation by nuclear needs to be stepped up as soon as possible. However, uranium resources, as estimated at that time, were considered sufficient to support an installed capacity of only 10,000 MW of Pressurised Heavy Water Reactors (PHWRs) and it was concluded that growth in nuclear installed capacity has to come from fast breeder reactors. As we will see later in this paper, an installed capacity of 10,000 MW based on PHWRs is very modest. A two-pronged strategy was formulated by the country: (i) launch aggressive campaign to locate more uranium resources in the country, and (ii) pursue a policy initiative to open international civil nuclear trade with the objective of importing uranium, which was denied to India for not having signed the Treaty on the Non-Proliferation of Nuclear Weapons (NPT).

The NPT divides the globe into 'haves' and 'have-nots' (that is states with, and states without nuclear weapons) and it provides for peaceful nuclear explosions. In early 1970s, the International Atomic Energy Agency (IAEA) organised annual conferences on peaceful application of nuclear explosions. Once India conducted a Peaceful Nuclear Explosion (PNE) in 1974, the concept of peaceful nuclear explosion disappeared from the lexicon on the subject and IAEA stopped organising conferences. According to NPT, states that have built and exploded a nuclear device before 1 January 1967 are classified as Nuclear Weapon States (NWS). After peaceful nuclear explosion by India in 1974, votaries of the NPT cast India "into a netherworld" (Tellis 2005) and it was abruptly denied international collaboration on the peaceful uses of nuclear energy. While the NPT is based on the motto, "early bird gets the nuke" (ElBaradei, 2003), even

now there are calls[1] on India by NPT votaries to sign NPT as a Non-Nuclear Weapon State (NNWS). India's opinion is the direct opposite that India can sign NPT as an NWS, (Fidler and Ganguly 2010).[2]

A two-pronged strategy was formulated by the country: (i) launch aggressive campaign to locate more uranium resources in the country, and (ii) pursue a policy initiative to open international civil nuclear trade with the objective of importing uranium.

Returning to electricity requirements, it is desirable to understand the necessity of having nuclear energy as a part of India's electricity mix. Figure 1 is a plot of Human Development Index (HDI) versus per capita electricity consumption. HDI increases rapidly as per capita electricity consumption increases, but saturation effect is seen around per capita consumption of 5000 units.[3] One can argue that correlation between two variables cannot be called causation; but the messaging from the plot is clear that for achieving a high (close to 0.9) HDI, it is necessary to provide about 5000 units of electricity per annum per capita to the citizens of India. It is pertinent to note that some of the countries in our neighbourhood (that is with similar climate conditions) have a per capita electricity consumption, much higher than India. For example, per capita consumption in Malaysia is 4656 units, Thailand – 2621 and the world average is 3052 units (IEA 2018). In the year 2018-19, India generated about 1600 billion units (including generation from both utilities and non-utilities). Assuming India's population to be about 135 crore, in per capita terms, generation was about 1200 units. Assuming India's population will stabilise at 1.6 billons,[4] transmission and distribution losses will come down to about 7 percent, then to provide 5000 units per capita per annum, and India has to generate 8600 billion units per annum. This is about five and half times the generation in 2018-19.

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There are calls, at the global level as well as at the national level, by many to meet all electricity requirements by renewable sources. These calls are based on an under-estimation of total electricity requirements based on the principle of frugality and an over-estimation of the potential of renewable sources. Renewable sources, including large and small hydro, solar and wind, cannot provide more than a quarter of the total projected electricity requirements of India (Grover 2017a). The balance has to come from coal and nuclear. Climate change imperative calls for deep decarbonisation and over a period of time India has, to the extent possible, substitute nuclear for coal. Thus, nuclear has to be an essential part of India's electricity mix and the sooner its share is ramped up, better it is for climate change. That can be done only if uranium is available to fuel the reactors. Therefore, it was necessary for the Government of India to launch a policy initiative to enable India to access international market to buy uranium.

2. The Beginning of the Atomic Energy Programme

To harness the power of atom, Atomic Energy Commission was set up in 1948, that is within months of getting independence. To take care of governance issues, Atomic Energy Act was enacted in 1948 and the Department of Atomic Energy was set up in 1954. A swimming pool type research reactor APSARA was constructed in Trombay and achieved first criticality in 1956. It was followed by construction, in collaboration with Canada, of a 40 MWt research reactor CIRUS in 1960. Collaboration was established with several other countries as well including the USA, the UK, France, and Russia. As the programme was moving ahead very fast, need was felt to modernize the Atomic Energy Act and, therefore, Atomic Energy Act, 1962 replaced the 1948 Act.

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During early years of the programme, science diplomacy was at work and India did derive benefit from international collaboration. Two Boiling Water Reactors were set up in 1960s at Tarapur, near Mumbai, on turn-key basis by a US company. Two PHWRs were set up at Rawatbhata in Rajasthan in collaboration with Canada, but the second unit had to be completed by indigenous efforts as all collaborations came to an abrupt halt after the PNE in 1974.

India remained steadfast in its resolve to develop nuclear technologies and achieved notable successes. Early on it was clear that India's domestic reserves are modest[5] and, therefore, it was decided to pursue a closed fuel cycle approach. It was articulated by Bhabha as a three-stage programme, which is a brilliant way to convey science-based complexities to all citizens. Over the years, technological capability has been developed for (i) exploration and mining of uranium, (ii) fabrication of a variety of fuels, (iii) heavy water production, (iv) designing and setting up research reactors, PHWRs, compact Pressurised Water Reactors (PWRs) and fast breeder reactors, (v) spent fuel reprocessing, and waste management including partitioning of actinides.

Nuclear has to be an essential part of India's electricity mix and the sooner its share is ramped up, better it is for climate change. That can be done only if uranium is available to fuel the reactors.

In parallel with the development of the nuclear power programme, India conducted three underground tests on 11 May 1998 and two on 13 May 1998. India became a declared nuclear weapon state.[6] Intense diplomatic activity followed, which can be gauged by the fact that there were fourteen meetings between India and the U.S. with India represented by Jaswant Singh and the U.S. by Strobe Talbott (Talbott 2004). India's technical achievements were appreciated at the global level and became a trigger for the resumption of international civil nuclear cooperation.

3. Triggers for the Initiative and the Joint Statement of July 18, 2005

Early on it was clear that India's domestic reserves are modest and, therefore, it was decided to pursue a closed fuel cycle approach. It was articulated by Bhabha as a three-stage programme, which is a brilliant way to convey science-based complexities to all citizens.

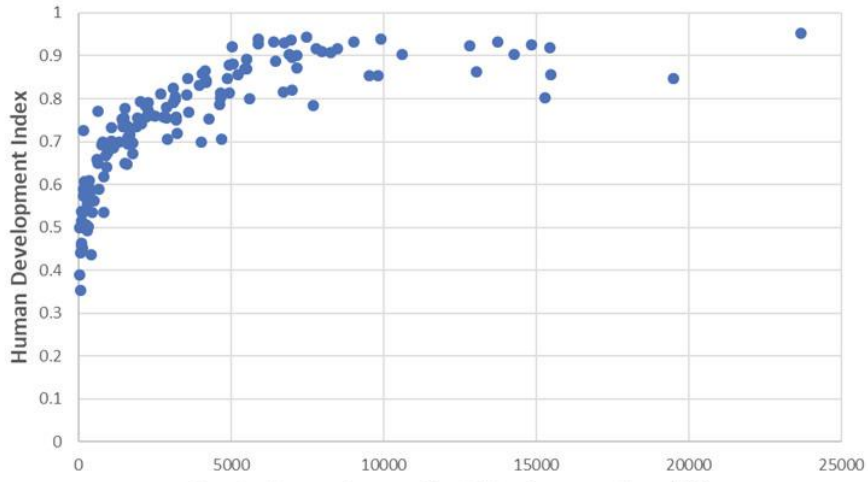
3.1 Trigger on the Indian side

Having realised the importance of nuclear as a part of electricity mix of the country, trigger for India was to have access to international uranium supplies. Uranium shortage was so acute that capacity factors of the operating reactors started coming down, reaching as low as 50 percent in 2008-09, and India could not think of constructing more PHWRs.

3.2 Triggers on the US side

On the US side, there were two different narratives for triggering the initiative: one strategic and the other scientific. Monographs by Itty Abraham and Ashley Tellis provide details about the debate in the USA (Abraham 2007; Tellis 2005) and a brief summary is given here. First public hint of the thinking about India by the US President Bush was provided during his election campaign by Condoleezza Rice (Rice 2000). She talked about the role of India in providing regional balance

Figure 1: Human Development Index versus Electricity Consumption for Different Countries



Source: Author's Compilation; Data for electricity consumption is from Key World Energy Statistics, 2018 published by International Energy Agency (IEA, 2018). Data for HDI is from "Human development Indices and Indicators" 2018 Statistical Update, published by United Nations Development Programme (UNDP, 2018).

Note: (1) HDI is a composite index calculated based on three dimensions health, education and living standard. Indicators for three dimensions are life expectancy at birth, mean years of schooling and expected years of schooling, and gross national income per capita; (2) Some important points are India (918, 0.640), Vietnam (1616, 0.694), Thailand (2868, 0.755), China (4279, 0.759), Malaysia (4656, 0.802), USA (12825, 0.924) and Iceland (not plotted) (53913, 0.938)

in Asia. After Bush took over as President, intense diplomatic engagement followed. First result was the release of a matched set of statements (Next Steps in Strategic Partnership) on 13 January 2004 by the PM of India in New Delhi and the President of the USA in Washington. Its benefit for the nuclear industry was symbolic. However, it did become a building block for a future dialogue.

Condoleezza Rice visited India on 15 March 2005, and the two sides agreed on a dialogue on energy including nuclear energy and she extended an invitation to Prime Minister to visit the USA. As a first step, the External Affairs Minister, Natwar Singh, led a delegation to the USA for a strategic dialogue in April 2005. The two visits paved the way for the visit of the Prime Minister of India to the USA in July 2005.

A few days prior to the visit of the Prime Minister to the United States, Carnegie Endowment for International Peace released a monograph "India as a global nuclear power: An action agenda by the US" (Tellis 2005). In the monograph, Tellis advocated that nothing should be done to cap India's nuclear deterrent as it would put it at a severe disadvantage vis-à-vis Beijing. He outlined several options in terms of what he called as six end states. Fifth end state proposed permitting India to have access to safeguarded nuclear fuel in return for bringing all present and future power reactors[7] under safeguards with no restriction on producing fissile material from research reactors. Sixth end state envisaged integrating India as a legitimate NWS with all privileges. Itty Abraham writes about the rise of China and a need to balance its rise, and adds India's economic growth as an important factor (Abraham 2007).

We'll return to the trigger provided by India's scientific strength in a later section.

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3.3 The Joint Statement

Ashley Tellis did write about growing capability of India in science and technology,[8] and an acknowledgement of scientific strength of India was embedded in the joint statement itself. Long after the Joint Statement, there was an explicit indication about the scientific strength of India having triggered the USA to act. To keep the historical perspective, let us look at the Joint Statement first. It was issued on 18 July 2005 in Washington during the visit of Prime Minister Manmohan Singh to Washington DC and involved tense negotiations. Relevant extracts are given in Annexure 1. In the Joint Statement, the USA:

- appreciated India's commitment to prevent WMD proliferation and stated that as a responsible state with advanced nuclear technology, India should acquire the same benefits and advantages as other such states;

An acknowledgement of scientific strength of India was embedded in the joint statement itself. Long after the Joint Statement, there was an explicit indication about the scientific strength of India having triggered the USA to act.

