Thorium Power, Ltd. – News Update
April 13, 2007

Letter from Seth Grae, CEO

Dear Stockholders:

We are pleased to share this latest news update, which includes company news as well as industry-related developments.

We are particularly enthused about the recent coverage in Platts' *NuclearFuel* and *World Nuclear News*, two leading industry trade publications. The articles further validate the positive progress we are making, with *NuclearFuel* remarking that "[thorium fuel] holds promise of being more efficient and proliferation-resistant and for producing a smaller volume of spent fuel than traditional uranium-based reactor fuel." In the same article, Christopher Paine, a senior nuclear program analyst with the Natural Resources Defense Council asks "why the administration is proposing to spend $100 billion on spent fuel reprocessing, which is dangerous and uneconomic, when it hasn't even looked at what could be a much cheaper and efficient alternative."

Meanwhile, *World Nuclear News* reports on our successful thermal-hydraulic tests and notes that we are moving from a scientific development phase to an "engineering executional" phase. In a separate report, the publication reports on our recent activities in India and makes special note of our constructive discussions with NTPC, India's largest electric utility.

As for notable news about our industry, we are witnessing unprecedented interest in thorium as a growing number of countries – Norway, Russia, India and Australia (to name a few) – declare their interest in thorium-based solutions. Coupled with positive industry projections from the IAEA and other bodies, the prevailing trends ultimately support our unique positioning as a source of solutions to address all major concerns of the industry – how to solve proliferation, reduce waste and improve profitability.

As always, we will continue to share the latest news and developments. As a reminder, our annual shareholders meeting will take place in New York on April 25th. Further information will be available on the Website as we get closer to the date. We look forward to meeting with you and discussing our recent progress and future plans.

Very Truly Yours,

Seth Grae
Chief Executive Officer

Thorium Power, Ltd. – News Update
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World Nuclear News – Indian Generators Think Ahead (04.11.07) – The paper reports that Nuclear Power Corporation of India Limited (NPCIL) is discussing the construction of a nuclear plant composed of six of Areva's EPR pressurized water reactor units in the state of Maharashtra. The article also reports that India's largest electric utility, NTPC, has made moves towards exploiting nuclear power for the first time, noting Thorium Power is currently in talks with the company concerning sites in Tamil Nadu, Madhya Pradesh and Maharastra.

The Globe and Mail (Canada) – Energy-efficient Japan eyes a nuclear-dependent future (04.02.07) – The paper reports on Japan's strategies for energy and technologies which involves the Nuclear Energy National Plan, aimed at greatly increasing nuclear power generation and reducing foreign dependency.

The Globe and Mail (Canada) – Russia eyes nuclear power co-operation with Canada (04.02.07) – The paper reports that Russia's ambitious nuclear energy agency is looking to forge a partnership with Atomic Energy of Canada Ltd. to develop the next generation of high-efficiency reactors, as part of the country's effort to become a global leader in the nuclear power industry.

Global Insight – Thorium Nuclear Plant Considered in Norway (04.02.06) – The article reports that Thor Energi, a Norwegian energy company, announced that it is investigating the construction of a nuclear power plant based on the use of thorium.

The Statesman (India) – Russia Hopeful of Indo-Us Nuke Deal (04.02.07) – The paper reports on Russian ambassador Mr. Vyacheslav Trubnikov's hopeful comments that the India-US nuclear deal will be completed.

PTI - The Press Trust of India Ltd. – US acted in good faith in 123 agreement talks: McCormack. (03.31.07) – The newspaper reports that US State Department spokesman Sean McCormack commented that US Under Secretary of State Nicholas Burns would do an internal assessment of the 123 Agreement talks after hearing from the American negotiating team, while assuring the press that he thought both sides had acted in good faith.

Reuters News – Norwegian firm proposes thorium nuclear plant (03.30.07) – The wire reports that Norwegian energy company, Thor Energi, announced its interest in building a nuclear power plant based on thorium. The article notes that Norway has never had nuclear production and the country is estimated to hold the world's third largest reserves of thorium. It also mentions that India is seeking to buy thorium technology from US based Thorium Power in order to exploit its thorium reserves.

The Press Trust of India – Ball in India's court: Burns (03.30.07) – The paper reports on comments made by US Under Secretary of State Nicholas Burns about negotiations between the US and India in the 123 Agreement. The article notes that Burns said some "progress" was made, but "not enough" as the two sides try to come to terms on issues of fuel supply assurances, reprocessing of spent fuel and future nuclear testing by India.

The Statesman (India) – Indo-Us Talks End, Some Issues Sorted Out (03.28.07) – The paper reports on the third and final day of Indo-US efforts toward finalization of the 123 Agreement. The article notes that while there was no official information on the substantive part of the negotiations, there have been indications that differences may have been narrowed down.

Asian Tribune – Nuclear Cooperation: Mutually Beneficial Deal with the US (03.27.07) – The paper reports that both the US and India have much to gain in finalizing the 123 Agreement. The article notes that in the case that the thorium cycle is mastered successfully over the next decade or so, India could increase its nuclear power capacity to 275 to 300 GW by 2050.

Nuclear Fuel – Progress being made on development of thorium-based fuel, company says (03.26.07) – The industry publication reports that Christopher Paine, a senior nuclear program

analyst with the Natural Resources Defense Council, urged attendants to look at a thorium-based fuel cycle as an alternative to spent fuel reprocessing at a March 19 Department of Energy public scoping meeting on the department's plans to prepare an environmental impact analysis on its proposed Global Nuclear Energy Partnership program. The article notes Thorium Power's announcement last month that it had finished two thermal-hydraulic experiments at a facility in Russia and quotes Thorium Power's Seth Grae who told the publication that while interest in nonproliferation technology at present is high in countries that don't already have reactors, he said, "I think the fuel will end up hitting a wide market of countries that currently have reactors and countries that will build new reactors."

National Post's Financial Post & FP Investing (Canada) – Uranium: Fuel for nuclear reactors benefiting from both underlying demand and fears of global warming (03.26.07) – The paper reports that uranium has become one of the biggest stars of the commodity boom because of growing concern over climate change. The article notes that while the argument for higher uranium prices is strong, risks such as the possibility of a disaster such as those that occurred at Chernobyl or Three Mile Island, or the possibility of the US Department of Defense flooding the market with its stockpile of uranium from decommissioned nuclear weapons, could dampen support.

World Nuclear News – Thorium passes tests (03.22.07) – This leading industry trade publication reports successful testing on behalf of Thorium Power of thorium fuel assemblies for widespread use at Russia's Kurchatov Institute. The article notes that Erik Hallstrom of Thorium Power told the news source that the company is moving from a scientific development phase to an 'engineering executional' phase, indicating Thorium Power's design could be scaled up further to full size.

The Journal of Turkish Weekly – Nuclear Energy Possibilities In Turkey (03.2007) – The article reports on Turkey's push for investment in nuclear energy and its enactment of "The Draft Law on the Construction and Running of the Nuclear Power Plants and Their Sales of Energy". The article discusses the bidding process for companies that are interested in building power plants in the country and notes that nuclear power investment in the country "is a must and the public must get used to the reactors and the nuclear energy."

Indian generators think ahead
World Nuclear News
April 11, 2007

Indian power companies are drawing provisional plans for a huge expansion in nuclear capacity after the expected lifting of trade restrictions.

Reports in the Indian newspaper *Financial Express* indicate that Nuclear Power Corporation of India Limited (NPCIL) is discussing the construction of a 10,000 MWe nuclear plant composed of six of Areva's EPR pressurized water reactor units in the state of Maharashtra. Most other NPCIL units are indigenously developed pressurised heavy water reactors.

