

# Uranium, India and the Nuclear Non-Proliferation Regime

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## 1. Introduction and summary

The Australian federal government is actively moving to facilitate uranium sales to India – a move with important implications for Australia’s uranium safeguards regime and the credibility of the international nuclear non-proliferation and disarmament regime.

Within days of the conclusion of a nuclear cooperation agreement between the US and India, foreign minister Alexander Downer said on July 31 that federal Cabinet would discuss the potential sale of Australian uranium to India “fairly soon”. Mr Downer and Prime Minister John Howard have expressed support for both uranium sales to India and the US-India deal.

Nuclear trade with India undermines the fundamental principle of the global non-proliferation regime – the principle that signatories to the Nuclear Non-Proliferation Treaty (NPT) can engage in international nuclear trade for their civil nuclear programs while countries which remain outside the NPT are excluded from civil nuclear trade.

For decades, India has been invited to dismantle its nuclear weapons and join the NPT as a non-weapons state. It would then be free to participate in international civil nuclear trade. Now, the US and Australia propose to engage in nuclear trade with India with no requirement for India to dismantle its nuclear arsenal or to join the NPT. This legitimises India’s nuclear weapons program and makes it less likely that it will disarm. The recently-concluded US-India deal does nothing to curtail India’s nuclear weapons program; indeed it will facilitate India’s weapons program.

Nuclear trade with India will also make it less likely that other non-NPT weapons states such as Israel and Pakistan will disarm and accede to the NPT. Pakistan resents the selective support for India's nuclear program and is well aware of the potential for the US-India deal and Australian uranium exports to facilitate an expansion of India's arsenal of nuclear weapons. Increased nuclear cooperation between Pakistan and China is a likely outcome of nuclear trade between the US, Australia and India.

The precedent set by nuclear trade with India increases the risk of other countries pulling out of the NPT, building nuclear weapons, and doing so with the expectation that civil nuclear trade would continue given the Indian precedent.

A key problem with proposed uranium exports to India is that it will free up domestic uranium in India for weapons production. Indeed, 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."

Civil nuclear trade with India would violate the rules of the Nuclear Suppliers Group. It cannot be reconciled with UN Security Council Resolution 1172, which calls on India and Pakistan to stop further production of fissile material for nuclear weapons. It would arguably amount to a violation of the NPT. Australian uranium sales to India would violate treaty commitments under the South Pacific Nuclear Weapons Free Zone Treaty.

The economic benefits of uranium sales to India would be negligible. If Australia supplied one quarter of India's current demand, annual sales revenue would amount to \$8.6 million, uranium export revenue would increase by 1.3%, and Australia's export revenue from all products would increase by 0.005%. If India's ambitious nuclear expansion plan is realised, Australia's uranium export revenue would increase by 6.8% over the current figure and export revenue from all products would increase by 0.026%.

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## 2. The US-India deal

The proposal to sell Australian uranium to India is closely connected with the US-India deal. The deal – unless blocked by the US Congress or the 45-country Nuclear Suppliers Group – will allow US companies to sell reactors, enriched uranium fuel and potentially other nuclear facilities for India's civil nuclear program.

Under the US-India agreement, India will separate its civil nuclear program from its weapons program. A total of 14 reactors will be subject to International Atomic Energy Agency (IAEA) safeguards inspections, 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 out 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).

An August 1, 2007 media release from foreign minister Alexander Downer states that: "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."

Mr Downer's comments are misleading. The Indian Embassy noted in 2005 that under the auspices of the US-India deal it has merely reiterated 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." (Indian Embassy, 2005.)

Mr Downer's statement regarding Nuclear Suppliers Group (NSG) standards is disingenuous given that the US-India deal is itself a clear violation of the NSG principle of not supporting nuclear programs in non-NPT states. The NSG will be asked to waive this principle in relation to the US-India deal.

India's 'moratorium' on nuclear weapons testing counts for nothing given that it refuses to sign or ratify the Comprehensive Test Ban Treaty (CTBT). Nuclear weapons testing was one of the most contentious aspects of the negotiations between the US and India. The text of the US-India deal, released on August 1, is ambiguous about the implications of a resumption of weapons testing by India (Governments of India and USA, 2007). It falls short of a clear statement that US nuclear supplies would be terminated in the event of India testing a nuclear weapon – although that is a requirement of current US law.

