

URANIUM, INDIA AND THE FRACTURING NUCLEAR NON-PROLIFERATION REGIME

EnergyScience Coalition
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Jim Green
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Acronyms

CTBT – Comprehensive Test Ban Treaty
FMCT – Fissile Material Cut-off Treaty
IAEA – International Atomic Energy Agency
MTCR – Missile Technology Control Regime
NPT – UN Nuclear Non-Proliferation Treaty
NSG – Nuclear Suppliers Group

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About the author: Dr. Jim Green is the national nuclear campaigner with Friends of the Earth, Australia and a member of the EnergyScience Coalition.

About the EnergyScience Coalition: The EnergyScience Coalition is an independent non-governmental organisation established as a collaboration of concerned scientists, engineers and policy experts to present information to people on the issue of sustainable energy. <www.energyscience.org.au>



Cartoon by Nicholson from The Australian newspaper: www.nicholsoncartoons.com.au

1. INTRODUCTION AND SUMMARY

The Federal Labor Government is under pressure to overturn policy banning the export of uranium to India. However a policy reversal would be controversial because India is a nuclear weapons state that has not signed the Nuclear Non-Proliferation Treaty (NPT). This debate has important implications regarding Australia's professed leadership on nuclear weapons non-proliferation and disarmament.

The former Coalition Government reversed its previous policy of banning uranium sales to India in August 2007, but lost office three months later. The Labor Government has upheld binding Labor Party platform policy¹ of prohibiting uranium exports to countries that refuse to sign the NPT (India, Pakistan, Israel) or to North Korea (which pulled out of the NPT).

As Leader of the Opposition in August 2007, Kevin Rudd said: "I believe we've got no alternative but to do that [reverse the Howard government's decision to approve uranium sales to India]. I realise that's a very difficult thing to do, but we have a principle when it comes to this country's foreign policy engagement with the world which is this: We respect the Nuclear Non-Proliferation Treaty and the [International Atomic Energy Agency] because we've got to prevent nuclear weapons proliferation in our own region, in our own neighbourhood and our own backyard. No one in Australia wants a nuclear arms race aided by us in the Indian sub-continent or between India and China because we've failed to properly ensure the upholding of the NPT and the IAEA safeguards regime under it."²

However the Labor government has supported the US-India deal – which opens up civil nuclear trade with India – in the 46-nation Nuclear Suppliers Group and the IAEA. Some argue that this is a contradiction that can only be resolved by a change in uranium policy. However a more appropriate course of action would be for both major parties to commit to strengthening rather than weakening the fracturing nuclear non-proliferation and disarmament regime. To that end, Australia needs to maintain the ban on uranium sales to non-NPT states, to work internationally to re-establish that norm, and to be more pro-active in other areas such as policy on uranium supply to 'declared' nuclear weapons states flouting their disarmament obligations under the NPT.

¹ <www.alp.org.au/sites/default/files/downloads/chapter_3.pdf>

² ABC Lateline, 16 August 2007, <www.abc.net.au/lateline/content/2007/s2007343.htm>.

The debate over proposed uranium exports to India needs to consider several key issues including:

1. Claimed economic and environmental benefits.
2. The possibility of securing non-proliferation and disarmament concessions from India.
3. The adequacy of safeguards.
4. Whether uranium sales would strengthen or weaken the global nuclear weapons non-proliferation and disarmament regime and Australia's claim to be a strong supporter of nuclear non-proliferation and disarmament.

Claims made about the benefits of allowing uranium sales to India do not stand up to scrutiny because:

- * Export revenue would be negligible in the short-term, and at best modest in the longer term.
- * Claims made about the environmental benefits of nuclear power ignore the enormous potential to pursue clean energy options in India through renewable energy and energy conservation.
- * Claims that Australia should sell uranium to India because of India's 'strategic importance' ignore the strategic importance of Pakistan (which resents the preferential treatment given to India), the strategic importance of regional stability, and the strategic importance of the global nuclear non-proliferation regime.

As for the problems with civil nuclear trade with India, this discussion needs to be considered in the light of the 2008 nuclear cooperation agreement struck between the US and India that permits civil nuclear trade between the two countries. Related agreements in the Nuclear Suppliers Group and the International Atomic Energy Agency have made it possible for other countries to follow the lead of the US. Several countries have since taken steps to initiate nuclear trade with India, including France, Russia, Canada, and the UK.

Proponents of the US-India deal promised non-proliferation and disarmament concessions and advantages, but in fact the opposite has occurred. India did commit to nuclear disarmament. India did not commit to sign the Comprehensive Test Ban Treaty (CTBT). India has not stopped producing fissile (explosive) material for nuclear weapons nor has it committed to doing so. There is no restraint on India building new, unsafeguarded reactors or other facilities for its weapons program. India did not commit to comprehensive safeguards. India will be able to divert more of its own uranium to weapons and the net result of the US-India deal has been to boost India's capability to produce fissile material for weapons.

Proponents of the agreement have resorted to dishonest arguments. These include the claim that India's 'moratorium' on nuclear tests is a victory although it was in place before the US-India negotiations and is clearly no substitute for signing and ratifying the CTBT. India's willingness to separate its peaceful and military programs is portrayed as a successful outcome, but it does not constrain India's nuclear weapons program in any way and is part of a process which legitimises India's weapons program and facilitates its expansion.

The events set in motion by the opening up of nuclear trade with India have been disastrous from a non-proliferation standpoint. They have led to an escalating nuclear arms race between India and Pakistan, and a weakening of the global non-proliferation and disarmament regime which others are now exploiting (e.g. China's plan to supply reactors to Pakistan). Another serious problem is that the precedent set by nuclear trade with India increases the risk of other countries pulling out of the NPT, and building nuclear weapons with the expectation that civil nuclear trade would continue.

There is no realistic possibility of meaningful concessions from India – such as CTBT ratification and a moratorium on the production of fissile materials for weapons – in the context of negotiations over the supply of Australian uranium. That can be said categorically given that no meaningful concessions were given by India during the US-India negotiations.

India's safeguards agreement with the IAEA leaves a great deal to be desired. Safeguards will be tokenistic and apply only to that part of the nuclear program that India considers surplus to its military 'requirements'. Safeguards would provide very little confidence that Australian uranium remained in peaceful use. Moreover, even if a rigorous safeguards regime was in place, that would in no way undo the damage done by opening up civil nuclear trade with non-NPT states.

Nor would a rigorous safeguards regime address another key problem: uranium exports to India freeing up domestic reserves for weapons production. K. Subrahmanyam, former head of the India's National Security Advisory Board, has said that: "Given India's uranium ore crunch and the need to build up our minimum credible nuclear deterrent arsenal as fast as possible, it is to India's advantage to categorize as many power reactors as possible as civilian ones to be refueled by imported uranium and conserve our native uranium fuel for weapons grade plutonium production."

If the Government wants to do its part to reverse the fracturing of the nuclear non-proliferation regime, maintaining its ban on uranium sales to non-NPT countries is a necessary starting point. The Government also ought to work internationally to re-establish the norm that countries outside the NPT – as well as those NPT signatories that are flouting their disarmament obligations – are not eligible for nuclear trade.

Australia would certainly not be alone in seeking to preserve what remains of the principle that non-NPT states are excluded from civil nuclear trade. During the 2010 NPT Review Conference, the 118 nations of the Nonaligned Movement complained that the US-India agreement had given a non-NPT state more benefits than NPT parties and argued that comprehensive, full-scope safeguards ought to be a requirement for nuclear supply.

The choice for Australia is this: we can stand with the vast majority of nations in upholding and attempting to strengthen the fragile nuclear non-proliferation and disarmament regime, or we can stand with those who continue to undermine it.

2. THE US-INDIA DEAL



US President George W. Bush and India's Prime Minister Manmohan Singh, New Delhi, 2 March 2006.

Summary

The US-India deal – concluded in 2008 after three years of negotiation – allows US companies to sell reactors, enriched uranium fuel and potentially other nuclear facilities for India's civil nuclear program.³

Under the deal, India will separate its civil nuclear program from its weapons program. It is left to India's discretion to decide which facilities are to be included in its civil program (and therefore subject to safeguards). There will be no attempt to separate civil and military programs with respect to personnel – R. Chidambaram, chief scientific adviser to the India government, said in 2007: "But we are not firewalling between the civil and military programmes in terms of manpower or personnel. That's not on."⁴

³ For detail on the US-India deal see the resources posted on the Abolition 2000 US-India Deal Working Group's website, <<http://cnic.jp/english/topics/proliferation/campaign/usindia.html>>

⁴ <www.hindu.com/2007/08/10/stories/2007081056171100.htm>

A total of 14 reactors will be subject to IAEA safeguards inspections by 2014, of which six are already subject to safeguards (four of them operating, two under construction). Other facilities to be safeguarded include three heavy water production plants (leaving at least two beyond the scope of safeguards) and two spent fuel storage facilities that contain spent fuel from the safeguarded reactors.

India's remaining eight power reactors, all its research reactors, the plutonium-fuelled fast breeder reactor program, reprocessing and enrichment facilities will remain beyond the scope of safeguards. India reserves the right to classify any future reactors as civilian or military (although supplier states can make sales contingent on the application of IAEA safeguards).

The precedent set by the US-India deal has encouraged some countries to initiate national policy processes and bilateral discussions to enable nuclear trade with India (e.g. USA, France, Russia, Japan, Canada, UK, Argentina, Kazakhstan, and Namibia)⁵, while other countries (e.g. Germany, Australia) retain their policies and/or legislation prohibiting nuclear trade with non-NPT states. A few countries have already initiated nuclear trade with India while some others are considering and discussing the option. In some cases obstacles are emerging such as a disagreement between Japan and India regarding a proposed clause in a bilateral agreement which would terminate nuclear trade if India conducts further nuclear weapons tests.⁶

India has been pressuring nuclear exporting countries (including Australia) to 'align' their domestic policies with India's NSG exemption. There are reports of India threatening to restrict access to Indian markets, or otherwise inhibiting routine bilateral relations, unless civil nuclear trade is permitted.

Politicking around the US-India deal

Debates over the merits of the US-India deal are addressed in subsequent sections. Suffice it here to make a few comments about the politicking around the US-India deal.

The deal was and remains highly contentious; it almost led to the defeat of the Indian government.

There was strong corporate pressure in the US to conclude a deal.⁷ Condoleezza Rice said in 2006: "At its core, our initiative with India is not simply a government-to-government effort. It was crafted with the private sector firmly in mind."⁸

Mian and Ramana point to broader strategic considerations: "Recruiting India may help reduce the immediate costs to the United States of exercising its military, political, and economic power to limit the growth of China as a possible rival. ... India is seen as a major prize, and support for its military buildup and its nuclear complex seems to be the price the Bush administration is willing to pay. This goal is, it seems, to be pursued regardless of how it will spur the spiral of distrust, political tension, and dangerous, costly, and wasteful military preparedness between the United States and China, between China and India, and between India and Pakistan."⁹

⁵ K. S. Jayaraman and Declan Butler, 6 January 2009, Companies racing into India's nuclear market, <www.nature.com/news/2009/090106/full/457134b.html>. World Nuclear Association, October 2010, Nuclear Power in India, <www.world-nuclear.org/info/inf53.html>

⁶ The Japan Roadblock to Nuclear Cooperation, 28 October 2010, <<http://online.wsj.com/article/SB10001424052702303362404575579493748766302.html>>

⁷ J. Sri Raman, 1 October 2009, The U.S.-India nuclear deal--one year later, <www.thebulletin.org/web-edition/features/the-us-india-nuclear-deal-one-year-later>

⁸ Subrata Ghoshroy, October 2008, The Real Story Behind the U.S.-India Nuclear Deal, <www.alternet.org/story/103313>

⁹ Zia Mian and M. V. Ramana, January/February 2006, Wrong Ends, Means, and Needs: Behind the U.S. Nuclear Deal With India, Arms Control Today, <www.armscontrol.org/act/2006_01-02/JANFEB-IndiaFeature>

Nuclear Suppliers Group

The NSG was formed in the 1970s as a direct result of India's 1974 nuclear weapons test, which used plutonium produced in a Canadian-supplied research reactor and violated India's promise to use the reactor for peaceful purposes only. In September 2008, the NSG agreed to exempt India from the NSG policy banning trade with countries which do not have full-scope safeguards.

