

**Thorium Power Ltd. News Update**  
**May 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 – UAE Announcement**

The United Arab Emirates (UAE) has always enjoyed a strong global reputation, not least because of its highly developed economy, strong geopolitical ties and progressive policies. The nation's current commitment to exploring peaceful nuclear power is unparalleled in the Gulf region. That is why we were pleased to disclose our business consulting relationship with a UAE government entity. Thorium Power was selected as a key advisor following an extensive analysis of our capabilities.

Since announcing the two business agreements – on December 3, 2007 and March 18, 2008 – we have assisted the government of the UAE in the development of a roadmap report with recommendations related to the possible establishment of a civil nuclear energy program in the UAE based on the principles of transparency, non-proliferation, safety and regulatory compliance. We are currently consulting in the development of timelines, organizational structure and priorities for the establishment of a Nuclear Energy Program Implementation Organization (NEPIO) as well as an independent federal Nuclear Regulatory Authority (NRA). Thorium Power received pre-payments covering professional fees and certain expenses of \$5 million and \$4.2 million for the contracts respectively.

We are pleased to contribute to the UAE's ongoing exploration of the nuclear energy option and we look forward to continuing to work on a project that also shares our central commitment to nuclear transparency, safety and non-proliferation. Following the publication of *The Policy of the United Arab Emirates on the Evaluation and Potential Development of Peaceful Nuclear Energy*, the UAE's Foreign Minister, Sheikh Abdullah bin Zayed Al-Nahyan, noted that: "Nuclear energy represents a commercially competitive option, particularly in light of projected future shortages of natural gas."

**Latest Media Coverage – Financial Times**

Thorium Power was the subject of a major feature piece in the March 31<sup>st</sup> edition of *The Financial Times (FT Weekend)*. Titled "New Power Generation" ("Fuel's Gold?" in the United States print edition), the leading international business newspaper extensively covered Thorium Power's history, ongoing fuel commercialization at the Kurchatov Institute in Moscow and current business activities within the context of the industry's rapid growth. Focusing on the lingering industry concerns, the article noted that "resolving the questions of waste and proliferation will help make the second life of nuclear much happier than its first." It went on to note the importance of Thorium Power's timely solutions as well as the company's "spotless non-proliferation credentials" and current, ongoing engagement in the UAE, which one State Department official cited as the potential pursuit of a "model civilian nuclear programme." Ultimately, the article highlighted Thorium Power's progressive vision and timely mission: **"The people who say they are going to bring us this renaissance are the people who brought us the Dark Ages," one industry critic told me. "This is Torquemada bringing us the idea of the Renaissance." Where, then, is nuclear's Leonardo da Vinci? What if there was, say, a small technology company that claimed there was a different way of doing things? What if it was developing a nuclear fuel that produced 70 per cent less waste and nothing that you could use to**

**make a bomb? Let's say it was chaired by one of the world's leading non-proliferation experts and advised by Hans Blix, former head of the International Atomic Energy Agency (IAEA) and UN weapons inspector. What if it had just been appointed consultant to the United Arab Emirates, which is expected to be the first Middle Eastern country, after Iran, to generate nuclear power? That might sound promising. But it would also probably sound too good to be true. The company is called Thorium Power..."**

### **Industry News**

Last month, we witnessed a number of developments that further reinforced the truly global nature of the Nuclear Renaissance. In the UAE, the president of the Saudi Electric Company noted that nuclear energy is the "only immediate solution" for the Gulf region's high demand for power and the population growth." In Europe, the newly-elected Italian government announced its intention to plan a new generation of nuclear plants. Also, all 24 Czech Members of the European Parliament (MEPs) signed a letter in support of further development of nuclear energy in the European Union in preparation for the country's hosting of the second scheduled European Nuclear Energy Forum meeting.

In Asia, meanwhile, the Government of Malaysia reported that it was preparing a comprehensive paper on the use of nuclear energy, noting that "within Asean, countries like Indonesia, Thailand and Vietnam are now considering using nuclear energy." These successive announcements were further bolstered by the IAEA's plans for a new nuclear power safety guide to serve as a key component of the overall preparations required for emerging nuclear power programs. In the U.S., meanwhile, the Congressional Budget Office released a new report titled *Nuclear Power's Role in Generating Electricity*, noting that CO2 charges and federal incentives would increase nuclear energy's cost competitiveness against other generation options making it the USA's most competitive source of new generation in the long run.

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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**May 31, 2008**

**Thorium Power Ltd. News**

**Financial Times – New Power Generation / Fuel’s Gold (05.31.08)** – Thorium Power was the subject of a major feature piece in the March 31<sup>st</sup> edition of *The Financial Times (FT Weekend)* edition. Titled “New Power Generation” (“Fuels Gold?” in the U.S. print edition), the article extensively covered Thorium Power’s history, ongoing fuel commercialization at the Kurchatov Institute and current business activities within the context of the industry’s rapid growth. After commenting the key concerns within the industry, the article noted the importance of Thorium Power’s Thorium Power’s timely solutions, our “spotless non-proliferation credentials” and current engagement in the UAE.

**Gulf News – Thorium Power to Assist UAE in Nuclear Programme (05.28.08)** – The leading Gulf newspaper reports on Thorium Power’s announcement that it has entered into two service agreements with the UAE to evaluate a domestic nuclear energy program. The article notes that the agreements, which combined are worth \$8.1 million, are in compliance with all applicable US export controls.

**Nuclear News**

**World Nuclear News – South Korea’s nuclear power independence (05.28.08)** – The industry publication reports on South Korea’s new independent nuclear power plant manufacturing capabilities and the potential for domestic firms such as Doosan and KHNP to take part in the global reactor market.

**Chicago Sun-Times – Solution to energy problems: go nuclear (05.27.08)** – The newspaper columnist calls for nuclear energy as a long-term answer to the US’s dependence on oil. The columnist notes that former Greenpeace co-founder Patrick Moore is now an advocate for nuclear energy and serves as co-chairman of the Clean and Safe Energy Coalition.

**Agence France Presse – Nuclear energy best option for Gulf states (05.27.08)** – The news agency reports on recent comments made by Saudi Electricity Company president Ali Saleh al-Barrack, who told a conference in the United Arab Emirates that nuclear energy is the “only immediate solution” for the Gulf region’s high demand for power and the population growth.

**World Nuclear News – Europe considers its nuclear future (05.27.08)** – The industry news source reports on a recent meeting of the European Nuclear Energy Forum (ENEF) which was held to debate the risks and benefits of nuclear energy and to consider a region-wide consolidation of nuclear safety rules. President of the European Commission, José Manuel Barroso said, “Europe could become a real model if it succeeds in adopting a common legal framework on nuclear safety and waste management.”

**The Star (Malaysia) – Dewan Rakyat: Nuclear energy could be used in future (05.27.08)** – The paper reports that a “comprehensive paper” is being prepared on the use of nuclear energy in Malaysia by a joint efforts of the country’s Science, Technology and Innovation Ministry and its Energy, Water and Communications Ministry. The article quotes Science, Technology and Innovation minister Fadillah Yusof, who said that “within Asean, countries like Indonesia, Thailand and Vietnam are now considering using nuclear energy.”

**Times of India – Rice plugs nuclear power, US oil exploration (5.24.08)** – The newspaper reports on US Secretary of State Condoleezza Rice’s recent comments concerning the need for the US to “explore more for oil at home and tap nuclear power as part of a comprehensive energy policy.” The paper notes that Rice also dismissed fears that the US economy was losing its competitive edge to China and India.