- committed to work to achieve full civil nuclear energy co-operation with India to enable it to realize its goals of promoting nuclear power and achieving energy security;
- agreed to seek agreement from Congress to adjust U.S. laws and policies;
- agreed to work with friends and allies to adjust international regimes to enable full civil nuclear energy co-operation and trade with India;
- agreed to consult with partners about India's interest for participation in the ITER[9] project; and
- offered to consult with the other participants in the Generation IV International Forum[10] with a view toward India's inclusion.

India reciprocally agreed to assume the same responsibilities and practices and acquire the same benefits and advantages as other leading countries with advanced nuclear technology, such as the United States.

India reciprocally agreed to assume the same responsibilities and practices and acquire the same benefits and advantages as other leading countries with advanced nuclear technology, such as the United States. These responsibilities and practices consist of:

- identifying and separating civilian and military nuclear facilities and programmes in a phased manner;
- voluntarily placing its civilian nuclear facilities under IAEA safeguards;
- signing and adhering to an Additional Protocol with respect to civilian nuclear facilities;
- continuing India's unilateral moratorium on nuclear testing;
- working with the United States for the conclusion of a multilateral Fissile Material Cut-off Treaty;
- refraining from transfer of enrichment and reprocessing technologies to states that do not have them and supporting international efforts to limit their spread; and
- ensuring that the necessary steps have been taken to secure nuclear materials and technology through comprehensive export control legislation and through harmonization and adherence to Missile Technology Control Regime (MTCR) and Nuclear Suppliers Group (NSG) guidelines.

Identification of facilities as civilian or military is a determination by India and is not linked to any condition. Further, placing its civilian facilities under safeguards by IAEA by India is on a voluntary basis. This again raises the status of India to an NWS

3.4 An Acknowledgement of India's Scientific Strength

Certain words in the Joint Statement are very important. These include recognition of India as "a state with advanced nuclear technology", which is a diplomatically acceptable equivalent for being a nuclear weapon state and is a recognition of India's scientific strength. Identification of facilities as civilian or military is a determination by India and is not linked to any condition. Further, placing its civilian facilities under safeguards

by IAEA by India is on a voluntary basis. This again raises the status of India to an NWS. IAEA has a standard template for the additional protocol for NNWS, but here the words are "an additional protocol" and not "the additional protocol."

A clear recognition of India's scientific strength is also reflected in the offer to enable India's participation in the ITER project, and Generation IV international forum. India's scientific strength was explicitly acknowledged by Anish Goel,[11] when he commented that during the period of isolation, "India continued to indigenously develop its nuclear program to ever-increasing sophistication." He also wrote that the decision to negotiate with India was taken "[a]fter years of careful analysis and foundational work, supported by scientific expertise" and that India had carried extensive research in thorium technologies (Goel 2014). It appears that the US scientific community has been monitoring scientific progress in India and reporting it to the Government as can be seen by the testimony given by Hecker[12] at a Hearing of the US Senate Committee on Appropriations, Subcommittee on Energy and Water Development, on April 30, 2008: "I found that whereas sanctions slowed progress in nuclear energy, they made India self-sufficient in nuclear technologies and world leaders in fast reactor technologies. While much of the world's approach to India has been to limit its access to nuclear technology, it may well be that today we limit ourselves by not having full access to India's nuclear technology developments. Such technical views should help to advise the diplomatic efforts with India."

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Growing technological capability of India was a source of concern for the USA as no treaty-based obligation to enforce export controls was applicable to India. It was realised that the pursuit of a closed fuel cycle will leave India "awash with more plutonium than it could ever use either for energy production or nuclear weaponry." (Tellis 2005: 18). While it is not correct to say that India cannot use all the plutonium for energy production, Tellis does bring out the main concern of the USA. Resulting from this concern, the US considered, tightening India's export controls far more important for its national security than capping and rolling back of India's strategic programme. Regarding export controls, India had been following and continues to follow a virtuous path, but the outside world was imposing costs by denying international trade. Ashley Tellis (2005) writes, "Beyond a certain point, virtue cannot remain its own reward….." (P. 26). Having a

deal with India was a way to ensure sustainability of India's export controls.

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3.5 Dialogue with Other Countries

The joint statement paved the way for a dialogue to finalise the text of a Nuclear Cooperation Agreement with the USA and also other countries, notably France and Russia.

4. Core Issues Important for India and the Separation Plan

4.1 The Debate on the Likely Contour of the Separation Plan

Between July 2005 and March 2006, there was an intense debate in India on the likely contours of the initiative to resume international civil nuclear trade. Debates included views regarding economics and safety of nuclear power, perceived opaqueness of India's nuclear programme, and how conditions associated with various agreements then under negotiations would influence ongoing strategic programme. It is relevant to discuss issues related to influence on the strategic programme. Expanding and paraphrasing the list proposed by Itty Abraham (Abraham 2007 28), the issues were the following:

The joint statement paved the way for a dialogue to finalise the text of a Nuclear Cooperation Agreement with the USA and also other countries, notably France and Russia.

- Finalising a credible and defensible separation plan;
- Ensuring that there is no moratorium on fissile material production for the strategic programme;
- Moratorium on testing;
- Costs imposed by safeguards;
- Intrusiveness of the Additional Protocol;
- Ensuring reciprocity of actions by India and the U.S.

First criticism came from a former Director of Bhabha Atomic Research Centre, AN Prasad (Varadarajan 2005), when he opined that the course of actions proposed by the Joint Statement was against national interest, fast reactor programme would be undermined and the cost of nuclear weapon programme would dramatically escalate. Note the concerns related to fast reactor programme going under safeguards. He was also concerned about the additional protocol.

Kakodkar clarified important issues early in the debate (Subramanian 2005) when he said that (i) classification of facilities as civilian would be an Indian decision, (ii) only the facilities having no strategic significance would be classified as civilian, (iii) fissile material production would not be capped, (iv) no developmental programme including Prototype Fast

Breeder Reactor (PFBR) would be offered for safeguards, (v) in view of large energy needs, India would look at imports as externalities and facilities would be offered for safeguards in a phased manner.

Concerns regarding offering facilities for safeguards were dispelled based on the fact that several Indian facilities were already under safeguards and this never posed any concern. This includes two reactors at Tarapur and two reactors at Rawatbhata in Rajasthan. Two reactors then under construction at Kudankulam in technical collaboration with Russia were also under safeguards.

The debate regarding influence on strategic programme continued and amidst this debate Kakodkar, in an interview to Pallava Bagla, provided explanation on all important issues (Bagla 2006). He extensively referred to the DAE study about electricity needs covering a 50-year horizon (Grover and Chandra 2006) and spoke about (i) not compromising country's strategic interest and energy interest, (ii) the criticality of the fast breeder programme for the nuclear power programme of the country as well as for maintaining minimum credible deterrent, (iii) the linkage of the fast reactor programme to the indigenous PHWR programme through the fuel cycle[13] and hence, the impossibility of offering fast reactors for safeguards and also keeping sufficient PHWR capacity outside safeguards. He clarified that research and development could be done only in an autonomous manner and that India needed additional capacity [for production of fissile material from power reactors] for strategic needs.

This interview became a decisive factor in defining the contours of the Separation Plan. Commenting on the interview, Siddharth Varadarajan wrote, "Indeed, the supporters of Indo-U.S. nuclear cooperation should realise that by drawing a thick red line out in the open, Dr. Kakodkar has done the only thing which can still salvage the deal: telling the Americans that if they don't blink, the agreement will die a natural death" (Varadarajan 2006).

4.2 The Separation Plan

While the debate was ongoing, considering responsibilities and practices identified in the Joint Statement, India started working on a plan to separate facilities. The Separation Plan was drafted to include the list of facilities as well as the basis for doing so. Several core issues important to India were embedded in the Separation Plan and their embedding in the Separation Plan was helpful in negotiating the Nuclear Cooperation Agreement with the USA.

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The Separation Plan emphasises the centrality of nuclear energy in meeting the challenges of energy security and environmental sustainability. It refers to India's growing technological prowess and points to the fact that "the strategic programme is an offshoot of research on nuclear power programme and consequently, it is embedded in a larger undifferentiated programme." It brings out strengths of India's research and development efforts and dismisses grid-connectivity as irrelevant to the separation exercise. It states that "India will:

- Include in the civilian list only those facilities offered for safeguards that, after separation, will no longer be engaged in activities of strategic significance.
- The overarching criterion would be a judgement whether subjecting a facility to IAEA safeguards would impact adversely on India's national security.
- However, a facility will be excluded from the civilian list if it is located in a large hub of strategic significance, notwithstanding the fact that it may not be normally engaged in activities of strategic significance.
- A civilian facility would therefore, be one that India has determined not to be relevant to its strategic programme."

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Taking the above into account, the Separation Plan offers eight indigenous reactors for safeguards by IAEA in addition to six which were already under safeguards. It offers certain facilities at Nuclear fuel Complex for safeguards and also offers a reprocessing plant for safeguards under campaign mode. It designates only three heavy water plants[14] as civilian. India did not offer Fast Breeder Test Reactor (FBTR) and under construction PFBR for safeguards as the fast breeder programme was still under development and its technology would take time to mature. India reserved its right to determine future facilities as civilian or strategic.

The Separation Plan also addresses the important issue of fuel supply assurances in great detail (See relevant extracts in Annexure 2), makes a clear linkage of fuel supplies with IAEA safeguards, and provides for India taking corrective measures to ensure uninterrupted operation of its civilian nuclear power reactors. It also brings in the concept of the safeguards agreement being India-Specific. As explained later, these features were woven into both the Nuclear Cooperation Agreement with the USA and also the India-Specific Safeguards Agreement.

DAE supports several research and development centres, industrial units, and grant-in-aid institutions. All grant-in-aid institutions, one research and development centre, and one industrial unit were declared as civilian (See Annexure 2 for the complete list) and it was specifically stated that they are

safeguards irrelevant.[15]

The Separation Plan was discussed and agreed between India and the USA during the visit of President Bush to India during 2nd-4th March 2006. The Prime Minister made a Suo Moto statement in the Lok Sabha on 7 March 2006 on the Separation Plan and the Separation Plan was tabled in Parliament on 11 May 2006, communicated to IAEA and issued by IAEA for information and wider circulation (IAEA 2008a).

The Separation Plan didn't impose any restrictions on the production of fissile material and was defensible from strategic considerations. It also paved the way for addressing the remaining issues that is IAEA safeguards, additional protocol, reciprocity of actions, in documents yet to be negotiated as discussed in subsequent sections.

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5. Adjustment of Laws and Policies by the US

5.1 India joins ITER

In the Joint Statement, the US agreed to seek agreement from Congress to adjust U.S. laws and policies. The first action by the US was to agree[16] to India joining the ITER project. India was invited to present its case before the meeting of negotiators held at Cadarache, France on 12 September 2005. India's case was well received and after that there was a flurry of activity and Indian delegation joined the meeting of the Negotiators' Senior Support Group (NSSG) at Jeju, South Korea during early December 2005. During NSSG meeting, the list of in-kind contributions to be made by India was negotiated and finalised. NSSG meeting was followed by a meeting of Negotiators and on 6 December 2005, where the then ITER partner countries unanimously approved Indian accession to the negotiations for finalizing the Joint Implementation Agreement (JIA) for setting up ITER. India signed the JIA along with others during a Ministerial meeting held in Paris on 21 November 2006.