Moreover, the US-India agreement envisages joint efforts to ensure ongoing operation of India's reactors even if US fuel supplies are terminated. 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 (2007) 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."

Indian national security adviser M.K. Narayan said that the 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." (Indian Embassy, 2007.)

In short, the US-India deal will do very little or nothing to stop India testing nuclear weapons and it is misleading for Mr Downer to imply otherwise. Mr Downer considers himself a champion of the CTBT. He now has a chance to prove it. As a member of the Nuclear Suppliers Group, which operates by consensus, Australia could block the US-India deal unless India meets various conditions - such as signing and ratifying the CTBT, stopping the production of fissile material for nuclear weapons, and/or signing and ratifying the NPT.

In relation to fissile material production, Indian officials noted on July 29, 2005 that: "There is no commitment at all to cease production of fissile material ahead of the conclusion of such a multilateral [FMCT] treaty." (Indian Embassy, 2005.)

International negotiations on a Fissile Material Cut-off Treaty (FMCT) have stalled, in part because the US says it will not accept binding monitoring, verification and inspection provisions. Therefore, India could continue producing fissile material indefinitely. Ironically, India's position is that the FMCT must be verifiable – precisely the issue which the US will not accept. Moreover, the draft FMCT treaty tabled by the US in May 2006 would not require India's accession for the FMCT to enter into force, thus lessening the pressure on India to join.

India says 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. The US-India deal allows civil trade with no requirement for India to sign or ratify the CTBT or to stop producing fissile material.

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### 3. Safeguards and India's weapons program

Mr Downer is not the only proponent of civil nuclear trade with India to have made false and misleading statements. During a March 2006 joint media conference with US Secretary of State Condoleezza Rice, Prime Minister John Howard commended India for not having tested a nuclear weapon since 1974. Evidently he had forgotten India's five tests in 1998.

Mr Howard also said India had a “very good record in relation to non-proliferation”. But India is a non-NPT nuclear weapons state, refuses to sign the CTBT, violated its pledge to use the CIRUS (Canada-India-Reactor-United-States) research reactor for peaceful purposes only, tested nuclear weapons in 1974 and 1998, and (as discussed later) has a history of illicit nuclear procurement and inadequate nuclear export controls.

Mr Howard falsely claimed, during the media conference with Condoleezza Rice, that the US-India deal would bring India’s nuclear program under international inspections “for the first time”. As mentioned, six reactors are already subject to safeguards. Since India has already decided that the eight additional reactors to be subjected to IAEA safeguards are surplus to its military ‘requirements’, it is difficult to see the value of applying safeguards to them.

The federal government claims that uranium sales to India would not be contemplated in the absence of appropriate safeguards. But India will presumably allow highly intrusive safeguards inspections of that part of its nuclear program which it has already decided is surplus to its military program.

Alexander Downer has ‘shifted the goalposts’. On March 7, 2006, the NPT was the key issue in relation to uranium sales to India. “We don’t have any current intentions of changing our policy and the reason is this: for 30 years we’ve been contributing very substantially in all sorts of ways to the Nuclear Non-Proliferation Treaty and to the non-proliferation regime,” Mr Downer said on ABC television. Since his change of view in July 2007, Mr Downer has downplayed the NPT, and now he states: “Inspections is the issue.”

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%. 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.” (Tellis, 2005.)

A July 27 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.” (Indian Embassy, 2007.)

While some proponents of nuclear trade with India argue that it will potentially curtail India’s weapons program, others argue that India will not disarm and there is no point trying to persuade the country to do so. Greg Sheridan, foreign editor at The Australian, argued on July 26 that India “is certainly never going to give up its nuclear weapons.”

But 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. North Korea has committed to abandoning its nuclear weapons program. 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.

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## 4. India’s uranium shortage

As India has limited domestic reserves of uranium, there is the very real risk that Australian uranium sales would free up India’s limited 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.

India’s annual uranium production of about 300 tonnes is insufficient to meet its current requirement of

about 500 tonnes. 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 factors. Efforts to increase production have been frustrated by public opposition. The problem becomes more acute as stockpiles are depleted and new reactors increase uranium requirements.