**World Nuclear News – Italian government set to reintroduce nuclear energy (05.23.08)** – The industry news source reports that Italy’s newly-elected government is planning a new generation of nuclear plants. The article notes that Minister of Economic Development, Claudio

Scajola told a meeting of the Italian employers' association, Confindustria, that the government's energy policy will focus on constructing new and modernizing existing infrastructure, including building new liquefied natural gas (LNG) terminals, developing new gas storage sites and enhancing interconnection transmission capacity with other countries.

**World Nuclear News – Czech support for nuclear energy expansion (05.21.08)** – The industry news source reports that all 24 Czech members of the European Parliament (MEPs) and have signed a letter in support of further development of nuclear energy in the European Union in preparation for the country's hosting of the second scheduled Enef meeting. The article notes that Vladimir Hlavinka, chief production officer at Czech utility CEZ, said the company should prepare itself to construct new nuclear power reactors in the country to ensure stable power supplies after 2020.

**World Nuclear News – Nizhniy Novgorod plans nuclear power plant (05.08.08)** – The industry news source reports that the governor of the Nizhniy Novgorod region of Russia has said that a nuclear power plant will be constructed either in the Urensky district or the Vyksunsky industrial area under the federal government's nuclear energy plans to 2020. The article notes that Rosatom signed a cooperation agreement in April 2007 with the Nizhniy Novgorod regional government to consider the feasibility of constructing nuclear power plants in Nizhniy Novgorod.

**World Nuclear News – Carbon charges make nuclear cheapest choice (05.08.08)** – The industry publication reports on findings by the *Nuclear Power's Role in Generating Electricity*, a new report by the US Congressional Budget Office (CBO) which finds that CO2 charges and federal incentives would increase nuclear energy's cost competitiveness against other generation options making it the USA's most competitive source of new generation in the long run. The article notes that with CO2 charges of about \$45 per ton, nuclear would become competitive with conventional fossil fuel technologies even without other incentives, and with existing coal power plants, so utilities would be likely to choose nuclear to replace existing coal plants where possible.

**Platt's International – IAEA preparing guide to help newcomers build infrastructure (04.28.08)** – The industry trade magazine reports on the IAEA's plans for a new nuclear power safety guide to serve as a key component of the overall preparations required for emerging nuclear power programs. The organization hopes to have an initial version ready for the IAEA General Conference in September and would then be put out for comments and any related revisions by member states before publication, which is targeted for June 2009.

#### **US-India Civil Nuclear Agreement News**

**Press Trust of India – India "committed" to nuclear deal with US (05.09.08)** – The paper reports on comments made by Indian Minister of State for External Affairs, Anand Sharma, who told reporters at the sidelines of a Federation of Indian Chambers of Commerce and Industry (FICCI) conference that India was committed to the 123 agreement and "sincerely" carrying on negotiations with the International Atomic Energy Association (IAEA) as nuclear energy was an "important component" in the country's fuel mix.

**New Power Generation**  
**By Sam Knight**  
**Financial Times**  
**May 31, 2008**

The term considered most apt by the nuclear industry to describe the next 20 to 30 years for their business is “renaissance”. Not growth, or revival; these words are not large enough. In terms of scale and cultural associations, as a transformation from what came before, this is going to be a rebirth.

For several reasons, “the global nuclear renaissance”, to use the full, preferred title, is well named. To be born again, you need to have died; and from Chernobyl onwards, with exceptions such as France, Japan and South Korea, the nuclear power industry has been impressively still. The last time planning permission was granted for a nuclear reactor in the UK was 1987. No new reactor has been built in the US since 1979, when an accident at the Three Mile Island power plant caused the reactor core to melt. Of the 439 nuclear power plants in the world today, 70 per cent are more than 20 years old. While global electricity demand grew by more than 60 per cent from 1980 to 2004, the number of new nuclear reactors being built halved every 10 years. During the 1990s, early developers of nuclear power such as Italy and Germany promised to phase out their nuclear energy altogether, while the United Kingdom Atomic Energy Authority became a decommissioning body.

Compare this slow death with the promise of the years ahead. Almost by process of elimination, nuclear power has emerged, once again, as the energy of the future. With world electricity demand forecast to double by 2030 – and about 25 per cent of all existing power stations due for replacement in the same period – nuclear power stands alone in its ability to deliver massive quantities of energy without carbon emissions. For countries without oil and gas supplies, it offers energy security; and for those with their own natural resources, it provides a way of diversifying their energy mix while preserving their fossil fuels for export. After years of not doing very much, the nuclear industry is now looking forward to building reactors on every inhabited continent. In Europe, Finland is leading the way: its first new plant since 1982 is scheduled to open in 2011. Britain is considering 10 new reactors, and the US Nuclear Regulatory Commission is expecting as many as 32 applications for new reactors by 2010 – after a 20-year pause.

And if that still sounds like a mere revival, then it is in India and China, as well as in countries still outside the pale of atomic technology, that something grander is starting to stir. India, despite being outside the Non-Proliferation Treaty, making it unable to trade in nuclear wares, plans to quintuple its nuclear capacity by 2020. China, which has 11 reactors, wants 10 times that number. And then come countries hoping to go nuclear for the first time. According to the World Nuclear Association, these include: Chile, Nigeria, Vietnam, Ireland, Turkey and Indonesia. In the past few years, nearly 30 governments have announced their intentions to launch peaceful nuclear programmes and most of them (not including Yemen) are being taken seriously. There is little doubt, for instance, about the likelihood of nuclear power in the Middle East. Between February 2006 and January 2007, no fewer than 13 governments in the region announced a need for nuclear reactors.

But does a lot of activity constitute a renaissance? And will nuclear power and all the concerns attached to it be any different this time round? Right now, there is no way of knowing, but there are certainly some doubts. One of these centres on the fact that technology changes slowly in the nuclear world. Most of the reactors built in the first half of the 21st century will look a lot like the ones built in the 1970s and 1980s. The long-promised “fourth generation” of nuclear plants – with “breeder” and “fast” reactors that use recycled fuel and make less waste – remains a distant promise. Only one such reactor currently operates on a commercial scale. Of the 34 reactors under construction in the world, 26 of them are based on designs largely unchanged since the 1960s.

This caution reflects how expensive nuclear power plants are – about £1bn each – and a reluctance to tinker with something that has been rendered largely safe. But it also means that some of the problems bound up in traditional nuclear technology will remain. The first of these is waste. Even after 51 years of commercial nuclear power, Britain has no long-term strategy for dealing with the concoction of unburned fuel and radioactive isotopes that emerge from conventional reactors. Likewise the US, which in 1977 suspended “reprocessing”, in which plutonium and other valuable elements are separated from waste to be burned again. Instead, America decided it would bury all its nuclear waste deep underground, within Yucca Mountain, 100 miles north-west of Las Vegas. But even that hasn’t happened: nine years after the site was supposed to open, the plan is still stuck in Congress.

The reason the US halted nuclear-fuel reprocessing was that the products can also supply the ingredients needed for nuclear weapons. In 1974, India used spent fuel from a Canadian-built reactor to detonate a nuclear bomb. This is the second great awkwardness of nuclear power, and its legacy from the military-industrial complexes of the 1950s: the overlap between what you need to have a peaceful nuclear programme and what you could be using to make a bomb. It’s the ambiguity currently personified – not very convincingly – by Iran.

Resolving the questions of waste and proliferation will help make the second life of nuclear much happier than its first. But there is plenty of scepticism about whether the existing companies, technologies and international institutions can achieve it. “The people who say they are going to bring us this renaissance are the people who brought us the Dark Ages,” one industry critic told me. “This is Torquemada bringing us the idea of the Renaissance.”