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5.2 The Hyde Act

Chapter 11 of the US Atomic Energy Act deals with international activities including international and export controls. Nuclear cooperation agreements are governed by the provisions of section 123 and that is why, colloquially, US refers to cooperation agreements as '123' agreements. Being not a signatory to NPT and having an active nuclear weapons programme, India didn't satisfy many provisions of the Act. To proceed with a nuclear cooperation agreement, the US Congress passed "Henry J. Hyde United States-India Peaceful Atomic Energy Cooperation Act of 2006" and it was signed into law by the President with his signature on 8 December 2006. For Indian negotiators, core issues were very clear and for the

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Being not a signatory to NPT and having an active nuclear weapons programme, India didn't satisfy many provisions of the Hyde Act. […] For Indian negotiators, core issues were very clear and for the US side clarity was provided by the Hyde Act. To start with, reconciling the two seemed like a challenge. It was clear that standard US templates for cooperation agreement would not work and real hard work lay ahead.

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6. The Nuclear Cooperation Agreements

6.1 Addressing the Core Issues

Finalisation of the Separation Plan and the passage of the Hyde Act paved the way for negotiations to arrive at the text of the Nuclear Cooperation Agreement. In view of the intense debate in the Indian media, core issues to be addressed were clear to the Indian negotiating team and as a result, the finalisation of the text took long time. Text of the Agreement was finalised after several rounds of internal discussions involving scientists from DAE and officials from MEA and PMO, and negotiations with the US team. While one has to look at the Agreement as a whole, the core issues have been addressed in the Nuclear Cooperation Agreement in the following manner.

6.1.1 Maintaining Integrity and Reliability of India's Strategic Programme, Continued Pursuit of Closed Fuel Cycle (Three-stage Nuclear Power Programme), and R&D

- Article 2.4 affirms that the Nuclear Cooperation Agreement will not affect the un-safeguarded programme thereby precluding any moratorium on production of fissile material. It mandates implementation of the agreement without any hindrance or interference with independent development activities.
- Article 1 (H) defines 'information' and is worded to provide precision in understanding. Lack of precision could have led to misunderstanding or even disputes over issues such as replication or infringement of confidentiality.
- Article 12 makes it clear that the Agreement is to be implemented in a manner that avoids hampering or delaying or interference in other activities and the provisions of the Agreement are not to be used to interfere with nuclear policy or programmes.

6.1.2 IAEA Safeguards Agreement and Fuel Supply Assurances

- Article 2.2e. includes development of a strategic reserve of nuclear fuel in the scope of cooperation.
- Article 5.6 reproduces verbatim para 15 of the 'separation plan' related to fuel supply assurances, safeguards and corrective measures (reproduced in Annexure 2).

- Article 10.2 on IAEA safeguards starts with the words, "Taking into account Article 5.6 of this Agreement", thereby provides a linkage between safeguards and fuel supply assurances.
- Article 14 on 'Termination and cessation of cooperation' in its para 8 states: "It is not the purpose of the provisions of this article regarding cessation of cooperation and right of return to derogate from the rights of the Parties under Article 5.6." Article 5.6 deals with important issues related to fuel supply, safeguards and corrective measures.
- Article 14.5 refers to uninterrupted operation of nuclear reactors.

Intensity of the dialogue between the Indian and the US negotiators can be judged from the following quote, "A U.S. official who had negotiated 123 Agreements with other countries told me he had never had to explain, discuss, and argue about text and language to the degree he had done with the Indians".

6.1.3 IAEA Safeguards

- Title of the article related to safeguards is "IAEA safeguards." This is further reiterated in Article 10.2, which refers to "India-Specific Safeguards Agreement between India and the IAEA".
- Article 10.4 states, "If the IAEA decides that the application of IAEA safeguards is no longer possible, the supplier and recipient should consult and agree on appropriate verification measures."
- Article 14.3 says that finding of safeguards non-compliance has to be made only by the Board of Governors of IAEA.
- The definition of the by-product material (Article 1(A)) was chosen to ensure precision in understanding.

6.1.4 Full Civil Nuclear Cooperation

- Article 2.2 covers scope of cooperation and Article 2.2d says that scope includes nuclear reactors and aspects of associated nuclear fuel cycle including technology transfer.
- Article 5.2 provides for cooperation in sensitive nuclear technologies only after amendment.[17] This article does permit transfer of dual use items for use in sensitive facilities as per applicable laws, regulations and policies.
- Article 6 iii) grants consent for reprocessing[18] of spent fuel and provides a time limit (one year) for agreeing on arrangements and procedures for reprocessing.

The US nuclear cooperation policies are embedded deep in their domestic law, while it is not so in case of France and Russia. As a result, there was a difference in the intensity of negotiations. […] Being not a part of policy of France and Russia, reprocessing consent was not an issue for negotiations.

6.1.5 Cessation of Cooperation and Right of Return

- Article 14 is a long article and it provides a layered approach for termination. Article 14.2 provides for consultation to carefully consider the circumstances and agree to take into account concerns arising out of security environment.
- Article 16.4 provides for implementation of the Agreement in good faith and in accordance with the principles of international law.

- Article 14.3 refers to 'material violation' as per the definition of Vienna Convention on the Law of Treaties and violation of non-compliance of safeguards agreement to be determined by the Board of Governors of the IAEA.
- Article 14.5 provides for caution before exercising right of return and refers to negative consequences on on-going projects.

Countries who have not signed NPT have to accept safeguards on nuclear facilities that are established by them based on international cooperation. […] India had no obligation to offer facilities designed and constructed indigenously for safeguards by IAEA as long as it used indigenously produced fuel to operate them.

6.2 Intensity of Negotiations

It is to be noted that core issues have been addressed in multiple ways and it can be argued that the Agreement has become verbose. However, such verbosity drives home the importance of core issues and is an insurance to protect the interests of the country in case of any dispute in the future. Intensity of the dialogue between the Indian and the US negotiators can be judged from the following quote, "A U.S. official who had negotiated 123 Agreements with other countries told me he had never had to explain, discuss, and argue about text and language to the degree he had done with the Indians" (Menon 2016: 85).

6.3 Negotiations with France and Russia

In parallel to negotiations with the USA for arriving at the text of a nuclear cooperation agreement, negotiations were also held with France and Russia. The US nuclear cooperation policies are embedded deep in their domestic law, while it is not so in case of France and Russia. As a result, there was a difference in the intensity of negotiations. Negotiating team felt that negotiators from the three countries might have been in touch and so once an agreement on an issue was reached with the US team, it was easier to deal with the other teams. Being not a part of policy of France and Russia, reprocessing consent was not an issue for negotiations.

One can categorically state that the approach followed by India is consistent with its legal obligations. All safeguards agreement referred to in paragraph 7.1 have since been subsumed in ISSA. All facilities identified as civilian in the Separation Plan have been offered for safeguards.

7. India-Specific Safeguards Agreement (ISSA)

7.1 Origin of Safeguards

Article 3 of the NPT begins with, "Each Non-nuclear-weapon State (NWS) Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfilment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices." Safeguards for NWS Parties to NPT are thus

binding and comprehensive[19] in scope as all of their nuclear facilities come under safeguards. NWS offer some of their civilian facilities for safeguards to IAEA on voluntary basis. Countries who have not signed NPT have to accept safeguards on nuclear facilities that are established by them based on international cooperation.[20] There is no obligation on non-signatories to the NPT, to offer their indigenous facilities for safeguards. India had no obligation to offer facilities designed and constructed indigenously for safeguards by IAEA as long as it used indigenously produced fuel to operate them.

7.2 India's Prior Safeguards Agreements

When negotiations for ISSA began, several facilities set up based on international collaboration were already under safeguards. In addition, India had negotiated safeguards agreements for supply of nuclear fuel and heavy water. The list of all such safeguards agreements follows.

- INFCIRC/154, 3 September 1971, for safeguards for the reactors TAPS-1 & 2. (This provided for safeguards for a period of 25 years).
- INFCIRC/211, 6 November 1974, for safeguards for the reactors RAPS 1 & 2.
- INFCIRC/260, 1 July 1978, for safeguards on heavy water supplied by Soviet Union for use in RAPS-1 & 2.
- INFCIRC/374, 1 January 1990, for safeguards on nuclear fuel supplied by France for use in TAPS-1 & 2.
- INFCIRC/433, 1 May 1994 and amended on 1 November 1994 for extension of safeguards to TAPS-1 & 2 beyond the initial 25 years.[21]

Thus, India had enough prior experience in implementing safeguards on nuclear facilities and material and was never in violation of any safeguards commitment.

7.3 Important Issues for India

While negotiating ISSA, the following were the important issues:

- There should be an acknowledgement of the fact that a part of India's programme is not civilian. Applicability of ISSA should be limited to civilian facilities and there should be no interference in activities not offered for safeguards.
- ISSA must reflect India-US understandings and facilitate cooperation with all other member-states of IAEA.
- It should be an umbrella agreement and all facilities offered by India should come under it. This was necessary to avoid spending of time and efforts in negotiating safeguards agreement time and again and to preclude the possibility

[...] the international law principle of *rebus sic stantibus*, which suggests that the duration of a binding commitment is linked to a continuation of the circumstances extant at the time of the original binding commitment. This tends to support an interpretation that India would be able legally to insist on the removal of safeguards from its civil nuclear program if there is a disruption in fuel supply."

of addition of any more conditions in future agreements. It should also provide for subsuming all earlier safeguards agreements. This was to facilitate implementation.

- Reciprocity should be built into it to ensure that India should not end up offering facilities for safeguards without reciprocal actions by the world community.

7.4 An Analysis of ISSA

As a part of the Joint Statement, India undertook to ensure that the necessary steps have been taken to secure nuclear materials and technology through comprehensive export control legislation and through harmonization and adherence to MTCR and NSG guidelines. In fact, even at the time of issuing the Joint Statement, India was implementing export controls based on a law-based regime and the regime is under continuous review for possible strengthening.

Using the guidance provided by the standard template for item-specific safeguards agreement as included in INFCIRC/66, Rev 2 (IAEA 1968), ISSA was negotiated and all the above issues were addressed. The following is an analysis of ISSA (IAEA 2009) with respect to the issues above.

- The title of the agreement includes the word 'civilian', making a subtle reference to the fact that a part of India's programme is not civilian. Third pre-ambular paragraph refers to "nuclear research and development for the welfare of its people and other peaceful purposes." This phrase was borrowed from Atomic Energy Act, 1961 and one should note that "welfare of its people" has a broad meaning including defence of the country. Article 5 states that implementation of safeguards shall not hinder or otherwise interfere with India's independent activities.
- Ninth pre-ambular paragraph refers to India-US understandings as reflected in the Joint Statement: (i) access to fuel supplies from the international market as an essential basis for India going in for ISSA, (ii) facilitating development of a strategic reserve of nuclear fuel, and (iii) India's right to take corrective measures. Twelfth pre-ambular paragraph refers to "the need to avoid hampering the peaceful uses of nuclear energy, economic and technological development or international cooperation in the peaceful uses of nuclear energy". The preamble is tightly coupled to the main agreement by the text, "NOW THEREFORE, taking into account the above, India and the Agency have agreed as follows:". Article 3 states: "The application of safeguards under this agreement is intended to facilitate implementation of relevant bilateral or multilateral arrangements to which India is a party, which are essential to the accomplishment of the objective of this Agreement."
- To make it an umbrella agreement, it provides for bringing the following three kind of facilities under its scope:
  - » Facilities identified by India in the separation plan as civilian (Article 14 (a)).
  - » Any further facilities identified by India as civilian (Article (14(a)), and

» All existing safeguarded facilities (Article 22).