The Australian-led International Commission on Nuclear Non-proliferation and Disarmament noted in a 2009 report: "The NSG's credibility has been put most at risk by its decision in September 2008 to exempt India from rules barring nuclear cooperation with states outside the NPT that do not accept international safeguards on all of their nuclear facilities. The United States and India instigated this change, strongly encouraged by France and Russia, which welcomed the opportunity for nuclear commerce with India. Any one of the NSG's 46 member states could have blocked the exemption, because the group operates by consensus. Several wanted to, but none did, due largely to commercial interests in India and political pressure from the United States."¹⁰

Reflecting widespread disappointment at the failure to secure meaningful commitments from India, even among NSG countries that agreed to exempting India from NSG guidelines, German foreign ministry spokesperson Jens Ploetner said on 8 September 2008: "There were several countries that put critical questions to India, but also the United States, about how this arrangement is compatible with the common goal of nuclear non-proliferation. ... It is not an ideal solution. The negotiations were very difficult and we cannot say that we could not have imagined something better."¹¹

Johan Bergenäs from the James Martin Center for Nonproliferation Studies explored the politicking around the NSG decision:¹²

"During NSG deliberations on September 4-6 [2008], as well as during a previous meeting in August, a small number of states, including Austria, Ireland, the Netherlands, New Zealand, Norway, and Switzerland, proposed amendments to the Indian exemption. These amendments included termination of nuclear exports to India in the case of a nuclear weapons test, and prohibition of the export of items to India related to uranium enrichment, spent fuel reprocessing, and production of heavy water. ...

"Four NSG countries – Australia, Canada, Japan, and Sweden – despite being considered "White Knights" because of their admirable record on nonproliferation and disarmament, did not join the six countries that asked for amendments to the exemption. Their inaction and their reasoning for joining the NSG consensus came under close scrutiny and were fiercely criticized by domestic political opposition, foreign and local observers, and nonproliferation and disarmament groups in their respective countries. ...

"France, Germany, Russia, the UK, and Brazil appear to have prioritized economic benefits over costs to the nonproliferation regime when supporting the Indian NSG waiver. South Africa's allegiance to its fellow NAM [Non-Aligned Movement] member seems to have trumped its commitment to the NPT. Insofar as Austria, Ireland, the Netherlands, New Zealand, Norway, and Switzerland are concerned, these countries apparently could not withstand the Bush and Singh administrations' onslaught of pressure and maneuvering over an extended period of time, including lobbying visits, letter-writing, and last minute phone calls. These six states would have needed the support from other White Knights in order to influence the outcome in the NSG. It is possible, however, that these countries' resistance led to the agreements that were initially beyond public knowledge.

¹⁰ International Commission on Nuclear Non-proliferation and Disarmament, 2009, Eliminating Nuclear Threats, A Practical Agenda for Global Policymakers, <www.icnnd.org>

¹¹ Germany Grudgingly Accepts Landmark Nuclear Deal with India, 9 September 2008, <www.dw-world.de/dw/article/0,,3629002,00.html>

¹² Johan Bergenäs, October 2008, White Knight States Deviate from Long Held Nonproliferation Ideals as Nuclear Suppliers Group Approves Waiver, WMD Insights, <www.wmdinsights.com/I27/I27_G2_WhiteKnightStates.htm>.

"The White Knights – Australia, Canada, Japan, and Sweden – wrestled with competing priorities, including balancing relations and responsibilities toward allies, economic interests, foreign policy goals, and long-held nonproliferation and disarmament ideals. In the end, the latter did not triumph, which provided an opportunity for domestic political opposition and other groups to point out the foreign policy inconsistencies that their stands represented. Future decisions on nonproliferation and disarmament will tell if these four countries' inaction in the NSG represent a fundamental change in their views on these subjects. At least for now, these four states' credibility and ability to speak up against proliferation and for disarmament have diminished.

"The NSG exemption is admittedly a landmark victory for both Prime Minister Singh and President Bush. Considering the potential damage the exemption and the U.S.-India deal could do to the nonproliferation regime, however, and especially its flagship treaty, it might turn out that in the longer run Washington and New Delhi have achieved – with the active support, tacit agreement, and reluctant approval of other NSG states – a Pyrrhic victory."

Australia made no effort to attempt to strengthen the deal or to limit the damage to the NPT and the non-proliferation regime more generally. Then foreign minister Stephen Smith said Australia did not "put any reservations or support any changes to the arrangement".¹³ Smith cited three broad reasons for the NSG's granting of a waiver to India: India's non-proliferation record, its commitment to disarmament and its "rise as a global power".¹⁴

Then Prime Minister Kevin Rudd said in Parliament on 26 November 2009: "... the Australian government was exceptionally supportive and constructive in the negotiation of that process through the Nuclear Suppliers Group when a range of additional countries in fact were not." A more constructive approach would have been to join with those countries attempting to achieve improvements to the US-India proposals.

Australia also supported the India-specific safeguards agreement through its position on the Board of Governors of the IAEA. There is no evidence that Australia made any attempt to strengthen the safeguards agreement.

Implications for nuclear power in India

As for the impact of the US-India deal and related events on nuclear power generation in India, Ramana notes in a December 2009 paper:¹⁵

"The effects of the NSG waiver remain uncertain. Though the [DaE – Department of Atomic Energy's] nuclear reactor construction has been marked with time and cost overruns, overnight construction costs are cheaper than reactors sold on the international market, primarily because of lower labour costs, but also because licensing requirements are easier to meet. Nevertheless, nuclear electricity remains more expensive than coal-based thermal power that is and will remain the staple source of electricity in the country. Unless foreign countries offer cheap loans for purchasing imported reactors, India is unlikely to be able to afford them. Such financing is unlikely to be a viable means for large-scale expansion of nuclear power in India.

"Despite media hype and continued government patronage, nuclear power is unlikely to contribute significantly to electricity generation in India for several decades. apart from the high cost of the power it produces, one important factor that will reduce the potential contribution of nuclear power even further is the reliance on breeder reactors, a technology shown to be unreliable in most countries that have

¹³ Johan Bergenäs, October 2008, White Knight States Deviate from Long Held Nonproliferation Ideals as Nuclear Suppliers Group Approves Waiver, WMD Insights, <www.wmdinsights.com/I27/I27_G2_WhiteKnightStates.htm>.

¹⁴ India got the waiver because of its rise as global power, 11 September 2008, <http://timesofindia.indiatimes.com/India_got_the_waiver_because_of_its_rise_as_global_power/articleshow/3472841.cms>

¹⁵ M.V. Ramana, 2009, The Indian Nuclear Industry: Status and Prospects, <www.cigionline.org/publications/paper-series/nuclearenergyfutures>

experimented with them. a shift to the more reliable light water reactors might increase nuclear power's contribution to electricity generation; however, in doing so, the nuclear establishment is faced with a dilemma. On the one hand, LWRs can be imported from the West at unit costs much higher than Indian PHWRs. This would make nuclear electricity uncompetitive. On the other hand, if the DaE were to insist on local manufacture of reactor components, as a way of leveraging India's lower labour costs, many of the construction projects might proceed slowly, as has been the case in the past. In any case, nuclear power will only contribute a modest share of electricity to India's energy needs for several decades at the very least."

Progress is likely to be slowed by a complicated set of disputes concerning India's Civil Nuclear Liability Act, enacted in August 2010.¹⁶ The legislation may make it difficult for some nuclear supply firms (especially US firms) to supply India given that the legislation does not completely indemnify suppliers. A related dispute concerns India's signing of the Convention on Supplementary Compensation for Nuclear Damage on 27 October 2010.¹⁷ India says its liability legislation is compatible with the Convention, while others say it is not because it does not provide for exclusive liability of facility operators. The situation is further complicated as the Convention has not entered into force and India has signed but not ratified it.

Chronology of the US-India nuclear deal¹⁸

- July 18, 2005: President Bush and Prime Minister Singh first announce their intention to enter into a nuclear agreement in Washington.
- March 3, 2006: Bush and Singh issue a joint statement on their growing strategic partnership, emphasising their agreement on civil nuclear cooperation.
- July 26, 2006: The US House of Representatives passes the 'Henry J Hyde United States-India Peaceful Atomic Energy Cooperation Act of 2006,' which stipulates that Washington will cooperate with New Delhi on nuclear issues and exempt it from signing the NPT.
- July 28, 2006: In India, the Left parties demand threadbare discussion on the issue in Parliament.
- November 16, 2006: US Senate passes the 'United States-India Peaceful Atomic Energy Cooperation and US Additional Protocol Implementation Act' to "exempt from certain requirements of the Atomic Energy Act of 1954 United States exports of nuclear materials, equipment, and technology to India."
- December 18, 2006: President Bush signs into law congressional legislation on Indian atomic energy.
- July 27, 2007: Negotiations on a bilateral agreement between the United States and India conclude.
- Aug 3, 2007: The text of the 'Agreement for Cooperation between the Government of the United States of America and the Government of India concerning peaceful uses of nuclear energy' (123 Agreement) is released by both governments.
- Aug 13, 2007: Prime Minister Manmohan Singh makes a statement on the deal in Parliament.
- Sept 4, 2007: In India, the UPA-Left committee to discuss nuclear deal set up.
- Feb 25, 2008: Left parties in India say the ruling party would have to choose between the deal and its government's stability.
- March 3–6, 2008: Left parties warn of 'serious consequences' if the nuclear deal is operationalised and set a deadline asking the government to make it clear by March 15 whether it intended to proceed with the nuclear deal or drop it.
- March 7–14, 2008: The CPI writes to the Prime Minister Singh, warns of withdrawal of support if government goes ahead with the deal and puts political pressure on the Manmohan Singh government not to go with the deal.
- April 23, 2008: The Indian Government says it will seek the sense of the House on the 123 Agreement before it is taken up for ratification by the American Congress.

¹⁶ Siddharth Varadarajan, 22 October 2010, India resists U.S. pushback on nuclear liability, <www.hindu.com/2010/10/22/stories/2010102253960100.htm>. Liability law has put nuclear agreement in jeopardy: Burns, 21 October 2010, The Hindu, <www.thehindu.com/news/national/article841131.ece>. Indian liability bill passes lower house, 26 August 2010, <www.world-nuclear-news.org/RS_Indian_liability_bill_passes_lower_house_2608101.html>

¹⁷ India signs CSC, but conflict remains on liability, 28 October 2010, Nucleonics Week.

¹⁸ Abridged from: <http://en.wikipedia.org/wiki/Indo-U.S._civilian_nuclear_agreement>

- June 17, 2008: External Affairs Minister Pranab Mukherjee meets Prakash Karat, asks the Left to allow the government to go ahead with International Atomic Energy Agency (IAEA) safeguards agreement.
- June 30, 2008: The Indian Prime Minister says his government prepared to face Parliament before operationalising the deal.
- July 8, 2008: Left parties in India withdraw support to government.
- July 9, 2008: The draft India-specific safeguards accord with the IAEA circulated to IAEA's Board of Governors for approval.
- July 10, 2008: Prime Minister Manmohan Singh calls for a vote of confidence in Parliament.
- July 14, 2008: The IAEA says it will meet on August 1 to consider the India-specific safeguards agreement.
- July 18, 2008: Foreign Secretary Shivshankar Menon briefs IAEA Board and some NSG countries on the safeguards agreement.
- July 22, 2008: Government is willing to look at "possible amendments" to the Atomic Energy Act to ensure that the country's strategic autonomy will never be compromised, says Prime Minister Singh.
- July 22, 2008: The UPA government led by Manmohan Singh wins trust vote in the Lok Sabha in India.
- July 24, 2008: India dismisses warning by Pakistan that the deal will accelerate an atomic arms race in the sub-continent.
- July 24, 2008: India launches lobbying among the 45-nation NSG for an exemption for nuclear commerce.
- Aug 1, 2008: IAEA Board of Governors adopts India-specific safeguards agreement unanimously.
- Aug 21-22, 2008: The NSG meet to consider an India waiver ends inconclusively amid reservations by some countries.
- Sep 4-6, 2008: The NSG meets for the second time on the issue after the US comes up with a revised draft and grants waiver to India after marathon parleys.
- Sept 11, 2008: President Bush sends the text of the 123 Agreement to the US Congress for final approval.
- Sept 12, 2008: US remains silent over the controversy in India triggered by President Bush's assertions that nuclear fuel supply assurances to New Delhi under the deal were only political commitments and not legally binding.
- Sept 18, 2008: The Senate Foreign Relations Committee kicks off a crucial hearing on the Indo-US nuclear deal.
- Sept 19, 2008: America's nuclear fuel supply assurances to India are a "political commitment" and the government cannot "legally compel" US firms to sell a "given product" to New Delhi, top officials tells Congressional panel.
- Sept 26, 2008: Singh meets Bush at the White House, but were not able to sign the nuclear deal as the Congress did not approve it.
- Sept 27, 2008: House of Representatives approves the Indo-US nuclear deal. 298 members voted for the Bill while 117 voted against.
- Oct 1, 2008: Senate approves the Indo-US civil nuclear deal with 86 votes for and 13 against.
- Oct 4, 2008: Secretary of State Rice visits Delhi. India and the US unable to ink the nuclear agreement with New Delhi insisting that it would do so only after President Bush signs it into a law, an occasion when it expects certain misgivings to be cleared.
- Oct 8, 2008: President Bush signs legislation to enact the landmark US-India civilian nuclear agreement.
- Oct 10, 2008: The 123 Agreement between India and US is finally operationalised between the two countries after the deal is signed by External Affairs Minister Pranab Mukherjee and his counterpart Secretary of State Condoleezza Rice in Washington D C.