Officials would hope to begin work on the first of the EPRs as early as 2008. Chairman of the company, S K Jain said such a project would cost just $11.4 billion in India.

Separately, India's largest electric utility, NTPC, has made moves towards exploiting nuclear power for the first time. On 5 March the company's board of directors approved a proposal to amend its association documents to allow the use of nuclear power. NTPC decribed this as a strategic initiative.

Consultants including former staff of NPCIL and the Atomic Energy Commission were hired to define a roadmap for NTPC, resulting in the goal of 6000 MWe of nuclear capacity. According to NTPC chair and managing director, T Sankaralingam: "We will have 2000 MWe of nuclear power generation by the middle of the 12th plan (2012-2017). Simultaneously, we will work on two power plants of 2000 MWe each."

NTPC are reportedly in discussion with General Electric and Thorium Power. The company is considering sites in Tamil Nadu, Madhya Pradesh and Maharastra.

Officials from both companies recognise that trade restrictions must be lifted before Western hardware can be employed. Negotiations are currently underway between India and the USA toward a '123' Agreement necessary for US-India trade, already sanctioned by President George Bush. Following agreement, the 45-nation Nuclear Suppliers Group will likely draft new guidelines for its members, allowing widespread nuclear trade with India.

Further information
Nuclear Power Corporation of India (NPCIL)
NTPC

Energy-efficient Japan eyes a nuclear-dependent future
By Gwyn Morgan
The Globe and Mail (Canada)
April 2, 2007

I'm writing this column en route home from Tokyo, following an interesting few days with a small European-North American delegation focused on Japan's energy technology and supply strategies.

Our group was led by former U.S. secretary of state George Shultz, best remembered as a key player in staring down a bellicose Soviet empire during the Reagan era. His boss's cry of, "Mr. Gorbachev, tear down this wall," unleashed pent-up forces of freedom that rushed through the breach like a tsunami, washing away the ramparts of a regime responsible for more than half-a-century of human subjugation and suffering. Now in his mid-80s, Mr. Shultz remains robust, engaged and highly respected around the world, as evidenced by invitations for him and his graciously gregarious wife, Charlotte, to tea at the palace with the Emperor and Empress of the famous Chrysanthemum Throne. By contrast, the closest this delegate got to the palace was a run around the surrounding moat replete with quintessential Japanese cherry blossoms.

In our mission to learn about Japan's energy technology and strategies, we were privileged to talk with some of the nation's top scientists, business leaders and politicians.

Japan is the world's second-largest economy, possessing an impressive infrastructure and high living standards. That the people of these small Pacific islands stretching in a narrow band from the sub-Arctic opposite Siberia to the tropical island of Okinawa have achieved so much certainly has nothing to do with natural resources . . . unless you consider educated, industrious people to be a natural resource.

Because of limited arable land, Japan's food self-sufficiency is only 40 per cent.

The country's energy self-sufficiency is an even lower 18 per cent, with 14 per cent of that from nuclear power. This has lead to a sharp focus on both energy technology and conservation. In fact, the International Energy Agency ranks Japan as the world's most energy-efficient economy per unit of GDP. Here are some figures for the number of times (x) by which energy use per unit of GDP in other countries exceeds that of Japan: U.S., 3x; Canada, 4x; China, 9x; and Russia, 15x.

Nevertheless, Japan is focused both on becoming even more efficient and reducing what it views as an unacceptable level of foreign source vulnerability, especially in a world where petroleum supply is becoming more and more concentrated in an unstable Middle East or an unpredictable Russia.

The search for solutions has engaged the country's foremost experts, such as the highly respected Masahisa Naitoh, chairman of Japan's Institute of Energy Economics. They conclude that wind and solar power do not offer major growth potential for the next decade or more. A presentation by the country's largest electricity distributor also made it clear that connecting too much wind and solar to the grid has already "decreased system stability" (the wind may not blow and the sun doesn't shine all the time). Bio-fuels are not an option because Japan doesn't have the required farmland.

This led to the adoption of the Nuclear Energy National Plan, aimed at greatly increasing nuclear power generation. In the great Japanese tradition of consensus building, the plan was subjected to rigorous scientific, economic and political debate before being adopted by all political parties in the Diet.

One element of the plan is titled "Positive Involvement in Creating an International Framework to Uphold Non-Proliferation."

As the only country upon which a nuclear bomb was ever dropped, the Japanese understand at a very personal level how crucial it is to prevent rogue states from possessing the ultimate

weapon. Mr. Shultz is also eminently qualified on this subject, given the key role he played as the world teetered on the brink of nuclear Armageddon during the Cold War. He and three other respected colleagues have just written a paper on the need to achieve a nuclear-weapon-free world as the only real solution to this threat.

Besides reducing foreign dependency, a key objective of Japan's nuclear strategy is reducing emissions. Here in the land of the city that gave it's name to the Kyoto Accord, this is considered both a matter of honour and necessity. Given that Japan is the world's most energy-efficient economy and a leader in renewable technology, one would think that achieving its Kyoto targets would be a slam dunk.

But dinner with the powerful Akira Amari, Minister of Economy, Trade and Industry (what else is there?) painted quite a different picture. Here are some of the things he had to say: "Kyoto is a flawed agreement. Japan cannot meet its Kyoto targets due to economic growth since the 1990 base year. Much longer time frames to develop and implement breakthrough technology are needed. We need to move past Kyoto. Any emissions reduction regime without the United States, China and India is meaningless."

During our informal dinner discussion, Mr. Amari expressed concern over Japan's exposure to toxic compounds from its Chinese neighbour's dirty coal-fired power plants. I found it fascinating how this problem paralleled the Canadian concerns over Chinese pollution that I discussed in my last column.

I came away from the Land of the Rising Sun with a profound appreciation for this nation's sense of unity around fundamental values of responsibility and respect, and its determination to control its own destiny in a chaotic world.

Gwyn Morgan is the retired founding CEO of EnCana Corp. His column appears every other Monday in the ROB.

Russia eyes nuclear power co-operation with Canada
By Shawn McCarthy
The Globe and Mail (Canada)
April 2, 2007

Russia's nuclear energy agency is looking to forge a partnership with Atomic Energy of Canada Ltd. to develop the next generation of reactors, as part of the country's effort to become a global leader in the nuclear power industry.

Russia has one of the world's most ambitious nuclear programs, both for its domestic market and in international sales, and it is looking to AECL to collaborate on a new generation of high-efficiency reactors.

In the next 25 years, the Russian government plans to build more than 40 reactors at home - at an estimated cost of $60-billion (U.S.) - and to expand nuclear power's contribution to the country's electricity mix to 25 per cent from the current 16 per cent. The country now has 31 nuclear plants.

Despite the legacy of the world's worst nuclear accident at Chernobyl, the Kremlin is eager to dramatically increase nuclear power generation to meet the country's growing power needs and reduce its dependence on natural gas to generate electricity. The government would rather direct the country's natural gas supplies to lucrative export markets in Europe, Asia and even North America.

Valery Rachkov, head of atomic power at Rosatom, the state nuclear agency, visited Ottawa last week to attend Russia's first formal session in an international organization for nuclear research that promotes co-operation on reactor development.

In an interview at an Ottawa hotel, Mr. Rachkov said Russian and Canadian nuclear efforts bear similarities, including plans for the development of a new pressure tube reactor, and the two sides are exploring avenues of mutual interest.

Canada has "great experience in operating the Candus-type of reactor," Mr. Rachkov said. "We think there are great opportunities for co-operation."