Inclusion of all above makes ISSA an umbrella Agreement.

- According to ISSA, safeguards on a facility shall come into force after the following steps have been taken:
  - » Approval of the Agreement by the Board of Governors of the IAEA.
  - » Signatures on the Agreement.
  - » Notification by India about its entry into force
  - » Filing a declaration by India about its civilian facilities after all conditions conducive to the accomplishment of the objectives of the Agreement have been met (Article 13), and
  - » Notification by India offering civilian facilities for safeguards (Article 14) according to a timeframe decided by India.

All these steps ensure reciprocity.

ISSA has an Annexure and to start with it had no entry. India submitted first notification on 16 October 2009 after all conditions conducive to implementation of international cooperation were met. Inclusion of all the above points makes the text of the agreement India-specific.[22]

Essentially India follows a unique nomenclature, but items on the control lists of India are the same as in the NSG lists. Based on the list of items and guidelines for export existing in 2008, it was possible for India to convince the Nuclear Suppliers Group that India's has a robust export control system.

7.5 Some Remarks about ISSA

IAEA doesn't have any template for implementing safeguards on research centres not handling nuclear material and, therefore, all such institutes remain outside the purview of ISSA. Civilian heavy water plants also remain outside ISSA. Text of the ISSA did create an unease in the non-proliferation lobby as can be seen from the following quote from Dean Rust: "According to IAEA documents and published reports, IAEA Director-General Mohammed ElBaradei asserted that the safeguards agreement meets all IAEA legal requirements, is of indefinite duration, and that the safeguards termination provisions in the operative sections of the agreement conform to longstanding IAEA principles. However, he also cited the preamble as an integral part of the agreement; the preamble contains India's position that fuel assurances are an "essential basis" for India's acceptance of safeguards under the agreement. ElBaradei also noted the international law principle of rebus sic stantibus, which suggests that the duration of a binding commitment is linked to a continuation of the circumstances extant at the time of the original binding commitment. This tends to support an interpretation that India would be able legally to insist on the removal of safeguards from its civil nuclear program if there is a disruption in fuel supply." (Rust 2008).

Nuclear fuel would remain under safeguards for all times as Article 29 of ISSA refers to termination according to GOV/1621 (20 August 1973). This is a decision of the Board of Governors of IAEA and ties duration of safeguards to actual use of the supplied items and material by the recipient state (Rockwood 2013: 17). Statement by Rust is, thus, a wrong interpretation of IAEA principles.

Approval of ISSA, with all the features referred to in para 7.4 embedded in it, by the Board of Governors was indeed a diplomatic triumph for India. Articles by academics criticising ISSA (Robertson and Carlson 2016; Carlson 2018), and response thereto (Ramakumar 2019) keep appearing. One can categorically state that the approach followed by India is consistent with its legal obligations. All safeguards agreement referred to in paragraph 7.1 have since been subsumed in ISSA. All facilities identified as civilian in the Separation Plan have been offered for safeguards. Additional facilities which came up afterwards have also been offered for safeguards. An updated list of facilities included in the Annexure to ISSA is given in Annexure 3. This will keep getting updated as and when India offers facilities for safeguards.

Acceptable technical conditions include the fact that any nuclear reactor constructed in India has to pass India's regulatory approval. Viable tariff regime will result from a low capital cost and a financial package based on soft loan. Affordability re-emphasises viable tariff regime.

8. Export Controls

8.1 India's Export Controls in 2008

As a part of the Joint Statement, India undertook to ensure that the necessary steps have been taken to secure nuclear materials and technology through comprehensive export control legislation and through harmonization and adherence to MTCR and NSG guidelines. In fact, even at the time of issuing the Joint Statement, India was implementing export controls based on a law-based regime and the regime is under continuous review for possible strengthening. Export controls are implemented in India based on the Atomic Energy Act, 1961 (AE Act) and the Foreign Trade (Development & Regulations) Act, 1992 (FTDR Act). The FTDR Act and the rules and policies formulated thereunder constitute the basic laws governing foreign trade, whereas the AE Act provides legal framework for controlling the export of nuclear items. The Weapons of Mass Destruction and their Delivery Systems (Prohibition of Unlawful Activities) Act, 2005 (WMD Act), was enacted to prevent unlawful activities pertaining to Weapons of Mass Destruction and further strengthens India's export controls. It provides specific provisions to prohibit the export, transfer or re-transfer of nuclear weapons, nuclear explosive devices or any item usable for such purpose.

Under FTDR, a national export control list known as Special Chemicals, Organisms, Materials, Equipment and Technologies (SCOMET) has been notified. The SCOMET list has eight categories. Category '0' in the SCOMET list is defined as 'Nuclear materials, nuclear-related other materials, equipment and technology' and corresponds to Trigger List items of the Nuclear Suppliers Group. These items are notified under the AE Act as prescribed substances, prescribed equipment and related technology. Nuclear-related dual-use equipment, materials, software, and related technology are covered by Category '4' of SCOMET and corresponds to the list of dual-use items by NSG. Essentially India follows a unique nomenclature, but items on the control lists of India are the same as in the NSG lists. Based on the list of items and guidelines for export existing in 2008, it was possible for India to convince the Nuclear Suppliers Group that India's has a robust export control system.

There was a debate in India whether the waiver granted to India is 'clean' that is free of conditionalities. It appears to be free of conditionalities, but paragraphs 6 and 7 of the NSG guidelines were amended by NSG in 2011 and NPT membership was made a criterion for the transfer of enrichment and reprocessing equipment and technology. Indian press was quick to pick up the amendment and call it as converting a 'clean' waiver to an 'unclean' waiver.

8.2 Updating India's Export Controls

The export controls have been further updated and according to information on Directorate General of Foreign Trade (DGFT) portal, "India is a signatory to the major multilateral export control regimes, namely, Missile Technology Control Regime (MTCR), Wassenaar Arrangement (WA) and Australia Group (AG) and adherent to Nuclear Suppliers Group (NSG). India is also a signatory to international conventions on non-proliferation, namely, Chemical Weapons Convention (CWC) and Biological and Toxic Weapons Convention (BWC). Accordingly, the SCOMET control list is aligned to the control lists of the all the multilateral export control regimes and conventions" (DGFT 2018a). Various categories and licensing authorities in SOCMET are given in Annexure 4. Details regarding lists and guidelines issued by the DGFT and DAE can be seen in the following documents:

- India's Export Control System, dated 4 September 2018 (DGFT 2018a).
- Special Chemicals, Organisms, Materials, Equipment and Technologies (SCOMET) export of which is regulated dated 31 January 2018 (DGFT 2018b).
- Guidelines for Nuclear Transfers (Exports) dated 28 April 2016 (DAE 2016a), and
- Updation of List of Prescribed Substances, Prescribed Equipment and Technology Under Atomic Energy Act 1962 dated 28 April 2016 (DAE 2016b).

9. Relaxation of NSG Guidelines

9.1 Steps Completed by India

By the middle of 2008, India had completed the following steps:

- A dialogue with the USA, France and Russia to negotiate nuclear cooperation agreements and all three texts were ready for signature;
- Formulation of a separation plan and its wider circulation as an information circular (IAEA 2008a);
- Negotiating an India-Specific Safeguards Agreement with the secretariat of the IAEA and its approval by the Board of Governors on 1 August 2008;
- Dialogue at the diplomatic level[23] with all the members of the NSG with a view to explain India's credentials including law-based export controls and seek support for a waiver from NSG for resumption of civil nuclear trade; and
- Release of a statement by EAM on 5th September 2008 to reiterate India's stand on disarmament and non-proliferation.
- WMD Act, 2005, SCOMET list and licensing guidelines issued by the DGFT, Guidelines issued by the DAE in 2006 were taken as harmonization of export controls by India.

India-Specific safeguards Agreement and the NSG waiver resulting into resumption of international civil nuclear trade have been described as the biggest foreign policy triumph by India in recent decades.

9.2 The Decision by Relaxation

As a result of this massive effort, guidelines for civil nuclear trade with India were relaxed by NSG on 6th September 2008 and have been issued by the IAEA as INFCIRC 734c (IAEA 2008b) and is reproduced here as Annexure 5. The statement issued by the External Affairs Minister is a crucial link for this waiver and is reproduced as Annexure 6.

It may be noted that the Statement by NSG,

- doesn't direct India to sign CTBT;
- doesn't direct India to stop producing fissile material for strategic use;
- does refer to paragraphs 6 and 7 of the NSG guidelines, as revised, which cover the transfer of enrichment and reprocessing technology; and
- doesn't ask Participating Governments to terminate cooperation in the event of a nuclear test by India, but does refer to the statement by India's External Affairs Minister (Annexure 6).

9.3 Debate on the Text of the Waiver in India

There was a debate in India whether the waiver granted to India is 'clean' that is free of conditionalities. Based on the above, it

appears to be free of conditionalities, but paragraphs 6 and 7 of the NSG guidelines were amended by NSG in 2011 and NPT membership was made a criterion for the transfer of enrichment and reprocessing equipment and technology. Indian press was quick to pick up the amendment and call it as converting a 'clean' waiver to an 'unclean' waiver (Varadarajan 2011). This has the potential to add to capital costs of reprocessing and enrichment plants as explained earlier.[24]

10. Signing of Nuclear Cooperation Agreements

10.1 Intent to Purchase Reactors from the USA

NSG waiver cleared the deck for the signing of the Nuclear Cooperation Agreement with the USA as well as other countries. The US nuclear industry was looking to benefit from this initiative and therefore, an assurance was given by India to the USA about the intent to buy reactors from companies in the USA. In his testimony to the Senate Foreign Relations Committee on 18 September 2008, the Undersecretary of State William Burns said, "The Indian government has provided the United States with a strong Letter of Intent, stating its intention to purchase reactors with at least 10,000 Mega Watts (MWe) worth of new power generation capacity from U.S. firms." India, he added, "has committed to devote at least two sites to U.S. firms" (Varadarajan 2008). Negotiations with one US company for purchase of reactors.[25] are proceeding. The main issue of negotiations with companies in the USA and other countries is to arrive at "mutually acceptable technical and commercial terms and conditions that enable a viable tariff regime for electricity generated" (MEA 2010).

Indian negotiators had taken care to commit to sign only an Additional Protocol in the Joint Statement. Accordingly, India negotiated with the IAEA an Additional Protocol that limits additional obligations to provision of additional information regarding nuclear exports from India and grants no extra physical access to the IAEA

Acceptable technical conditions include the fact that any nuclear reactor constructed in India has to pass India's regulatory approval. Viable tariff regime will result from a low capital cost and a financial package based on soft loan. Affordability re-emphasises viable tariff regime. The process of negotiations for setting up reactors is likely to take more time as India insists on seeing a reference plant and the plant which India can consider as a reference plant is still under construction in the USA.

10.2 Concerns about Statements from Washington

Concerns were expressed in India about certain statements included in the documents coming from Washington, but the Government of India was very clear about what is applicable as can be seen in the following statement issued by New Delhi on 12 September 2008: "The text of the 123 agreement has been agreed upon by the Governments of India and the US. It is a public document. The rights and obligations of the two

governments are clearly spelt out in the terms and provisions of the 123 agreement. Once this Inter-governmental agreement enters into force, the agreement would become a legal document in accordance with well recognised principles of international law and the Law of Treaties" (MEA 2008).