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."

Civil nuclear trade and uranium supply would allow India not only to continue, but also to potentially accelerate the expansion of its stockpile of nuclear weapon materials. A report by the International Panel on Fissile Materials notes that India continues to build up its stockpile of weapon materials and has indicated that it intends to continue to do so until there is international agreement on a Fissile Material Cut-Off Treaty (Mian et al., 2006). That could take many years.

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 concluded:

*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 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.*

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## 5. The precedent set by nuclear trade with India

Why engage in nuclear trade with India but not with other non-NPT weapons states such as Pakistan and Israel? (North Korea is the only other non-NPT state, and also has nuclear weapons, but has recently expressed willingness to dismantle its nuclear weapons and to shut down the 'civil' nuclear facilities which underpinned the weapons program.)

On March 6, 2006, Alexander Downer, then an opponent of nuclear 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."

Pakistan is already lobbying for the same privileges being extended to India, though it has yet to receive any favourable responses.

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." 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."

Former U.N. Under-Secretary-General for Disarmament Affairs, Jayantha Dhanapala, said of the US-India deal in late July: "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."

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 (rightly or wrongly) to be part of a broader strategic policy of containing China.

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. Prime Minister Howard argued last September that it would be "anomalous" to sell uranium to China but not India. His argument was of course 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.

Civil nuclear trade with India 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."

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.

Iran would not expect to be able to participate in civil nuclear trade if it developed nuclear weapons and withdrew from the NPT. Nevertheless, civil nuclear trade with India, a non-NPT weapons state, seriously undermines international efforts to persuade Iran to abandon its uranium enrichment program.

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## 6. Nuclear exports

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 July 26, 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 that "India has an impeccable record of never having proliferated nuclear technology to anybody else".

These claims are false.

A US Congressional Research Service noted that in 2004 the US imposed sanctions on two Indian scientists for nuclear-related transfers to Iran (Squassoni, 2006). The report also noted that India has an illicit procurement system for its own nuclear weapons program.

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" (Albright and Basu, 2006.)

The ISIS 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 ISIS 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."

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## 7. Violation of resolutions and treaty obligations

Civil nuclear trade with India certainly violates the rules of the Nuclear Suppliers Group, hence the ongoing efforts by the US and India to secure exemptions from NSG rules.

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. (The Resolution is posted at: <[www.armscontrol.org/projects/india/india\\_record.asp](http://www.armscontrol.org/projects/india/india_record.asp)>.)

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. (The text of the Treaty is posted at: <[www.armscontrol.org/documents/rarotonga.asp](http://www.armscontrol.org/documents/rarotonga.asp)>.)

On June 20 2006, 10 nonproliferation experts and former senior 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. (The letter is posted at <[www.npec-web.org](http://www.npec-web.org)>.)

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."

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## 8. Windfall profits?

It may come as a surprise to learn that the Australian Uranium Association has reserved its position on proposed uranium sales to India. The Association's Michael Angwin said in late July 2007: "We wouldn't support any arrangements that Australia agreed to which undermined the world's or Australia's anti-proliferation regime." Likewise, the chief executive of the Minerals Council of Australia, Mitch Hooke, was quoted in The Age on March 7, 2006 saying that local companies were not about to damage their integrity

by selling uranium to a nation that had not signed the NPT.

The uranium mining industry is weighing the potential political fallout of selling uranium to non-NPT states against the potential profits.

India's civil uranium requirements are very small – demand this year will be just under 500 tonnes. For comparison, Australia exported 9535 tonnes of uranium in 2006-07, valued at \$658 million (\$69,000 per tonne).

If Australia supplied one quarter of India's current uranium demand, that would amount to 125 tonnes, worth \$8.6 million at the 2006-07 prices. Uranium export revenue would increase by 1.3%. Australia's export revenue from all products would increase by 0.005%.

If we assume that all reactors under construction and planned in India reach fruition, India's nuclear output will increase by a factor of 2.5, from 3.8 gigawatts to 9.6 gigawatts (a standard reactor produces one gigawatt). If Australia supplied one quarter of this market, uranium export revenue would increase by 3.3% over the 2006-07 figure. Australia's export revenue from all products would increase by 0.013%.

