

Thorium Power Ltd. News Update
July 31, 2008
Letter from the CEO

Dear Stockholders:

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

Latest Company News

Last month, we achieved another major milestone by appointing two nuclear industry stalwarts to our team. Robert Ihde was appointed as Thorium Power's Senior Vice President for Nuclear Technology and Claudio Filippone stepped into the role of Senior Director of Nuclear Technology Analysis. Mr. Ihde and Mr. Filippone join us at a critical time when we are accelerating the technical work related to our proliferation-resistant fuel designs while also expanding the scope of our technology platform development.

In addition to the key milestones, we were also encouraged by the latest media coverage. In a *Hindu Business Line* article titled "India's N-expertise draws biz suitors from France, US," the reporter quoted Thorium Power and noted that "companies such as US-based Thorium Power are eyeing India's R&D edge in the area of thorium research." In a separate *Economic Times* article about the prospects for U.S. companies, Thorium Power's Dennis Hays noted that "signing the [Convention on Supplementary Compensation] would be a way for India to say that they are prepared to play a full role in the international nuclear renaissance." Given the positive developments in the US-India nuclear deal, we were pleased to see the timely coverage.

In a separate *Gulf News* article, the reporter commented on the UAE's ongoing evaluation of nuclear power, cited Thorium Power's advisory role and concluded that nation is poised to "join the ranks of nations generating nuclear power for peaceful purposes."

Industry News, US-India Nuclear Deal

Over the last month, we observed a number of key developments, including two scholarly perspectives on the necessity of nuclear power. William Tucker, the author of *Terrestrial Energy: How Nuclear Power Can Lead the Green Revolution and End America's Long Energy Odyssey*, noted the following in a *Wall Street Journal* editorial: "Convincing Wall Street to invest means persuading the public that there is nothing unacceptably dangerous or diabolical about nuclear power." Meanwhile, Jack Spencer, the Research Fellow in Nuclear Energy at The Heritage Foundation's Roe Institute for Economic Policy Studies, noted that nuclear power is gaining momentum in the U.S. but emphasized that the country "can learn a great deal from other nations further along in the process."

We also witnessed a number of major developments in the US-India nuclear deal. PM Singh won a critical vote of confidence and Indian officials are presently meeting with the

IAEA to discuss the nuclear safeguards pact, a key step for operationalisation of the deal. The chief U.S. delegate to the International Atomic Energy Agency has noted that the agreement is “sound” and the deal “allowing U.N. monitors to inspect some of India's nuclear facilities is a net gain for global nonproliferation.”

Once again, these latest developments support our unique positioning as a source of solutions to address the major industry concerns – how to solve proliferation, reduce waste and improve profitability.

Very Truly Yours,
Seth Grae
Chief Executive Officer

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Company News

The Hindu Business Line – India’s N-expertise draws biz suitors from France, US (07.27.08) – The Indian business publication comments on the latest developments in the US-India nuclear deal, and examines potential business opportunities for American and European companies. The reporter quotes Seth Grae and notes that “companies such as US-based Thorium Power are eyeing India’s R&D edge in the area of thorium research.”

The Economic Times – Pivotal Time for India Deal (07.22.08) – The article focuses on the latest developments in the US-India nuclear deal and examines the prospects for U.S. companies: “The prize for the American companies? More than \$100 billion in new reactor construction contracts in just the next 10 years, in a market that has always been closed off to American companies.”

Latest Industry News

Gulf News – Nuclear Matters (07.31.08) – Gulf News reports on the UAE’s ongoing evaluation of nuclear power and notes that the country is poised to “join the ranks of nations generating nuclear power for peaceful purposes.” The reporter notes that “tentative plans are in place to meet the economy’s surging power” and the move will “require a quantum leap in planning.”

World Nuclear News – Capabilities in place for new Chinese reactors (07.30.08) – WNN reports that “ground has been broken on the first of China’s AP1000 nuclear power reactors as the country puts together what amounts to a production line for further build.”

Bloomberg News – Japan to Curb Emissions with Hybrids, Nuclear Power (07.29.08) –

The news service reports on PM Fukuda’s new commitment to energy reform. The Japanese PM vowed to “make half of vehicles sold in his country run on hybrid or other clean technologies by 2020 and to build nine nuclear reactors in as many years to fight global warming.”

Associated Press – US Praises IAEA-India Deal for Nuclear Inspections (07.30.08) –

The wire service reports on the US-India nuclear deal, and includes a positive assessment from Gregory L. Schulte, the chief U.S. delegate to the International Atomic Energy Agency, who notes that the agreement is sound and the deal “allowing U.N. monitors to inspect some of India’s nuclear facilities is a net gain for global nonproliferation.”

Hartford Courant – Nuclear Power Key to Containing Energy Costs (07.29.08) –

The Hartford Courant editorial focuses on the pivotal role nuclear energy can play in the energy reform and notes the following: “If ever there was a question about the need for nuclear power, it has certainly been dispelled now with the rising cost of fossil fuels.”

World Nuclear News – India: Confidence Vote Clears Path for Trade? (07.24.08) – WNN reports on the latest developments in the US-India nuclear energy and comments on PM Singh’s recent vote of confidence, which could “pave the way for the conclusion of the long-awaited US-India nuclear energy deal.”

World Nuclear News – Nuclear Remains a Foundation for Gore (07.18.08) – WNN reports on the launch of Al Gore’s ‘We’ campaign from the Alliance for Climate Protection, and notes that the plan relies on nuclear energy, “but Gore chooses to give the headlines to renewables.” It also notes that Gore spoke out in favor of the carbon tax as a necessary next-step, which “would increase demand for nuclear power.”