IAEA approach to safeguards and physical security have evolved over the years, but the USA continues to follow policies that were initiated by it before the evolution and, therefore, the document on Arrangements and Procedures in a mere re-iteration of what is included in IAEA documents.

10.3 Signing of Agreements

The nuclear cooperation agreement between India and the USA was signed on 10 October 2008.

As stated earlier, negotiations with France and the USA were going on in parallel and texts of the agreements had been finalised prior to NSG granting its waiver. Agreements were signed one by one; with France on 30 September 2008 and with Russia on 5 December 2008. India-Specific safeguards Agreement and the NSG waiver resulting into resumption of international civil nuclear trade have been described as the biggest foreign policy triumph by India in recent decades with two former foreign secretaries writing extensively about it in their respective books (Menon 2016; Saran 2017).

11. India's Additional Protocol

As a part of the Joint Statement, India had agreed to sign and adhere to an Additional Protocol with respect to civilian nuclear facilities. IAEA applies safeguards to nuclear facilities declared by its Member States. Following discovery of certain undeclared programme in an NNWS, "In February 1992, the Board of Governors [of IAEA] affirmed that the scope of comprehensive safeguards agreements was not limited to verification of the non-diversion of nuclear material actually declared by a State, but included verifying the absence of undeclared nuclear material and activities in the State" (Rockwood 2013: 19). In 1997, IAEA approved the text of a new document called the model additional protocol, INFCIRC/540, with the objective to detect undeclared nuclear activities. It is not a standalone document, but an addition to the safeguards agreement between a State and IAEA. All NNWS are expected to use the standard template, while NWS can choose measures identified by them as capable of contributing to the non-proliferation and efficiency aims of the protocol. The Board also authorised the DG to negotiate protocols with "other states" "that are prepared to accept measures provided for in the Model Protocol in pursuance of safeguards effectiveness and efficiency objectives," (IAEA 1997).

Indian negotiators had taken care to commit to sign only an Additional Protocol in the Joint Statement. Accordingly, India negotiated with the IAEA an Additional Protocol that limits additional obligations to provision of additional information

regarding nuclear exports from India and grants no extra physical access to the IAEA. India's Additional Protocol also adds to safeguards obligation a commitment to provide IAEA inspectors multiple-entry visas and to allow the IAEA "free communications … including attended and unattended transmission of information generated by Agency containment and/or surveillance or measurement devices" from India's safeguarded facilities (IAEA 2014).

Overall, India's additional protocol do not impose any onerous obligations on India.

12. Arrangements and Procedures for Reprocessing

As stated earlier, the Nuclear Cooperation Agreement signed by India with the USA grants India consent for reprocessing of spent fuel, but it also states that: "To bring these rights into effect, India will establish a new national reprocessing facility dedicated to reprocessing safeguarded nuclear material under IAEA safeguards and the Parties will agree on arrangements and procedures under which reprocessing or other alteration in form or content will take place in this new facility." The Agreement goes on to prescribe time limits for arriving at arrangements and procedures. Negotiations to arrive at arrangements and procedures were started soon after signing the nuclear cooperation agreement and concluded as per the time limit.

The Nuclear Cooperation Agreement goes on to prescribe time limits for arriving at arrangements and procedures. Negotiations to arrive at arrangements and procedures were started soon after signing the nuclear cooperation agreement and concluded as per the time limit.

Article 1 of the document deals with notification and effectiveness of right to reprocess. The most difficult part in negotiating this article was regarding number of facilities India would establish. Difficulty arose because the Nuclear Cooperation Agreement uses the words 'a new national reprocessing facility'. After negotiations, this was interpreted broadly and the agreed document states 'two new reprocessing facilities' including their 'future expansion, modifications, renovations or additions'.

Article 2 relates to IAEA safeguards and includes provisions as are applied by IAEA. Article 3 provides for consultation and Article 4 covers physical protection and storage. For implementing physical protection, it refers to IAEA documents, which have been developed with the participation of experts from India. Article 5 covers environment protection and Article 6 deals with management of plutonium. In pursuit of a fast reactor programme, India will at a future date have plutonium stocks to ensure uninterrupted operation of reactors. Therefore, Article 6 begins with: "India is committed to the management of separated plutonium in ways that are consistent with its national decisions on the civil nuclear fuel cycle."

Article 7 deals with suspension of arrangements and procedures, and provides a layered approach as in Article 14 of the Nuclear Cooperation Agreement for termination and cessation of cooperation. The remaining are routine articles.

IAEA approach to safeguards and physical security have evolved over the years, but the USA continues to follow policies that were initiated by it before the evolution and, therefore, the document on Arrangements and Procedures is a mere re-iteration of what is included in IAEA documents.

13. Administrative Arrangements

While the work on drafting a liability legislation was ongoing, the Government of India launched the initiative to resume civil nuclear cooperation as described in this paper. USA was looking forward to India joining an international liability regime, particularly the Convention on Supplementary Compensation.

Article 17 of the Nuclear Cooperation Agreement provides for establishing administrative arrangements. This also has been done. The only contentious issue in this regard was 'flagging'. India might import nuclear material from several countries and one of the countries could be say 'X'. Spent fuel might arise after irradiation in a reactor constructed in collaboration with a country say 'Y'. Nuclear material becomes obligated to both X and Y. USA requires complete material accounting for any material that is obligated to it. IAEA maintains accounting of nuclear material as a whole. India didn't want to maintain country-wise accounts of materials. This issue was resolved by making the USA agree to get material accounting reports from the IAEA. To satisfy their legal requirements, US will do calculation of their share of material based on operating record of nuclear reactors constructed by India in collaboration with companies from the USA.

Similar approach was adopted for solving the issue of flagging with two other countries who had raised this issue.

14. Civil Liability for Nuclear Damage

Nuclear liability is an area of intense debate amongst policy makers, legal community and nuclear industry professionals. India started looking at this issue towards the end of 1990s when it was decided to set up two large reactors at Kudankulam in collaboration with Russia (Grover, 2017b). To understand the issue, a study-project was awarded and the recommendation of the study included that India should enact a liability legislation and join the Convention on Supplementary Compensation. While the work on drafting a liability legislation was ongoing, the Government of India launched the initiative to resume civil nuclear cooperation as described in this paper. USA was looking forward to India joining an international liability regime, particularly the Convention on Supplementary Compensation.[26] Ongoing drafting work was completed and "The Civil Liability for Nuclear Damage Act, 2010" was enacted. Rules under the Act were also notified.

As explained by Grover (2017b), the legislation follows established international norms regarding no-fault and strict liability regime, channelling of liability to the operator, a single court of jurisdiction etc. In addition, Indian legislation has a unique feature and that is right of recourse as included in section 17 of the Act and elaborated by Rule 24. Section 17 reads as follows:

"17. The operator of a nuclear installation, after paying the compensation for nuclear damage in accordance with section 6, shall have a right of recourse where –

i) such right is expressly provided for in a contract in writing;

ii) the nuclear incident has resulted as a consequence of an act of supplier or his employee, which includes supply of equipment or material with patent or latent defects or sub-standard services;

iii) the nuclear incident has resulted from the act of commission or omission of an individual done with the intent to cause nuclear damage."

While the section cited above uses the word 'supplier', the Act doesn't define it or use it elsewhere in the Act. It is explained by Rule 24 as follows:

""Supplier" shall include a person who –

(i) manufactures and supplies, either directly or through an agent, a system, equipment or component or builds a structure on the basis of functional specification, or

(ii) provides build to print or detailed design specifications to a vendor for manufacturing a system, equipment or component or building a structure and is responsible to the operator for design and quality assurance; or

(iii) provides quality assurance or design services."

Being a unique feature, section 17 has been debated by the industry. This debate has not taken full account of the explanation included in Rule 24. Grover (2017b) has explained it in detail and concludes: "Rule 24 provides explanation about a supplier and when one looks at the explanation along with practices in the nuclear industry, one concludes that it is the plant system designer, who is the supplier. The 'explanation' has been formulated based on an analysis of engineering practices followed by the nuclear industry. Any examination of the Indian law without studying the 'explanation' will lead to erroneous conclusions. To protect his interest against the Right of Recourse, the system designer can avail of the insurance policy that is meant for the suppliers. Sub-vendors have no liability under the Right of Recourse."

Based on the legislation, India has joined and ratified CSC. While NPCIL is going ahead with the programme to construct

While NPCIL is going ahead with the programme to construct PHWRs based on its own technology and Indian industry is participating in the new-build programme, an agreement for setting up reactors in collaboration with companies from France or the USA is yet be concluded.

PHWRs based on its own technology and Indian industry is participating in the new-build programme, an agreement for setting up reactors in collaboration with companies from France or the USA is yet be concluded.

15. Outcome of the initiative

15.1 Tangible Outcomes

One can look at the outcome of the initiative in different[27] ways and one is to identify tangible benefits India has derived as a result on the waiver from NSG. This has been examined by Grover (2017c) and is further elaborated here:

India started its nuclear programme in cooperation with other countries and resumed cooperation after a lapse of more than three decades in 2008. Science diplomacy was at play in the beginning of the programme when India benefited from international cooperation.

- At the time of approval of the waiver by NSG in 2008, two reactors were under construction at Kudankulam in technical collaboration with Russia based on an inter-governmental agreement signed in 1988. The agreement was limited to construction of two reactors. Subsequent to 2008, agreements to construct four more reactors at Kudankulam have been signed with Russia. In addition, an Action Plan to construct six more reactors, 1200 MW each, at a new site was signed in October 2018. Action plan also proposes to increase the level of participation of Indian industry. The Action Plan also envisages implementation of projects jointly in third countries (Chaudhury 2018).
- Due to a mismatch between uranium production and its requirements for the operating requirements, it was not possible to operate the reactors at high capacity factors and average capacity factor dropped to 50 percent in 2008-09. Since then, India has been able to import uranium to fuel its PHWRs and their capacity factors have gone up as can be seen from Table 1. Assured of availability of imported uranium, the government has approved construction of additional PHWRs. Table 2 provides details.
- Dialogue with companies in France and USA is ongoing and one can expect agreements on more reactors to be set up in India. Sites where these reactors are proposed to be set up have already been identified.
- Post PNE in 1974, scientific collaboration between India and advanced countries slowed down not only in nuclear field, but in other fields as well. Of course, based on their personal contacts and expertise, some Indian scientists continued to collaborate with their counterparts abroad in various fields. This started changing in mid-1990s when India accepted to collaborate with CERN. Joint Statement of 2005 made a major change when the US committed to consult with partners to secure India's participation in the ITER[28] project. India joined ITER[29] and requests to join

mega-science projects keep pouring in. As written by Grover (2017c), "India has joined Joule Horowitz Reactor (JHR) being constructed by France, Facility for Antiproton and Ion Research (FAIR), Square Kilometre Array (SKA), Thirty Meter Telescope (TMT), High Intensity Proton Accelerator of Fermi Lab and recently Laser Interferometer Gravitational-Wave Observatory (LIGO)." India has also become an associate member of CERN.

- India has started building a strategic reserve of uranium. Building a reserve needs investment and cannot be done in one step. Therefore, a stepwise approach is being followed to build the reserve.

Table 1: Improvement in Capacity factors of Indian reactors over the past few years.