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Where, then, is nuclear’s Leonardo da Vinci? What if there was, say, a small technology company that claimed there was a different way of doing things? What if it was developing a nuclear fuel that produced 70 per cent less waste and nothing that you could use to make a bomb? Let’s say it was chaired by one of the world’s leading non-proliferation experts and advised by Hans Blix, former head of the International Atomic Energy Agency (IAEA) and UN weapons inspector. What if it had just been appointed consultant to the United Arab Emirates, which is expected to be the first Middle Eastern country, after Iran, to generate nuclear power? That might sound promising. But it would also probably sound too good to be true.

The company is called Thorium Power, and I met Seth Grae, its president and CEO, on a damp April morning in Moscow. Grae is a lawyer from Staten Island, New York, who became a nuclear entrepreneur in his late twenties after studying Soviet law and representing a Russian refusenik scientist in the late 1980s. Now 45, he has wavy, receding hair and, although not tall, stands with a slight hunch that gives him a permanent urgency, as if he is forever on the point of saying something or darting somewhere.

Thorium Power has been working in Moscow since the mid-1990s, when it was part-funded by the US Department of Energy as a way of keeping former Soviet scientists occupied. Now privately funded, it is testing a new nuclear fuel, based on the chemical element thorium, in a research reactor on the edge of the city.

In the back seat of a car on the way to the company’s laboratory, Grae explained what Thorium Power was trying to achieve. He compared its work, which has cost more than \$20m so far, to the development of unleaded petrol in the 1980s. The company is not trying to build a new kind of reactor or power plant, he said, just a new fuel element that can be retro-fitted or placed into conventional uranium-run reactors, which make up about 80 per cent of the world’s nuclear power stations. Once the technology is proven and its benefits shown, the plan is to license it to the world’s big nuclear manufacturers.

“When you try to develop a new nuclear technology, it’s a lot like drug development,” said Grae. “You can’t just leap to the latter stages, to human testing. You have to start with the lab work, years of experiments.” Now just two years away from using its fuel technology in a commercial Russian reactor, the company is beginning to sense the rewards.

Grae is aiming his hopes at the furthest edges of the nuclear renaissance: those countries going nuclear for the first time. According to Thorium Power’s calculations, one-third of the new light water reactors expected to be built by 2027 – or about 40 – will be in countries that have not had atomic energy before. It is in these countries, which do not have weapons programmes but may have sceptical neighbours or international lenders, that Grae thinks a proliferation-proof nuclear fuel will be attractive, a guarantee of good intentions. “The issue of weaponisation relates to financing,” he said. “People need to know the political risk. Is a country’s reactor going to get bombed because its neighbours think it is trying to develop a bomb?”

After half an hour, we arrived at the Kurchatov Institute, where the thorium fuel cycle is being tested. Glowering over the car park was a bust of Igor Kurchatov, the father of the Russian nuclear weapons programme, who grew a beard in 1941 and swore not to cut it until the Nazis were defeated. (“The Beard”, as he became known, ended up sticking with it.) Because of a problem with my paperwork, I was not allowed inside IR-8, the 50-year-old nuclear reactor where the thorium fuel cycle has been running for the past five years. Instead, an in-house photographer was sent to take pictures, and I was introduced to Yaroslav Shtrombakh, the first deputy director of the Kurchatov Institute, who agreed that the great potential for thorium lay in new nuclear settings. “We must not give these new countries dangerous toys like uranium and plutonium to play with,” said Shtrombakh. “In this case, thorium is a very promise-able thing.”

Over lunch, Grae described the early days of Thorium Power, which was incorporated just outside Washington in 1992. As he spoke, it became clear not only that the group’s non-proliferation idea had been around for some time, but that it had an unlikely first proponent.

The founding myth of Thorium Power is a meeting organised 25 years ago by the reputed model for Dr Strangelove, Edward Teller, the maker of the hydrogen bomb. Teller is not a familiar pin-up for the non-proliferation movement; he is better known for his decade-long labours that led to the explosion of his 65-ton “super” bomb in 1952, offering a glimpse of Armageddon and catalysing the cold war.

But by 1983, a 75-year-old Teller had undergone a change of heart. He arranged to meet a former student, Alvin Radkowsky, one of America’s most prolific reactor designers, to talk about his fears about the next age of nuclear power. Teller foresaw more and more countries adopting atomic energy and the spread of uranium-fuelled reactors to all corners of the world – and with them their by-product: plutonium.

Teller had contacted Radkowsky, an Orthodox Jew from New Jersey who designed reactors for the world’s first nuclear submarine and America’s first commercial nuclear power plant, because Radkowsky had worked with an element called thorium. A radioactive metal long considered a possible alternative fuel to uranium, thorium does not produce nearly as much plutonium when it is irradiated in a reactor. At their meeting, Teller suggested that Radkowsky use it to design a proliferation-proof fuel cycle.

After eight years of work, Radkowsky, who was by now in his seventies, was ready to set up a nuclear technology company. He approached Grae, then recently qualified in international commercial law. Grae initially refused the quiet scientist. “It didn’t sound like billable hours,” he recalled, “even if he was who he said he was.”

Radkowsky died in 2002, Teller a year later. Grae now believes their conversation in 1983 was highly prophetic. A standard uranium light water reactor produces about 200kg of plutonium a year. Although far from being ideal for use in a nuclear weapon, reactor-grade plutonium can be reprocessed or at the very least used to make a “dirty bomb”. It is the prospect of dozens of plutonium-producing reactors in countries and regions of the world where there has never before been nuclear power that alarms Grae, despite the safeguards and inspections of the International Atomic Energy Agency.

But the wider nuclear power industry disagrees about the risk of proliferation. Before I went to Moscow, I spoke to John Ritch, director general of the World Nuclear Association, which represents the industry. He told me that the vast majority of reactors built in the 21st century would be in countries that already had nuclear power, and that the IAEA regime was well equipped to monitor new nuclear players. “I do not think the global nuclear renaissance carries with it an inherent proliferation risk,” he said. “Weapons do not arise by accident, and we can expect IAEA safeguards to give early warning of any illicit programme.”

But when I mentioned this to Grae, he asked why the plutonium had to be there in the first place. “It’s the same as if these plants were producing massive amounts of arsenic. [Ritch’s] argument would be that it is controlled. That we are in a world that knows how to handle this... How would you feel about hundreds of new plants in tens of new countries making massive amounts of arsenic? This [plutonium] is much more dangerous. This can destroy cities.”

It was not until that evening that I learned more about the science of Radkowsky’s thorium fuel cycle. Back at Grae’s hotel, I met Alexei Morozov, the Russian physicist who has been testing the technology since 1994. Morozov, who is 62, worked for 25 years on the Soviet nuclear ice-breaker programme and other advanced reactors before being hired by Thorium Power. For most of our conversation, he sat rigidly in his chair, but he relaxed when I asked him to choose a Russian word to describe Radkowsky’s designs. “Elegantni,” he replied.

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Thorium has always intrigued nuclear physicists; the question has been how best to use it. A silvery metal, it has similar radioactive properties to Uranium 238, the isotope which makes up the bulk of all nuclear fuels. But it is thought to be between three and four times more abundant in nature. Named after the Norse god of thunder by Jons Jacob Berzelius, the Swedish chemist who discovered it in 1828, thorium occurs in mineral-rich monazite sand, of which the world’s largest deposits are in Australia, north America, Turkey and India.