In a telephone interview, AECL's senior scientist, Romney Duffey, said he sees "potential areas of collaboration" with the Russian nuclear agency, which, he noted, has a well-developed program with good testing facilities.

But he does not expect to see AECL sell reactors to Russia. In fact, the Crown corporation competes against the Russians for international reactor sales.

"Russia is an important energy producer to the world - they've got an extensive development effort and good people, which clearly we could leverage,"' Mr. Duffey said. "They're both a collaborator and a competitor."

He added, however, that AECL's Canadian suppliers may have the opportunity to do business in Russia as the country looks to dramatically expand its nuclear power infrastructure.

Mr. Rachkov said Russia is aiming to account for 20 per cent of the world's foreign reactor sales. Rosatom now boasts that it has the largest number of foreign reactor projects in the world, with two under construction in China, two in India, two in Bulgaria and one in Iran.

Work at the Iranian reactor was halted after Russia complained about late payments, but has recently resumed. Mr. Rachkov said he does not expect the project to be affected by United Nations sanctions - which Russia supported - aimed at halting Iran's uranium enrichment program, which the United States and its allies claim is part of a clandestine nuclear weapons program.

"We do not connect this with any type of sanctions; that is a separate problem," he said. "If they fulfill their obligations, we will fulfill ours."

At home, the Russian nuclear agency expects little public resistance to its massive construction plans, despite the lingering memories of the Chernobyl disaster that occurred 21 years ago in the Ukraine. By 2020, Rosatom expects, at a minimum, to double its power output to 45 from the current 23 gigawatts.

The country's nascent environmentalist movement recently complained about a vote by the regional legislators in Kostroma, 300 kilometres east of Moscow, to allow construction of a nuclear power plant. Residents had voted down such plans in a 1996 referendum.

Mr. Rachkov said every country will face some public opposition to the location of nuclear power plants, but it "will not be a great problem for the development of atomic energy" in Russia.

Russia's power

Electricity production in 2004 by source:

* Natural gas, 45 per cent

* Hydro, 19 per cent

* Coal, 17 per cent

* Nuclear, 16 per cent

* Petroleum, 3 per cent

International Energy Agency

Thorium Nuclear Plant Considered in Norway
By Matthew Hall
Global Insight
April 2, 2007

Norwegian energy company Thor Energi has announced that it is investigating the construction of a nuclear power plant based on the use of thorium, a radioactive metal that is seen as a safer alternative to the traditional nuclear fuel uranium. The company said that such a plant could be built using existing technology to convert a regular power plant at a cost of around US$4 billion. Company spokesperson Sven Roest said that the proposed plant could within a decade be producing 2,000MW of 15% of Norway's energy needs.

Significance: Norway currently has no nuclear power plants and future development of such plants has been viewed as unlikely given the country's strong stand on environmental issues. The proposal to use thorium which has a shorter half life than uranium and cannot be used for nuclear weapons could see debate over nuclear power re-emerge as the country seeks to meet growing energy demand while avoiding increased greenhouse gas emissions. Norway is estimated to hold the world's third largest thorium reserves.

Russia Hopeful Of Indo-Us Nuke Deal
The Statesman (India)
March 31, 2007

Statesman News Service NEW DELHI, March 30: Expressing his belief that the India-US nuclear deal will be completed, the Russian envoy to India said the bilateral agreement would have to be inked for the Nuclear Suppliers Group to make an exception for India. The Russian ambassador, Mr Vyacheslav Trubnikov, was speaking on the future direction of the Indo-US nuclear negotiations, which has so far failed to conclude the bilateral 123 agreement that will govern civil nuclear energy co-operation. The talks will not break down, asserted Mr Trubnikov, pointing out that both sides were keen to resolve the issue, as they had a major stake in the success.

For us, it is important that the negotiations are successful, he said, adding that if the agreement did not get through, then the NSG will find it difficult. He pointed out that that several members of the NSG are already not very positive. Referring to the negative stances of several countries like Austria and Finland, he said, India has to fight on several fronts. Currently, the PMs special envoy on the India-US nuclear deal, Mr Shyam Saran, is in Australia, where he spoke to the PM, Mr John Howard, about support for India in the NSG and supply of uranium for nuclear plants. Significantly, Mr Howard said that Australia will support the nuclear deal if it comes up in the April meeting of Nuclear Suppliers Group in Cape Town. But on the other hand, the chief American pointsman on the deal, US under secretary of state for political affairs, Mr Nicholas Burns has said that now the ball was in India's court. Expressing frustration at the slow pace of negotiations, Mr Burns told reporters in Washington, The United States has done its part. We've met every commitment we said we would meet. ... Right now I would say the ball is in India's court. He added that it was time for India to expedite the 123 talks as well as expedite talks with the IAEA towards a safeguards agreement. The Russian ambassador said he understood India's reticence in inking a safeguards agreement with International Atomic Energy Agency at this stage.

US acted in good faith in 123 agreement talks: McCormack.
PTI - The Press Trust of India Ltd.
March 31, 2007

Washington, Mar 31 (PTI) The United States has said it acted in good faith in the negotiations on the proposed 123 agreement with Indiato operationalise civil nuclear cooperation and assumes that New Delhi did so as well.

"Certainly, we have acted in good faith in these negotiations to see that they move forward and we can only assume that that is the motivation of the Indian Government as well," US State Department spokesman Sean McCormack told reporters when asked to comment on the recently concluded talks on the 123 Agreement.

He said the agreement being negotiated was a highly technical one and that US Under Secretary of State Nicholas Burns would do an internal assessment of the status of the talks after hearing from the American negotiating team.

"This is all highly technical stuff. Off the top of my head, I do not know. There are some areas that the Indians have raised and that has caused us to raise some questions back to them as well.

"So we're -- Nick (Burns) is going to take the information that hereceives from the negotiating team that's just returning. He's goingto do a conversation in-house here to assess where we are in these negotiations," McCormack said.

The 123 agreement will enable India to get US nuclear fuel and reactors, ending a 30-year freeze.

At the two-day talks in New Delhi earlier this week, the two sideshad indicated narrowing down of some differences. Both sides are trying to bridge gaps on issues like fuel supply assurances, reprocessing of spent fuel and future nuclear testing by India.

McCormack said the Bush administration has already worked with theCongress to pass the overall legislation as part of total implementation of the civil nuclear deal that the Washington concluded with NewDelhi. "The negotiations have taken some time. These are tough negotiations. I guess that's the way I'd put it right now. And once we have an opportunity to assess where we are in those negotiations, I think we'll probably have Nick (Burns) go back to the Indians at the political level to really have a conversation about where we are and what's needed in order to move forward and successfully complete these negotiations." McCormack parried a querry on the time frame for the next negotiating session. "I can't tell you. We'll have to do an in-house assessment and see where we are." "...Everybody has their own politics... We had our own politics in working with the Congress to pass the overall legislation, so everybody has politics. That's just the reality of democracies dealing with one another. We expect at this point that the Indians do want to move forward with these negotiations and we're acting on that basis," he said.

Norwegian firm proposes thorium nuclear plant
Reuters News
March 30, 2007

OSLO, March 30 (Reuters) - A Norwegian energy company, Thor Energi, has declared its interest in building a nuclear power plant based on thorium, a radioactive metal seen as a safer alternative to uranium.

Norway had never had nuclear production, as legislation bans nuclear power, but Norwegian energy authorities are now studying the prospects for exploiting the country's thorium reserves.

The plant could be built by using existing technology to convert a regular power plant into a thorium burning plant. A makeover is expected to cost $4 billion, Thor Energi said.