Total installed capacity: 6780 MW

S. No.	Year	Capacity factor %	Generation in million kW-hours
1	2008-09	50	14927
2	2009-10	61	18831
3	2010-11	71	26473
4	2011-12	79	32455
5	2012-13	80	32863
6	2013-14	83	35333
7	2014-15	82	37835
8	2015-16	75	37456
9	2016-17	80	37674
10	2017-18	70	38336
11	2018-19	70[30]	37813

Source: Grover (2017c) for 2008-09 and 2009-10; NPCIL (2019) for subsequent years.
Note: 2008-09 means the year from 1 April 2008 to 31 March 2009.

Though India never signed NPT, yet it became a reason for denying all cooperation to India when India demonstrated its scientific strength by going in for a PNE in 1974.

Table 2: PHWRs under construction, approved for construction, and planned (site has been approved)

Unit size: 700 MWe

S. No.	Location	No of units	Status
1	Rawatbhata, Rajastahn	2	Under construction
2	Kakrapar, Gujarat	2	Under construction
3	Gorakhpur, Haryana	4	Approved
4	Mahi Banswara	4	Approved
5	Kaiga, Karnatka	2	Approved
6	Chutka, Madhya Pradesh	2	Approved
7	Bhimpur, Madhya Pradesh	4	Planned

Source: DAE, 2018

15.2 Intangible Outcomes

Alternate way of looking at the outcome is to examine all intangibles, which have their own importance.

- India has joined three export control regimes namely Missile Technology Control Regime (MTCR), Wassenaar Arrangement (WA) and Australia Group (AG). It enhances India's prestige and also provides possibilities to access high technology.
- This initiative has transformed the relationship between India and the USA. To quote Menon (2016:82), "While both countries have always fought shy of saying that their partnership is to balance China, it is clear that the rise of China was one of the major spurs." He continues:"There is a creative tension at the heart of India-U.S. relations. India clearly needs U.S. technology, markets, and support to transform itself and create the stable and peaceful environment that the country needs to grow. The United State finds a stronger and more active India useful since there is a clear strategic congruence between the countries' goal in the Asia-Pacific."

India has been able to import uranium, signed contracts for building additional four reactors at Kudankulam, announced construction of several PHWRs as uranium availability is not a constraint and joined three export control regimes. India has been trying to join the fourth regime that is NSG, but due to opposition by China, NSG has not been able to come to a consensus about India's membership

16. Concluding Thoughts

Resumption of international civil nuclear trade has been transformative in several ways as described in the previous section. All steps taken by the Government were subjected to a detailed scrutiny by the country as well as international non-proliferation experts, and the government of the day had to even go through a vote of confidence in Parliament. All technical steps have been already described earlier, but to recap, Annexure 7 lists important milestones (including political milestones); details of political steps have been covered by other authors (Tellis 2005; Abraham 2007; Chari (ed) 2009, Menon 2016; Saran 2017).

India started its nuclear programme in cooperation with other countries and resumed cooperation after a lapse of more than three decades in 2008. Science diplomacy was at play in the beginning of the programme when India benefited from international cooperation. It was at play when the world was divided into 'haves' and 'have nots' by NPT. Though India never signed NPT, yet it became a reason for denying all cooperation to India when India demonstrated its scientific strength by going in for a PNE in 1974. Subsequent emergence of technology control regimes is also a demonstration of how diplomacy and science are intertwined.

Despite disruption in scientific cooperation and denial of advanced technologies, India continued to grow scientifically and industrially and this was noticed by the global community.

The result was resumption of international civil nuclear trade and this was achieved without influencing ongoing strategic programme.

Beginning from the unveiling of the Joint Statement on 18 July 2005, and until the grant of the waiver by the NSG on 6 September 2008, there was an intense debate in India advising the Government about the steps it should take, red lines that should not be crossed, and even the desirability of the initiative itself. Global non-proliferation experts were worried about crumbling of the narrative built by them ever since NPT came into force.

Prior to the finalisation of the Separation Plan, differing views were expressed by individuals involved in drafting the Separation Plan, but the differences changed into a unity of purpose once the Separation Plan was finalised. The Separation Plan maintains strategic autonomy and provided clarity about what was expected by the nation from the negotiating teams. Several teams were involved in various negotiations: agreements for cooperation with the USA, France and Russia, ISSA and an additional Protocol with the Secretariat of the IAEA, arrangements and procedures for reprocessing with the US, administrative arrangements for implementing the cooperation agreements and so on.

The Separation Plan maintains strategic autonomy and provided clarity about what was expected by the nation from the negotiating teams. Several teams were involved in various negotiations: agreements for cooperation with the USA, France and Russia, ISSA and an additional Protocol with the Secretariat of the IAEA, arrangements and procedures for reprocessing with the US, administrative arrangements for implementing the cooperation agreements and so on.

Membership of the negotiating teams was chosen to ensure that scientific and diplomatic expertise is available in the team. While the author had the privilege of being associated with all the teams, to provide specific scientific expertise, domain-specific subject experts were also added to the teams. For example, an expert in reprocessing was a member of the team for discussing arrangements and procedures for reprocessing, and a nuclear chemist having experience in implementing nuclear material accounting and control was a member for discussing ISSA and India's additional protocol. Embedding experts having knowledge of nuclear science and engineering in the negotiating teams, prior experience by India in implementing safeguards on several nuclear facilities, and clarity about the goal to be achieved were important factors that helped in shaping the text of the agreements. Paying attention to domain specificity along with general science diplomacy is necessary for achieving success.

This was a landmark initiative and was achieved because of scientific strength of the research establishment, industrial capability, and clear guidelines provided by the leadership of the country, and by the joint efforts of scientists and diplomats. India has been able to import uranium, signed contracts for building additional four reactors at Kudankulam, announced construction of several PHWRs as uranium availability is not

a constraint and joined three export control regimes. India has been trying to join the fourth regime that is NSG, but due to opposition by China, NSG has not been able to come to a consensus about India's membership. While continuing diplomatic efforts regarding the membership of NSG, India should work to increase exports of components, equipment and systems for the nuclear island of reactors and provide services for construction of reactors. Efforts should also be made to export PHWRs as many developing countries may be interested in small and medium size reactors currently being built and operated by India. Countries going for a nuclear power plant for the first time also need regulatory services and this should also be explored. Increasing nuclear exports would require joint efforts by diplomats and the nuclear industry in India. The tripartite memorandum of understanding for cooperation in the construction of the Rooppur nuclear power plant in Bangladesh signed by India, Bangladesh and Russia on 1 March 2018 is a step in this direction. Overall objective should be to become a de facto nuclear supplier prior to becoming a de jure member of NSG.

Efforts should also be made to export PHWRs as many developing countries may be interested in small and medium size reactors currently being built and operated by India. Countries going for a nuclear power plant for the first time also need regulatory services and this should also be explored.

Endnotes

1. In October 2017, speaking at the UN General assembly committee, on behalf of New Agenda Coalition comprising Brazil, Egypt, Ireland, New Zealand, South Africa and Mexico, Mexico's Alternate Permanent Representative said that they were introducing a resolution urging "India, Israel and Pakistan to accede to the (Non-Proliferation) Treaty as non-nuclear-weapon states promptly and without conditions, and to place all their nuclear facilities under International Atomic Energy Agency safeguards." Accessed on 03 February 2019 at https://www.news18.com/news/india/at-un-india-denounces-call-to-give-up-nuclear-arsenal-and-sign-npt-1545073.html.
2. "On November 29, 2009, Manmohan Singh, India's Prime Minister, stated on Fareed Zakaria's GPS show that India wants to join the NPT as a nuclear-weapons state (NWS) and become the sixth NPT-recognized nuclear power." (Fidler and Ganguly, 2010)
3. The word 'Unit' is colloquial equivalent of the scientific term 'kWhr' and is used throughout the text.
4. This may be considered as a low estimate. This was chosen to give a lower value for the estimate of projected electricity requirements.
5. As mentioned in the Introduction, an aggressive campaign was launched to locate more reserves and increase domestic production of uranium and that is now showing results. More mines have been opened in Jharkhand and mining in Andhra Pradesh has also been started. Even after all these efforts, reserves continue to be modest in view of large energy requirements of the country. However, this paper is focused on resumption of international trade.
6. Excerpts from the statement by the Prime Minister Atal Bihari Vajpayee in Lok Sabha on 27 May 1998, "India is now a nuclear weapon state. This is a reality that cannot be denied. It is not a conferment that we seek; nor is it a status for others to grant. It is an endowment to the nation by our scientists and engineers."
7. Emphasis added.
8. Ashley writes, "Moreover, as successive U.S. chairmen [of Nuclear Regulatory Commission] who have visited India have come to appreciate, Indian nuclear science could actually contribute to the success of these research efforts, thanks, paradoxically, to the enormous repository of indigenous theoretical and engineering capability that has been developed as a result of decades of forced isolation." (Tellis, 2005: 21)
9. When first proposed, ITER was an abbreviation for International Thermonuclear Experimental Reactor. Iter is Latin for 'the way' and the earlier detail has been dropped. ITER began in 1985 as a Reagan–Gorbachev initiative with the equal participation of the Soviet Union, European Union, the United States, and Japan. Detailed design was completed in 2001 under the auspices of IAEA. Negotiation for the launch of the project started thereafter and over the years more Parties joined the original four.
10. As per the information on its website, the Generation IV International Forum (GIF) is a co-operative international endeavour which was set up to carry out the research and development needed to establish the feasibility and performance capabilities of the next generation nuclear energy systems. At present, the forum has 14 members. Based on goals adopted by GIF, six nuclear energy systems have been selected by it for further development. Selected systems do include systems based on closed fuel cycle approach, which India has been pursuing right from the beginning of the nuclear power programme. After a careful analysis of pros and cons, it was decided not to join GIF.
11. When nuclear cooperation agreement was being negotiated, Anish Goel was working in the White House.
12. Siegfried S. Hecker served as the Director of the Los Alamos National Laboratory from 1986 till 1997 and is now with Stanford University. He visited India several times and interacted with the scientific community.
13. Spent fuel arising from PHWRs is reprocessed to recover Plutonium, which is fabricated into fuel for the Fast Breeder Reactors. To keep fast breeder reactors outside safeguards, it is necessary to keep PHWRs also outside safeguards.
14. Heavy water plants at Thal, Tuticorin and Hazira were designated as civilian. All three are ammonia based, are co-located with fertilizer plants and draw feed synthesis gas from the fertilizer plant. Hydrogen-sulphide-based plants at Kota and Manuguru are independent plants. The sixth plant at Baroda is ammonia based, and is collocated with a fertilizer plant. Baroda plant has been modified by adding an Ammonia Water Exchange Front-End unit making it independent of the co-located fertilizer plant.
15. IAEA has standard templates for implementing safeguards: one template for implementing comprehensive safeguards (see information circular INFCIRC/153, (IAEA1972)) which is applicable to a NNWS as a whole; and the other for item-specific safeguards (see information circular INFCIRC/66, (IAEA 1966)). Non-signatories to the NPT have to offer facilities established based on international cooperation for item-specific safeguards. Both these templates are meant for safeguarding nuclear reactors and fuel cycle facilities. While comprehensive safeguards cover everything by definition, there are no guidelines for safeguarding research institutes or heavy water plants in the item-specific template that is INFCIRC/66.
16. Section 57 of the US Atomic Energy Act prohibits transfer of technologies for the production of special nuclear materials. Informal dialogue with colleagues from USA gives an indication that a determination was made that ITER has no such possibilities.