Wall Street Journal – Let’s Have Some Love for Nuclear Power (07.21.08) – The Journal editorial advocates increased investment in nuclear power, and states the following: “If nuclear energy is to progress, it must stand on its own. That means Wall Street has to invest. And convincing Wall Street to invest means persuading the public that there is nothing unacceptably dangerous or diabolical about nuclear power.”

The Heritage Foundation – Nuclear Energy: What We Can Learn From Other Nations (07.02.08) – Jack Spencer, the Research Fellow in Nuclear Energy at The Heritage Foundation’s Roe Institute for Economic Policy Studies, notes that the nuclear power is gaining momentum in the U.S. “as the nation seeks environmentally friendly and affordable sources of energy that can meet growing demand. But he emphasizes that the country has not yet caught up and “[should] learn a great deal from other nations further along in the process.”

India's N-expertise draws biz suitors from France, US

By Anil Sasi

The Hindu Business Line

July 27, 2008

- *India keen to use R&D edge to tap global nuclear market*
- *Talks on with French cos for manufacture of reactors*
- *Thorium expertise draws US co Thorium Power*

India's entry into the global civilian nuclear fraternity may not be a one-way street in terms of technology flows and business opportunities.

India, which has established global leadership in research involving Pressurised Heavy Water Reactors (PHWR), Fast Breeder Reactors and thorium cycle, hopes to leverage its edge in these areas to tap the export potential as and when the global markets open up.

Even as the Indo-US nuclear deal is being firmed up, India is exploring the possibility of exporting indigenous 220-MWe reactor to developing nations eyeing nuclear power generation but constrained by small-sized electricity grids. Besides, French and US firms are evincing interest for industrial cooperation in the manufacture of Pressurised Water Reactor (PWR) equipment as well as deployment of thorium technology.

According to Government officials, discussions have already been initiated with French firms for industrial cooperation in the manufacture of PWR equipment in India. This is envisaged as an important element in enhancing the competitiveness of French reactors worldwide. Besides, companies such as US-based Thorium Power are eyeing India's R&D edge in the area of thorium research.

"We have been involved in India for many years and are looking at partnering strategies in both the government and private sectors, which will enable us to pursue a number of licensing opportunities... Should the India-US deal be completed, it will also enable us to generate licence-driven revenue within India as well as from international nuclear vendors," Thorium Power's President and CEO Mr Seth Grae told *Business Line*.

Global nuclear trade

Besides, the deal could clear the decks for India to enter the global nuclear trade, following which the export of indigenous reactors and services could be viewed as a viable commercial proposition, an official said. Several Asean countries have been eyeing the nuclear option, with Indonesia, Vietnam, the Philippines and Thailand among those that have announced plans to tap nuclear energy.

Globally, the major developers of nuclear reactors in the EU and North America have moved on to larger reactor sizes of 700 MWe or 1,000 MWe and above. India stands out in having an active nuclear power programme using 220 MWe reactors, with 12 such reactors currently in operation and another three under construction.

R&D strength

India's research prowess is clearly evident from the number of its scientific publications covering PHWRs, accounting for nearly 55 per cent of the publications in 2006 (the latest year for which data is available). Canada comes in at a distant second.

In the case of publications for Fast Breeder Reactors (FBRs) and thorium cycle research as well, India has a clear leadership position. In the area of FBRs, the Indira Gandhi Centre for Atomic Research brought out the largest number of publications by any single institution during 2005 and 2006.

In the area of thorium research, on the basis of International Nuclear Information System (INIS) database, India stands at the top, ahead of Japan, France, Germany and the US.

Pivotal time for India-US nuclear deal

By Mehul Srivastava

The Economic Times

July 22, 2008

For the past three years, eager executives from US-based producers of nuclear power plants have been making a beeline for New Delhi, meeting with Indian government officials and coming back to America to lobby for the passage of a controversial nuclear deal between the US and India. The agreement, first announced in June 2005 but still awaiting approval by Indian lawmakers, would allow India—which has been subject to sanctions since testing a nuclear weapon 10 years ago—to buy and sell nuclear technology in the international marketplace in exchange for opening up its civilian reactors for inspections.

The prize for the American companies? More than \$100 billion in new reactor construction contracts in just the next 10 years, in a market that has always been closed off to American companies such as GE Energy (GE), USEC (USU) and Westinghouse Electric. "Everyone knows that this is big," says GE's India CEO, Tejpreet Chopra. "At this point, we're just waiting to see how much capacity the government is willing to add and where."

The deal has been on hold for months, thanks to opposition from members of Prime Minister Manmohan Singh's coalition government. Singh's decision to continue with the deal plunged the country into a parliamentary crisis two weeks ago, as his communist allies withdrew their support, decrying the deal as American imperialism. The Congress-led coalition faces a confidence vote in Parliament on July 22. If the government survives—and it's expected to, having replaced the left parties with smaller regional allies—it will take the deal to the International Atomic Energy Agency in Vienna, which must approve it before the US Congress can vote on it.

Waiting for India to Sign the CSC

The delays have taken their toll, though. For the US executives who have been impatiently awaiting the deal's passage, it's becoming clear that when the Indian government finally hands out contracts for up to 30 new nuclear reactors of up to 1,200 megawatts each, US companies might not be at the front of the line.

Instead, French and Russian companies like Areva NP SAS, Atomenergoproekt, and ZAO Atomstroyexport are already taking advantage of their long-standing ties with India's nuclear community, and the fact that India has yet to sign the Convention on Supplementary Compensation (CSC). That's an international treaty that created a global pool of money to pay victims of nuclear disasters, and since India's not a party to it, any American-built reactors would have to shoulder their own civil liabilities—a cost that would likely prove prohibitive.

Russian and French state-owned competitors wouldn't have that problem, since those companies could claim sovereign immunity in case of an accident. "GE may never sell a reactor to India if they don't get the civil-liabilities issues taken care of," says George Perkovich at the Carnegie Endowment for International Peace and the author of India's Nuclear Bomb: The Impact on Global Proliferation.