"If we can define the fuel cycle and get the right permissions, it will not take many years to build a thorium plant," spokesman Sven Roest told Reuters on Friday.

He said a thorium-powered plant could within a decade produce 2,000 megawatts of power, or 15 percent of Norway's energy needs, if quickly approved by authorities.

Thorium production is regarded as more expensive than a conventional nuclear plant fired by radioactive uranium, but thorium has a shorter half-life and cannot be used to develop nuclear arms.

Norway is estimated to hold the world's third largest reserves of thorium. Roest said Norway has enough thorium to cover all of its energy needs for the next 10,000 years.

India is seeking to buy thorium technology from U.S based Thorium Power in order to exploit its thorium reserves.

Ball in India's court: Burns
The Press Trust of India
March 30, 2007

The US today said enough was not done to iron out issues in the proposed 123 agreement with India to operationalise civil nuclear cooperation but some "progress" was made in the recent negotiations in New Delhi.

"The United States has done its part. We've met every commitment we said we would meet," Undersecretary of State Nicholas Burns told reporters here emphasising "Right now, I would say the ball is in India's court".

"We were hopeful that we would be able to make progress to close out all of the issues on the 123 (agreement) talks. Some progress was made but in our view, not enough," Burns said.

At the two-day talks in New Delhi earlier this week, the two sides had indicated narrowing down of some differences. Both sides are trying to bridge gaps on issues like fuel supply assurances, reprocessing of spent fuel and future nuclear testing by India.

New Delhi has alleged that the Henry Hyde Act, passed by the US Congress in December last year to allow civil nuclear trade with India, "significantly deviates" from the understandings of July 18, 2005, and March 2006, which was unacceptable to it.

India has made it clear that it will accept no deviation from the understanding reached between the two sides last year. New Delhi has already conveyed its concerns to Washington and handed over a draft text of the agreement suggesting the clauses it wants to be incorporated.

The 123 agreement will enable India to get US nuclear fuel and reactors, ending a 30-year freeze. Burns, US pointsman in the tough negotiations on the nuclear issue, refused to elaborate on differences that persist, saying he was awaiting a report from the American negotiating team which has returned from the Indian capital.

Describing the July 2005 and March 2006 agreements reached between the two countries as "very good", he said it was now time for India to expedite talks on the 123 agreement as well as a safeguards accord with the IAEA.

The 123 agreement, named after a section of the US Atomic Energy act, is part of the complex process under which India has to reach a country specific agreement with the IAEA paving the way for inspection of its civilian nuclear facilities.

India also has to get on board the 45-member Nuclear Suppliers Group (NSG) by pushing for changes in its guidelines to enable nuclear supply to it.

American officials feel that despite little movement on certain key issues, the agreement will finally come through since the top leadership of both countries have taken personal interest in advancing it.

Indo-Us Talks End, Some Issues Sorted Out
The Statesman (India)
March 28, 2007

Statesman News Service NEW DELHI, March 27: The third day of technical talks on reaching common ground to finalise the bilateral agreement on civilian nuclear energy ended today, with India and the USA reportedly making headway on some contentious issues. The talks had begun on Sunday in the Capital, following the arrival of the US delegation led by the senior state department official in charge of the nuclear energy, safety and security division, Mr Richard Stratford.

There has been no official information on the substantive part of the negotiations, though there have been indications that differences may have been narrowed down. India has again raised its concern that if the 123 agreement after a clause in the US Atomic Energy Act, was confined to the contours of the enabling legislation, Hyde Act, then it would be a deviation from the joint statements of 18 July 2005 and 2 March 2006. Indian officials, especially from the department of atomic energy, were assertive that the right to reprocess imported fuel was non-negotiable. They also do not want to convert Indias unilateral voluntary moratorium on nuclear testing into a legal guarantee by including it in the bilateral agreement. India had given a draft of the 123 agreement to the Americans during the visit of the foreign secretary, Mr Shiv Shankar Menon earlier this year. Meanwhile, the PMs special envoy, Mr Shyam Saran, is on his way to Australia and New Zealand to hold talks with them on the topic of ending Indias nuclear isolation. India had earlier asked Australia to consider selling uranium, which the latter cant do as India is not an NPT signatory.

Nuclear Cooperation: Mutually Beneficial Deal with the US
By Gurmeet Kanwal
Asian Tribune
March 27, 2007

The Indo-US nuclear deal, signed in July 2005 at Washington D.C., has been criticised on political, ideological and non-proliferation grounds in both India and the United States (US) as well as in some other countries. However, neither government appears to have any doubts about the deal's mutual benefits. This week Indian and US diplomats have begun negotiations on the '123' agreement that the two countries must sign consequent to the enactment in December 2006 of the Hyde Act that allows the US Administration to make an exception for India in nuclear trade and technology cooperation.

Besides allowing India to come out of the nuclear doghouse, the nuclear deal has enormous potential benefits. India has been under international sanctions and has been subjected to technology denial regimes, which have hampered India's research and development (R&D) efforts in nuclear energy, defence, space and industry since May 1974. Sanctions were further tightened after India declared itself a state with nuclear weapons (SNW) in May 1998. These are already being eased and will be completely lifted eventually.

While Indian science and R&D have some spectacular achievements to their credit despite international sanctions and technology denial regimes, India is still a developing country with several hundred million people below the poverty line. India's GDP is growing at an average rate of about eight per cent per annum and a recent Goldman Sachs report has predicted that India's economy will overtake that of the US as the world's second largest economy after China's by about 2040. However, in order to sustain an eight per cent economic growth, India's energy supplies must increase at an average rate of six per cent per annum. The demand for electricity is likely to grow from 130 giga watts (GW) at present to 1,300 GW by 2050.

India has very limited oil and natural gas reserves and already imports over 70 per cent of its crude oil needs. While India has sizeable reserves of coal, it is of low quality. Also, excessive reliance on coal and oil for India's energy needs will contribute adversely to global warming. Though the full potential of India's hydel power has not yet been exploited, there's a finite limit to it. Non-conventional sources of energy, such as solar power and wind energy, are being exploited but cost-effective technologies for these are yet to be developed.

At 3,500 mega watts (MW) or 3.50 GW per annum, nuclear energy contributes only three per cent to India's energy basket. India's goal for the year 2000 was to achieve nuclear power capacity of 10,000 MW of power. India has neither modern cost-effective nuclear technology nor sufficient uranium reserves to appreciably increase its capacity for generating nuclear power. Modern nuclear reactors average 1,000 MW of power while Indian reactors average only 220 MW. India has only one reactor with 540 MW capacity. With continuing indigenous research, this may be enhanced to 700 MW at best. In case the thorium cycle is mastered successfully over the next decade or so, India could increase its nuclear power capacity to 275 to 300 GW by 2050. Even this would require external supplies of nuclear fuel.

It, therefore, emerges quite clearly that India needs both nuclear fuel supplies as well as nuclear reactor technology to enhance its capacity for generating electric power and to reduce its dependence on fossil fuels. India's endeavour should be to eventually enhance the share of nuclear power in its energy basket to more than 25 to 30 per cent like France and Japan and several other countries. Hence, the Indo-US nuclear deal is primarily about nuclear energy. It will open up the Indian market for nuclear trade and by increasing the share of nuclear energy in India's energy basket; it will help to reduce global warming.