17. India has developed all three sensitive nuclear technologies namely heavy water production, spent fuel reprocessing and uranium enrichment. While the complete process flow sheet has been designed by the units of DAE based on indigenous efforts, equipment for setting up plants are sourced from industry. From past experience, one finds that cost of setting up plants can be brought down if equipment are sourced from global market based on open global tenders. Indian negotiators wanted to include cooperation in sensitive nuclear technology with the objective of sourcing equipment from the global market, but the US side responded that it was not possible and so opted for a forward-looking language which says that transfer of sensitive technologies would become possible only after an amendment.
18. Granting consent for reprocessing on a programmatical basis is not a normal part of the US policy. Such a consent is included only in the nuclear cooperation agreement concluded by the US with Japan. Pursuit of closed fuel cycle is an integral part of India's policy and it has been explicitly included in the Agreement. However, as per the US law, for giving consent it is necessary to have arrangements and procedures for implementing the consent and these were negotiated subsequently within the time limit specified. More on arrangements and procedures is covered in a later section.
19. Please see endnote xv.
20. Please see endnote xv.
21. The agreement of cooperation between India and the United States for setting up TAPS-1 & 2 expired n 24 October 1993. According to the terms of the agreement, the safeguards agreement also expired on that date. A new safeguards agreement was negotiated to continue safeguards on TAPS-1 & 2 on voluntary basis by India.
22. In the initial stages, there was some criticism from experts in India about the agreement not being India specific. This subsided after all questions were answered in a Press Conference on 12 July 2008 (Smith and Chakravarthi, 2008).
23. Shivshankar Menon has described in detail about the position of various countries during the debate and how they were brought on board (Menon 2016:72). Shyam Saran lobbied with various NSG countries (Saran 2017: 227). China's opposition was formidable. It looked at the US-India nuclear agreement as a major blow to the international non-proliferation regime (Kumara and Jayasekera, 2008).
24. Please see endnote xvii.
25. An incident narrated by Shivshankar Menon provides an interesting insight, "On September 25, 2008, President Bush hosted a small private dinner for Prime Minister Manmohan Singh in the white house for about ten persons, when the 123 Agreement was awaiting approval by the U.S. senate. Secretary of State Rice leaned over and asked Singh when India would be ordering reactors from Westinghouse. Bush cut her off immediately and said that this was not about reactor sales but about much bigger things. Singh did not have to reply" Menon 2016: 82)
26. HYDE Act, SEC 103 (b) (3) (E) says, "Secure India's ratification of or accession to the Convention on Supplementary Compensation for Nuclear damage, done at Vienna on September 12, 1997."
27. Itty Abraham has approached the issue of outcomes from a different perspective. He poses several hypothetical questions and gives his response. My short response to questions posed by him is that this deal is about civilian programme, India has been and will continue to follow a law-based export control regime, research collaborations and nuclear installed capacity in India will grow as result of this deal.
28. EU was looking at India to join ITER even prior to the US taking the initiative. However, without the support by the US, it would not have been possible for India to join ITER.
29. In view of its high cost, ITER project came in for criticism in the USA, but a recent report from National Academies Press has strongly supported the project (USNAP 2018). High project cost remains a concern for all Parties.
30. Low capacity factors for the years 2017-18 and 2018-19 are due to initial problems with reactors at Kudankulum.
31. This has indeed happened. Institute for Plasma Research is the lead institute for India's participation in ITER.
32. Adapted and expanded from the version published by "India Today", Indo-Asian News Service, Washington, 2 October 2008.

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Annexure 1

Extracts from the Joint Statement

Recognizing the significance of civilian nuclear energy for meeting growing global energy demands in a cleaner and more efficient manner, the two leaders discussed India's plans to develop its civilian nuclear energy programme.

President Bush conveyed his appreciation to the Prime Minister over India's strong commitment to preventing WMD proliferation and stated that as a responsible state with advanced nuclear technology, India should acquire the same benefits and advantages as other such states. The President told the Prime Minister that he will work to achieve full civil nuclear energy cooperation with India as it realizes its goals of promoting nuclear power and achieving energy security. The President would also seek agreement from Congress to adjust U.S. laws and policies, and the United States will work with friends and allies to adjust international regimes to enable full civil nuclear energy cooperation and trade with India, including but not limited to expeditious consideration of fuel supplies for safeguarded nuclear reactors at Tarapur. In the meantime, the United States will encourage its partners to also consider this request expeditiously. India has expressed its interest in ITER and a willingness to contribute. The United States will consult with its partners considering India's participation. The United States will consult with the other participants in the Generation IV International Forum with a view toward India's inclusion.

The Prime Minister conveyed that for his part, India would reciprocally agree that it would be ready to assume the same responsibilities and practices and acquire the same benefits and advantages as other leading countries with advanced nuclear technology, such as the United States. These responsibilities and practices consist of identifying and separating civilian and military nuclear facilities and programmes in a phased manner and filing a declaration regarding its civilians facilities with the International Atomic Energy Agency (IAEA); taking a decision to place voluntarily its civilian nuclear facilities under IAEA safeguards; signing and adhering to an Additional Protocol with respect to civilian nuclear facilities; continuing India's unilateral moratorium on nuclear testing; working with the United States for the conclusion of a multilateral Fissile Material Cut Off Treaty; refraining from transfer of enrichment and reprocessing technologies to states that do not have them and supporting international efforts to limit their spread; and ensuring that the necessary steps have been taken to secure nuclear materials and technology through comprehensive export control legislation and through harmonization and adherence to Missile Technology Control Regime (MTCR) and Nuclear Suppliers Group (NSG) guidelines.

The President welcomed the Prime Minister's assurance. The two leaders agreed to establish a working group to undertake on a phased basis in the months ahead the necessary actions mentioned above to fulfill these commitments. The President and Prime Minister also agreed that they would review this progress when the President visits India in 2006.

Annexure 2

Extracts from the Separation Plan

14 vii) **Research Facilities**: India will declare the following facilities as civilians:

α) Tata Institute of Fundamental Research

β) Variable Energy Cyclotron Centre

χ) Saha Institute of Nuclear Physics

δ) Institute for Plasma Research

ε) Institute of Mathematical Sciences

ϕ) Institute of Physics

γ) Tata Memorial Centre

η) Board of Radiation and Isotope Technology

ι) Harish-Chandra Research Institute

These facilities are safeguards irrelevant. It is our expectation that they will play a prominent role in international cooperation.[31]

15. Safeguards:

a) The United States has conveyed its commitment to the reliable supply of fuel to India. Consistent with the July 18, 2005, Joint Statement, the United States has also reaffirmed its assurance to create the necessary conditions for India to have assured and full access to fuel for its reactors. As part of its implementation of the July 18, 2005, Joint Statement the United States is committed to seeking agreement from the U.S. Congress to amend its domestic laws and to work with friends and allies to adjust the practices of the Nuclear Suppliers Group to create the necessary conditions for India to obtain full access to the international fuel market, including reliable, uninterrupted and continual access to fuel supplies from firms in several nations.

b) To further guard against any disruption of fuel supplies, the United States is prepared to take the following additional steps:

ι. The United States is willing to incorporate assurances regarding fuel supply in the bilateral U.S.-India agreement on peaceful uses of nuclear energy under Section 123 of the U.S. Atomic Energy Act, which would be submitted to the U.S. Congress.

ιι. The United States will join India in seeking to negotiate with the IAEA an India-specific fuel supply agreement.

ιιι. The United States will support an Indian effort to develop a strategic reserve of nuclear fuel to guard against any disruption of supply over the lifetime of India's reactors.

ιϖ. If despite these arrangements, a disruption of fuel supplies to India occurs, the United States and India would jointly convene a group of friendly supplier countries to include countries such as Russia, France and the United Kingdom to pursue such measures as would restore fuel supply to India.

c) In light of the above understandings with the United States, an India-specific safeguards agreement will be negotiated between India and the IAEA providing for safeguards to guard against withdrawal of safeguarded nuclear material from civilian use at any time as well as providing for corrective measures that India may take to ensure uninterrupted operation of its civilian nuclear reactors in the event of disruption of foreign fuel supplies. Taking this into account, India will place its civilian nuclear facilities under India-specific safeguards in perpetuity and negotiate an appropriate safeguards agreement to this end with the IAEA.

Annexure 3

List of facilities subject to safeguards under ISSA

	Facility offered for Safeguards by India	Date of receipt of notification
1.	Uranium Oxide Plant (Block A), Nuclear Fuel Complex, Hyderabad	16 October 2009
2.	Ceramic Fuel Fabrication Plant (Pelletizing)(Block A), Nuclear Fuel Complex, Hyderabad	16 October 2009
3.	Ceramic Fuel Fabrication Plant (Assembly)(Block A), Nuclear Fuel Complex, Hyderabad	16 October 2009
4.	Enriched Uranium Oxide Plant, Nuclear Fuel Complex, Hyderabad	16 October 2009
5.	Enriched Fuel Fabrication Plant, Nuclear Fuel Complex, Hyderabad	16 October 2009
6.	Gadolinia Facility, Nuclear Fuel Complex, Hyderabad	16 October 2009
7.	TAPS 1 -Tarapur Atomic Power Station, Unit 1	16 October 2009
8.	TAPS 2 - Tarapur Atomic Power Station, Unit 2	16 October 2009
9.	RAPS 1 - Rajasthan Atomic Power Station, Unit 1	16 October 2009
10.	RAPS 2 - Rajasthan Atomic Power Station, Unit 2	16 October 2009
11.	KK 1 -Kundankulam Nuclear Power Plant, Unit 1	16 October 2009
12.	KK 2 - Kundankulam Nuclear Power Plant, Unit 2	16 October 2009
13.	RAPS 5 - Rajasthan Atomic Power Station, Unit 5	19 October 2009
14.	RAPS 6 - Rajasthan Atomic Power Station, Unit 6	19 October 2009
15.	RAPS 3 - Rajasthan Atomic Power Station, Unit 3	9 March 2010
16.	RAPS 4 - Rajasthan Atomic Power Station, Unit 4	9 March 2010
17.	KAPS 1 - Kakrapar Atomic Power Station	3 December 2010
18.	KAPS 2 - Kakrapar Atomic Power Station	3 December 2010
19	Away from Reactor (AFR) Fuel Storage Facility, Tarapur	11 December 2012
20.	Nuclear Material Store at Tarapur	11 March 2014
21.	NAPS 1 - Narora Atomic Power Station, Unit 1	12 December 2014
22.	NAPS 2 - Narora Atomic Power Station, Unit 2	12 December 2014
23	Kakrapar Atomic Power Station Unit 3 (KAPS-3)	11 September 2017
24	Kakrapar Atomic Power Station Unit 4 (KAPS-4)	11 September 2017
25	KK-3 – Kudankulam Nuclear Power Plant, Unit 3	7 May 2018
26	KK-4 – Kudankulam Nuclear Power Plant, Unit 4	7 May 2018

Source: IAEA, 2018

Annexure 4

Various categories and licensing authorities in SCOMET

SCOMET Category	SCOMET items	Licensing Jurisdiction
0	Nuclear materials, nuclear-related other materials, equipment and technology	DAE
1	Toxic chemical agents and other chemicals	DGFT
2	Micro-organisms, Toxins	DGFT
3	Materials, Materials Processing Equipment and related Technologies	DGFT
4	Nuclear-related other equipment and technology, not controlled under Category '0'	DGFT
5	Aerospace systems, equipment, including production and test equipment, and related technology	DGFT
6	Munitions List	DD
7	Reserved	
8	Special Materials and Related Equipment, Material Processing, Electronics, Computers, Telecommunications, Information Security, Sensors and Lasers, Navigation and Avionics, Marine, Aerospace and Propulsion.	DGFT