3. LEGITIMISING INDIA'S NUCLEAR WEAPONS PROGRAM

A case could be argued for opening up civil nuclear trade with nuclear-armed India if strong non-proliferation and disarmament agreements were part of the deal. These might include:

* an immediate, verified cessation of the production of fissile material for weapons and agreement that nuclear trade would cease immediately if India resumed the production of fissile material for weapons.

* India ratifying the CTBT and agreement that nuclear trade would cease immediately if India resumed nuclear weapons testing.

However, no such agreements were struck. Civil nuclear trade with India, in the absence of meaningful disarmament commitments or concessions, merely legitimises and entrenches India's nuclear weapons program. Australian uranium sales would provide further legitimacy.

Some argue that nuclear disarmament is an unrealistic expectation of India. However, South Africa gave up its nuclear weapons. Three ex-Soviet states – Belarus, Ukraine, and Kazakhstan – gave up their nuclear weapons after the collapse of the Soviet Union. There are other relevant historical precedents, such as the agreement between Argentina and Brazil to abandon their pursuit of nuclear weapons in the late 1980s. And considerable progress has been made with respect to the eradication of other weapons of mass destruction, namely chemical and biological weapons.

A responsible course of action would be to aim to curb the nuclear weapons programs of India and Pakistan while working towards a longer-term goal of disarmament. The US-India deal demonstrably undermines those short-term and longer-term goals.

Supporters of the US-India deal claim that it will have an overall positive influence on global non-proliferation and disarmament initiatives but such claims are baseless.

INDIA'S NON-COMMITMENTS

An August 1, 2007 media release from then foreign minister Alexander Downer states: "The US-India initiative includes commitments by India to continue its nuclear testing moratorium, work on conclusion of a Fissile Material Cut-off Treaty, and adhere to Missile Technology Control Regime and Nuclear Suppliers Group standards."

In truth, India committed to nothing – certainly nothing of substance. A July 2007 statement by the Indian Embassy states that the US-India agreement "will specifically provide that India's strategic nuclear programme ... will remain unhindered and unaffected."¹⁹

The Indian Embassy noted in 2005 that under the auspices of the US-India deal it was merely reiterating previous, non-binding 'commitments': "A number of existing policies were also reiterated by India, among them a unilateral moratorium on nuclear testing, working towards conclusion of a multilateral Fissile Material Cut-off Treaty, non-transfer of enrichment and reprocessing technologies, securing nuclear materials and technology through export control, and harmonisation with MTCR and NSG guidelines."²⁰

Mr Downer's statement regarding NSG standards was disingenuous given that the US-India deal was itself a violation of the NSG principle of not supporting nuclear programs in non-NPT states (or more precisely, its requirement for full-scope safeguards to apply).

India's 'moratorium' on nuclear weapons testing counts for nothing given that it refuses to sign or ratify the CTBT. Mr Downer himself argued at a 2005 CTBT conference that a voluntary moratorium on testing was no substitute for CTBT ratification.²¹

Indian national security adviser M.K. Narayan said that the US-India deal did not cover the question of nuclear tests. "This deal deals primarily with the civil nuclear cooperation. There is no reference here to detonation or to any test. So, what happens in the event of a test, we will come to that position later on."²² Likewise the Indian

¹⁹ Indian Embassy, July 27, 2007, "Fact Sheet on the India US Civil Nuclear Energy Co-operation: Conclusion of the '123' Agreement", <www.indianembassy.org/newsite/press_release/2007/July/10.asp>.

²⁰ Indian Embassy, July 29, 2005, "Backgrounder on India-U.S. Civilian Nuclear Energy Cooperation", <www.indianembassy.org/press_release/2005/July/32.htm>.

²¹ Andy Butfoy, 20 August 2007, <www.theage.com.au/news/opinion/australia-is-backing-a-nuclear-rogue/2007/08/19/1187462081031.html>

²² Indian Embassy, July 27, 2007, "Fact Sheet on the India US Civil Nuclear energy Co-operation: Conclusion of the '123' Agreement", <www.indianembassy.org/newsite/press_release/2007/July/10.asp>.

government's chief scientific adviser states that "there is nothing in the agreement which prevents us from testing, if the government decides to test for whatever reason."²³

Moreover, the US-India agreement envisages joint efforts to ensure ongoing fuel supply for, and operation of, India's reactors even if US fuel supplies are terminated (e.g. as a response to India testing nuclear weapons). These include the establishment of a fuel reserve (or 'bank'), and joint efforts to convene a group of "friendly supplier countries" including Russia, France and the UK to pursue measures to restore fuel supply to India. The Arms Control Association notes that: "The fuel supply assurances that the United States is committed to giving India are not found in any other U.S. peaceful nuclear cooperation agreement, including those with parties to the NPT. In other words, with these fuel assurances the United States is giving preferential treatment to a non-NPT party that has assumed none of the obligations and burdens of the NPT."²⁴

It is claimed that the introduction of IAEA safeguards to India is a positive step. However, IAEA safeguards already applied to six reactors prior to the US-India deal. The value of extending safeguards is limited given that safeguards will only apply to that part of the nuclear program that India considers surplus to military 'requirements'.

In relation to fissile material production, Indian officials noted on 29 July 2005 that: "There is no commitment at all to cease production of fissile material ahead of the conclusion of such a multilateral [FMCT] treaty."²⁵ India's commitment to an FMCT has not been seriously tested because the negotiations have made little progress – and of course it is a commitment which sits uneasily with India's ongoing production of fissile material.

India claims that it will live up to the responsibilities of other nuclear weapons states. But all five of the 'declared' weapons states – the US, China, the UK, Russia, and France – have signed the CTBT and the UK, Russia and France have ratified it. At least four and possibly the fifth (China) have stopped producing fissile material for weapons. By contrast, India has not signed or ratified the CTBT and continues to produce fissile material.

Far from being lumbered with commitments which will curb India's nuclear weapons program, India is not even bound by the NPT disarmament obligations which apply to the five 'declared' nuclear weapons states. Those obligations are to "[declare] their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament."

Rory Medcalf from the Lowy Institute argues that: "The world can no longer afford to leave [India] out of the nonproliferation and nuclear security tent ..."²⁶ However the argument collapses given that India has made no disarmament concessions and is not bound by the NPT disarmament obligations.

Australian academic Sandy Gordon states: "It makes little sense to sell uranium to China (as Australia has agreed to do) while denying it to India. ... Now it might be argued that China is a NPT signatory and thus has certain restrictions placed upon it, which India, as a non-signatory, does not have. When we come to analyse these restrictions, however, we find that, China being a member of the N5, there are in fact none – or at least none that would not apply to India under the proposed safeguards regime. For, as discussed above, China is not constrained from testing or producing more fissionable material under any formal agreement currently in force, including the NPT."²⁷ However the five declared weapons states are bound by the disarmament provisions of the NPT; India is not.

Assoc. Prof. Tilman Ruff summarises: "India has not committed to nuclear disarmament, not committed to stop nuclear tests, not signed or ratified the Comprehensive Test Ban Treaty, not stopped or committed to stop

²³ Quoted in The Hindu, 10 August 2007, <www.hindu.com/2007/08/10/stories/2007081056171100.htm>

²⁴ Arms Control Association, 2 August 2007, "U.S.-Indian Nuclear Agreement: A Bad Deal Gets Worse", <www.armscontrol.org/pressroom/2007/20070803_IndiaUS.asp>.

²⁵ Indian Embassy, July 29, 2005, "Backgrounder on India-U.S. Civilian Nuclear Energy Cooperation", <www.indianembassy.org/press_release/2005/July/32.htm>.

²⁶ Rory Medcalf, 15 April 2010, The Wall Street Journal, <www.loyyinstitute.org/Publication.asp?pid=1277>

²⁷ Sandy Gordon, 2007, Implications of Sale of Australian Uranium to India <http://fiap.flinders.edu.au/Uranium/Gordon_Paper.pdf>

production of highly enriched uranium or plutonium bomb fuel, and not committed to full-scope safeguards. India will be able to divert more of its own uranium to weapons. The net result of the deal will be to boost India's capability to produce fissile material for weapons."²⁸

FACILITATING AN EXPANSION OF INDIA'S NUCLEAR WEAPONS PROGRAM

As India has limited domestic reserves of uranium, there is the very real risk that uranium sales will free up domestic reserves for the production of nuclear weapons. This is a theoretical possibility with uranium exports to any nuclear weapons state, but in the case of India it is not just a possible outcome but a likely one. K. Subrahmanyam, former head of the India's National Security Advisory Board, was quoted in the Times of India on 12 December 2005 saying that: "Given India's uranium ore crunch and the need to build up our minimum credible nuclear deterrent arsenal as fast as possible, it is to India's advantage to categorize as many power reactors as possible as civilian ones to be refueled by imported uranium and conserve our native uranium fuel for weapons grade plutonium production."

India's uranium production has fallen short of its requirements at various stages in recent years. Dwindling stockpiles of previously mined and processed uranium have been used to partially meet the shortfall, but it has also been necessary to operate reactors at lower capacity. Efforts to increase production have been frustrated by public opposition. However the situation has changed in the wake of the US-India deal.

An October 2010 report from the World Nuclear Association states: "Russia's Rosatom and Areva from France had contracted to supply uranium for power generation, while Kazakhstan, Brazil and South Africa were preparing to do so. In July 2010 the Minister for Science & Technology reported that India had received 868 tU from France, Russia and Kazakhstan in the year to date. As of August 2010 the DAE said that seven reactors (1400 MWe) were using imported fuel and working at full power, nine reactors (2630 MWe) used domestic uranium."²⁹

The figure of 868 tonnes of uranium is approximately equivalent to India's annual requirements for nuclear power reactors. Whether uranium supply (from domestic mines and imports) keeps pace with growing demand remains to be seen.

Australian academic Sandy Gordon states: "At the very least, India's civil nuclear program should be separated from the military program and placed under IAEA-agreed safeguards before Australia would agree to sell. This would significantly limit India's ability to produce fissionable material and thus its capacity for vertical proliferation."³⁰ However the supply of uranium to India has expanded rather than reduced India's capacity to produce fissile material for weapons.

The extent to which uranium imports could facilitate weapons production depends on numerous factors. The International Panel on Fissile Materials explored this issue in detail and concluded³¹:

"If India could import fuel for its civilian nuclear reactors, it could use more domestic uranium for the production of weapon materials. India has exacerbated the concern that it might do so by placing eight of its heavy-water power reactors, the breeder reactor it has under construction, its reprocessing facilities, and its stocks of previously-produced reactor-grade plutonium outside international safeguards. ...

"We find that India's current domestic production of natural uranium of about 300 tons/year is insufficient to

²⁸ <www.onlineopinion.com.au/view.asp?article=7796>

²⁹ World Nuclear Association, October 2010, Nuclear Power in India, <www.world-nuclear.org/info/inf53.html>. See also World Nuclear Association, 12 October 2010, Uranium imports boost Indian reactor output, <www.world-nuclear-news.org/NP-Uranium_imports_boost_Indian_reactor_output-1210104.html>.

³⁰ Sandy Gordon, 2007, Implications of Sale of Australian Uranium to India <http://fiap.flinders.edu.au/Uranium/Gordon_Paper.pdf>

³¹ Zia Mian, A.H. Nayyar, R. Rajaraman, and M.V. Ramana, September 2006, Fissile Materials in South Asia: "The Implications of the U.S.-India Nuclear Deal", research report of the International Panel on Fissile Materials, <www.fissilematerials.org/ipfm/site_down/ipfmresearchreport01.pdf>.

fuel its unsafeguarded reactors and sustain its current weapon grade plutonium and enriched uranium production, which altogether require about 475 tons a year. India has been able to escape this constraint so far by using stocks of previously mined and processed uranium. As new unsafeguarded reactors come on-line in 2007-2008, India would need altogether about 615 tons of domestic uranium per year. However, this requirement will decline from 615 tons/year to about 380 tons since India will be able to import uranium for reactors when they come under safeguards in 2010, 2012, and 2014.