India will also benefit when technology denial regimes are wound down. It will be able to get state-of-the-art weapons and C4ISR technology, Indian companies will be able to enter into cutting edge joint R&D projects, such as those in ballistic missile defence, with the world's leading defence contractors. The Indian Space Research Organisation (ISRO) will benefit from commercially available space technologies. Due to the sanctions imposed on it, India was not allowed to purchase supercomputers for weather forecasting and will be able to do so once

sanctions are fully lifted. Similarly, India will benefit in many other areas such as medical diagnostics and inertial navigation equipment as these employ dual-use technologies. Indian scientists will be able to travel freely and participate in international conferences for which they were so far routinely denied Visas. While some of the benefits are tangible and easy to calculate, many others will be indirect and will contribute in a substantive manner to India's overall growth.

There have been many tangible gains for the US as well. While signing the "Henry Hyde United States-India Peaceful Atomic Energy Cooperation Act" on December 18, 2006, President George W. Bush had listed four major gains for the US: the agreement will help strengthen cooperation between India and the US on energy, "one of the most important challenges of the 21st century"; the deal will help to promote economic growth and open up an important market for American businesses "by paving the way for investment in India's civilian nuclear industry for the first time ever"; It will enable India to reduce emissions of greenhouse gases and improve its environment; and, the agreement will keep America safe by paving the way for India to join the global effort to stop the spread of nuclear weapons.

While writing about the strategic logic underlying President Bush's initiative, Ashley Tellis, one of the principal architects of the deal, has identified three major benefits for the US from close strategic cooperation with India: a strong American partnership with democratic India is essential for constructing "a stable geopolitical order in Asia that is conducive to peace and prosperity"; in order to promote "an effective non-proliferation system… it is necessary to have India on board"; and, an enduring relationship with democratic India is key for America to successfully preserve "a global order that protects liberal societies and advances freedom in myriad ways."

Stephen Cohen, a noted South Asia specialist, is of the view that the deal provides the US with an opportunity to work with India to help prevent a broader nuclear arms race, "something that is certainly not in the interest of India, Pakistan, China, or America." Hence, the nuclear deal is a win-win deal for both the countries as well as the international community.

Gurmeet Kanwal the writer is Senior Fellow, Centre for Air Power Studies, New Delhi.

Progress being made on development of thorium-based fuel, company says
By Jenny Weil, Washington
Platts' NuclearFuel
March 26, 2007

Two key tests to validate a thorium-based nuclear fuel design have yielded positive results, says Thorium Power Ltd., which aims to be a global supplier of thorium to the nuclear industry.

Though thorium fuel is several years away from commercialization, its supporters say the fuel holds promise of being more efficient and proliferation-resistant and for producing a smaller volume of spent fuel than traditional uranium-based reactor fuel.

At a March 19 public scoping meeting on DOE's plans to prepare an environmental impact analysis on its proposed Global Nuclear Energy Partnership program, a public advocacy group urged the department to look at a thorium-based fuel cycle as an alternative to spent fuel reprocessing, construction of fast reactors, and development of transmutation fuels.

Christopher Paine, a senior nuclear program analyst with the Natural Resources Defense Council, said that a thorium fuel cycle has potential nonproliferation advantages and could reduce the volume of spent fuel in a repository.

He told Platts March 22 that NRDC was "not vouching for or boosting a thorium-based fuel cycle, but we are saying it needs to be studied.

"We think there is potential there," he said. Paine added it was unclear "why the administration is proposing to spend $100 billion on spent fuel reprocessing, which is dangerous and uneconomic, when it hasn't even looked at what could be a much cheaper and efficient alternative."

Paine said NRDC believes the thorium fuel cycle could result in a "modest" reduction in waste volumes and thermal loading. Also, he said, such a fuel cycle could address a "long-term concern" about reactor fuel ? the "exhaustion of high-grade sources of uranium ore." In the future, he said, as the high-grade ores are depleted, the industry will have to mine "less rich ore bodies," which will have an environmental impact.

Thorium Power said earlier this month that it has finished two thermal-hydraulic experiments at a facility in Russia. The tests simulated pressure and temperature conditions that would be found inside a reactor core in the event of an accident. One test involved a meter-long seed and blanket assembly for a VVER-1000. The other test used a meter-long partial seed fuel assembly consisting of 25 rods to simulate conditions in a Western PWR design.

Thorium Power CEO Seth Grae said the thermal-hydraulic testing subjected the fuel to high temperatures and high pressures simulating accident scenarios similar to those at Chernobyl and Three Mile Island.

Separately, the company has conducted irradiation tests of the rod and fuel assembly configuration that would be used in a commercial reactor.

"The irradiation testing shows how the fuel would perform in the reactor," Grae said, "and the thermal-hydraulic testing would show what would happen if there were a problem in the reactor -- how would the fuel perform."

The next step is to demonstrate the fuel in a VVER-1000. Thorium Power is working to scale up the fuel to full length, 10-foot rods.

Grae said the company expects to have lead test assemblies ready for testing in a VVER-1000 in about 2.5 years. Assuming the tests are successful, VVER-1000s could be retrofitted with thorium-based fuel soon afterward. There would be some "lag time" for the PWRs because the project has had a VVER-lead focus, Grae said.

Grae said there has been "significant" commercial interest in the fuel. He said his company is in talks with fuel fabricators and has been contacted by senior-level government officials and government-controlled companies in several countries considering building new reactors. "What we are seeing right now is a greater interest in nonproliferation technology in countries that don't

already have reactors," he said. But, he said, "I think the fuel will end up hitting a wide market of countries that currently have reactors and countries that will build new reactors."

Grae said thorium fuel could stay in the reactor longer before refueling was necessary. "The blanket, which is about 60% of the fuel assembly, will last nine years in the reactor," he said. "The seed is about 40% of the fuel cycle, and will go on the exact schedule that the reactor currently uses."

Uranium is still in the fuel assembly, but less would be used. Grae said the reduction of uranium could address potential future shortages and the rising costs of uranium. Relying on thorium, which is abundant in more countries than is uranium, would create a more reliable supply of the fuel, Grae said.

Uranium: Fuel for nuclear reactors benefiting from both underlying demand and fears of global warming
By John Greenwood
National Post's Financial Post & FP Investing (Canada)
March 26, 2007

It's illegal for individuals to own and extremely dangerous even to get close to. The few markets that exist for it are highly regulated and private. Yet strange as it sounds, uranium has become one of the biggest stars of the commodity boom, with hedge funds and assorted other speculators scrambling to tap into the excitement around a sector that only three years ago was on its knees.

Hardly a week goes by without the launch of a new mining company or fund looking to join the party. "There [are] hundreds of outfits today that didn't exist a few years ago," said Peter Farmer, chief executive of Denison Mines Corp., a leading Toronto-based producer, and president of Uranium Participation Corp., a company formed for the sole purpose of owning physical uranium.

According to UX Consulting Company LLC, uranium spot prices have moved up ninefold since 2002, sitting at about US$91 a pound today. And the upward momentum may still have room to run, with analysts saying stocks with solid fundamentals may continue to benefit from the underlying demand for uranium.

Unlike other raw materials and foodstuffs that are benefiting from exploding demand, the forces at work in uranium only partly involve the economic expansion in China. The main driver is rising concern around the world over global warming. More than half of the electricity flowing through electricity grids globally is generated by power plants that are fuelled by coal and other fossil fuels, major culprits in the greenhouse-gas problem.

Since nuclear generators run on uranium and, therefore, don't contribute to climate change, many countries are starting to see it as part of the solution. So after decades of decline, the nuclear industry is going through a renaissance as utilities around the world announce new plants.

That's good news for uranium miners, since nuclear generators are their biggest customers.

"This is completely different from the boom in other commodities," says Bart Jaworski, an analyst at Raymond James. "It's coincident with what's going on in metals, but there are different drivers, because the demand for uranium is from power utilities."