Companies have had difficulty penetrating India thanks to sanctions that date back a decade. In 1998, India tested a nuclear bomb near the border with Pakistan. The resulting international trade sanctions, led by the US, starved India's nuclear reactors of uranium and its elite scientific institutes of superfast computers and other equipment that Washington deemed sensitive, or dual-use technology. The current deal, nicknamed the 123 Agreement, was championed by President George W. Bush and Prime Minister Manmohan Singh as a way to bring the U.S. and India closer, and also for India to do business with the cliquish club of international nuclear suppliers. India is supposed to open up its 14 civilian reactors to international inspectors, and in return will be allowed to buy and trade nuclear fuel, reactors, and spares with the 45-member Nuclear Suppliers Group. Its military reactors will stay off-limits.

For American companies, this sounded like a blessing. Governments in the US have not approved a nuclear reactor for construction since 1979's Three-Mile Island accident, even though American companies have been involved in about 60 reactors in Japan, South Korea, Finland, and elsewhere. India's energy needs are vast—as its economy booms, the country plans to quintuple its nuclear energy production to as much as 40,000 megawatts by 2020. At an estimated \$2.5 billion per 1,000 megawatts, the nearly 30 new reactors India will commission could signal the beginning of a "nuclear renaissance" that American nuclear companies have been waiting for, says the US-India Business Council's Ron Summers.

France, Russia stand to gain more

First, the deal needs to win approval in India's Parliament, though. India's Congress-led United Progressive Alliance government has had to swap out its communist allies with those from a smaller regional party. And the deal is no sure thing in Washington, either. The White House is pushing hard to get the deal on the legislative calendar in the House and Senate. For an embattled President, bringing India into the nuclear fold would be a rare foreign policy success for the Bush Administration.

Even if the deal does finally go through, it could be as late as 2009 when India finally gets around to signing the CSC; until it does, no American nuclear company can afford to take the risk of doing business in India. "That's the kind of protection that companies look for when they decide to invest in countries," said Omer Brown, a Washington-based lawyer who helped push the treaty on behalf of the Contractors International Group on Nuclear Liability.

Meanwhile, both Areva and the Russian companies have leaped to the front of the queue, Atomenergoproekt and Atomstroyexport are already helping India build a nuclear reactor in Kudankulam, in southern India. France's Areva has been in site-specific negotiations with the state-owned Nuclear Power Corp. of India, says a senior official at the Indian company who declined to be identified because of the political sensitivity of the deal; Areva has exploratory agreements in place that almost assure it of a site in western India.

The prospect of losing more lucrative contracts to the French and Russians has US companies worried. "Signing the CSC would be a way for India to say that they are prepared to play a full role in the international nuclear renaissance," says Dennis Hays, vice-president of governmental affairs at Thorium Power, a specialist in nuclear-fuel design based in McLean, Va., that considers India to be crucial for growth. India has

one-third of the world's known thorium deposits.

Large enough playing field for everyone

At the same time, the argument in India goes, why should India commission reactors from American companies that aren't even making sales at home? "I can easily see the Indians going for French or Russian reactors because they are seen as more advanced," said Padmanabha Chari of the Institute for Peace and Conflict Studies, a Delhi-based think tank. "In the US, the entire industry has stopped growing, and they aren't into the most modern technology."

That's a misconception, say executives from US companies, but it's one they have to fight hard against. Indian officials have tried to assure the companies that the pie is large enough that they will eventually get a decent-sized piece. "Irrespective of any understanding or quid pro quo, the current situation in India is that the demand for electricity is so large, that we can accommodate all countries," says RB Grover of India's Bhabha Atomic Research Center and India's chief negotiator for the nuclear deal.

There's more than just nuclear reactor business on the line. The deal is seen as a proxy for Indo-American relations, and if it survives, it augurs well for future strategic defense and economic ties. One defense deal delayed until the 123 agreement is signed is the nearly \$11 billion purchase of 126 fighters for India's Air Force, a bellwether for US-India military acquisitions. Both Boeing (BA) and Lockheed Martin (LMT) have horses in that race.

Nuclear matters
Gulf News
By Himendra Mohan Kumar
July 31, 2008

Abu Dhabi: By the end of the next decade, the UAE will join the ranks of nations generating nuclear power for peaceful purposes. Already, tentative plans are in place to meet the economy's surging power need by building three reactors, two of which will likely be located on the coast between Abu Dhabi and Ruwais. The move will require a quantum leap in planning.

The UAE will cut its dependence on natural gas and oil for electricity generation by 2020, and turn instead to nuclear fuel and renewable energy to meet the increasing power needs of a fast-expanding economy, industry experts say.

"Over the next 12 years, roughly 50 per cent of the power plants in the country will be gas-fired, while 30 per cent of electricity generation will be by nuclear power plants," Khalid Malallah Al Awadi, a UAE energy expert, told Gulf News. "About 15 per cent of the electricity will be generated using coal and liquid fuels as feedstock. The remaining 5 per cent will be generated at the wind farms and by using solar energy."

Of the UAE's current capacity of about 18,000 megawatts (MW), almost 85 per cent of the power generated is gas-based, while the other plants are oil-fired. Nearly all of Abu Dhabi and Dubai's electricity comes from gas-based stations.

Latest analysis shows that national annual peak demand for electricity is likely to be 40,858MW by 2020, up 162.82 per cent from present, based on an annual growth rate of about 9 per cent from 2007 onwards.

As much as \$12 billion has been committed in total for the next five years for building new generating capacity and desalination plants in the UAE, say experts. That figure does not include any provision for nuclear reactors.

"The UAE will always maintain a higher electricity generation capacity than the physical demand, up to 15 per cent higher," Al Awadi said. "The plan is to cut the firing of power plants by expensive oil and maximise the use of gas as a feedstock for electricity generation."