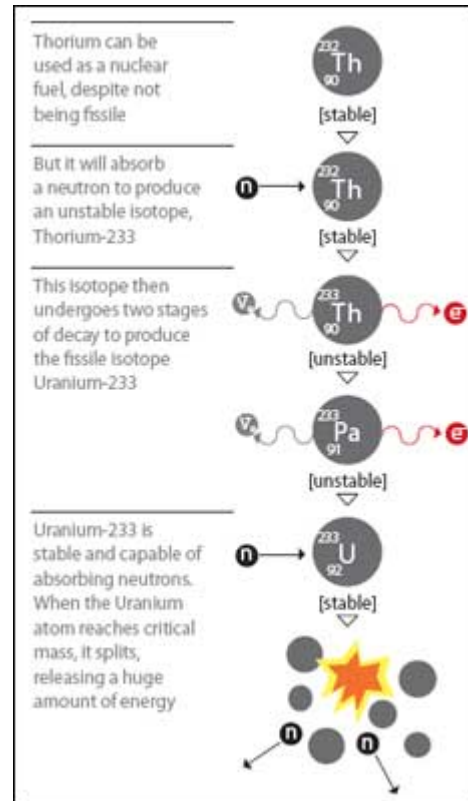


Since the early 1950s, when uranium was in short supply, physicists have designed fuel cycles to run on thorium. Like U-238, thorium (T-232) will absorb neutrons from another fissile material, such as enriched uranium (U-235), and start to break down, releasing huge amounts of energy. The difference comes in the family of radioactive elements and isotopes that are created as a result. The key absence from the thorium reaction is large quantities of the manmade element plutonium, particularly in the Pu-239 form favoured as a weapons material.

Instead, thorium breaks down into several unstable uranium isotopes, chief among them U-233, and, to a lesser extent, U-232, an unpleasant, gamma-radiating by-product. These provide what physicists call thorium's nuclear "burn" – a process made attractive by U-233, which degrades efficiently, and by thorium's high boiling point (about 500°C higher than uranium's) which has potential safety advantages.

Thorium's behaviour has enticed scientists for a variety of reasons – not all wholesome. John Simpson, a historian and non-proliferation expert at the University of Southampton, believes that Britain first experimented with thorium in the 1950s because of mistaken rumours that it had been used in the hydrogen bomb. The intentions of India, the only country to have maintained long-standing research into thorium because of its large domestic supply, are also viewed as ambiguous: it focused on breeding as much U-233 as possible, reprocessing it for use elsewhere. U-233 on its own is considered a proliferation risk.

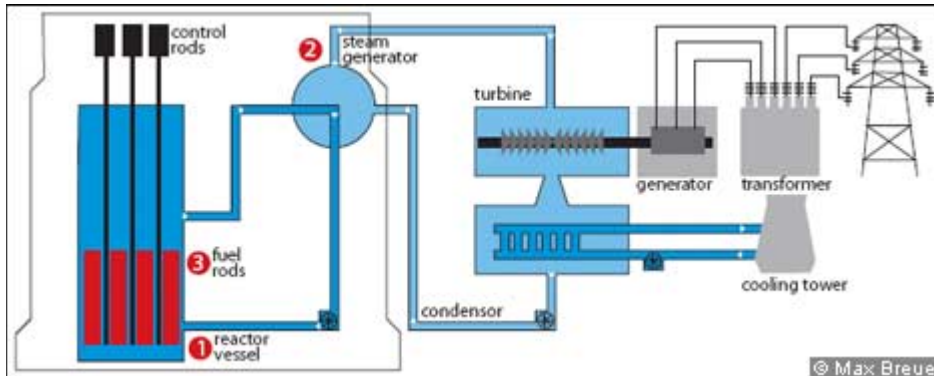
Thorium and fission



According to Thorium Power, Radkowsky's fuel cycle design is unique because it is intended to use up as much of the fuel as possible in a single stage, making it impossible to extract any weapons-usable isotopes afterwards. "It's not the thorium, it's the design that matters," said Grae. A "seed" of enriched uranium starts a chain reaction in a "blanket" of thorium, which is then "spiked" with U-238 to prevent the U-233 from being easily separated afterwards.

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## How a nuclear reactor works



1. *The heating unit* The nuclear reactions take place in the fuel rods. In traditional power plants, this involves uranium. In Thorium Power's model, a "seed" of plutonium kick-starts a nuclear reaction in a "blanket" of uranium and thorium surrounding it.

2. *The steam* Thorium Power's Kurchatov reactor is not attached to a steam generator or turbine. But the technology is designed to fit into existing power plants, so a thorium-fuelled plant would look much like this one: only the fuel rods would be different.

3. *The waste* Traditional uranium reactions – which take place in a power plant's fuel rods – produce a range of isotopes, many of which don't break down for hundreds of thousands of years. Thorium produces similar material but in smaller quantities – and in forms that can't be used to create nuclear bombs

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Morozov told me that, with the fuel arranged this way, he has achieved a yield of 100MW days per kg of fuel, which compares with an average of about 60MW days in most uranium-run reactors. As well as being more efficient, Morozov repeated the company's central claims about the fuel: that it produces 70 per cent less waste by weight (50 per cent by volume) and 85 per cent less plutonium than standard light-water reactors, none of it viable for making a weapon.

Because of rising uranium demand and the long time that the thorium "blanket" can be burned in a reactor – up to nine years, as opposed to three for ordinary uranium fuel – the company also believes that a thorium cycle could be as much as 10 per cent cheaper than a uranium-run process. I asked Morozov if his experiments could really work on a commercial scale. "This is not an unrealistic idea," he replied.

Still, Thorium Power faces a sceptical public. According to Grae, once the fuel has run for three years in a Russian VVER-1000 reactor (the standard Russian uranium reactor), it will be commercially proven. That should happen in 2013. But this is the cautious world of nuclear. Mujid Kazimi, the director of MIT's Center for Advanced Nuclear Energy Systems, is one of the few scientists to study the Radkowsky design in detail, and he believes the company must do more publicly to demonstrate its claims. "They should be reporting on it more in the open literature than there has been thus far," he said. "I think that's obviously the dilemma here. How do you gain the confidence [and] at the same time retain the commercial edge?"

Kazimi said his own experiments show the Radkowsky design to be feasible and support its central claim – that it reduces the amount of plutonium generated in the reactor. But he said there

were other complications, particularly related to the smaller but highly radioactive quantities of waste, that were yet to be resolved. "This is an arena where the risk of the unknown is taken very seriously," he said.

If scientific support for the fuel is one thing, political support is another. Just as Grae has tended Thorium Power's team of Russian scientists, so he has spent years nurturing politicians on Capitol Hill and assembling a group of non-proliferation experts to sell thorium to the world. He hired Tom Graham, the American diplomat who led the indefinite extension of the Non-Proliferation Treaty in 1995, to be the company's executive chairman in 1997. Hans Blix joined the company as a consultant in February. Since last year, the company has also been working with opponents of the Yucca Mountain repository plan, including Harry Reid, the US Senate majority leader, on placing a bill before Congress supporting more research into thorium.

Not everyone appreciates this assertiveness. The argument for thorium, particularly on non-proliferation grounds, can sound like an argument against the dangers of the nuclear industry as a whole. Ritch, of the World Nuclear Association, stopped short of accusing Thorium Power of scare-mongering, but not by much. "People who are commercially active in the area of thorium will of course advertise the non-proliferation characteristics of their technology as an advantage," he said. "That's fair enough, but I don't like to grant that a fundamental problem exists." And even Blix stressed that building a nuclear weapon is more than just a crime of opportunity – it takes more than a spare pile of plutonium. "The basic thing that drives proliferation, I think, is not the possession of fuel or spent fuel but fear and perceived security risks," he said. "And so, while in Washington they might feel that practically anyone outside the Beltway is a proliferation risk, the world does not look that way."