Mr. Jaworski is calling for demand to keep growing for the next five to 10 years, based on the worldwide resurgence in nuclear power.

"If demand remains strong, we expect prices will continue to be propelled to much higher levels," said Adam Schatzker, an analyst at RBC Capital Markets.

Mr. Jaworski said it's not too late for investors to benefit. "You want to buy shares in companies with strong growth profiles, financial capacity and experienced management teams."

Since Canada is the world's top uranium producer, there is plenty of choice close to home, including Cameco Corp., the world's biggest producer. Its shares have moved up about 10% in the past six months, closing last week at $46.53 for a 16% return in the past 52 weeks.

Other smaller players include SXR Uranium One Inc., Forsys Metals Corp. and Denison Mines Corp., all of which have seen their shares more than double since October.

While the argument for higher uranium prices is strong, there are risks. Mr. Jaworski said the biggest one is the possibility of a disaster such as the meltdowns at Chernobyl in 1986 or Three Mile Island in 1979, which could put a damper on public support for the industry. But that is unlikely since advances in technology have dramatically improved reactor safety, he said.

Another worry is that the U.S. Department of Defence, which keeps a stockpile of uranium from decommissioned nuclear weapons, could flood the market. But he said that risk is also remote because the U.S. government has indicated it won't interfere with the market.

As of the end of January, there were 435 reactors operating around the world, with about 28 under construction and a further 64 in the planning stages, according to the World Nuclear Association. Russia alone is planning 20 and China and India have also unveiled major investments.

All that new capacity and the demand expected to flow from it is what is pushing up uranium prices, and the situation is being exacerbated by a supply crunch, since the uranium mining industry only recently twigged to what was going on.

There are only a few places in the world where uranium ore, or "yellowcake" as it's called, occurs in sufficient concentration to be economic. The biggest supply is in Northern Saskatchewan.

Typically, it takes many millions of dollars and several years to find a new mine. Because of concerns around uranium falling into the wrong hands, companies are required to pass through a maze of regulatory hurdles and red tape before they can get the necessary approvals to start producing uranium. In all, it takes about a decade to turn a proven deposit into an operating mine.

The trouble is that for the past two decades many producers have been struggling to stay alive. Ever since Three Mile Island and Chernobyl, uranium prices have been languishing well below the level where companies could afford even to finance new exploration.

"For the past 20 years there has been no investment in new uranium mines," says Thomas Neff, a professor at the Massachusetts Institute of Technology's Center for International Studies.

The bottom line is that while governments around the world were rushing to build new reactors, the uranium-mining industry -- crucial to the success of a nuclear renaissance -- was floundering. Because of the long lead time needed to get a new mine up and running, there is the worrying possibility that some of those new reactors may not be able to find fuel to run on.

"The take-home message is that if we're going to increase use of nuclear power, we need massive new investments in capacity to mine uranium and facilities to process it," Prof. Neff said.

In fact, not everyone was taken by surprise by the nuclear boom. A handful of alert money managers saw what was coming.

Back in 2004, Audit Capital, a Portland, Ore.-based hedge fund, bought up millions of pounds of uranium at prices as low as US$20 per pound. Uranium Participation Corp., a Toronto-based company formed for the sole purpose of owning uranium, started up in 2005, and last year U.K.-based Nufcor Uranium Ltd., which trades on the London Stock Exchange's AIM market, started a hoard that has grown to 2.3 million pounds.

Given the recent rise in uranium prices, it's not surprising that some uranium buyers are crying foul. Indeed, some U.S. utilities complain that the funds are opportunistically benefiting from the nuclear renaissance and that it will be homeowners who will end up paying the price.

Uranium Participation Corp.'s Mr. Farmer dismisses that argument. He says when mining companies were trying to keep their heads above water in 2003, none of the power generation companies offered to pay more for their uranium. Now the shoe is on the other foot.

"The utilities have got to realize that without the growth in prices they will not have [a secure uranium supply]," he says. "There's got to be enough profits to finance investments in exploration. You got to pay a fair price."

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Thorium passes tests
By Jeremy Gordon
World Nuclear News
March 22, 2007

Thorium fuel assemblies have completed thermal-hydraulic tests at Russia's Kurchatov Institute.

The experimental nuclear fuel rods, based on thorium instead of uranium, were subjected to pressure and temperature conditions that could be found in commercial light-water reactors during an emergency. One test was conducted on a 1 m long fuel assembly akin to those used in Russian-designed VVER pressurised water reactors. The other on a partial assembly similar to those used in Western equivalent designs.

The experiments were carried out over three years at the Kurchatov Institute for US-based Thorium Power, a technology company developing thorium fuel designs. Russia's OKBM design bureau also participated.

[Erik Hallstrom] of Thorium Power told *World Nuclear News* that the company is moving from a scientific development phase to an 'engineering executional' phase. With the results of the recent tests, which indicate Thorium Power's design could be scaled up further to full size.

In about three years, Thorium Power hope to begin full-size tests which will take another three years. After that the company hopes to gain regulatory approval for the fuel to be used in commercial reactors, at which point it would licence or sell the technology to established nuclear fuel manufacturers.

This program to qualify the fuel for widespread use - first in VVERs, then in other light water reactors - is Thorium Power's main priority. The other is to develop a market for the fuel. Dennis [Hays], vice president of the company, told *WNN* that it has been approached by various "players in the nuclear industry" including governments and companies interested in building new nuclear power plants. [Hays] said that as the work program has progressed he had seen the companies make "increasingly firm commitments."

Thorium presents interesting possibilities for the nuclear industry. It is more abundant that uranium and its use leads to the production of only very small amounts of plutonium. Furthermore, Thorium Power say the radiotoxic profile of used thorium fuel is dramatically different to that of uranium fuel. Because the fuel could stay in a reactor longer (parts of fuel assemblies could remain in a reactor for three or even nine years) more of the highly-radioactive actinides produced by fission are 'burnt'. This means used thorium fuel will decay to background levels of radioactivity in around 100 years.

Kalam visualizes a prosperous India before 2020
IndiaPRWire
March 20, 2007

New Delhi: Envisioning a prosperous India "well before the year 2020", President A.P.J. Abdul Kalam Monday said the country was set to take rapid strides in human development and banish poverty.

"I visualise a prosperous India well before the year 2020. We expect the people below the poverty line to come to near zero and our literacy must be nearly 100 percent. The Human Development Index of India will be less than 50 against the present 127," Kalam said while addressing students at the Shri Ram College of Commerce (SRCC) here.

He said every Indian would have either a good university degree or quality training with globally competitive employable vocational skill. E-governance would be in position for all Government-to-Government (G2G) and Government-to-Citizens (G2C) transactions making the governance system transparent with a national ID card in position.

"Tele-density will reach over 75 percent. All our villages will have reliable, uninterrupted quality electric power supply. 600,000 villages will have all three connectivity such as physical connectivity, electronic connectivity, and knowledge connectivity leading to economic connectivity," he said.

"In Indian history, very rarely has our nation come across a situation, all at a time, an ascending economic trajectory, continuously rising foreign exchange reserves, reduced rate of inflation, global recognition of our technological competence, energy of 540 million youth, umbilical connectivity of 20 million people of Indian origin in various parts of the planet, with the potential sharing capacity of knowledge and resources and interest shown by many developed countries to invest in our engineers and scientists including setting up of new research and development centres."

The interlinking of rivers and water bodies and use of technology for water collection, water recycling and water management will result in equitable distribution of water for drinking, irrigation, industry, navigation and as natural beauty, he said.