Preferred option

He added that while coal will be an alternative fuel for the short-term, nuclear fuel will be the preferred option in the longer term because it's cleaner, cheaper and a safer energy source.

"By 2020, at least three nuclear power plants should be up and running in the country, with a minimum capacity of 1,500MW for each," Al Awadi said.

Each nuclear plant will cost an estimated \$7 billion to build, although this initial high outlay will be offset by inexpensive electricity generation. Power from fully operational nuclear plants is four times cheaper than gas-based generation.

"Nuclear power plants use fuel rods containing enriched uranium to generate electricity, which do not generate much waste," Al Awadi said. "These wastes can easily be managed."

He said hazardous nuclear waste is generated only while enriching uranium, which is not what the UAE's aim is, and he added that the government has made it clear that it would import enriched uranium for any reactor it builds.

Al Awadi recommended that the UAE Government should enter into power-purchase contracts with nuclear power generating companies from the US, France, Russia and Japan, who should then be allowed to build and operate nuclear power plants within the country.

"These companies can have their branch in the UAE on a franchise-basis," he said. "This will help speed up the process of integrating nuclear energy into the UAE's energy system."

The UAE nominated Hamad Al Ka'abi as its ambassador to the International Atomic Energy Agency (IAEA) earlier this year as part of its declared intention to launch a nuclear programme for power generation. Abu Dhabi has inked nuclear energy cooperation agreements with both the United States and France.

"Nuclear power-generation emerged as a proven, environmentally-promising and commercially competitive option, which could make a significant base-load contribution to the UAE's economy and future energy security," notes the policy of the UAE on the Evaluation and Potential Development of Peaceful Nuclear Energy, a copy of which was obtained by Gulf News.

The report says that while the evaluation of coal-fired power generation established its lower relative price compared to liquids-fired power generation, its widespread use within the UAE would have a severe detrimental effect on the environment, while also raising thorny issues related to security of supply.

"It is on the basis of this analysis that the UAE is establishing a Nuclear Energy Programme Implementation Organisation, as recommended by the International Atomic Energy Agency, and is proceeding to evaluate the establishment of a peaceful nuclear programme that would make the potential benefits of nuclear power available to the people of UAE," the document says.

It also notes that the UAE will draft a comprehensive national nuclear law, which will provide legal authority for the establishment of a fully independent nuclear regulatory authority - an institution critical to safeguard and sustain operational transparency in any nuclear-energy sector.

"As an additional mechanism to secure transparency in the day-to-day operation of any future nuclear power plants, the UAE would offer joint venture arrangements to foreign investors for the construction and operation of future nuclear power plants," the document says. "The involvement of experienced and reputable foreign commercial partners in the construction and operation of any eventual nuclear plants would provide a continuous and fully transparent window into the UAE nuclear sector and make it

virtually impossible for any party to misconstrue or misinterpret the UAE's nuclear activities."

The document goes on to say that "should the UAE opt to deploy nuclear power plants, it will only consider partnerships with companies having a history of transparent operations and a reputation for excellence in safety, and whose national governments are parties to the treaty on the Nonproliferation of Nuclear Weapons and have negotiated and implemented safeguard agreement as required by the treaty."

The document also notes that the government is aware of health, safety and the environmental concerns raised over a nuclear option.

British media have reported that the UAE is planning to build up to 14 nuclear power plants at a cost of Â£40 billion (\$79 billion) in a bid to satisfy growing demand for electricity. Nine engineering firms have already been pre-qualified to oversee the project, including Britain's Amec. The reports also noted CH2M Hill, Bechtel and Fluor Corp might be also on the list of contenders. An appointment is expected to be made by the end of the summer, and the UAE has appointed Thorium Power as a key advisor for its proposed nuclear programme, according to the reports.

Dalton Garis, associate professor of Economics at the Petroleum Institute in Abu Dhabi, said that efficient countries look at total cost alternatives, over time. "Nuclear power is one alternative that should be studied," he said.

Current nuclear technologies require easy access to large bodies of water for production processes, cooling and venting mechanisms, and easy shipping access for both nuclear fuel and spent nuclear rods.

Potential site

While no sites have yet been identified for building the UAE's nuclear power plants, Al Awadi said a potential site could be the long shoreline between Abu Dhabi and Ruwais.

"Two nuclear power plants could be built here, 50 kilometres apart," he said. As well, there's room to put one up in Fujairah.

Separately, while renewable sources of energy will help supplement the UAE's energy needs, they cannot be entirely depended upon because of their limitations.

The UAE Government document says "evaluation of alternative energies, including solar and wind, suggested that, while these options could be deployed within the UAE, even aggressive development could only supply 6-7 per cent of peak electricity demand by 2020."

A step towards developing alternative energy sources in the country is the Abu Dhabi Government's \$15 billion Masdar Initiative. Masdar will help maximise the benefits of sustainable technologies such as photovoltaic cells and concentrated solar power. By implementing these technologies, Masdar City, located on the outskirts of the Abu Dhabi city, expects to save the equivalent of more than \$2 billion in oil over the next 25 years, based on today's energy prices.

Masdar's chief executive Dr Sultan Ahmad Al Jaber has said Masdar is planning the world's largest hydrogen power plant, which will provide 500MW of clean power.

Primer: The real deal

What is nuclear energy?

- Nuclear energy is generated by the splitting (fission) or merging together (fusion) of the nuclei of atoms.

- Nuclear power is any nuclear technology designed to extract usable energy from atomic nuclei via controlled nuclear reactions using fission. Nuclear fusion has yet to be achieved.

- Today, more than 15 per cent of the world's electricity comes from nuclear power, with the United States, Russia, France, Japan, Canada and the United Kingdom being the main users. Commercial nuclear plants also operate in Romania, China and South Korea.