Nonetheless, it is Thorium Power's spotless non-proliferation credentials – enhanced by Graham and Blix – that are winning its first commercial work. Earlier this month, the company announced that it was advising the United Arab Emirates on how to implement what a senior US State Department official described to me as "a model civilian nuclear programme", just 50 miles from Iran. Thorium Power has already collected about \$10m in consulting fees on the deal and is advising the Executive Affairs Authority of Abu Dhabi, which is overseeing the programme, as it aims to build its first reactor by 2017. Although there is no guarantee that the reactor will run on thorium, Grae insists the technology will be ready to install. "Given that we started with a vision that seems to be coming true," he had told me in Moscow. "There's no reason for us to stop now, to not seize this."

**Thorium Power to Assist UAE in Nuclear Programme**  
**Gulf News**  
**May 28, 2008**

Dubai: Thorium Power on Tuesday said it has signed two consulting and strategic advisory service agreements worth \$8.1 million (Dh29.7 million) with a UAE government entity involved in the nation's evaluation of a domestic nuclear energy programme.

"Under the two previously announced agreements, Thorium Power entered into a \$3.8 million contract to assist in the development of a roadmap report with recommendations related to the possible establishment of a civil nuclear energy programme in the UAE based on the principles of transparency, non-proliferation, safety and regulatory compliance," the company said.

"Under the second contract, with professional fees of \$4.3 million, Thorium Power is currently consulting in the development of timelines, organisational structure and priorities for the establishment of a Nuclear Energy Programme Implementation Organisation (NEPIO) as well as an independent federal Nuclear Regulatory Authority (NRA). Thorium Power received pre-payments covering professional fees and certain expenses of \$5 million and \$4.2 million for the contracts respectively."

The scope of services under both contracts was defined in consultation with appropriate authorities in the US government in compliance with all applicable US export controls. The pacts were signed with the Executive Affairs Authority, an entity of the Government of Abu Dhabi, mandated to engage Thorium Power in a consultancy capacity on behalf of the UAE Federal Government.

Till date, the company has entered into two business agreements as announced on December 3, 2007 and March 18.

Seth Grae, CEO of Thorium Power, stated, "Thorium Power is providing an unrivalled team of expert analysts and industry practitioners to work with counterparts in the UAE on the full range of issues involved in establishing a nuclear power programme. We look forward to continuing to work on this programme."

Profile: Pioneering venture

Thorium Power is a pioneering US nuclear energy company based in McLean, Virginia. The company develops non-proliferative nuclear fuel technology and provides comprehensive advisory services for emerging nuclear programmes based on a philosophy of transparency, non-proliferation, safety and operational excellence.

**South Korea's nuclear power independence**  
**World Nuclear News**  
**May 28, 2008**

With the completion of a man-machine interface system, South Korea is now able to manufacture nuclear power plants fully independently. Firms from the country could shortly begin to take part in the global reactor market.

South Korea started its nuclear power program in the 1970s by licensing pressurized water reactor (PWR) technology from US-based Westinghouse. Since then, as its industrial base has grown, domestic researchers and firms have updated the System 80 PWR design originally imported and developed South Korean versions of all major components. Separately, South Korea has imported Canadian-designed Candu pressurized heavy water reactors and is developing a unique strategy to re-use PWR fuel in these.

Under a licensee relationship with Westinghouse, Korea Hydro and Nuclear Power was able to develop variants of System 80 for its own requirements. KHNP went on to develop the Korean Standard Nuclear Plant (KNSP), the OPR-1000 design and finally the APR-1400. Further refinements are under discussion.

In 2001, a national project to become self-sufficient in nuclear power technology was launched involving Doosan Heavy Industries, KHNP, the Power Research Institute and Korea Electric Power Company's nuclear fuel research department. This reached a milestone with the readiness of the last major component, a man-machine interface for nuclear instrumentation and control, which Doosan marked on 22 May with a ceremony involving over 100 dignitaries. The system will be used in KHNP's forthcoming APR-1400 design reactors, two of which are beginning construction at Shin-Kori.

Currently, only a small number of large firms have the technical knowledge and project management experience to export nuclear power plants. Chief among them are Atomic Energy of Canada Ltd (AECL), Areva, AtomStroyExport, GE-Hitachi, Mitsubishi Heavy Industries, Toshiba and its subsidiary Westinghouse.

The change in status should enable Doosan in consortium with KHNP and other Korean or foreign firms to market a successor to the APR-1400 in collaboration with Westinghouse. Korean industry has already been linked to future reactor projects in Indonesia.

In an separate development, Doosan has signed a memorandum of understanding with China National Nuclear Company to bid jointly on nuclear power projects. Doosan is already contracted to provide large components such as steam generators for Chinese nuclear power plants and the firms expect to work together on more Chinese projects. In a statement, the countries mentioned southwest Asia and Africa. China is involved in Pakistan's nuclear power program and also interested in supporting a new program in Bangladesh.

## **Solution to energy problems: go nuclear**

**By Steve Huntley**

**Chicago Sun-Times**

**May 27, 2008**

Gas at \$4 a gallon inflicts a lot of pocketbook pain on Americans. To try to persuade you that it can do something about this, government huffs and puffs and threatens to blow down the house of big oil. Washington is capable of hurricane-force hot air, but all that bluster won't save you a penny at the pump.

The Democrat-run Congress seems to be nearing panic. Maybe it should be, given House Speaker Nancy Pelosi's pledge: "Elect us, and we will produce a common-sense plan to help bring down the price of gasoline at the pump."

The plan? Sue 'em!

The House passed a bill to authorize the Justice Department to sue OPEC in U.S. courts for price-fixing. Were this symbolic fit of rage to become law, and litigation started, don't expect the sheiks to quake in their boots or gas prices to drop to \$3.

The Senate decided to demonstrate its outrage by hauling oil company executives before it for a public whippin'. They responded that profits of 4 cents on the dollar weren't high by any standard of U.S. capitalism. The problem for them is that their companies are such gargantuan enterprises that 4 cents on the dollar adds up to many billions of greenbacks.

Political grandstanding over profits is easier than facing up to what drives oil costs: a globalized economy increasing demand for petroleum; a weak dollar; speculation in commodities markets; stretched refinery capacity; falling production from aging oil fields, and fears of supply disruptions from geopolitical troubles.

The International Energy Agency estimates the world will need 35 percent more oil by 2030. Some experts believe we're near peak production of easily pumped oil. Worse, much of this black fuel is buried in countries where Islamist radicalism thrives. And our thirst for oil soars even as we fret over global warming.

A long-term answer to our energy problems exists -- nuclear energy, already the source of 20 percent of America's electricity.

A leading proponent of nuclear power is Patrick Moore. You may remember him as a co-founder of the aggressive environmental group Greenpeace. He has broken with it over several issues, notably his advocacy of nuclear energy, and he serves as co-chairman of the Clean and Safe Energy Coalition.

Moore envisions a nuclear-powered America where private cars are battery-powered or hybrids and buildings are warmed by heat pumps instead of furnaces. Of course, "We're never going to have a battery-operated plane," Moore says. He sees nuclear reactors powering production of biofuels and perhaps synthetic fuels from coal for heavy transportation -- airplanes, big trucks and trains.

True, reactors cost more than coal- or gas-powered generators. But those carbon polluters are likely to face added costs from environmental taxes. Nuclear plants take a long time to come on line: up to 10 years, with half of that attributed to the governmental approval and regulatory process. Still, use of prefab and modular components could bring the five-year building time down to four or even three years, Moore believes.

The Three Mile Island accident happened nearly three decades ago, and it occurred because operators misread gauges. Now reactors boast passive safety systems, meaning no one has to push a button for them to operate. The next generation reactor, the pebble bed, uses fuel containers that are meltdown-proof. Beyond that is the fast reactor that produces its own fuel.

An April poll found 63 percent of Americans favor nuclear power. Among those living within 10 miles of a reactor, it's 80 percent. Moore sums up the case: "Nuclear energy is clean, safe and

economically competitive. With it you move away from fossil fuels to a much better energy policy from an environmental point of view, a health point of view and a strategic or energy security point of view."