"To meet the increased demand, India expects to expand uranium mining. It is hoped that the proposed Nalgonda mines could produce about 150-200 tons per year, increasing the total available to about 450-500 tons a year. Assuming this happens, and as the requirement falls to 380 tons of uranium per year, India may be able to divert the additional 70-120 tons/year towards producing 60-100 kg/year of weapon grade plutonium by partially running one of its unsafeguarded power reactors at low burn up."

INDIA'S TRACK RECORD

Then Prime Minister John Howard said in 2006 that India had a "very good record in relation to non-proliferation". Similar words almost always accompany arguments in support of civil nuclear trade with India. But India is a non-NPT nuclear weapons state, refuses to sign and ratify the CTBT, violated its pledge to use the Canadian-supplied CIRUS research reactor for peaceful purposes only, tested nuclear weapons in 1974 and 1998, has a history of illicit nuclear procurement and inadequate nuclear export controls, and continues to produce fissile material for weapons and to expand its nuclear weapons and missile capabilities more generally.

The 1974 disaster warrants mention given the possibility of history repeating itself. Nuclear exporters were falling over themselves to get a toe-hold in the Indian nuclear sector, enticed by predictions of a large and rapid expansion of nuclear power. Those predictions came to nothing (current nuclear power capacity is 4.2 GWe, accounting for 2.2% of total electricity supply capacity).³² But India did gain expertise, equipment and materials which facilitated its weapons program, culminating in its use of the CIRUS reactor to produce plutonium for India's 1974 'peaceful' nuclear explosion.

Paul Leventhal and Victor Gilinsky wrote in the Washington Post in 1998³³:

"[I]n the history of U.S.-India relations, nothing stands out so much as India's constancy in pursuing nuclear bomb-making and America's nearsightedness about Indian intentions. India fought to weaken the charter of the new International Atomic Energy Agency in the 1950s. It was duplicitous in carrying out Atoms for Peace agreements in the 1960s. It undermined the Nuclear Non-Proliferation Treaty with its "peaceful" bomb of 1974. Despite this history, each new generation of American policymakers thinks that by being a little more accommodating it will gain Indian restraint and acceptance of nuclear controls. The Indians (they are not alone in this) have for a long time played on that characteristically American self-deception that stems from a mix of idealism and commercial greed. It is not surprising that the Indians expect that game to continue."

INDIA'S NUCLEAR EXPORTS – AN IMPECCABLE RECORD?

Indian Prime Minister Manmohan Singh said in March 2006 that India has "an impeccable record of not contributing to any unauthorised proliferation of sensitive nuclear technologies". Likewise, Alexander Downer said in a 26 July 2007 media conference that "India has no record of having exported nuclear weapons technology to anybody." Likewise, Greg Sheridan asserted in The Australian on July 26 2007 that "India has an impeccable record of never having proliferated nuclear technology to anybody else". Neville Roach from the Australia India Business Council asserts that India has an "impeccable non-proliferation record".³⁴ No less enthusiastic is the World Nuclear Association: "A clean waiver to the trade embargo was agreed in September 2008 [by the NSG] in

³² <www.world-nuclear.org/info/reactors.html>

³³ Quoted in <www.nci.org/06nci/04/CIRUS%20Reactors%20Role%20in%20a%20US-India%20Nuclear.htm>

³⁴ <www.theaustralian.com.au/news/opinion/rudd-needs-to-make-a-deal-with-india/story-e6frg6zo-1225928554544>

recognition of the country's impeccable non-proliferation credentials. India has always been scrupulous in ensuring that its weapons material and technology are guarded against commercial or illicit export to other countries."³⁵

These claims are false – albeit the case that Pakistan clearly has a worse record. A US Congressional Research Service noted that in 2004 the US imposed sanctions on two Indian scientists for nuclear-related transfers to Iran.³⁶ The report also noted that India has an illicit procurement system for its own nuclear weapons program.

The Arms Control Association notes: "The George W. Bush administration has sanctioned several Indian entities for transferring technologies and know-how to Iraq and Iran that could contribute to chemical or biological weapons programs. Independent analysts also allege that India's procurement system for its own nuclear programs could leak or reveal nuclear know-how to other states or non-state actors."³⁷

A March 2006 report by the Institute for Science and International Security (ISIS) details "a well-developed, active, and secret Indian program to outfit its uranium enrichment program and circumvent other countries' export control efforts" and also found that "Indian procurement methods for its nuclear program leak sensitive nuclear technology".³⁸ The report notes that to prepare tenders for the supply of equipment for India's uranium enrichment program, interested parties can obtain tender documents listing sensitive technical specifications of uranium centrifuge equipment. The report notes that India's nuclear control system is poorly implemented, partly because the relevant officials are inexperienced; that many Indian companies are unaware of export control laws; and that government outreach programs are in their infancy. It found that ensuring that exports are legal and do not contribute to nuclear weapons proliferation will remain a major challenge for many years. The ISIS report comments on the implications of the US-India deal: "Under the US-India agreement, India is expected to boost imports of a wide range of dual-use and high-tech items from supplier states including the United States. India needs to take additional steps to ensure that imported dual-use items are not retransferred or reverse-engineered and sold to states hostile to the United States for the purpose of making nuclear weapons."

In another 2006 ISIS report, David Albright and Susan Basu detail three areas of concern³⁹:

***Illicit Procurement.** Indian nuclear entities and trading companies have procured nuclear dual-use equipment and material overseas without specifying that the end-user is an unsafeguarded uranium enrichment plant. In so doing, India has conducted illicit procurement for its nuclear programs. ...*

***Centrifuge Know-How Leakage.** India's procurement system for its gas centrifuge program leaks sensitive gas centrifuge information through its bidding or "tendering" process. The United States needs to ensure that India's classification guidelines and practices do not increase the chance of nuclear proliferation, endangering US, Indian, and others' national security.*

***Poorly Implemented National Export Control System.** Indian export controls are poorly implemented and the possibility of onward proliferation, such as where imported items are re-exported, remains a serious concern. Proliferant states are known to target Indian industries. If the US/India deal is approved by Congress, proliferant states will find India more attractive, because India's imports of nuclear dual use items will dramatically increase. ..."*

³⁵ World Nuclear Association, October 2010, Nuclear Power in India, <www.world-nuclear.org/info/inf53.html>

³⁶ Sharon Squassoni, 26 June 2006, "U.S. Nuclear Cooperation with India: Issues for Congress", Congressional Research Service Report Number: RL33016, <<http://digital.library.unt.edu/govdocs/crs/permalink/meta-crs-9399>>.

³⁷ <www.armscontrol.org/factsheets/indiaprofile>

³⁸ David Albright and Susan Basu, March 10, 2006, "India's Gas Centrifuge Program: Stopping Illicit Procurement and the Leakage of Technical Centrifuge Know-How", Institute for Science and International Security, <www.isis-online.org/publications/southasia/indianprocurement.pdf>.

³⁹ David Albright and Susan Basu, April 5, 2006, Neither a Determined Proliferator Nor a Responsible Nuclear State: India's Record Needs Scrutiny, <<http://isis-online.org/uploads/isis-reports/documents/indiacritique.pdf>>

VIOLATION OF RESOLUTIONS AND TREATY OBLIGATIONS

Civil nuclear trade with India cannot be reconciled with UN Security Council Resolution 1172. Approved unanimously in June 1998 following India's nuclear weapons tests, Resolution 1172 calls on India and Pakistan to stop further production of fissile material for nuclear weapons, to stop their nuclear weapons development programs, refrain from weaponisation or deployment of nuclear weapons, to cease development of ballistic missiles capable of delivering nuclear weapons, and join other nations in a legally-binding nuclear test ban treaty.

On 20 June 2006, 10 nonproliferation experts and former US government officials wrote to Congress arguing that the US-India deal would violate the NPT. The deal would benefit India's weapons program, and therefore violate the NPT, by "free[ing] up India's limited domestic nuclear fuel making capacity to produce highly enriched uranium and plutonium for weapons," the letter said.⁴⁰

Given that full-scope safeguards do not apply in India under the US-India deal, civil nuclear trade with India cannot be reconciled with the following statement issued by the 1995 NPT Review Conference, in its 'Principles and objectives for nuclear nonproliferation and disarmament': "New supply arrangements for the transfer of source or special fissionable material or equipment or material especially designed or prepared for the processing, use or production of special fissionable material to non-nuclear-weapon States should require, as a necessary precondition, acceptance of the Agency's full-scope safeguards and internationally legally binding commitments not to acquire nuclear weapons or other nuclear explosive devices."

Australia has made treaty commitments under the South Pacific Nuclear Weapons Free Zone Treaty (a.k.a. the Treaty of Rarotonga) not to provide any "source or special fissionable material or equipment" to any non-nuclear-weapon State unless subject to the safeguards required by Article III.1 of the NPT. India is considered a non-nuclear-weapon state under the NPT and, while it has accepted partial safeguards on some of its nuclear reactors, it rejects the comprehensive safeguards on all of its nuclear facilities and materials that are referred to in Article III of the NPT. Leonard Spector of the US James Martin Centre for Non-proliferation Studies said in 2007, "The question of whether Australia can legally export uranium to India is no longer in doubt. It cannot."⁴¹

4. LEGITIMISING OTHER NUCLEAR WEAPONS PROGRAMS – REGIONAL AND GLOBAL IMPLICATIONS

INDIAN AND PAKISTANI NUCLEAR WEAPONS PROGRAMS

In April 2006, Pakistan's National Command Authority (NCA), chaired by President Pervez Musharraf, declared that: "In view of the fact the [US-India] agreement would enable India to produce a significant quantity of fissile material and nuclear weapons from unsafeguarded nuclear reactors, the NCA expressed firm resolve that our credible minimum deterrence requirements will be met."⁴² In the same month, Pakistan's Prime Minister, Shaukat Aziz warned that "a selective and discriminatory approach will have serious implications for the security environment in South Asia."⁴³

Former U.N. Under-Secretary-General for Disarmament Affairs, Jayantha Dhanapala, said of the US-India deal in July 2007: "It has the dangerous potential of triggering a nuclear arms race among India, Pakistan and China, with disastrous consequences for Asian peace and stability and Asia's emerging economic boom."⁴⁴

⁴⁰ The letter is posted at <www.armscontrol.org/pdf/20060620_Letter_to_Congress.pdf>.

⁴¹ <www.dailytimes.com.pk/default.asp?page=2007%5C08%5C30%5Cstory_30-8-2007_pg7_45>. The text of the Treaty is posted at: <www.armscontrol.org/documents/rarotonga.asp>.

⁴² Shakil Sheikh, 2006, "Pakistan Vows to Maintain Credible N-deterrence," The News, April 13.

⁴³ Aziz Pleads for Pak-US N-Deal, 6 April 2006, Daily Times.

⁴⁴ Thalif Deen, 31 July 2007, US-India Nuke Deal May Spark Asian Arms Race, <<http://ipsnews.net/news.asp?idnews=38744>>

These fears are being realised. In the past few years both India and Pakistan have been expanding their nuclear weapon capabilities by increasing their capacity to produce fissile materials (and continuing and possibly increasing the rate of fissile material production) and through their missile programs.⁴⁵ The two countries are no closer to a legally-binding ban on nuclear weapons tests, and support for an FMCT is "weak at best" (and weaker than it was prior to the US-India deal).⁴⁶

Pakistan has been playing a blocking role in the Conference on Disarmament, frustrating progress on an FMCT. Zamir Akram, Pakistan's Ambassador to the Conference on Disarmament, said in early 2010 that the US-India deal "shall increase the existing asymmetry in fissile materials stockpiles between Pakistan and our neighbor, thereby accentuating our security concerns for maintaining a credible deterrence capability."⁴⁷

In October 2010 Ambassador Akram said: "Over the past few years, some powerful countries, in pursuit of their commercial interests as well as dubious notions of balance of power, have embarked upon an unfettered and discriminatory nuclear cooperation arrangement in gross violation of their international commitments. ... This has accentuated our security concerns as such nuclear cooperation shall further widen the asymmetry in stockpiles in our region."⁴⁸

In short, proponents of civil nuclear trade held out the promise of a cessation of fissile material production and progress towards an FMCT as a result of the US-India deal. Instead, both India and Pakistan continue to produce fissile material (possibly at an increased rate), both have increased their capacity to produce fissile material, and progress on an FMCT has been frustrated as a direct result of the US-India deal.