What's the UAE government's stance on nuclear energy

The government has prepared and formally endorses the following policy statement as a reflection of its views on the potential establishment of a peaceful civilian nuclear energy programme in the UAE.

1. The UAE is committed to complete operational transparency.
2. The country is committed to pursuing the highest standards of non-proliferation.
3. The UAE is committed to the highest standards of safety and security.
4. The Emirates will work directly with the International Atomic Energy Agency and conform to its standards in evaluating and potentially establishing a peaceful nuclear energy programme.
5. The UAE hopes to develop any peaceful domestic nuclear power capability in partnership with the governments and firms of responsible nations, as well with the assistance of appropriate expert organisations.
6. The country will approach any peaceful domestic nuclear power programme in a manner that best ensures long-term sustainability.

Source: Policy of the UAE on the Evaluation and Potential Development of Peaceful Nuclear Energy, industry sources.

Capabilities in place for new Chinese reactors
World Nuclear News
July 30, 2008

AP1000 reveals its major components

Ground has been broken on the first of China's AP1000 nuclear power reactors as the country puts together what amounts to a production line for further build.

Westinghouse reported a key milestone in its sale of four new nuclear power reactors in China today as its partner, Shaw, and Shandong Nuclear Power Company broke ground on the first unit at Haiyang.

The pre-construction milestone comes ten days after a ceremony to mark the readiness of a factory specifically designed for nuclear power plant component modules. Shandong Nuclear Power Construction Group built the facility, which has the capacity to support the construction of two AP1000s each year, in just 11 months.

Haiyang nuclear power plant is planned to eventually host eight large advanced reactors, of which only two have so far been contracted from Westinghouse and Shaw. The new manufacturing facility is local to Haiyang in Shandong province, but also to the Weihei and Hongshiding sites which are also expected to host two advanced reactors each.

In order to expand construction horizons and speed work on site, the latest reactors are designed to be made in prefabricated modules that can be transported and fitted as a whole after production at factories like the new one in Shandong. Located near the sea, the components and modules from the plant could be taken to any new nuclear site in China, and potentially the rest of the world.

Shandong said the new 71,000 square metre factory includes a cutting workshop, a pipeline workshop, a paint shop and a workshop for containment vessels (the steel liners that lie within the overall reinforced concrete reactor containment).

Large components for the Haiyang units have already been contracted: Doosan Heavy Industries of Korea is making the reactor pressure vessels and steam generators, while Mitsubishi Heavy Industries of Japan and Harbin Boiler Works of China will supply the steam turbines. For Westinghouse's other pair of AP1000s at Sanmen the steam generators and reactor pressure vessels will be made in China by either Harbin, First Heavy Machinery Works or Shanghai Electric.

First concrete at Haiyang - the official start of construction - is expected in September 2009, with commissioning of the first unit about 36 months later.

US praises IAEA-India deal for nuclear inspections
The Associated Press
July 30, 2008

The chief U.S. delegate to the International Atomic Energy Agency says a deal allowing U.N. monitors to inspect some of India's nuclear facilities is a net gain for global nonproliferation.

Gregory L. Schulte says the agreement between India and the U.N. nuclear watchdog is sound.

IAEA approval of the so-called safeguards agreement is one of several steps needed to finalize a nuclear deal between India and the U.S. The agency's 35-member board of governors will consider the matter Friday.

Schulte said Wednesday that approval would constitute a major step forward in the effort to erase differences that impeded the world's relationship with India for more than three decades.

Nuclear Power Key to Containing Energy Costs

By Mark J. Perry

July 29, 2008

Hartford Courant

If ever there was a question about the need for nuclear power, it has certainly been dispelled now with the rising cost of fossil fuels.

The high price of oil, natural gas and coal should be a wake-up call to all regions of the country that the era of boundless use of cheap fossil fuels is over — and that nuclear power will need to play a larger role in supplying electricity to homes, business and industry.

Although natural gas is now the fuel of choice in electricity generation, its price has quadrupled in recent years and supplies are extremely tight. Not too long ago, the expectation of rising imports of liquefied natural gas led many to conclude that more abundant gas supplies and greater use of alternative fuels would end the long run of soaring gas costs.

But the pause in increased gas costs proved temporary. Natural gas prices are once again rising rapidly — 93 percent since last August. Major industries that require large amounts of gas for space heating and as a feedstock in making consumer products are once again in crisis.

So now is the time to point out that one-quarter of the gas supply is wasted on electricity generation. Since 1990, virtually all of the new electric-power capacity in the country has used natural gas, and that has driven up the price of natural gas.

Natural gas is a finite and dwindling commodity. North American production has been at a plateau in recent years. Canada has told the United States not to expect additional shipments of natural gas, because it now requires a larger share of its gas reserves to meet its own domestic needs.

Another thing: Congress has yet to lift the ban on drilling for oil and natural gas along 85 percent of the U.S. Outer Continental Shelf as well as the Alaskan wilderness.

The surge in gas prices is also being fed by increased global competition for LNG. Today, an LNG tanker pulling into port in Japan or Spain can get almost \$20 per million BTUs — far higher than the U.S. price.

Most Americans probably don't realize the effect all of this is having on some key industries. In the chemical industry, a big natural gas user, more than 118,000 American jobs have been lost since 2000.

For U.S. manufacturing overall, about 3 million jobs have been lost in that time due in large part to energy costs. Particularly in the fertilizer and chemical industries, plants are shutting down and reopening abroad to take advantage of lower natural gas prices overseas.

The economic problems with natural gas buttress the case for switching to nuclear

energy for electricity production. Seventeen companies are preparing license applications to build and operate 31 new reactors. John McCain wants 45 new reactors by 2030, followed by another wave of plants.