Conservation and green energy just aren't enough to resolve our energy problems. What's needed is a political commitment to nuclear. Among presidential candidates, John McCain comes closest with his pledge to have 20 reactors in construction within four years.

**Nuclear energy best option for Gulf States**  
**Agence France-Presse**  
**May 27, 2008**

DUBAI - Nuclear power rather than renewable sources like the wind or sun are the best option for oil-rich Gulf Arab states to meet growing energy demands, especially if produced collectively, say regional experts.

'Renewable energies are (playing) only a very small part in supplying even those who started (developing them) a long time ago,' Saudi Electricity Company president Ali Saleh al-Barrack told a conference in the United Arab Emirates on Monday.

He said that while Saudi Arabia was conducting research into renewable energies, options such as wind and solar power were either limited or less attractive for technical reasons.

Given the high demand for power and the population growth in the Gulf region, 'I think the only immediate solution is nuclear energy,' which is the best option in economic and environmental terms, Barrack said.

He dismissed fears of environmental damage from nuclear energy as 'driven by Hollywood-style fiction.'

'The danger really is from what we are doing now, by adding more and more of this fossil and coal which is destroying the environment and (causing global) warming,' he said.

Gulf Cooperation Council partners Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the UAE decided in December 2006 to develop a joint nuclear technology programme for peaceful uses and have been in talks with the International Atomic Energy Agency.

The move by the pro-Western oil and gas producers came amid concerns over non-Arab Iran's nuclear drive, which has sparked a standoff with Western powers. Some of these, led notably by the United States, accuse Tehran of seeking to develop an atomic bomb, a charge Iran denies.

The UAE, Bahrain and Saudi Arabia have since concluded bilateral nuclear cooperation deals with the United States.

The UAE, which is in the midst of an economic boom, has also signed an agreement with France to receive help to develop civilian nuclear energy.

Saudi deputy electricity minister Saleh al-Awaji stressed that while Riyadh started studying medical and industrial applications of nuclear technology two decades ago, it was now barely in the process of examining the feasibility of using it to produce power.

'The issue is still at the stage of feasibility studies. The same goes for the GCC (as a bloc),' he told AFP.

The UAE announced last month that it would import enriched uranium for any reactor it builds, ruling out the controversial aspects of Iran's nuclear programme.

But Awaji said other Gulf states need not necessarily follow suit.

'This option (of producing nuclear energy) is still being studied. But if a decision is made to go ahead, each country would have its own circumstances in acquiring fuel sources ... within the regulations governing peaceful uses of nuclear energy,' he said.

Saudi and Qatari speakers at the conference agreed that it would be more efficient for GCC countries to develop nuclear energy as a bloc.

'I think it's logical, but I don't think it's going to happen,' commented Raja Kiwan, an analyst with energy advisers PFC Energy.

Since the GCC signalled an interest in developing civilian nuclear technology in 2006, 'each country seems to be pursuing its own track' and talking to various suppliers, he told AFP.



If the current pace continues, the UAE will probably be the first to produce nuclear energy, Kiwan said.

Kiwan said the growth in energy demand in the region will result in a gas deficit in several countries and makes it inevitable that alternative sources of power will be sought.

'Nuclear is probably the most tested and the most applicable source of energy for the (level) of demand growth that this region is going to be seeing over the next 20-25 years,' he said.

'Renewable is a fairly new phenomenon in the energy world and it is primarily being led by the private sector -- the big international oil companies that are becoming a little bit greener ... Renewable energy is a tiny fraction of global consumption.'

**Europe considers its nuclear future**  
**World Nuclear News**  
**May 27, 2008**

A top-level European forum on the risks and benefits of nuclear energy has heard repeated calls for harmonised standards for the 150 nuclear power reactors across the group of 27 nations.

The European Nuclear Energy Forum (Enef) is the product of an initiative of the March 2007 European Council meeting. It held its second biannual meeting in the Czech capital, Prague, on 22-23 May immediately after Czech politicians voiced their support for an expansion of nuclear energy. According to the president of the European Commission, José Manuel Barroso, who opened the meeting, Enef is "designed to respond to an urgent need."

"A need to an open debate without taboos, without too many preconceived ideas, amongst all the relevant actors, on nuclear energy in Europe. A debate on the opportunities, but also the risks. A debate on the costs, but also on the benefits. A debate on the future of the industry."

Barroso was joined by energy commissioner Andris Piebalgs as well as the prime ministers of the Czech Republic, Slovakia and Lithuania - Mirek Topolánek, Robert Fico and Gediminas Kirkilas respectively.

The forum is meant to facilitate debate between politicians, financiers, non-governmental organisations (NGOs), top executives and experts from the industry as well as the chairs of Enef's three working groups on nuclear energy. The 200 invited delegates heard Barroso call for closer cooperation between the 27 EU states under the Euratom treaty and the International Atomic Energy Agency (IAEA). He said: "Perhaps we can go further, to develop in the EU an even more advanced framework for nuclear energy meeting the highest standards of safety, security and non-proliferation."

Reiterating EU desires to consolidate nuclear safety rules he said, "Europe could become a real model if it succeeds in adopting a common legal framework on nuclear safety and waste management." One agenda item for Enef was "the need for a legal roadmap accompanying the responsible use of nuclear energy," according to an EU statement.

Some industry leaders supported Barroso's aims, concluding that harmonising safety requirements for new nuclear plants would reduce duplication of effort and lower barriers to competition for the energy source. Other practical topics under discussion were measures to ensure a sufficient supply of workers for new nuclear and details of financing the construction of new reactors.

Two NGOs attending Enef, which claimed to be the only representatives of civil society, were *Greenpeace* and *Friends of The Earth*. The groups complained that Enef amounted to little more than a trade fair for nuclear power, and *Greenpeace* decided to project anti-nuclear slogans on conference venues such as Prague Castle and a riverboat hosting an official dinner.

## **Dewan Rakyat: Nuclear energy could be used in future**

**By Sim Leoi Leoi**

**The Star (Malaysia)**

**May 27, 2008**

KUALA LUMPUR: A comprehensive paper on the use of nuclear energy in the country is being prepared by the Science, Technology and Innovation Ministry.

Its deputy minister Fadillah Yusof said the paper, which was jointly produced with the Energy, Water and Communications Ministry, would look into all aspects including environmental protection and security, and even the possibility of using nuclear energy in the future.

"Under our national policy on energy, which was drawn up in 1979, nuclear energy is not included as one of the sources for the generation of electricity.

"At present, we are focusing too much on coal, gas and petrol to generate our electricity while hydro power tends to destroy a lot of the environment," he told Dr Che Rosli Che Mat (PAS - Hulu Langat) in Dewan Rakyat on Tuesday.

With the present energy crisis and the increase in the greenhouse gases, added Fadillah, there might come a time when Malaysia might have to use nuclear energy.

As a comparison to burning petrol and gas for electricity, he said nuclear energy was generally clean and that "one nuclear rod" could last up to 20 or 30 years.

He also told Razali Ibrahim (BN - Muar) that as of December last year, there were 74 nuclear plants being planned for construction in countries like China, Japan and South Korea.

"Within Asean, countries like Indonesia, Thailand and Vietnam are now considering using nuclear energy. Even countries in the Middle East are thinking of it, among which are Saudi Arabia, Jordan, Syria and Egypt," he pointed out.

Earlier, Fadillah said Malaysia was ready to harness nuclear power for its electricity needs.

"We have 150 scientists, 50 of whom have PhD specifically in the study of nuclear science and energy, while others have at least a master's degree.

"Currently, we have a nuclear energy plant in Dengkil which is capable of generating 1 megawatt of electricity, but this is mainly for scientific research," he said.