"Good sanitation facilities will be available in homes in every part of India and for all Indians and tourists. We will be using more of renewable energy such as solar energy, wind power, bio-mass, mini and micro hydel and thorium based nuclear reactors which are environment friendly energy sources," he hoped.

Painting a rosy picture, Kalam said India would provide quality healthcare access at an affordable cost to all people including those living in remote areas.

"I am sure you will all see prosperity in the country, which will replace scarcity and controls. India will also have a visible global presence in strategic sectors and will contribute to world peace." (IANS)

`Moratorium is voluntary'
Interview with Dr. Anil Kakodkar, Chairman, AEC.
Nuclear Issues
By T.S. Subramanian
Frontline
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THE year 2006 was "exciting" for the Department of Atomic Energy (DAE) on several counts. It kicked off the year with the inauguration of the golden jubilee celebrations of its nerve centre, the Bhabha Atomic Research Centre (BARC), Trombay on January 20. It was on this day 50 years ago that Prime Minister Jawaharlal Nehru formally inaugurated the Atomic Energy Establishment, Trombay (AEET), making the beginning of India's atomic energy programme. The AEET, founded in 1957 by Homi J. Bhabha, the paterfamilias of the programme, was renamed after him in January 1967, by Prime Minister Indira Gandhi. Today, BARC is the largest research and development organisation in the world. Dr. Anil Kakodkar, Chairman, Atomic Energy Commission and Secretary, DAE, calls it "a technology powerhouse". Dr. Srikumar Banerjee, Director, BARC, describes it as "the fountainhead of all major activities" of the DAE.

On March 2, 2006, during U.S. President George W. Bush's visit, India and the U.S. agreed upon a Separation Plan document, which enables export of nuclear reactors to India from other countries. The plan was a sequel to the Joint Statement made by Prime Minister Manmohan Singh and President Bush on July 18, 2005, in Washington D.C. It entailed that India would place 14 of its 22 pressurised heavy water reactors (PHWRs), in operation or under construction, representing 65 per cent of its nuclear capacity, under the International Atomic Energy Agency's (IAEA) safeguards. The DAE was, however, firm that its breeder reactors, would be kept out of the purview of these safeguards.

On May 21, 2006, the third reactor at Tarapur, an indigenous PHWR with a capacity of 540 MWe, reached criticality. India will no longer build 220 MWe or 540 MWe PHWRs. All its future PHWRs that use natural uranium as fuel will be of 700 MWe capacity. A problem, however, remains: the shortage of natural uranium that fuels the indigenous PHWRs. The projects for mining uranium are delayed because of the local opposition especially in Meghalaya and Andhra Pradesh. This in turn has led to a delay in starting the construction of 700 MWe indigenous PHWRs. The capacity factor of the operating 220 MWe PHWRs has also dropped because of the shortage.

Kakodkar and representatives of six other countries signed an agreement in Brussels on May 24, 2006 to launch the construction of the International Thermonuclear Experimental Reactor (ITER), which is a fusion reactor.

The year was not without its share of big controversies. In April/May 2006, Russia supplied about 50 to 60 tonnes of enriched uranium for the two light water reactors at Tarapur, invoking the safety clause of the Nuclear Suppliers' Group guidelines. This angered the U.S.

On July 26, 2006, the U.S. House of Representatives passed the "United States and India Nuclear Cooperation Promotion Act of 2006." The Bill provoked angry reaction in India from the media, academics and nuclear science community because it imposed many new, tough conditions that were not part of the joint statement by Manmohan Singh and Bush. As Dr. M.R. Srinivasan, former Chairman, Atomic Energy Commission, said, "During much of July and August 2006, politicians, Members of Parliament, media, public opinion and the scientific community were greatly agitated over the attempts of the U.S. Congress to rewrite what India perceived as a settled agreement." There was a similar angry reaction when the U.S. Senate passed in September 2006 the "United States-India Peaceful Atomic Energy Cooperation Act." The Hyde Act, passed by the U.S. Congress in December 2006, was equally unpalatable to the DAE officials.

Asked whether the Hyde Act impinged on India's strategic programme, Kakodkar, in an interview published in *The Hindu* of January 27, 2007, said, "... Whether you take it at the level of the sense of the Congress, the level of U.S. policy or the assessment and reporting requirement, there are a fairly large number of sections which essentially seek to, sort of contain or cap the

Indian strategic programme. And in fact, in some places, it also articulates a policy or philosophy of rollback. This is a very serious issue and we need to seek clarifications. This is one of the most important things. There are of course many others."

Problems have surfaced again between India and the U.S. in the negotiations leading to the "123 agreement" with the U.S. insisting that India could not conduct any more nuclear tests and India sticking to its position that its unilateral voluntary moratorium "cannot be converted into a bilateral legality." The DAE is also firm that India should get lifetime of fuel supply for the reactors it places under the IAEA safeguards, not merely one extra "core" of fuel that the U.S. says these reactors are entitled to.

It was in this context that T.S. Subramanian met Dr. Kakodkar at BARC on March 2, 2007, for an interview:

What will be the future thrust of BARC activities?

BARC is a technology powerhouse. The future thrust will essentially be, of course, in the utilisation of thorium as fuel, which has been the thrust all along. Next comes the generation of nuclear energy at high temperature so that we can produce hydrogen in addition to electricity because hydrogen is likely to be another important carrier of energy in future. Then another thrust will be on ways of using technologies for storage, transportation and utilisation of hydrogen. We are also talking about the role of particle accelerators.

Do you mean accelerator-driven systems?

A lot of technologies have to be developed because particle accelerators can be used for energy production, for example, through accelerator-driven systems. This is as far as area of energy is concerned.

There are other areas. The spent fuel that comes out of the reactor contains a lot of radioactive products such as cesium. It is an important material for radiation processing. It is better than cobalt.

Can cesium be used for irradiation of spices, potatoes and onions to increase their shelf-life and prevent sprouting?

We can have a whole set of new technologies for radiation processing using cesium. Other thrust areas will be a host of technologies, including MEMs [micro-electro-mechanical systems], high-precision engineering and even futuristic micro-maching.

When will you start the construction of the Advanced Heavy Water Reactor (AHWR) that will use thorium as fuel, which will signify the beginning of the third stage of India's nuclear power programme? When you were BARC Director, you had written an article in the BARC newsletter in 1999 that India should accelerate the utilisation of thorium, which we have in plenty.

Correct.

In 2003, you said the DAE will start the construction of the AHWR in 2004. It is 2007 now.

I know.

Construction of the AHWR has not begun. You said it would begin in 2004.

The peer review was completed sometime ago. It was being looked at by the Atomic Energy Regulatory Board for pre-licensing review. I believe that has just been completed. They are now preparing the project document. So we want to start the construction this year. That will be our attempt.

Has Tarapur been selected as the site for the AHWR?

We have not decided on the site yet.

How was the criticality of the third nuclear reactor at Kaiga, Karnataka on February 26?

Kaiga-3 criticality went off very well.

It is said there has been a delay in starting the construction of the 700 MWe PHWRs because the

natural uranium supply from the country will not match the demand. (The indigenous PHWRs use natural uranium as fuel and heavy water as both coolant and moderator).

Yes. We have to make some more progress on the mining and milling capacity of natural uranium in the country. We have this new mine coming up now.

Where is this new mine?

The uranium mine at Bandurung [near Jaduguda in Jharkhand State] is ready. The erection of a mill at Turamdih [also near Jaduguda for processing the natural uranium] is almost complete.

We have the environmental clearance for the Tumalapalle mine in Andhra Pradesh. We also have the environmental clearance for exploratory mining at Gogi in Karnataka.