Although Barack Obama says nuclear energy is "not a panacea" for U.S. energy problems, he says nuclear is worth investigating for further development. A number of governors have called for expanded use of nuclear energy — most notably California Gov. Arnold Schwarzenegger and Florida Gov. Charlie Crist.

This support for nuclear energy is a hopeful sign, because the problems it has encountered have never been technological; they have been primarily political and institutional.

The United States pioneered the development of nuclear energy, and had the first major nuclear program. Most other leading industrial countries have continued developing their nuclear programs since the last nuclear plant order in the United States — primarily using U.S. technology.

Today we have the means — and more important, an urgent need — to bring that technology back home.

Mark J. Perry is a professor of finance and economics at the University of Michigan. This was distributed by McClatchy-Tribune Information Services.

India: Confidence vote clears path for trade?
World Nuclear News
July 24, 2008

As India's first indigenously designed nuclear power plant celebrates its 25th anniversary, a vote of confidence in prime minister Manmohan Singh's coalition government could pave the way for the conclusion of the long-awaited US-India nuclear energy deal.

The US-India agreement has been a bone of contention within the Indian government for many months. The deal was the instigating agreement that should ultimately lead to India gaining access to world markets for nuclear fuel and energy technology from which it has been excluded in the past because of its status as non-signatory of the Nuclear non-Proliferation Treaty (NPT). However, India's communist parties have remained bitterly opposed to the bilateral on the grounds that its conditions would give the USA influence over Indian foreign policy. Specifically they object to the deal's prohibition of India testing nuclear weapons.

The confidence vote was called by Singh after a group of left-wing parties withdrew their support for the coalition government. Following a lengthy debate over two days, the motion expressing confidence in the Council of Ministers was adopted by 275 votes to 256.

The confidence vote further invigorates the US-India deal which many had thought to be dead in the water until the text of a draft copy of India's nuclear safeguards agreement with the International Atomic Energy Agency was released earlier this month. The deal would see many of India's nuclear facilities brought into the global mainstream, widening the nuclear power facilities under international nuclear safeguards, and is a vital precursor to international nuclear trade.

Quarter century for MAPS

India's nuclear power program dates back to the 1960s, but since it carried out its first nuclear weapons test in 1974 it has remained outside the NPT and thus virtually isolated from international nuclear trade, although it has voluntarily opened many of its civilian nuclear operations to international inspection. In the meantime it has developed its own indigenous nuclear power industry. The first indigenously built Indian nuclear power plant, Madras Atomic Power Station unit 1 (MAPS 1, also known as Kalpakkam 1), celebrated its 25th anniversary of being synchronized to the Indian grid on 23 July.

The two 220 MWe pressurized heavy water reactors at the site, operated by the Nuclear Power Corporation of India Ltd (NPCIL), are Indian-designed based on Canadian technology, and early models in a program which now counts nearly 4000 MWe of installed capacity and count total 20,000 MWe by 2020. However, nuclear development in energy-hungry India is stymied by its exclusion from international trade, especially its inability to buy uranium - of which it does not have large indigenous resources - on the international market.

Bharat ready

Indian companies are already readying themselves for the future potential trade opportunities. Following recent reports that Indian company Larsen & Toubro (L&T) was preparing to increase its capacity for domestic and international nuclear forging contracts, power equipment manufacturer Bharat Heavy Electricals has announced that it plans to triple spending on nuclear components manufacture once the US-India agreement is signed.

Japan to Curb Emissions with Hybrids, Nuclear Power
Bloomberg News
By Keiichi Yamamura and Toko Sekiguchi
July 29, 2008

Japanese Prime Minister [Yasuo Fukuda](#) vowed to make half of vehicles sold in his country run on hybrid or other clean technologies by 2020 and to build nine nuclear reactors in as many years to fight global warming.

Fukuda's Cabinet today approved his plan to cut emissions of gases blamed for global warming by 60 to 80 percent by 2050. As part of the goal, which was first announced in June, the government will introduce a trial carbon emissions trading program for companies in October, an official who briefed reporters said.

Fukuda has made the fight against climate change his main policy objective since taking office in September. The prime minister pushed world leaders to follow Japan's emissions targets during the July 7-9 Group of Eight summit on the northern island of Hokkaido.

The "next generation" vehicles Japan hopes to promote include those that run on electricity, fuel cells, clean diesel, and compressed natural gas, the official, who briefed reporters on the condition he not be named, said.

Japan intends to boost its use of solar energy 10-fold by 2020 and 40-fold by 2030, he said. Japan also hopes to promote carbon capture technology, which traps emissions underground to prevent them from entering the atmosphere.

The official didn't provide details of how the government would achieve the goals outlined in today's plan, or what support it would provide to industry

Nuclear remains a foundation for Gore
World Nuclear News
July 18, 2008

Al Gore has called on the American people to switch to 100% low-carbon electricity within ten years. The plan relies on nuclear energy, but Gore chooses to give the headlines to renewables.

Speaking yesterday in Washington, former Vice President Gore explained the plans of the 'We' campaign from the Alliance for Climate Protection, which he chairs. He said that the USA's current problems of borrowing, dependence on imported oil and impending climate change could all be solved by one bold initiative. "We're borrowing money from China to buy oil from the Persian Gulf to burn it in ways that destroy the planet. Every bit of that has to change," he said. "The answer is to end our reliance on carbon based fuels."

"So today I challenge America to commit to producing 100% of our electricity from renewable energy and from truly clean carbon-free sources within ten years," said Gore, who is now as famous for his *An Inconvenient Truth* tour as his conventional political career.

A ten-year deadline for the switch, Gore said, would be the longest timeframe the USA could expect to "hold a steady aim," citing past successful national projects such as the Moon landings, the Marshall Plan and the interstate highway network.