Squassoni discusses Pakistan's reaction to the US-India deal:⁴⁹

"Although Bush administration officials told Congress they would encourage India and Pakistan to exercise restraint in fissile material production, the deal seems to have accelerated Pakistan's unsafeguarded uranium- and plutonium-production capability. Pakistan has been expanding its capabilities to produce plutonium in unsafeguarded production reactors (Khushab site) and reprocessing plants (PINSTECH site) and to process uranium (at the Dera Ghazi Khan site). Finally, Pakistan's perceptions of and concerns about the Indian civil nuclear deal also appear to have further degraded Islamabad's willingness to engage in key nonproliferation and disarmament talks. Responding to a press question in 2009 about the prospects that Pakistan would follow suit if India joined the Comprehensive Test Ban Treaty (CTBT), the Ministry of Foreign Affairs spokesman noted that "[o]bviously new realities have to be considered. I can tell you that at this point in time there is no consideration to sign the CTBT." Pakistan has also hardened its opposition to the start of fissile material production cutoff talks at the Conference on Disarmament (CD) in Geneva. For more than a decade, Pakistan has complained that that a cutoff treaty must not lock in disparities in fissile material stocks. The India deal has only underscored that fear."

⁴⁵ Pakistani nuclear forces, Sept/Oct 2009, Bulletin of the Atomic Scientists, <<http://thebulletin.metapress.com/content/f828323447768858>>. R. Jeffrey Smith and Joby Warrick, 28 May 2009, Nuclear Aims By Pakistan, India Prompt U.S. Concern, <www.washingtonpost.com/wp-dyn/content/article/2009/05/27/AR2009052703706.html>. Sharon Squassoni, July/August 2010, The U.S.-Indian Deal and Its Impact, <www.armscontrol.org/act/2010_07-08/squassoni>.

⁴⁶ Daryl Kimball, July/August 2009, Toward a Nuclear Freeze in South Asia, <www.armscontrol.org/act/2009_07-08/focus>. On the FMCT see <http://gsn.nti.org/gsn/nw_20090821_7549.php>

⁴⁷ Mark Hibbs, Shahid-ur-Rehman, and Randy Woods, 25 February 2010, Pakistan says US-India deal forces it to keep making weapons material, Nucleonics Week. Pakistan's statements at the Conference on Disarmament are summarised in a 18 February 2010 UN Office paper: <http://unog.ch/80256EDD006B9C2E/%28httpNewsByYear_en%29/E03CF8E5E9B5CAB4C12576CE0048A1CB?OpenDocument>

⁴⁸ Treaty banning only future production of fissile material 'unacceptable': Pakistan, 13 October 2010, <www.defence.pk/forums/wmd-missiles/76497-pakistan-rejects-fmct-again.html>

⁴⁹ Sharon Squassoni, July/August 2010, The U.S.-Indian Deal and Its Impact, <www.armscontrol.org/act/2010_07-08/squassoni>.

In a worst-case scenario, Indo-Pakistani warfare involving the detonation of 100 15-kiloton weapons would kill about 20 million people in the short term. It could also cause catastrophic climate change with urban firestorms lofting 5 million tonnes of black smoke above cloud level, engulfing the entire planet within 10 days.⁵⁰

REGIONAL AND GLOBAL IMPLICATIONS

Why engage in nuclear trade with India but not with other non-NPT weapons states – Pakistan, Israel, and North Korea? On March 6, 2006, Alexander Downer, then an opponent of uranium sales to India, said on ABC television's Lateline program: "And the problem is, if you start to make an exception for India then it raises questions, of course, about Pakistan and then it raises questions about Israel. They're the three non-signatories. ... You'd have to be pretty persuasive in not extending the same privilege to Pakistan and Israel."

Beijing has called on the Nuclear Suppliers Group to apply any exemptions to normal nuclear export rules to India and Pakistan equally – a proposal rejected by the US. It is likely that China's support for Pakistan's nuclear program – including its historical support for Pakistan's nuclear weapons program – will be extended in the wake of the US-India deal. This is all the more likely given that the deal is widely perceived to be part of a broader strategic policy of containing China.

As at October 2010 a dispute is unfolding over reports that China is planning to sell two additional nuclear power reactors to Pakistan. The sale would breach NSG guidelines.⁵¹

A Lowy Institute paper flags the prospect of Russia or Namibia supplying Iran on the same basis.⁵² Russia's ongoing help with the construction of a nuclear power plant in Iran in recent years – opposed by the US – has probably been encouraged by the weakening of non-proliferation and disarmament norms established by the US-India deal.

In time, Australia may become an equal-opportunity proliferator, supplying WMD feedstock in the form of uranium to both India and Pakistan – just as Australia sells uranium to both Taiwan (via the US) and China. Then Prime Minister Howard argued in September 2006 that it would be "anomalous" to sell uranium to China but not India. His argument was specious since China is a NPT signatory. But it would indeed be anomalous to sell uranium to India but not Pakistan since both are non-NPT states. It might be argued that India is a democracy whereas Pakistan is not; but Australia has already crossed that threshold by approving uranium sales to China.

Alexander Downer's comments were prescient.

Beyond the region, there is the risk that the US-India deal and the ongoing erosion of non-proliferation norms will increase the risk of other countries pulling out of the NPT and developing arsenals of nuclear weapons – and doing so with the expectation that civil nuclear trade would continue." As former Australian diplomat Professor Richard Broinowski wrote in the Sydney Morning Herald on March 8, 2006: "The sale of Australian uranium to India would not just weaken our non-proliferation credentials – it would also signal to some of our major uranium customers, such as Japan and South Korea, that we do not take too seriously their own adherence to the NPT. They may as a result walk away from the Treaty and develop nuclear weapons – against North Korea, China, or perhaps Russia – without necessarily fearing a cut-off of Australian supplies."

⁵⁰ Steven Starr, 12 March 2010, The climatic consequences of nuclear war, Bulletin of the Atomic Scientists, <www.thebulletin.org/web-edition/op-eds/the-climatic-consequences-of-nuclear-war>

⁵¹ <www.armscontrol.org/pressroom/ChinaPakistanReactors>, <www.armscontrol.org/act/2010_06/ChinaPakistan>. Experts, Organizations from 14 Countries Call on Nuclear Suppliers Group to Uphold Rules Barring Chinese Sale of Reactors to Pakistan, June 2010, <<http://cnic.jp/english/topics/proliferation/campaign/usindiafiles/nsgchinapak17jun10.html>>. NSG discusses China-Pakistan deal, defers new ENR rules, 26 June 2010, The Hindu, <www.thehindu.com/todays-paper/tp-national/article486367.ece>.

⁵² Ron Walker, 2007, Uranium for India: Avoiding the Pitfalls, <www.lowyinstitute.org/Publication.asp?pid=588>.

Rory Medcalf from the Lowy Institute argues: "Neither the US-India deal nor Australian uranium sales will determine whether third countries opt for nuclear arms. Each state that holds or might want such weapons has its own reasons based on fear, power and prestige."⁵³ Medcalf misses the point. For a number of countries, civil nuclear trade is an incentive to remain in the NPT as a non-weapons state, and conversely the threat of cessation of nuclear trade is a disincentive to pulling out of the NPT and building weapons.

Successive Australian governments have repeatedly argued that the NPT is the "cornerstone of the non-proliferation regime." That view is incompatible with uranium sales to a non-NPT state.

Israel has also sought exemptions from NSG guidelines based on the precedent of the US-India deal and may press the matter in coming years.⁵⁴

Another example of the corrosive effects of the US-India deal concerns reprocessing. In July-August 2010 the US and India signed an agreement that will enable India to reprocess US-obligated nuclear material.⁵⁵ Thus the US has relaxed its policy regarding reprocessing in countries without full-scope safeguards. Squassoni notes: "Until the India deal, the United States did not give programmatic consent, as opposed to case-by-case consent, for reprocessing U.S.-origin fuel unless a country already had an advanced nuclear program, including reprocessing and enrichment plants; did not pose a proliferation risk; was not located in regions of proliferation concern; and had excellent nonproliferation credentials. Until India, the United States had approved the reprocessing of U.S.-origin spent nuclear fuel only in Japan and EURATOM countries France and the United Kingdom."⁵⁶

Squassoni discusses some broader negative impacts of the US-India deal:⁵⁷

"During the 2010 NPT Review Conference, India's special status was a significant irritant. The 118 members of the Nonaligned Movement (NAM) charged that the U.S.-Indian nuclear deal had given an NPT nonparty more benefits than NPT parties. This had two effects: NAM countries sought to restrict benefits to India by including language on the need for full-scope safeguards for nuclear supply, and they sought to widen their own possibilities for supply by including language on fuel cycle rights. ...

"Creating an "exceptional" nonparty to the NPT has increased pressure across the nonproliferation regime. States have pushed the boundary between legally binding and voluntary commitments. NSG consensus has suffered dramatically, as China and Russia have exploited the political disarray for their own national benefit. Efforts to restrict enrichment and reprocessing may suffer, as some states insist on their "legal" rights. At the 2010 NPT Review Conference in May, the language in the action plan referring to states' fuel cycle decisions called on treaty parties to "[r]espect each country's choices and decisions in the field of peaceful uses of nuclear energy without jeopardizing its policies or international cooperation agreements and arrangements for peaceful uses of nuclear energy and its fuel cycle choices," a swipe at efforts to get countries to forswear the acquisition of sensitive technology such as uranium enrichment and spent fuel reprocessing."

⁵³ Rory Medcalf, 6 August 2007, Welcoming India to the nuclear club, <www.theage.com.au/news/opinion/welcoming-india-to-the-nuclear-club/2007/08/05/1186252539465.html>

⁵⁴ Sharon Squassoni, July/August 2010, The U.S.-Indian Deal and Its Impact, <www.armscontrol.org/act/2010_07-08/squassoni>.

⁵⁵ India-US reprocessing agreement signed, 2 August 2010, <www.world-nuclear-news.org/NP-India-US_reprocessing_agreement_signed-0208107.html>

⁵⁶ Sharon Squassoni, July/August 2010, The U.S.-Indian Deal and Its Impact, <www.armscontrol.org/act/2010_07-08/squassoni>.

⁵⁷ Sharon Squassoni, July/August 2010, The U.S.-Indian Deal and Its Impact, <www.armscontrol.org/act/2010_07-08/squassoni>.

The Economist in June 2010 raised other problems arising from the US-India deal:⁵⁸

"America argued that India had a spotless non-proliferation record (it doesn't) and that bringing it into the non-proliferation "mainstream" could only bolster global anti-proliferation efforts (it didn't). The deal incensed not just China and Pakistan but many others, inside and outside the NSG. An immediate casualty was the effort to get all members of the Nuclear Non-Proliferation Treaty (NPT), who have already promised not to seek the bomb, to sign up to an additional protocol on toughened safeguards. Many have, but on hearing of the America-India deal Brazil's president is reputed to have flatly ruled that out. And where Brazil has put its foot down, others have also hesitated. ...

"The deal also affects efforts to contain Iran. Western diplomats seeking support for UN sanctions on the Islamic republic find themselves receiving a wiggling over the double standards used with India. Iranian officials used to argue that they just wanted to be treated like Japan. It has free access to advanced nuclear technology. But unlike Iran, Japan does not repeatedly violate nuclear safeguards. Some Iranian officials now muse boldly that the big powers will eventually come to do deals with them, just as they did with India. Iran's latest raspberry in response to a fourth round of UN sanctions was to ban two nuclear inspectors from the International Atomic Energy Agency, the UN's nuclear guardian. Iran dislikes its reports on the regime's dubious nuclear activities."

5. SAFEGUARDS

During a March 2006 media conference with Condoleezza Rice, then Prime Minister John Howard falsely claimed that the US-India deal would bring India's nuclear program under international inspections "for the first time". Mr Downer said in July 2007 that "... we have not been selling uranium to India over the years because India has not been subjected to International Atomic Energy safeguards." However, six reactors in India are already subject to safeguards. The value of extending safeguards is deeply compromised by the prevailing circumstances – safeguards apply only to that part of the nuclear program that India considers surplus to military 'requirements'.⁵⁹ There is nothing in the US-India deal to stop India building new, unsafeguarded reactors or other facilities for its weapons program.

There is no reason to believe that a rigorous safeguards regime would attend an agreement to permit uranium sales from Australia to India. Both the Labor government and the Coalition Opposition have shown scant interest in ensuring that rigorous safeguards apply to Australia's uranium exports, the most striking recent example being their willingness to permit uranium exports to Russia despite the rarity of IAEA safeguards inspections in Russia and without any requirement in the bilateral treaty agreement for any inspections to take place in future. The Joint Standing Committee on Treaties argued against ratification of the Howard/Putin uranium agreement until "IAEA inspections are implemented for Russian facilities that will handle Australian Obligated Nuclear Materials". A reasonable recommendation – but it was rejected by the Labor government.