**Rice plugs nuclear power, US oil exploration**  
**Times of India**  
**May 24, 2008**

WASHINGTON: The United States needs to explore more for oil at home and tap nuclear power as part of a comprehensive energy policy, Secretary of State Condoleezza Rice said in an interview aired.

Speaking to CNBC television during a visit to California, Rice also dismissed fears that the US economy was losing its competitive edge to China and India.

"It's very important that we diversify (energy) supply," Rice said in the interview taped Thursday.

"We say we want to be less addicted to foreign oil, but then we say to oil producers you have to increase supply rather than thinking about what we can do at home to increase supply.

"The ability to use our domestic resources, our domestic sources of oil would be a very important part of that."

It was also important for the United States to increase its oil refining capacity.

"Nuclear energy is another clean technology that we should be using and exploring," she said.

"We simply have put ourselves into a situation in which it's hard to break our addiction to oil," Rice added.

Rice acknowledged the US was experiencing hard times but sought to dispel any ideas that the US economy was losing its competitive edge to the booming Chinese and Indian economies.

"I can count many, many times that people have said that America had lost its competitive edge," Rice said, recalling claims in the 1980s that the United States was losing out to Japan.

"So there have been many premature sentences for America losing its competitive edge."

**Italian government set to reintroduce nuclear energy**  
**World Nuclear News**  
**May 23, 2008**

The newly-elected Italian government is planning a new generation of nuclear power plants, the minister of economic development Claudio Scajola told a meeting of the Italian employers' association, Confindustria.

Speaking about Italy's energy situation, he said: "The country needs energy at competitive costs, in appropriate quantities and in certain conditions. There is no reason why our companies must pay more for energy than their main European competitors, with the fear of interruptions in supply, more and increasing burdens due to the Kyoto Protocol."

Scajola added, "We must act forcefully on three pillars: diversification, infrastructure and internationalisation. We need to diversify the geographic areas of supply and energy sources, developing energy efficiency and new technological options: renewables, clean coal and, in particular, nuclear energy."

He said that prime minister Silvio Berlusconi had made the reintroduction of nuclear energy part of his manifesto during the elections and that he would now keep to this commitment with "conviction and determination." The new government took office last week. Scajola added, "Before the end of this legislature, we will take the first step in constructing a new generation of nuclear plants in our country." The Italian government serves a five-year term.

"It is our intention to establish a national energy strategy that includes priorities, addresses and means of implementation for the short- and long-term," he said. "This strategy will be submitted for public consultation and debate through a National Conference for Energy and the Environment."

Scajola stressed that "an action plan for a return to nuclear energy can no longer be avoided", adding that "only nuclear plants allow the production of energy on a large scale, in a safe, cost competitive way and respecting the environment." He said, "We must therefore rebuild skills and regulatory institutions, forming the necessary technical and entrepreneurial sector and providing credible solutions for radioactive waste."

The minister said that the government's energy policy will focus on constructing new and modernising existing infrastructure, including building new liquefied natural gas (LNG) terminals, developing new gas storage sites and enhancing interconnection transmission capacity with other countries.

On his first day as prime minister, Berlusconi told the upper house of parliament that "nuclear power, with all the necessary precautions, is today an indispensable option, not just for guaranteeing the energy needed for future development, but for safeguarding the environment we live in."

Meanwhile, environment minister Raffaele Ventresca has said that Italy's environment and industry ministries, regional governments and state agencies are in the process of identifying potential radioactive waste storage sites, according to the *Corriere della Sera* newspaper. The search is focusing on potential sites for an above-ground storage area, the report said. Ventresca said that a site could be identified by June.

Following a referendum in November 1987, provoked by the Chernobyl accident 18 months earlier, work on Italy's nuclear program was largely stopped. In 1988, the government resolved to halt all nuclear construction, shut the remaining reactors and decommission them from 1990. As well as the operating plants, two new boiling water reactors were almost complete and six locally-designed pressurized water reactor units were planned. Various fuel cycle facilities were also

shut down. The country now relies on imported energy to meet its needs - notably from France, where 78% of electricity comes from nuclear.

In 2004, a new energy law opened up the possibility of joint venture with foreign companies in relation to nuclear power plants and importing electricity from them. This resulted from a clear change in public opinion, especially among younger people favouring nuclear power for Italy.

**Czech support for nuclear energy expansion**  
**World Nuclear News**  
**May 21, 2008**

A letter in support of the further development of nuclear energy in the European Union (EU) has been signed by all 24 Czech members of the European Parliament (MEPs) and published in the Czech press.

The second meeting of the European Nuclear Energy Forum (Enef) is scheduled to be held in Prague, Czech Republic, on 22-23 May. The letter said that "without nuclear energy as a vital component of a low-carbon energy mix the Community will not be able to meet its energy security, energy independence and CO<sub>2</sub> emissions reduction goals." It said that the Enef has "provided a much-needed endorsement of the pivotal role nuclear energy plays in the EU's current and future low-carbon economy" and "has, finally, put nuclear energy on an equal footing with other major energy sources." The letter closed by saying it hoped the Prague meeting will "further advance open and transparent dialogue on nuclear energy matters."

Santiago San Antonio, director general of Foratom, the European nuclear industry trade association, described the letter as a "timely and significant statement of support." He added, "It is a unique political statement because all Czech MEPs, regardless of individual party affiliations, have unanimously pledged their support."

**Domestic nuclear expansion**

Meanwhile, Vladimir Hlavinka, chief production office at Czech utility CEZ, has said the company should prepare itself to construct new nuclear power reactors in the country to ensure stable power supplies after 2020.

CEZ, which is mainly owned by the Czech government, has suspended its plans for nuclear expansion since the national election in 2006, when a new coalition government agreed not to promote nuclear energy due to opposition from the junior ruling partner, the Green Party. However, senior government representatives, including prime minister Mirek Topolánek, as well as opposition parties, have since advocated nuclear energy.

Hlavinka told Reuters, "It is high time to start preparations of new nuclear blocks by entering the legislation process." He added, "I can hardly imagine that CEZ will start to manoeuvre outside the field set by its owner. But it is necessary to sensitively persuade, explain ... at a certain stage of the whole process, there has to be a decision, and the moment has not yet come."

He suggested that adding two new reactors with capacities of 1000 MWe or above at the existing Temelin plant would be the most efficient as the site was originally planned to house four units. However, he also said expansion of the Dukovany plant was also possible.

**Nizhniy Novgorod plans nuclear power plant**  
**World Nuclear News**  
**May 8, 2008**

The governor of the Nizhniy Novgorod region of Russia has said that a nuclear power plant will be constructed either in the Urensky district or the Vyksunsky industrial area under the federal government's nuclear energy plans to 2020.

According to Valery Shantsev: "Presently, the region, especially its northern part, urgently needs electricity. We are planning to solve this problem by building a nuclear power plant and a combined cycle [gas-fired] power plant."

Sergei Kiriyyenko, director general of the Rosatom corporation, had earlier recommended speeding up of the project to construct a nuclear power plant in the Nizhniy Novgorod region. In a press conference in October 2007, he said "Under the general scheme, the first unit of Nizhniy Novgorod nuclear power plant is to be launched in 2016, the second unit in 2018. I think that the plant should have four units, but for the time being we are planning just two units. If we want to launch the first unit in 2016 we have to start the preparatory work in 2009 and the project in 2011."

More than \$10 billion will reportedly be invested in the plant, which will could eventually consist of four 1150 MWe VVER reactors.

In April 2007, the Nizhniy Novgorod regional government and Rosatom signed a cooperation agreement. Under the framework of the agreement, the region and Rosatom were to consider the feasibility of constructing nuclear power plans in Nizhniy Novgorod.