Gore spoke at length about the contribution solar, geothermal and wind energy could make without mentioning nuclear or hydro, today's leading low-carbon sources. He later admitted, however, to the Associated Press that his plan relies on nuclear power for the 20% of US electricity it currently produces. Hydropower also provides about 7% of US electricity; other renewables currently provide less than 3%.

Furthermore, Gore's vision of an extensive switch to electric vehicles would dramatically grow the electricity sector and therefore demand for off-peak nuclear power. Another infrastructure change required along with huge numbers of renewable projects would be a nation-wide grid upgrade to connect the renewables hotspots to the cities that need the power.

Gore also spoke in favour of a carbon tax as "the single most important change we could make" - another measure that would increase demand for nuclear power. He said he was in favour of sharply cutting income tax and making up the difference from carbon taxes: "We should tax what we burn, not what we earn," he concluded.

Let's Have Some Love for Nuclear Power

By William Tucker

The Wall Street Journal

July 21, 2008

All over the world, nuclear power is making a comeback. British Prime Minister Gordon Brown has just commissioned eight new reactors, and says there's "no upper limit" to the number Britain will build in the future. German Chancellor Angela Merkel has challenged her country's program to phase out 17 nuclear reactors by 2020, saying it will be impossible to deal with climate change without them. China and India are building nuclear power plants; France and Russia, both of whom have embraced the technology, are fiercely competing to sell them the hardware.

And just last month John McCain called for the construction of 45 new reactors by 2030. Barack Obama is less enthusiastic about nuclear energy, but he seems to be moving toward tacit approval.

In the U.S. at present, 104 nuclear plants generate about 21% of our electric power. Last November, NRG Energy, of Princeton, N.J., became the first company to file for a license to build a new nuclear plant since the 1970s. Almost a dozen more applications have now also been filed.

While we may be at a turning point, one enormous question still hangs over this revival of nuclear power in the U.S.: Who is going to pay for it? The construction of reactors in the rest of the world is essentially a government enterprise. Private investment and even public approval are not always necessary. In the U.S., however, the capital will have to be raised from Wall Street. But not many investors are willing to put up \$5 billion to \$10 billion for a project that could become engulfed by 10 to 15 years of regulatory delay -- as occurred during the 1980s. The Seabrook plant in New Hampshire went through 14 years of that before opening in 1990. The Long Island Lighting Company's Shoreham plant began in 1973, but was shut down by protests in 1989 without generating a watt of electricity, and the company went bankrupt as a result.

If we are now going to choose nuclear power as a way to resolve both our concerns about global warming and our looming energy shortfalls, we are first going to have to engage in a national debate about whether or not we accept the technology. To begin this discussion, I suggest redefining what we call nuclear power as "terrestrial energy."

Every fuel used in human history -- firewood, coal, oil, wind and water -- has been derived from the sun. But terrestrial energy is different.

Terrestrial energy is the heat at the earth's core that raises its temperature to 7,000 degrees Fahrenheit, hotter than the surface of the sun. Remarkably, this heat derives largely from a single source -- the radioactive breakdown of uranium and thorium. The energy released in the breakdown of these two elements is enough to melt iron, stoke volcanoes and float the earth's continents like giant barges on its molten core.

Geothermal plants are a way of tapping this heat. They are generally located near fumaroles and geysers, where groundwater meets hot spots in the earth's crust. If we dig down far enough, however, we will encounter more than enough heat to boil water.

Engineers are now talking about drilling down 10 miles (the deepest oil wells are only five miles) to tap this energy.

Here's a better idea: Bring the source of this heat -- the uranium -- to the surface, put it in a carefully controlled environment, and accelerate its breakdown a bit to raise temperatures to around 700 degrees Fahrenheit, and use it to boil water. That's what we do in a nuclear reactor.

Because the public first became aware of nuclear energy through warfare, reactors have always been thought of as "silent bombs." But nuclear plants cannot explode. The fissionable isotope of uranium must be enriched to 90% to create a weapon. In a reactor it is only 3%. You could not blow up a nuclear reactor if you tried.

Nor is the threat of terrorists crashing an airplane into a reactor and setting off a holocaust very plausible. The Department of Energy once crashed an F-4 jet going 500 miles per hour into a concrete wall the thickness of a nuclear containment structure. The plane vaporized while the concrete was barely dented. (You can watch it on YouTube: "Plane crashes into wall.")

Finally, the problem of radioactive waste has been absurdly exaggerated. More than 95% of the material in a spent fuel rod can be recycled for energy and medical isotopes.

We have a nuclear waste problem in this country because we gave up reprocessing in the 1970s. The fear was that terrorists or foreign nationals would steal plutonium from American reactors to build bombs. This is a bit like worrying that terrorists will steal all the gold from Fort Knox. Other countries have built bombs in the intervening years. They didn't need American plutonium to do it.

Meanwhile, France has proved that reprocessing works. With a fully developed nuclear cycle, the French now store all the waste from 30 years of producing 75% of its electricity beneath the floor of one room at La Hague in Normandy.

Three days after Sen. McCain made his proposal on June 18, Admiral "Skip" Bowman, president of the Nuclear Energy Institute, wrote an op-ed asking for yet more government support in developing nuclear energy. It can't work this way.

If nuclear energy is to progress, it must stand on its own. That means Wall Street has to invest. And convincing Wall Street to invest means persuading the public that there is nothing unacceptably dangerous or diabolical about nuclear power.

Mr. Tucker's book, "Terrestrial Energy: How Nuclear Power Can Lead the Green Revolution and End America's Long Energy Odyssey," will be published in September by Bartleby.

Nuclear Energy: What We Can Learn From Other Nations
by Nicolas Loris and Jack Spencer
The Heritage Foundation
July 2, 2008

Nuclear power is gaining momentum in the United States as the nation seeks environmentally friendly and affordable sources of energy that can meet growing demand. As the U.S. deliberates the possibility of building new nuclear power plants, other nations have already begun the process.