Another reason to be sceptical of claims that safeguards would provide confidence that Australian uranium was not diverted for weapons is that the IAEA makes no effort to systematically monitor nuclear facilities and materials in nuclear weapons states. For weapons states, safeguards are at best tokenistic (e.g. China) or at worst non-existent (Russia). Vocal proponents of civil nuclear trade with India are labouring under a number of illusions, as with the claims of columnist Greg Sheridan in *The Australian*: "It's important to note of course that Australia proposes to sell uranium to India under strict safeguards, which means it can only be used in the peaceful nuclear energy generation field, not for weapons. These are the same conditions under which we sell uranium to China and are proposing to sell uranium to Russia."⁶⁰

One limitation is that the IAEA does not have adequate resources to carry out its existing safeguards roles and it

⁵⁸ The Economist, 24 June 2010, *The power of nightmares*, <www.economist.com/node/16426072>.

⁵⁹ Daryl Kimball, Fred McGoldrick, and Lawrence Scheinman, 30 July 2008, *IAEA-Indian Nuclear Safeguards Agreement: A Critical Analysis*, <www.armscontrol.org/node/3205>.

⁶⁰ <www.theaustralian.news.com.au/story/0,25197,22499069-5013460,00.html>

has no resources to expand its safeguards activities in nuclear weapons states. Another limitation is the restricted mandate of IAEA inspectors. The World Nuclear Association, commenting on the approval of the India safeguards agreement by the IAEA Board of Governors, must surely know that it is peddling misinformation with its claim that: "Safeguards checks carried out by the IAEA will ensure that no material or technology traded with India for peaceful purposes will ever be misused in the military sector."⁶¹

Reuters cited a diplomat involved in 2009 IAEA negotiations stating that the safeguards agreement "contains no provisions to ensure India cannot divert into its military nuclear sector nuclear materials and know-how it obtains abroad for the civilian sector."⁶²

Then IAEA Director General Mohamed El Baradei noted in 2008 that the safeguards agreement with India did not provide for comprehensive or full-scope safeguards.⁶³ He further noted that safeguards will apply only to facilities notified by India – in other words, India is free to build new facilities for its weapons program.

India and the IAEA have negotiated not only a basic safeguards agreement but also an 'Additional Protocol'. Theoretically, an Additional Protocol provides expanded inspection rights and reporting requirements. However it is clear from public documents and leaked IAEA documents that safeguards will be largely tokenistic as they are in other weapons states. A 2009 IAEA document indicates that safeguards will be limited and subject to the vagaries of the IAEA's chronically overstretched budget: "The [IAEA] Board of Governors will be aware that the Agency will not mechanistically or systematically seek to verify information obtained under Additional Protocols. The verification activities in question are not linked to quantitative yardsticks such as inventories of nuclear materials. Therefore, the Secretariat cannot provide precise estimates of those costs of implementing each Additional Protocol concluded. The volume of activities relevant in this regard will depend on case by-case decisions taken within the authority conferred upon the Agency by the Additional Protocol and subject to the overall budgetary appropriations for safeguards implementation."⁶⁴

The 2009 IAEA document also states: "The frequency and intensity of IAEA inspections shall be kept to the minimum consistent with the aim of improving safeguards." That statement suggests that safeguards will be non-existent except in circumstances where the IAEA wants to test novel safeguards technologies or procedures and India agrees to take part.

Arms Control Today reported in April 2009: "[T]he agreement the agency approved omitted many of the key provisions of the Model Additional Protocol regarding the type of information India would provide to the agency and the access that would be granted to agency inspectors. In particular, among the provisions of the Model Additional Protocol on what kinds of activities and facilities a country would report to the agency, India only agreed to share information on nuclear-related exports. Reporting provisions of the model protocol not contained in India's agreement cover information such as nuclear fuel-cycle-related research and development, nuclear-related imports, and uranium mining. The Indian additional protocol also does not include any complementary access provisions, which provide the IAEA with the potential authority to inspect undeclared facilities. Such provisions also allow the agency to carry out environmental sampling. Many of the provisions not included in the Indian additional protocol are intended to provide the agency with the means to detect undeclared nuclear activities."⁶⁵

⁶¹ World Nuclear Association, 4 March 2009, Additional Protocol for India, <www.world-nuclear-news.org/newsarticle.aspx?id=24764>.

⁶² Mark Heinrich, 4 March 2009, IAEA approves extra nuclear inspection pact for India, <<http://in.reuters.com/article/domesticNews/idINL36577120090303?sp=true>>. See also IAEA Board of Governors, 9 July 2008, An Agreement with the Government of India for the Application of Safeguards to Civilian Nuclear Facilities, <www.isis-online.org/publications/southasia/India_IAEA_safeguards.pdf>. IAEA, 1 August 2008, IAEA Board Approves India-Safeguards Agreement, <www.iaea.org/NewsCenter/News/2008/board010808.html>.

⁶³ Mohamed ElBaradei, 1 August 2008, Introductory Statement to the Board of Governors, <www.iaea.org/NewsCenter/Statements/2008/ebsp2008n006.html>

⁶⁴ Protocol Additional to the Agreement between the Government of India and the International Atomic Energy Agency for the Application of Safeguards to Civilian Nuclear Facilities, 2009, available from <jim.green@foe.org.au>.

⁶⁵ Peter Crail, April 2009, IAEA Approves India Additional Protocol, <www.armscontrol.org/act/2009_04/IndiaProtocol>

Australian uranium sales to India would be subject to a bilateral agreement. However key provisions in bilateral agreements have never once been invoked. Most importantly, no Australian government has ever refused a uranium customer country permission to reprocess spent fuel containing Australian uranium (and its by-products) even when that leads to plutonium stockpiling (as it does in Japan and some EU countries).

It cannot be said that Australian uranium exports to India would be systematically monitored, and the tired rhetoric that 'strict' safeguards will 'ensure' peaceful use of Australian uranium cannot be justified.

It is argued that it is better for Australia to supply India to uranium rather than suppliers with less stringent bilateral agreements (or no bilateral agreement). However, the IAEA is tasked with carrying out safeguards regardless of the supplier – and Australia has no independent safeguards capability or authority. Moreover, as mentioned, Australian governments have without exception been unwilling to invoke powers under bilateral agreements to curb plutonium stockpiling.

Even in the event that a rigorous safeguards regime provided confidence that Australian uranium was not used in India's weapons program, that would in no way undo the damage done to the NPT by civil nuclear trade with India. Nor would a rigorous safeguards regime address another key problem: uranium exports to India freeing up domestic reserves for weapons production.

Proponents of nuclear trade with India argue that it will bring 65% (14/22) of India's reactors under safeguards. But it does not curtail India's nuclear weapons program by 65% – it does not curtail India's weapons program at all. Nuclear trade will probably do more to *facilitate* India's nuclear weapons program than to curtail it. Indeed it is by no means clear that the US has any interest in curtailing India's nuclear weapons program. Arthur Tellis from the Carnegie Endowment for International Peace (and previously the US National Security Council) expresses a view which appears to have considerable support in Washington. He argues that integrating India into the nonproliferation order at the cost of capping the size of its nuclear arsenal "threaten[s] to place New Delhi at a severe disadvantage vis-à-vis Beijing, a situation that could not only undermine Indian security but also U.S. interests in Asia in the face of the prospective rise of Chinese power over the long term."⁶⁶

Finally, given the political volatility of the region, it is worth noting that there are several historical examples of safeguards being suspended in the event of conflict between states or conflict within a state (including Yugoslavia, Iraq, and some African states).

6. RISKS OF ACCIDENTS AND ATTACKS

Accidents

A 27 July 2007 editorial in *The Australian* argued that the US-India deal would give India "access to the most advanced nuclear energy technology in the world, making its civilian nuclear power plants far safer."⁶⁷

However Squassoni notes that India could take advantage of the NSG exception for safety-related issues prior to the US-India deal.⁶⁸

The risk of a serious accident at any particular reactor may decrease but the overall risk of serious accidents may increase since the US-India deal is likely to lead to a greater number of reactors (and other nuclear facilities). Moreover the US-India deal will do very little or nothing to improve other key determinants of risk, namely the safety culture, expertise and training, and rigorous, independent regulatory oversight. These are all lacking in India. Ramana notes:

⁶⁶ Ashley J. Tellis, July 2005, "India as a New Global Power: An Action Agenda for the United States", Carnegie Endowment Report, <www.carnegieendowment.org/publications/index.cfm?fa=view&id=17079>.

⁶⁷ <www.theaustralian.news.com.au/story/0,25197,22140725-16382,00.html>

⁶⁸ Sharon Squassoni, June 26, 2006, "U.S. Nuclear Cooperation with India: Issues for Congress", Congressional Research Service Report Number: RL33016, <<http://digital.library.unt.edu/govdocs/crs/permalink/meta-crs-9399>>.

"Practically all nuclear reactors and other facilities associated with the nuclear fuel cycle operated by the [DaE – Department of Atomic Energy] have had accidents of varying severity. The description of some accidents offers a sense of the lack of importance given to nuclear safety by the DaE. This history suggests the organization cannot be trusted to safely manage hazardous technologies. ...

"The DaE claims safety is its primary concern, but it has been a low priority, as demonstrated by India's history of small accidents, unsafe design choices and operating practices. The DaE's obsession with secrecy inhibits independent studies of the complex. The agency in charge of regulating safety at nuclear facilities comes under the administrative control of the [Atomic Energy Commission], and is therefore not truly independent."⁶⁹

While the provision of advanced reactor technology promises some safety gains, even greater gains can be achieved by promoting and supporting energy efficiency programs and renewable energy sources.

Attacks

Nuclear expansion in India (and Pakistan) will increase the risks of attacks on nuclear plants.

There is a long history of conventional military strikes and attempted strikes on nuclear plants in the Middle East – the destruction of reactors in Iraq by Israel and the US; Iran's attempts to strike nuclear facilities in Iraq during the 1980-88 war (and vice versa); Iraq's attempted strikes on Israel's nuclear facilities; and, most recently, Israel's bombing of a suspected nuclear reactor site in Syria in 2007. In the Middle East, attacks have targeted small research reactors and related facilities and the aim has been to curb or prevent weapons proliferation. In the case of nuclear power plants (or reprocessing facilities), attacks (by an adversarial nation-state or sub-national group) could serve other purposes – spreading radioactive contamination far and wide, and/or disrupting electricity supply.

Data compiled by the US National Counterterrorism Center show that terrorist incidents are far more common in India and Pakistan than in any other countries. In India, there have been 4,462 terrorist incidents over the past five years; in Pakistan, 3,687.⁷⁰ In 2009, India tightened security and put its nuclear power plants on alert in some states after intelligence about possible attacks. An official from the home ministry said: "The states have been asked to increase the vigil and patrolling to thwart any sabotage attempt aimed at these vital facilities."⁷¹

Nuclear weapons plants in Pakistan have reportedly been targeted by al Qaeda in recent years⁷² although others claim the plants were non-nuclear plants.⁷³

7. WINDFALL PROFITS?

Some simple calculations give the lie to claims that permitting uranium sales to India would generate windfall profits[#]:

* If Australia supplied 20% of India's current uranium demand, uranium exports would increase by 182 tonnes or 1.8% above the 2008/09 figure of 10,114 tonnes. Revenue from the export of all products would increase by 0.007%.

* If all reactors under construction or planned in India come to fruition (2.7 gigawatts + 16.7 GW respectively), Australia's uranium exports would increase by 1020 tonnes, a 10% increase compared to the 2008/09 export figure. Revenue from the export of all products would increase by 0.036%.

⁶⁹ M.V. Ramana, 2009, The Indian Nuclear Industry: Status and Prospects, <www.cigionline.org/publications/paper-series/nuclearenergyfutures>

⁷⁰ <<http://wits.nctc.gov>>

⁷¹ <<http://itn.co.uk/273f5e17bf168aa7c47aac785cf49b30.html>>

⁷² <www.telegraph.co.uk/news/worldnews/asia/pakistan/6011668/Pakistans-nuclear-bases-targeted-by-al-Qaeda.html>

⁷³ <www.guardian.co.uk/world/2009/aug/12/pakistan-nuclear-al-qaida>

* Even if we make the heroic assumption that all 'proposed' reactors in India reach fruition (giving a total of 72.6 GW, which is 17.3 times greater than the current figure of 4.2 GW), Australia's uranium exports would increase by 8.5–11% above the Australian Uranium Association's estimate of total exports of 28,500 to 37,000 tonnes in 2030.