Source: DGFT, 2018a

Note: DAE: Department of Atomic Energy

DGFT: Directorate General of Foreign Trade, Ministry of Commerce and Industry

DD: Department of Defence Production, Ministry of Defence

Annexure 5

Nuclear Suppliers Group's Statement on Civil Nuclear Cooperation with India (IAEA, 2008b)

1. At the Extraordinary Plenary Meeting on 6 September 2008 the Participating Governments of the Nuclear Suppliers Group decided that they:
   a. Desire to contribute to the effectiveness and integrity of the global nonproliferation regime, and to the widest possible implementation of the provisions and objectives of the Treaty on the Non-Proliferation of Nuclear Weapons;
   b. Seek to avert the further spread of nuclear weapons;
   c. Wish to pursue mechanisms to affect positively the non-proliferation commitments and actions of all states;
   d. Seek to promote fundamental principles of safeguards and export controls for nuclear transfers for peaceful purposes; and
   e. Note the energy needs of India.
2. Participating Governments have taken note of steps that India has voluntarily taken with respect to the following commitments and actions:
   a. Deciding to separate civilian nuclear facilities in a phased manner and to file a declaration regarding its civilian nuclear facilities with the IAEA, in accordance with its Separation Plan (circulated as INFCIRC/731);
   b. Concluding negotiations with the IAEA and obtaining approval by the Board of Governors on 1 August 2008 for an "Agreement between the Government of India and the IAEA for the Application of Safeguards to Civilian Nuclear Facilities," in accordance with IAEA standards, principles, and practices (including IAEA Board of Governors Document GOV/1621;)
   c. Committing to sign and adhere to an Additional Protocol with respect to India's civil nuclear facilities;
   d. Refraining from transfer of enrichment and reprocessing technologies to states that do not have them and supporting international efforts to limit their spread;
   e. Instituting a national export control system capable of effectively controlling transfers of multilaterally controlled nuclear and nuclear-related material, equipment and technology;
   f. Harmonizing its export control lists and guidelines with those of the Nuclear Suppliers Group and committing to adhere to the Nuclear Suppliers Group Guidelines; and
   g. Continuing its unilateral moratorium on nuclear testing, and its readiness to work with others towards the conclusion of a multilateral Fissile Material Cutoff Treaty.
3. Based on the commitments and actions mentioned above, as reiterated by India on September 5, 2008, and without prejudice to national positions thereon, Participating Governments have adopted and will implement the following policy on civil nuclear cooperation by Participating Governments with the IAEA-safeguarded Indian civil nuclear programme:
   a. Notwithstanding paragraphs 4(a), 4(b) and 4(c) of INFCIRC/254/Rev.9/Part 1, Participating Governments may transfer trigger list items and/or related technology to India for peaceful purposes and for use in IAEA safeguarded civil nuclear facilities, provided that the transfer satisfies all other provisions of INFCIRC/254/Part 1, as revised, and provided that transfers of sensitive exports remain subject to paragraphs 6 and 7 of the Guidelines.

b. Notwithstanding paragraphs 4(a) and 4(b) of INFCIRC/254/Rev.7/Part 2, Participating Governments may transfer nuclear-related dual-use equipment, materials, software, and related technology to India for peaceful purposes and for use in IAEA safeguarded civil nuclear facilities, provided that the transfer satisfies all other provisions of INFCIRC/254/Part 2, as revised.

c. At each Plenary, Participating Governments shall notify each other of approved transfers to India of Annexure A and B items listed in INFCIRC/254/Part 1, as revised. Participating Governments are also invited to exchange information, including about their own bilateral agreements with India.

d. With a view to intensification of dialogue and cooperation with India, the Chairman is requested to confer and consult with India and keep the Plenary informed of these consultations.

e. Participating Governments will maintain contact and consult through regular channels, including the Consultative Group and Plenary, for the purpose of considering matters connected with the implementation of all aspects of this Statement taking into account relevant international commitments or bilateral agreements with India. In the event that one or more Participating Governments consider that circumstances have arisen which require consultations, Participating Governments will meet, and then act in accordance with paragraph 16 of the Guidelines.

4. In order to facilitate India's adherence to INFCIRC/254/Parts 1 and 2 and to remain current in its implementation of the Guidelines, the NSG Chair is requested to consult with India regarding changes to and implementation of the Guidelines and inform the Plenary of the outcome of the dialogue with India. Consultations with India regarding proposed amendments will facilitate their effective implementation by India.

5. Upon request by Participating Governments, the Chairman is requested to submit this Statement to the IAEA Director General with a request that it be circulated to all Member States.

Annexure 6

Statement by External Affairs Minister of India Shri Pranab Mukherjee on the Civil Nuclear Initiative

September 05, 2008

To reiterate India's stand on disarmament and nonproliferation, EAM has made the following statement:

A Plenary meeting of the Nuclear Suppliers Group to consider an exception for India from its guidelines to allow for full civil nuclear cooperation with India is being held in Vienna from September 4-5, 2008.

India has a long-standing and steadfast commitment to universal, non-discriminatory and total elimination of nuclear weapons. The vision of a world free of nuclear weapons which Shri Rajiv Gandhi put before the UN in 1988 still has universal resonance.

We approach our dialogue with the Nuclear Suppliers Group and all its members in a spirit of cooperation that allows for an ongoing frank exchange of views on subjects of mutual interest and concern. Such a dialogue will strengthen our relationship in the years to come.

Our civil nuclear initiative will strengthen the international non-proliferation regime. India believes that the opening of full civil nuclear cooperation will be good for India and for the world. It will have a profound positive impact on global energy security and international efforts to combat climate change.

India has recently submitted a Working Paper on Nuclear Disarmament to the UN General Assembly, containing initiatives on nuclear disarmament. These include the reaffirmation of the unequivocal commitment of all nuclear weapon States to the goal of complete elimination of nuclear weapons; negotiation of a Convention on the complete prohibition of the use or threat of use of nuclear weapons; and negotiation of a Nuclear Weapons Convention prohibiting the development, production, stockpiling and use of nuclear weapons and on their destruction, leading to the global, non-discriminatory and verifiable elimination of nuclear weapons within a specified timeframe.

We remain committed to a voluntary, unilateral moratorium on nuclear testing. We do not subscribe to any arms race, including a nuclear arms race. We have always tempered the exercise of our strategic autonomy with a sense of global responsibility. We affirm our policy of no-first-use of nuclear weapons.

We are committed to work with others towards the conclusion of a multilateral Fissile Material Cut-off Treaty in the Conference on Disarmament that is universal, non-discriminatory and verifiable.

India has an impeccable non-proliferation record. We have in place an effective and comprehensive system of national export controls, which has been constantly updated to meet the highest international standards. This is manifested in the enactment of the Weapons of Mass Destruction and their Delivery Systems Act in 2005. India has taken the necessary steps to secure nuclear materials and technology through comprehensive export control legislation and through harmonization and committing to adhere to Missile Technology Control Regime and Nuclear Suppliers Group guidelines.

India will not be the source of proliferation of sensitive technologies, including enrichment and reprocessing transfers. We stand for the strengthening of the non-proliferation regime. We support international efforts to limit the spread of ENR equipment or technologies to states that do not have them. We will work together with the international community to advance our common objective of non-proliferation. In this regard, India is interested in participating as a supplier nation, particularly for Thorium-based fuel and in establishment of international fuel banks, which also benefit India.

India places great value on the role played by the IAEA's nuclear safeguards system. We look forward to working with the IAEA in implementing the India-specific Safeguards Agreement concluded with the IAEA. In keeping with our commitment to sign and adhere to an Additional Protocol with respect to India's civil nuclear facilities, we are working closely with the IAEA to ensure early conclusion of an Additional Protocol to the Safeguards Agreement.

New Delhi

5th September 2008

Annexure 7

Milestones[32] leading to resumption of international civil nuclear trade

13 January 2004: The release of a matched set of statements (Next Steps in Strategic Partnership) by the PM of India in New Delhi and the President of the USA in Washington.

18 July 2005: Prime Minister Manmohan Singh and President George W. Bush sign a joint statement in Washington on India-US civil nuclear cooperation.

6 December 2005: India is admitted to the negotiations for finalising the Joint Implementation Agreement for setting up ITER.

2 March 2006: India and the US agree on a Separation Plan during President Bush's visit to Delhi. In exchange, US agrees to work towards full civil nuclear cooperation with India.

21 November 2006: India signs Joint Implementation Agreement to set up ITER.

9 Dec 2006: Both houses of US Congress approve the Henry J. Hyde US-India Peaceful Atomic Energy Cooperation Act of 2006.

18 Dec 2006: Bush signs the enabling legislation permitting full civilian nuclear cooperation with India into law.

27 July 2007: India and the US announce the finalization of bilateral Nuclear Cooperation Agreement.

October 2007: Left allies of the UPA government declare that the Nuclear Cooperation Agreement is against the country's interests and compromising to its sovereignty.

November 2007-June 2008: United Progressive Alliance (UPA) and its Left allies set up a joint panel and agree to allow the government to carry on negotiations with IAEA on finalising the text of ISSA.

May 2008: Indian negotiators complete negotiations with the secretariat of the IAEA for the text of the ISSA.

25 June 2008: The Left parties give an ultimatum to withdraw support if the government goes ahead with signing the ISSA with IAEA.

7 July 2008: While on way to Japan to attend the G8 summit, Prime Minister Manmohan Singh informs accompanying media persons about the plan of the government to go ahead with finalising the ISSA with IAEA.

9 July 2008: The Left parties withdraw support to the UPA government and call for a vote of confidence.

22 July 2008: The UPA government wins the vote of confidence.

1 Aug 2008: Board of Governors of IAEA approves ISSA.

6 Sep 2008: The 45-member Nuclear Suppliers Group (NSG) grants waiver to India facilitating international civil nuclear trade with India.

10 Sep 2008: President Bush notifies Congress to take up the India-US nuclear deal and give it the approval. Also, India's Foreign Secretary issues a letter to his counterpart regarding India intention to conclude agreements for the construction of nuclear power units at least at two sites capable of generation a minimum of 10,000 MWe.

23 Sep 2008: The US Senate Foreign Relations Committee approves the agreement but its new provisions stating that the deal will be subject to the Hyde Act create some uncertainty.

25 Sep 2008: President Bush tells Prime Minister Manmohan Singh in Washington that the administration is working to get the Nuclear Cooperation Agreement approved by the US Congress.

26 Sep 2008: US House of Representatives Foreign Affairs Committee chairman Howard Berman introduces the approval resolution to Agreement.

27 Sep 2008: House of Representatives passes the 123 Agreement for civil nuclear cooperation between India and the US by a margin of 298-117.

30 September 2008: India and France sign the Nuclear Cooperation Agreement.

1 Oct 2008: Senate passes the approval bill 86-13.

10 October 2008: India and the USA sign the Nuclear Cooperation Agreement.

5 Dec 2008: India and Russia sign the Nuclear Cooperation Agreement.

30 Jul 2010: India and the USA sign Arrangements and Procedures for Reprocessing

15 May 2009: India signs the Additional Protocol

16 Oct 2009: India notifies first set of facilities to IAEA for implementing safeguards under ISSA

11 Nov 2011: India notifies the Civil Liability for Nuclear Damage Act, 2010.

12 Dec 2014: India completes separation plan by offering last set of facilities identified in the Separation Plan as per the agreed time table.

4 Feb 2016: India deposits its instrument of ratification for the Convention on Supplementary Compensation for Nuclear Damage (CSC).

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