A Domestic Source of Energy

France is an example of a country that developed nuclear energy to reduce foreign energy dependence after the oil shock of the 1970s. It now receives nearly 80 percent of its electricity from nuclear power and is a net exporter of electricity.[1] Germany, alternatively, decided to phase out nuclear energy for political reasons and now imports some of this energy.[2]

Japan is another country that has looked to nuclear power as a clean, safe and reliable form of energy. Nuclear power already provides 30 percent of the country's electricity; however, Japan is working to increase this to 37 percent by 2009 and 41 percent by 2017.[3]

Finland, ranking fifth in the world for per capita electricity consumption, has a significant incentive to secure long-term energy solutions. Embracing nuclear energy as part of an effort to decrease the nation's dependency on foreign energy sources, Finland has begun constructing a modern 1,600-megawatt reactor, which will likely be a model used throughout the United States. Finland already gets 28 percent of its electricity from nuclear power, and a possible sixth reactor would increase that amount substantially.

Presently, the U.K. has 19 reactors that provide about 18 percent of the nation's electricity. Because the U.K. is already a net importer of energy and all but one of its coal-fired and nuclear plants are scheduled to be decommissioned by 2023, building new reactors is a must for the U.K. if it is to avoid creating increased energy dependencies. The British government, while providing long-term politically stable support for nuclear power, has made it clear that it would not subsidize the industry. The U.S., on the other hand, continues to squabble politically about nuclear power but has offered some subsidies to the industry. As a result, the British model should provide a sustainable environment for nuclear power moving forward, while the U.S. model could create a politically tenuous dependency relationship between government and industry.

Environmental Concerns

Nuclear energy is attractive to many countries because of its impeccable environmental record. Burning fossil fuels releases an abundance of elements into the atmosphere. Nuclear energy, to the contrary, fully contains all of its byproduct in the form of used nuclear fuel. Such waste is safely managed throughout the world in countries like France, Finland, and Japan.

Nations across the world that are struggling to reconcile mandates to reduce carbon dioxide emissions with the need to maintain economic competitiveness are looking to nuclear technology. Under the new European Union energy plan, by 2020 Finland will be forced to reduce greenhouse gas emissions by 20 percent, increase renewable energy by 20 percent, and increase efficiency by 20 percent by 2020. It has turned to nuclear energy to meet these goals.

Economic Competitiveness

Affordable energy is critical to sustaining economic competitiveness in economies with high labor costs, expensive environmental mandates, and other regulatory expenditures. This is especially true in economies that depend on energy-intensive activities like manufacturing, such as the Finnish and U.S. economies. Finland concluded that access to vast quantities of affordable energy should be a top national priority, and nuclear was an obvious choice.

These countries and others searching to expand their nuclear capacity have an opportunity to fuel their respective economies through the thousands of jobs, both temporary and permanent, that nuclear energy creates. A global nuclear renaissance will attract construction jobs as well as high-skill engineering jobs to operate the plants.

Thus, two of the greatest benefits of building more nuclear reactors, if done correctly, will be more jobs and cleaner, cheaper energy. Countries that do not choose to produce clean energy in a carbon constrained world will inevitably pay more to produce energy, resulting in higher input costs and higher prices for consumers on the open market.

As the economic consequences of higher fossil-fuel costs spread to countries that do not produce nuclear power, many countries will likely increase imports of nuclear electricity from foreign suppliers. While less expensive and more reliable than other non-nuclear, non-emitting sources, this energy will surely cost more to import than it would have had to produce it domestically. In the end, the countries that have barred nuclear power from being produced in their respective countries will ultimately rely on nuclear power, albeit at a more expensive imported price.

Meeting Higher Demands for Energy

U.S. electricity demand is projected to increase up to 40 percent by 2030, and other countries are projecting similar increases.^[4] The rapid industrial development of both China and India is already placing great pressure on global energy supplies. And because energy sources, especially fossil fuels, are global commodities, growing demand in one part of the world affects the global economy. As a result, higher prices and tightened supply have some nations, such as China, experiencing power shortages.^[5] While the U.S. has, for the most part, been able to keep the lights on, with the price of gas breaking the \$4 barrier and natural gas prices increasing, every American knows full well the pain of increasing global energy demand.

Nuclear energy can help meet this growing demand. Most directly, nuclear energy can be used to generate electricity. If that demand were not met by nuclear power, then it would likely be met with natural gas. This would put additional pressure on natural gas

reserves, driving up the price for electricity as well as all the other goods that use natural gas in their production.

Although natural uranium is a finite resource like gas, oil, or coal, it can be recycled and reused. The French, Japanese, and British all recycle their used nuclear fuel. The French, for example, remove the uranium and plutonium and fabricate new fuel. Using that method, America can recycle its 58,000 tons of used fuel stored across the nation to power every U.S. household for 12 years.

China, India, and Russia are already building new nuclear plants. Even smaller countries, like Vietnam and countries in the Middle East, have begun exploring nuclear power as they too are facing demand shortages and feeling pressure from the industrialized world to reduce CO2 emissions.

What the U.S. Could Learn

With the U.S. entertaining the idea of building new nuclear plants, the country can learn a great deal from other nations further along in the process. Electricity demand is skyrocketing in many parts of the world; purported human-induced climate change has the entire globe in a panic. Nuclear energy has become a focal point for countries trying to meet these needs, and some believe that it can provide an economic boost at the same time. It creates opportunities to electrify portions of the economy that today rely almost entirely on fossil-fuels, like transportation.

Other countries seem to understand the potential benefits of nuclear power and have either commenced constructing, or have developed projections for, new nuclear plants. The time has come for the U.S. to stop squabbling, remove regulatory impediments, and allow nuclear energy to continue helping this country to meet its growing energy demands.

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