In short, it is difficult to see uranium sales to India making a significant contribution to uranium export revenue. This may go some way to explaining the Australian Uranium Association's ongoing support for the policy of prohibiting uranium sales to non-NPT states. The Association claims that the uranium industry is not pushing for uranium sales to India because "the Australian government of the day will know better than we do the countries to which Australia can export uranium and the conditions under which the uranium should be exported."⁷⁴ That explanation is implausible given the industry's enthusiastic promotion of uranium sales to other countries in recent years, including Russia and China. There are two possible explanations for the industry's silence regarding uranium sales to India (and they are not mutually exclusive). First, the industry knows that revenue from uranium exports to India would be negligible. Second, the industry may be hoping that the government overturns the ban on uranium exports to countries that refuse to sign the NPT – and that the government takes all the blame for the damage thus inflicted on the non-proliferation regime.

India's Prime Minister Manmohan Singh said in September 2009 that: "If we manage our program well, our three-stage strategy could yield potentially 470,000 MWe of power by the year 2050."⁷⁵ However:

* The second and third stages of India's nuclear strategy are based on plutonium and thorium fuelled reactors rather than conventional uranium-fuelled reactors. As such, they are of no relevance to the question of Australian uranium exports.

* As noted by M.V. Ramana from Princeton University, India's Department of Atomic Energy "has a long history of making extravagant projections, none of which have been fulfilled despite extravagant budgets." Actual nuclear capacity in India has typically fallen short of predictions by factors of 10-20.⁷⁶

* 470 GWe represents an expansion by a factor of 112 compared to India's current nuclear power capacity of 4.2 GWe, in other words an 11,200% expansion. The 470 GW figure is 25% above current global nuclear power capacity of 376 GW. There are numerous constraints to such an expansion as discussed by Ramana.

There are broader economic considerations other than direct revenue from uranium exports. Greg Sheridan posed this question in *The Australian*: "Why would Delhi do a free trade agreement with us if we think India is too disreputable for us to sell uranium to, while we do sell uranium to China?"⁷⁷ One obvious answer suggests itself – India would consider it advantageous to pursue a free trade agreement regardless of Australia's uranium export policy. Then trade minister Simon Crean said in May 2010 that: "We agree to disagree on it [uranium policy] but it's not the stumbling block to concluding an FTA."⁷⁸ Mr Crean did however acknowledge the possibility that India would raise the issue in the context of discussions on a free trade agreement.

The calculations are based on the following:

* *India's nuclear power capacity, reactors under construction etc., and required uranium:* www.world-nuclear.org/info/reactors.html

* *Australia supplies just under 20% of current world uranium demand (excluding secondary sources):* www.aaa.org.au/Content/AustralianUraniumMines.aspx

* *The average value of Australia's uranium exports in 2008/09 was \$102,000 per tonne (ASNO Annual Report).*

* *Australian Uranium Association estimates of uranium export growth:* www.aaa.org.au/DownFile.aspx?fileid=4

⁷⁴ Michael Angwin, 4 November 2010, Uranium is a vital export, *Canberra Times*.

⁷⁵ <www.world-nuclear-news.org/NP_Think_big_India_2909092.html>

⁷⁶ M.V. Ramana, 2010, *The Future of Nuclear Power in India*, <<http://casi.ssc.upenn.edu/iit/ramana>>. See also MV Ramana, 2009, *The Indian Nuclear Industry: Status and Prospects*, <www.cigionline.org/publications/paper-series/nuclearenergyfutures>

⁷⁷ Greg Sheridan, 23 October 2008, Uranium should be the new gold, <www.theaustralian.news.com.au/story/0,25197,24537825-5013460,00.html>

⁷⁸ Matt Wade, 5 May 2010, Uranium no bar to India deal: Crean, <www.smh.com.au/business/uranium-no-bar-to-india-deal-crean-20100504-u72h.html>.

* 2008/09 data on revenue from all Australian exports (\$283.8 billion):

www.trademinister.gov.au/releases/2010/sc_100118.html

* Uranium accounted for 0.32% of total Australian export revenue in 2005, 0.25% in 2006, 0.38% in 2007, 0.36% in 2008/09, and an estimated <0.25% in 2009/10.

8. CLIMATE CHANGE AND INDIA'S ENERGY OPTIONS

As with the potential economic returns on uranium sales to India, the potential greenhouse benefits are underwhelming. Nuclear power currently accounts for 2.2% of India's electricity generation. That figure will increase with the proposed expansion of nuclear power, but not to the extent that it will make a large impact on greenhouse emissions. If all reactors currently listed as under construction, planned or proposed are built, then nuclear power would supply about 7% of India's electricity supply by 2020.⁷⁹

Claims that Australian uranium sales to India would reduce greenhouse emissions rest on the assumption that more greenhouse-intensive energy sources are displaced by nuclear power. However, there is no reduction in greenhouse emissions if Australian uranium simply displaces uranium from other sources (leaving aside minor differences in emissions associated with mining etc.). And there is no reduction in emissions if nuclear power displaces low-carbon renewable energy sources or energy efficiency and conservation measures.

Leonard Weiss, a former staff director of the US Senate Subcommittee on Energy and Nuclear Proliferation and the Committee on Governmental Affairs, discusses India's energy supply options in the Bulletin of the Atomic Scientists:⁸⁰

"India's Bureau of Energy Efficiency reports that, in the industrial sector alone, more efficient use of energy could conserve 15 GWe of electricity a year. Further improvements in end-use efficiency of household appliances could save another 3-5 GWe. That means an aggressive program of improved energy efficiency could substitute for all the future power output from nuclear reactors currently being planned in India between now and 2020.

"[A]ccording to India's own picture of what its power production would look like if it were to achieve energy independence by 2030, most of such production would not come from nuclear power. Under this scenario, the projected level of electric power production would be 456 GWe and would still be fueled mainly by coal (43.8 percent), followed by hydro (22 percent), renewables (27.6 percent), and, finally, nuclear (6.6 percent). It is clear that India does not see nuclear power as the solution to its energy problems for the next 25 years. ...

"According to a study by the international management consulting firm Frost and Sullivan, India's untapped electrical generating capacity is 150 GWe from hydro (the equivalent of 150 large nuclear plants), 85 GWe from biomass, and 45 GWe from wind power. ...

"All of these facts lead to the conclusion that the nuclear deal with India is the wrong deal with the wrong energy source at the wrong time. ... A more appropriate energy agreement would concentrate on developing India's indigenous resources in the areas of hydro, wind, biomass and solar; assist in improving end-use efficiency; and aid planning for more distributed generation. Since India has no choice at this point but to rely on coal until the potential of these other sources are more fully realized, clean coal technologies and coal gasification are also appropriate and important areas for cooperation.

⁷⁹ Mark Bucknam, January 2007, "Power to the People of India: U.S. Nuclear Cooperation with India", Strategic Insights, Volume VI, Issue 1, <www.ccc.nps.navy.mil/si/2007/Jan/bucknamJan07.asp>.

⁸⁰ Leonard Weiss, May/June 2006, "Power points", Bulletin of the Atomic Scientists, vol. 62, no. 3, <www.thebulletin.org/article.php?art_ofn=mj06weiss>.

"New natural gas supplies, domestic or imported, can play an important role as well. Natural gas is the most benign fossil fuel in terms of the production of greenhouse gases, and its use in place of coal is beneficial to the environment."

Mian and Ramana write:⁸¹

"A 2003 study by the Confederation of Indian Industry found that there is great scope for improving Indian energy intensity (energy consumption per unit of gross domestic product), which is high compared to other countries, and called for increased cooperation with the United States in this area. It has been estimated that Indian industry could save as much as 20-30 percent of its total energy consumption and that nearly 30,000 megawatts, i.e., more than the total planned nuclear capacity by 2020, could be saved through energy conservation programs. This would also be cheaper than building new generating capacity, especially additional nuclear capacity. This study also noted that, in the 1999 Indo-U.S. Joint Statement on Cooperation in Energy and Related Environmental Aspects, India had declared a goal of a 10 percent share for renewable energy by 2012 and a 15 percent improvement in energy efficiency by 2008 and was seeking U.S. help to meet these targets.

"The real challenge facing India is the growing divide between the energy-intensive pattern of development of its cities, with increasing demands for electricity and petroleum, and the continuing dependence on fuel-wood and animal-dung energy by the majority who live in its many villages. Nuclear energy as a large, centralized, and costly source of electricity will do little for meeting the basic energy needs of rural India because connecting these areas to a central power grid is expensive, involves high transmission losses, and is financially unsustainable. The UN Development Program's World Energy Assessment in 2000 observed that "past efforts to deliver modern energy to rural areas have often been ineffective and inefficient" and that, "above all, planning for rural energy development should have a decentralized component and should involve rural people—the customers—in planning and decision-making." By working with the rural poor, it may be possible at last to develop and provide the small-scale, local, sustainable, and affordable energy systems that they need."

The nuclear industry and its supporters assert that renewable energy sources cannot provide reliable, baseload electricity. A 27 July 2007 editorial in *The Australian* lambasts "wealthy, First World greenies [who] fail to acknowledge is that nuclear power is the only existing technology that can provide base-load power without increasing greenhouse gas emissions and that it is essential to clean development in the Third World." But in fact, several renewable energy sources can provide baseload power – such as bioenergy, geothermal 'hot rocks', solar thermal electricity with storage, and in some cases hydroelectricity.⁸² Moreover, India's nuclear power reactors run at well short of 100% capacity, and only part of that problem has arisen from limited uranium supplies in recent years.

For the hundreds of millions of Indian's living in rural areas and not connected to electricity grids, nuclear power is no solution at all. The former Director General of the IAEA, Dr Mohamed El Baradei, has stated that off-grid, small-scale, localised renewables are the best power solutions for the rural poor in developing countries.⁸³

Australia could provide practical support to help India realise its plan – approved by the Prime Minister's Council on Climate Change in 2009 – to expand solar power capacity to 20 gigawatts by 2020 and 200 gigawatts by 2050.⁸⁴

⁸¹ Zia Mian and M. V. Ramana, January/February 2006, *Wrong Ends, Means, and Needs: Behind the U.S. Nuclear Deal With India*, *Arms Control Today*, <www.armscontrol.org/act/2006_01-02/JANFEB-IndiaFeature>. See also Divya Badami Rao and M. V. Ramana, 3 July 2008, *The Indian approach to climate and energy policy*, <<http://thebulletin.org/web-edition/features/the-indian-approach-to-climate-and-energy-policy>>

⁸² Mark Diesendorf, 2007, "The Base Load Fallacy", *EnergyScience Briefing Paper #16*, <www.energyscience.org.au>.

⁸³ Quoted in John Vidal, "Nuclear plants bloom", *The Guardian*, August 12, 2004, <www.guardian.co.uk/life/feature/story/0,13026,1280884,00.html>.

⁸⁴ Anna da Costa, 18 August 2009, *India announces groundbreaking solar plan*, <www.theecologist.org/take_action/campaigns/304977/india_announces_breakthrough_solar_plan.html>

India's per capita emissions are 17 times lower than Australia's according to academics at Sydney University's School of Physics.⁸⁵ If global per capita emissions were at India's current level of 1.1 tons per person per year⁸⁶, global warming would be unheard of; the same cannot be said of Australia.

9. PULLING THE THREADS TOGETHER – CONSIDERATIONS FOR AUSTRALIA

The decision on Australian uranium exports to India needs to factor in the history of the US-India deal and subsequent developments.

The damage done to the NPT by the US-India deal (and now China and Pakistan) will, to a large extent, unfold regardless of Australia's decision on uranium exports. There is however some potential for Australia to play a positive role – in conjunction with like-minded states – by upholding the principle that non-NPT states are excluded from civil nuclear trade.

Conversely, there is no potential to secure non-proliferation or disarmament concessions from India in the context of negotiations over uranium sales. That can be said categorically given that no concessions were given by India during the US-India negotiations (or related negotiations with the NSG and the IAEA).

A shortage of uranium has limited the operation of India's power reactors at various stages in recent years and uranium supply was a significant constraint to the expansion of nuclear power.⁸⁷ Theoretically, Australia might hold some realistic hope of securing significant concessions from India in exchange for an agreement to supply uranium. In practice, however, the argument does not hold up. The US was certainly in a strong bargaining position but won no concessions from India. Moreover, India's uranium 'crunch' has eased with uranium imports and import agreements following the US-India deal.⁸⁸

Ron Huisken, of the Strategic and Defence Studies Centre at the ANU, argued in 2006 that Australian support for the US-India deal and permitting uranium exports to India could have these components⁸⁹:

- * Pressing the US to reaffirm the article of the NPT that enjoins the nuclear weapon states to negotiate effective measures relating to nuclear disarmament;
- * Signalling a renewed determination to conclude the Fissile Material Cut-off Treaty (FMCT); and
- * Seeking "a global consensus to construct one or more internationally-owned and operated facilities for the production of fissile material for peaceful purposes."