Another 11.1 gigawatts of nuclear power output is "proposed" in India according to tables compiled by the Uranium Information Centre. In addition to reactors which are operating, under construction and planned, this would bring total nuclear capacity to 19.7 gigawatts. (This figure is in line with the Indian Department of Atomic Energy's stated plan to achieve 20 gigawatts by 2020.) In the unlikely event that those plans are fully realised, Australia's uranium export revenue would increase by 6.8% over the 2006-07 figure and Australia's export revenue from all products would increase by 0.026%.

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## 9. Reactor safety

The US-India deal will give India access to reactor technology which in some cases will be safer than indigenous Indian technology. On the other hand:

\* Squassoni (2006) notes that India can already take advantage of the NSG exception for safety-related items.

\* The risk of a serious accident at any particular reactor may decrease but the overall risk of serious accidents may not decrease (and may even increase) since the US-India deal is likely to lead to a greater number of reactors.

\* The US-India deal will provide India with access to safer nuclear hardware but it will do very little or nothing to improve other key determinants of risk, namely the safety culture and rigorous, independent regulatory oversight.

\* 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.

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## 10. Climate change and energy options

As with the economic returns, the potential greenhouse benefits of uranium sales to India are underwhelming. Nuclear power currently accounts for 2.6% 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 any significant 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 according to Bucknam (2007).

The assumption that nuclear expansion will have any positive greenhouse impact whatsoever rests on the premise that nuclear power displaces fossil fuels. But if nuclear power displaces wind power – which is three times more greenhouse-friendly than nuclear power according to the Switkowski report – nuclear power will exacerbate climate change.

India's installed wind power capacity of 6.3 gigawatts as at December 2006 is fourth in the world, behind only Germany, the US, and Spain. The Indian Wind Turbine Manufacturer's Association expects the

installation of 1.5-1.8 gigawatts of wind power capacity each year for the next three years. The Indian government projects an even faster growth rate resulting in an additional 10 gigawatts by 2010. (Global Wind Energy Council, 2006).

If nuclear power displaces energy efficiency measures, nuclear power will exacerbate climate change. An article by Leonard Weiss in the May/June 2006 edition of the Bulletin of the Atomic Scientists states (Weiss, 2006):

*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.*

Weiss, a former staff director of the US Senate Subcommittee on Energy and Nuclear Proliferation and the Committee on Governmental Affairs, also discusses India's energy supply options:

*[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.*

*"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.*

The nuclear industry and its supporters assert that renewable energy sources cannot provide reliable, baseload electricity. A July 27 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 thermal storage, and in some cases hydroelectricity (Diesendorf, 2007).

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. Even the 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 (quoted in Vidal, 2004).

Lastly, it should be noted that it is difficult for Australia to play a constructive role in slowing the growth of emissions in India given that emissions in Australia are still rising and Australia still refuses to ratify the Kyoto Protocol. India's per capita emissions are 17 times lower than Australia's according to academics at Sydney University's School of Physics (Dey and Lenzen, 2006). If global per capita emissions were at India's level, global warming would be unheard of; the same cannot be said of Australia.

The Economist noted on July 30, 2007: "[A]s a member of the Asia-Pacific Partnership on Clean Development and Climate, India has had a particularly close look at rich countries doing nothing. Comprising two Kyoto spoilers, America and Australia, as well as South Korea, China and Japan, the

partnership was established last year to promote transfers of green technology among its members. A patent fig-leaf for the refusal of America and Australia to ratify Kyoto, it has achieved little.” (The Economist, 2007.)

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## 11. References and further information

(References have been provided for key statements and reports. For other references, contact <jim.green@foe.org.au>.)

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For a positive view on the US-India deal, see:

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## **Acknowledgements**

The authors would like to thank members of the Abolition 2000 network, and the EnergyScience Coalition, for valuable feedback on a draft of this paper.

## **Acronyms**

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

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## **About our organisation:**

energyscience.org.au is a co-operative production by a group of concerned scientists, engineers and policy experts that seek to promote a balanced and informed discussion on the future energy options for Australia.

With increasing concern over the looming impact of global climate change the community needs to be aware of the issues involved. energyscience aims to provide reliable and evidence based information to our whole community

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