Is the mine at Bandurung producing uranium ore?

They have reached the ore body. As soon as the mill at Turamdih starts working, they will start producing the ore at Bandurung. The mill is mechanically complete. They must be commissioning it now.

You have not been able to bring around the Meghalaya government to start the process of uranium mining in the State.

In Meghalaya, some progress is there. It will take time. In the meantime, we are working on the preliminary activities on [starting the construction of] 700 MWe reactors [at Rawatbhatta in Rajasthan and Kakrapar in Gujarat].

You said in September 2006 that India would not allow its unilateral, voluntary moratorium on nuclear tests into a bilateral legality with the United States. The U.S. officials have told their Indian counterparts during their negotiations on the "123 agreement" that it is not merely a nuclear test by India but any event in India that "jeopardises supreme U.S. national interests" will lead to the termination of the Indo-U.S. nuclear cooperation.

The question is our position remains the same. The Prime Minister has very clearly stated our concerns in Parliament. Now, we are, of course, approaching the whole matter in a positive spirit. So what we would like to see is explicit provisions that safeguard our interests in the light of the concerns that were expressed in Parliament by our Prime Minister. That will be the basis on which we will approach the negotiations.

If the U.S. insists that India should not conduct any more nuclear tests and that it will terminate the Indo-U.S. nuclear cooperation if we do the tests...

We don't want to convert this [unilateral, voluntary moratorium on nuclear tests] into a bilateral legality. We cannot do that. The moratorium on nuclear testing is unilateral, voluntary. So that is the position. Nothing more than that.

The U.S. says that it would supply only one extra "core" of fuel for the reactors instead of the lifetime fuel supplies which had been agreed upon earlier by India and the U.S.

The March 2006 Separation Plan document has a clear provision for building stockpiles of fuel to meet the lifetime requirements of reactors placed under the International Atomic Energy Agency's safeguards. That is what I am saying. We need everything to be built into the 123 agreement in a very explicit manner so that our interests are protected.

At what stage is our negotiations with the U.S. on the 123 agreement?

The 123 draft has just been given to them.

Nuclear Energy Possibilities In Turkey
View by Fevzi Saffet Bora, USAK Energy Review
The Journal of Turkish Weekly
Source: F. S. BORA
March 2007

It is estimated that oil price would surpass USD 200 per barrel by the year 2015. Oil constitutes 38pct of all energy imports of Turkey, and for every 1 USD increase per barrel the cost for Turkey becomes USD 175 million. The total cost of oil to Turkey as USD 8.6 bln in 2005, 5.5 bln USD for natural gas, and 20 bln USD for the overall energy imports. 6 bln USD of the foreign trade deficit rise in 2005 stemmed from the oil price surges. 5 billion USD of annual investments are needed in the energy sector in order to cut the foreign energy dependence level of 71pct to 50pct in the long term. Making these investments in the generation side and especially in nuclear energy seems like to be a good option. In order to make this possible the government formed “The Draft Law on the Construction and Running of the Nuclear Power Plants and Their Sales of Energy”

“The Draft Law on the Construction and Running of the Nuclear Power Plants and Their Sales of Energy” has been accepted principally by the Parliament’s Energy Commission. According to the text the Ministry of Energy and Natural Resources (MENR) will choose the firm which will undertake the investment for the nuclear power plant among the bidders which have fulfilled the criteria of TAEK (Turkish Atomic Energy Agency) through competitive bidding. The draft law foresees the winning of the bid by the bidder who provides the lowest price for the government to buy the electricity generated from the nuclear reactor on a continuum of 15 years. The prices offered by the bidders on unit energy will not exceed the national average wholesale price as has been set by the Energy Market Regulatory Authority. Funds are foreseen to be established which will be active during the course of the active operation of the power plant which will be used to transport, dispose and get rid of the nuclear waste and to take care of the financial burden of decommissioning after active operation. There will be a cost ingredient engrained in the electricity generated and sold from the nuclear reactors. The firms will also have to contribute to the fund from their revenues as well. The MENR will have the power to give incentives to the winning firms in order to acquire new technology, to train it staff on these issues and also for the investment which they are going to make in order to extract nuclear raw materials. It is also foreseen by the draft law that the nuclear projects will have to have complete insurance coverage in all phases of construction and running. The State Economic Enterprises are foreseen to be able to get in ownership stakes in these projects. State land will be provided free of charge to the Project developers but with the responsibility of full decommissioning after the ending of the contract. The D. law brings in purchase guarantees not only for the prospective nuclear power stations but also for the prospective lignite based power plants which have an installed capacity of 1000MW (they all have to be completed before 2014 in order to gain the right of purchase guarantees). Finally the D. Law paves the pave for the public sector to get in the business of constructing these plants in case the private sector does not want to get involved only as a security of supply precaution.

1973-1974 oil crises and the cost of bulk energy, the need to reduce CO2 emissions, the competence in creating commercially viable nuclear energy stemming from its uses in other areas such as medicine and the relatively miniscule cost of nuclear fuel have all contributed to the popularization of nuclear power plants since the 1970s.

Nuclear is a must and the public must get used to the reactors and the nuclear energy. And the third generation reactors are quite safe even in the face of severe earthquakes. 1000 MWs of new nuclear capacity will set the investors back from 1,9 billion to 3 billion dollars but the reliability of these generators are immense at about 7200 hours of running per year. They serve the baseload very well in case they are associated with sound transmission investment. The raw materials such as uranium and thorium which are used as reactor fuels can very well be found in Turkey otherwise you will have to resort to countries such as Canada.

Currently there are 441 nuclear power plants in 31 countries. They generate 17% of the world’s

electricity demand. 27 new nuclear power plants are being constructed right now in 12 countries. 21 new license applications are being evaluated in the US for nuclear power plants after the EPACT of 2005. The Turkish government plans to create three nuclear power plants of 5,000-MW by 2020 through the enforcement of this D. law. The method is criticized as it cannot even be called a bid in its current form. But nevertheless positive responses have started to come out to the public as in the case of the Ciner Group's application to EMRA for a new NPP without the purchase guarantees.

Park Holding has applied to the Energy Market Regulatory Authority for construction of a nuclear power plant in Akkuyu bay in southern city of Mersin. Ciner Group applied to receive a "generation license" to establish a nuclear power plant which will generate 7.5 billion kWh of electricity a year in Akkuyu. Turkey's Atomic Energy Authority (TAEK) earlier granted a site license for the bay. After assessing the application, EPDK will release a statement in the coming days. No purchase guarantees are demanded Park Holding included a self-declared statement in its application that says the company does not need a power purchase guarantee for the 1600 MW installed capacity nuclear plant. The company also made a commitment for the completion of the plant by 2015. The President of the Energy Market Regulatory Authority Yusuf Gunay commented on the Ciner Group's application to build a nuclear power plant by saying that today's energy sector was working according to free market procedures in terms of not including procurement guarantees.

He indicated that this is the method that they are analyzing the application made by Park Holding. It is an application made completely within the conditions that guide the free market, in other words, without any guarantee of purchase later. He expressed that investors have so much faith in the market that they are willing to build a nuclear power plant without receiving a guarantee.

Gunay highlighted that the nuclear power plant in question would include both "reactor and electricity production" capabilities, and that while the reactor would be followed up on by the Turkey Atomic Energy Agency (TAEK), the electricity production element would be the area of EMRA

EMRA is going to enter into talks with TAEK, and they will be working on structuring the business from the point of view of national and constitutional rules. After that, they will start the period of licensing.

We shall hope that the number of similar applications will increase in the very near future.

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Turkish Weekly