It is worth revising Huisken's proposal in light of intervening events:

- * The opportunity to win concessions from the US has come and gone, with no positive outcomes achieved (and none attempted).
- * India's 'support' for an FMCT is as conditional as ever, while Pakistan played a blocking role in the Conference on Disarmament in 2009, thus frustrating progress on a FMCT. Attempts to secure concessions from India

⁸⁵ Chris Dey and Manfred Lenzen, December 12, 2006, "You can't have your yellow cake and eat it too", Online Opinion, <www.onlineopinion.com.au/view.asp?article=5268>.

⁸⁶ Divya Badami Rao and M. V. Ramana, 3 July 2008, The Indian approach to climate and energy policy, <<http://thebulletin.org/web-edition/features/the-indian-approach-to-climate-and-energy-policy>>

⁸⁷ Zia Mian and M. V. Ramana, January/February 2006, Wrong Ends, Means, and Needs: Behind the U.S. Nuclear Deal With India, Arms Control Today, <www.armscontrol.org/act/2006_01-02/JANFEB-IndiaFeature>. See also M. V. Ramana, 2007, India: Living Beyond its Nuclear Means, <www.fissilematerials.org/ipfm/pages_us_en/blog/blog/blog.php?onepost=1&post_id=6>

⁸⁸ World Nuclear Association, 12 October 2010, Uranium imports boost Indian reactor output, <www.world-nuclear-news.org/NP-Uranium_imports_boost_Indian_reactor_output-1210104.html>. World Nuclear Association, October 2010, Nuclear Power in India, <www.world-nuclear.org/info/inf53.html>.

⁸⁹ Ron Huisken, 2006, Uranium sales to India: What should Australia's price be?, <www.nautilus.org/publications/essays/apsnet/policy-forum/2006/0612a-huisken.html>

regarding fissile material production during the US-India negotiations were unsuccessful and there is no prospect of Australia securing such concessions during negotiations over uranium supply.

* International ownership and operation of sensitive nuclear fuel cycle facilities is a worthy aim (compared to the alternative of national ownership). However it is difficult to see how an Australian-Indian uranium deal would or could facilitate such an outcome, and near-impossible to imagine India agreeing to any proposal which undermined national control of its nuclear program.

A 2007 Lowy Institute policy brief by ANU academic Ron Walker proposes a grand bargain in which uranium exports are tied to joint efforts to 'update' the NPT, negative security assurances, some reforms in the 'peaceful energy' sector (e.g. multilateralisation of the nuclear fuel cycle), and some disarmament-related commitments (falling well short of a commitment to disarm).⁹⁰ It is a thoughtful paper. Yet, in light of the 2008 US-India deal, there is no prospect of Australia securing any concessions. A much more likely outcome is that a decision to permit Australian uranium sales to India would be accompanied by sham, non-binding commitments – yet another non-binding 'commitment' to refrain from weapons testing, for example, or an agreement to apply 'strict' (read: tokenistic) safeguards to Australian uranium.

It was widely and incorrectly reported that the 2009 report of the Australian-led International Commission on Nuclear Non-proliferation and Disarmament had given a 'green light' to uranium sales to India. However the ICNND set down conditions which were not met by the US-India deal and could not be achieved during any future negotiations between Australia and India. The ICNND argued that civil nuclear trade with India, Pakistan and Israel should be allowed "provided they satisfy strong objective criteria demonstrating commitment to disarmament and non-proliferation, and sign up to specific future commitments in this respect."⁹¹ The ICNND report mentions "centrally important" parallel instruments like the CTBT and FMCT that India, Pakistan and Israel could sign and ratify. The report notes that the US-India deal sets a "very unfortunate precedent" in its failure to require India to meet objective criteria such as CTBT and FMCT ratification.

In its 5 July 2010 Vienna Communiqué, the ICNND states: "One unique contribution of the Commission not available to the NPT parties in preparation for the Review Conference was outreach to the non-NPT states (India, Pakistan and Israel), making the case – if their early membership of the NPT itself could not be secured – for their participation in parallel instruments and arrangements which apply equivalent non-proliferation and disarmament obligations (see Commission Recommendations 17-19). But the Commission reaffirms its concerns about the terms of the exemption approved by the Nuclear Suppliers Group for India's nuclear programs, which did not require a strong new commitment to disarmament and non-proliferation objectives and measures. Its view remains that any future supply to non-NPT countries be on condition at least that the receiving state not conduct any nuclear test and implement a moratorium on the production of fissile material for weapon purposes pending the entry into force of a fissile material production ban."⁹²

Rory Medcalf, the Lowy Institute's program director for international security, promotes uranium sales to India on the grounds that: "Australia has to be more actively engaged in the civil nuclear energy revival globally if we are going to be a credible player in the non-proliferation environment."⁹³ However it is a curious logic to argue that undermining the NPT – a cornerstone of the non-proliferation regime – is a necessary step towards strengthening that regime. Undermining the NPT would more likely undermine Australia's credibility in nuclear non-proliferation fora.

The claim that Australia should sell uranium to India because of India's 'strategic importance' ignore the strategic importance of Pakistan (which resents the preferential treatment given to India), the strategic importance of regional stability, and the strategic importance of the global nuclear non-proliferation regime. Proponents claim the

⁹⁰ Ron Walker, 2007, Uranium for India: Avoiding the Pitfalls, <www.lowyinstitute.org/Publication.asp?pid=588>.

⁹¹ International Commission on Nuclear Non-proliferation and Disarmament, 2009, Eliminating Nuclear Threats, A Practical Agenda for Global Policymakers, <www.icnnd.org>

⁹² <www.icnnd.org/Pages/100705_vienna_communique.aspx>

⁹³ Mark Davis and Jonathan Pearlman, 16 December 2009, Commission points way for uranium sales, <www.smh.com.au/national/commission-points-way-for-uranium-sales-20091215-kunu.html>

NPT is flawed and anachronistic – but they have put forward no serious proposals for an alternative global non-proliferation system of equal or greater merit, nor have they explained the logic of further weakening an already flawed non-proliferation and disarmament regime as a logical or necessary step towards the establishment of an alternative system.

Safeguards

There is no potential to secure non-proliferation or disarmament concessions from India in the context of uranium negotiations. Nor is there any possibility of strict safeguards being applied to monitor Australian uranium exports to India. India's safeguards agreement with the IAEA leaves a great deal to be desired – safeguards will be tokenistic and in any case they apply only to that part of the nuclear program that India considers surplus to its military 'requirements'. Nor is there any restraint on India building new, unsafeguarded reactors or other facilities for its weapons program.

Even in the unlikely event that a rigorous safeguards regime provided confidence that Australian uranium was not used in India's weapons program, that would in no way undo the damage done to the NPT by opening up civil nuclear trade with non-NPT states. Nor would a rigorous safeguards regime address another key problem: uranium exports to India freeing up domestic reserves for weapons production.

Economic and environmental considerations

Some simple calculations give the lie to claims that permitting uranium sales to India would generate windfall profits:

* If Australia supplied 20% of India's current uranium demand, uranium exports would increase by 1.8% above the 2008/09 figure.

* If all reactors under construction or planned in India come to fruition, Australia's uranium exports would increase by 10% compared to the 2008/09 export figure.

* Even if we make the heroic assumption that all 'proposed' reactors in India reach fruition, Australia's uranium exports would increase by 8.5–11% above the Australian Uranium Association's estimate of total exports in 2030.

Australian uranium sales to India have been promoted on the grounds that an expansion of nuclear power would reduce reliance on coal fired plants and thus reduce greenhouse emissions. That argument was always contestable – India's planned nuclear expansion could easily be replaced with a more systematic pursuit of energy conservation and renewable energy sources. The argument is even more dubious now that a number of countries are now supplying India with uranium in the wake of the US-India deal. India has little or no need for Australian uranium, certainly in the short term. India continues to press the Australian Government to reverse its policy because a uranium supply agreement which imposed no meaningful disarmament conditions on India would further legitimise and entrench India's nuclear weapons program.

Some proponents of uranium sales to India argue that a reversal of the current prohibition would give Australia considerable leverage in international climate change negotiations. There is no rationale or basis for these claims. There is no reason to believe that permitting uranium sales would lead to any such initiatives, however worthwhile, nor that any such initiatives would necessarily be preceded by permitting uranium sales. Some proponents argue that Australia should be awarded 'carbon credits' of one form or another for exporting uranium to India⁹⁴ – a precedent that would sit uneasily with Australia's coal export industry.

Strengthening or weakening the non-proliferation and disarmament regime

The economic benefits of uranium trade with India would be very small, the arguments concerning climate change do not stand up to scrutiny, so the decision on Australian uranium exports turns primarily on whether Australia takes seriously its professed commitment to be a leader in the nuclear non-proliferation and disarmament field.

⁹⁴ See for example Gavin Atkins, 8 November 2009, Uranium sale could solve two problems, <www.brisbanetimes.com.au/opinion/politics/uranium-sale-could-solve-two-problems-20091108-i3fn.html>

The importance of the NPT and the non-proliferation regime to Australia cannot be understated. Walker describes a worst case scenario in his Lowy Institute paper: "[B]y helping to relieve Australian and Indonesian military planners from one nightmare scenario it [the non-proliferation regime] assists in protecting our relationship with our neighbour from a major potential source of tension. If the NPT were further eroded, and there was a serious deterioration in the strategic environment, both countries could have to review their force structure. In the extreme, a regional nuclear arms race might ensue."⁹⁵

Kevin Rudd has issued similar warnings about the perilous state of the non-proliferation regime: "[T]he Nuclear Non-proliferation Treaty disintegrates before our very eyes ... the current non-proliferation regime is fundamentally fracturing. The consequences of the collapse of this regime for Australia are acute, including the outbreak of regional nuclear arms races in South Asia, North East Asia and possibly even South East Asia."⁹⁶

There would be no advantage in reversing Australia's principled opposition to uranium exports to non-NPT states in the absence of concessions from India (such as CTBT ratification) – and yet there is no possibility of concessions.

The government may be considering options which would allow it to have its yellowcake and eat it too, such as the third-party arrangements that allow Australian uranium to be exported to Taiwan. However, if the government wants to do its part to reverse the fracturing of the nuclear non-proliferation regime, maintaining its ban on uranium sales to non-NPT countries is a necessary starting point. The government also ought to work internationally to re-establish the norm that countries outside the NPT – as well as those NPT signatories that are flouting their disarmament obligations – are not eligible for nuclear trade.

Australia would certainly not be alone in seeking to preserve what remains of the principle that non-NPT states are excluded from civil nuclear trade. During the 2010 NPT Review Conference, the 118 nations of the Nonaligned Movement complained that the US-India deal had given a non-NPT state more benefits than NPT parties and argued that full-scope safeguards ought to be a requirement for nuclear supply.

Action 35 of the Final Document of the 2010 NPT Review Conference “urges all States parties to ensure that their nuclear-related exports do not directly or indirectly assist the development of nuclear weapons or other nuclear explosive devices and that such exports are in full conformity with the objectives and purposes of the Treaty ... as well as the decisions and principles and objectives ... adopted in 1995 by the Review and Extension Conference.” The 1995 NPT decisions include making full-scope IAEA safeguards a condition of nuclear supply.

In conclusion, Australia does need a change of policy with respect to nuclear non-proliferation and disarmament. But it is not the ban on uranium exports to non-NPT states that needs changing. It is the unwritten, bipartisan policy of paying lip-service to the importance of nuclear non-proliferation (and even more so nuclear disarmament) while undermining these objectives in so many ways – maintaining Australia's place under the US nuclear weapons umbrella, exporting uranium to nuclear weapons states which flout their NPT disarmament obligations, refusing to invoke Australia's powers under bilateral agreements to prevent plutonium stockpiling, approving uranium sales to Russia with no requirement for IAEA inspections, and generally subordinating nuclear non-proliferation and disarmament goals to economic and political considerations.

Australia can stand with the vast majority of nations in upholding and attempting to strengthen the fragile nuclear non-proliferation and disarmament regime, or we can stand with those who continue to undermine it.

⁹⁵ Ron Walker, 2007, Uranium for India: Avoiding the Pitfalls, <www.lowyinstitute.org/Publication.asp?pid=588>.

⁹⁶ 19 September 2006, Sydney Institute.