The plant in Nizhniy Novgorod was included in the Russian government's overall scheme, announced in March 2008, for siting power plants up to 2020, including up to 42 new reactors. Under the plan, one VVER-1000 pressurized water reactor and one RBMK-1000 reactor (Kursk 5) will enter operation before 2010. In addition, the world's first floating nuclear power plant with two 35 MW KLT-40C reactors would be launched. The speed of nuclear build accelerates in the period between 2011 and 2015, when one VVER-1000, some eight new VVER-1200 units, and one BN-800 fast reactor are planned to start up. From 2016 to 2020 between 15 and 20 VVER-1200s could be brought online, along with six new-design VBER-300 boiling water reactors. Two more floating plants are slated for completion during this time.



**Carbon charges make nuclear cheapest choice**  
**World Nuclear News**  
**May 6 2008**

Carbon dioxide charges and federal incentives would increase nuclear energy's cost competitiveness against other generation options making it the USA's most competitive source of new generation in the long run, a study by the Congressional Budget Office (CBO) has found.

*Nuclear Power's Role in Generating Electricity*, a newly published study from the CBO, assesses the future commercial viability of advanced nuclear technology. It compares the costs of new baseload electricity generation from nuclear and others in the light of the possible effects of carbon dioxide emission constraints and also incentives favouring advanced nuclear technology offered under the 2005 US Energy Policy Act (EPA). In keeping with the agency's mandate to remain objective and impartial, the study draws conclusions but makes no recommendations.

With carbon dioxide (CO<sub>2</sub>) charges of about \$45 per tonne, nuclear would become competitive with conventional fossil fuel technologies even without other incentives. At the same carbon price, nuclear generation would also become competitive with existing coal power plants, so utilities would be likely to choose nuclear to replace existing coal plants where possible. However, in the absence of carbon charges or incentives, the study found that conventional fossil fuel technologies would probably remain the least expensive source of new generating capacity.

EPA incentives would make nuclear technology competitive for new baseload capacity even in the absence of CO<sub>2</sub> charges, but CBO warned that because of the fixed amount of funding behind some such incentives their impact would be diluted as the number of nuclear projects increased. "CBO anticipates that only a few of the 30 plants currently being proposed [in the USA] would be built if utilities did not expect carbon dioxide charges to be imposed," the report cautions.

**Countering uncertainties**

If the costs of new nuclear construction proved to be higher than anticipated or the price of natural gas was to fall to 1990s levels, EPA incentives alone would not be sufficient to make new nuclear competitive, the CBO found. Such uncertainties would be less likely to deter investors in the presence of carbon charges, but a carbon charge of over \$80 per tonne of CO<sub>2</sub> would be needed for nuclear to remain competitive in such scenarios. (To put this into perspective, European Union allowances (EUAs) for carbon dioxide emissions in Europe are currently being traded at around €25-28 (\$38-44) per tonne, according to the European Climate Exchange.)

As the CBO study focuses only on widely available baseload capacity it does not address renewable energy technologies it describes as "intermittent" or baseload technologies such as hydro or geothermal that can only be used in a limited number of locations.

## **IAEA preparing guide to help newcomers build infrastructure**

**By Ann MacLachlan**

**Inside N.R.C.**

**Platt's International**

**April 28, 2008**

Prompted by requests from countries newly embarking on nuclear programs, the IAEA secretariat is preparing a "roadmap" to help them use the voluminous guidance the agency has already published to set up robust nuclear safety infrastructure.

The new safety guide, once finalized, will help the countries prioritize actions to set up a safety infrastructure "as a key component of the overall preparations required for emerging nuclear power programs," according to a proposal that has been posted on the IAEA's web site and will be discussed next month by the IAEA's Committee on Safety Standards, or CSS.

Agency officials say the guide is a necessary companion to the other part of the IAEA's work on emerging nuclear power programs: the so-called Milestones document, published last year by the IAEA Department of Nuclear Power, that sets out the steps to provide for sufficient infrastructure in government and industry before a country can reasonably embark on reactor construction.

The "Document Preparation Profile" describing the safety guide says it will "provide a roadmap for member states to apply the IAEA safety standards and other elements of the Global Nuclear Safety Regime progressively during the early phases of the implementation of a nuclear power program. ... It is important for member states to establish at an early stage a dedicated project management organization with a strong commitment to nuclear safety including appropriate staffing, funding and other necessary resources."

The IAEA's Dominique Delattre said the agency has produced 130 safety standards, including a top-level Safety Fundamentals and 16 standards that bear the higher rank of "requirements." The bulk of the safety standard documents are more detailed safety guides on how to implement the requirements. All are updated regularly. Delattre shepherds the work of the CSS in the Safety Standards and Application Unit of the IAEA's Department of Nuclear Safety and Security.

The CSS, which is composed of senior member state representatives and chaired by Andre-Claude Lacoste of France, has sent a clear message that there is a need for countries starting out in nuclear power to identify "very quickly" what needs to be done for safety infrastructure "before being ready to assess a bid" for a new reactor, Delattre said April 24.

Lacoste has made similar remarks to journalists and legislators in France, expressing misgivings about the potential for nuclear diplomacy ? including initiatives made over the last year by French President Nicolas Sarkozy to conclude nuclear agreements with several countries in North Africa and the Middle East ? getting countries started on nuclear power programs without an adequate regulatory structure in place.

A country starting out in nuclear needs a guide to which of the IAEA's many standards should be implemented at which step of a nuclear power program, Delattre said. The new document won't create any additional requirements, he said, but will point governments toward what should be done up-front ? called phase I ? and in preparation for construction of a nuclear power plant once a policy decision has been made ? phase II.

He said that as a first step, governments must be "aware of requirements" already published in the IAEA's safety standards series, covering things like the authorization process, competence of regulatory authorities, and legal provisions for dealing with radioactive waste. Later, after making a policy decision to move forward with a nuclear power plant, the government can follow the proposed new guide "step by step" to set up their regulatory infrastructures, he said.

Delattre said the proposed safety guide can also be of use for countries that are not neophytes in nuclear but which may have only a research reactor, for example. Such countries can use the guide, he said, to "measure what they have against what is required."

The Document Preparation Profile was approved by the CSS steering committee in January and will be presented for approval to the full CSS next month. If the committee gives the green light, the guide would be developed over the next few months. Delattre said the drafters hoped to have an initial version ready for the IAEA General Conference in September. It then would be put out for comments and any related revisions by member states before publication, which is targeted for June 2009, according to the DPP.

**India "committed" to nuclear deal with US - minister**  
**Press Trust of India**  
**May 9, 2008**

Mumbai, 8 May: India Thursday [8 May] scotched speculation that the India-US civil nuclear deal has been put on the back burner in the wake of the political deadlock over it between United Progressive Alliance [federal coalition] government and Left parties and said it was committed to it.

"As the prime minister said, we are optimistic...we (India and US) have reached an understanding as equal partners and we are committed to the 123 Agreement," Minister of State for External Affairs Anand Sharma told reporters here on the sidelines of FICCI [Federation of Indian Chambers of Commerce and Industry] conference.

He said India was sincerely carrying on negotiations with the International Atomic Energy Association (IAEA) as nuclear energy was an "important component" in India's fuel mix.

"The cooperation is in national interest and also in the interest of the economic growth of the country," Sharma said.

He also pitched for expanding the United Nations Security Council stating that it should reflect "contemporary realities."

"The Security Council cannot have a democratic character if it excludes the largest democracy like India or Africa or countries of Latin America," he said.

The UN Council now comprises five countries - US, China, France, Britain and Russia - with veto powers.

"The UN must be democratic in its structure to reflect contemporary realities," Sharma said.