Thorium Power Ltd. News Update
September 30, 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

We were excited to see the latest media coverage throughout September, particularly the recent Indian coverage highlighting our potential role in India's new nuclear market. We also achieved an important milestone on the technological front. We entered into a Post-Irradiation Examination (PIE) agreement with the Kurchatov Institute, one of Russia's premier nuclear research facilities, which will enable us to further confirm the fuel performance and provide key irradiation testing data required for regulatory licensing of our fuel designs. We remain focused on developing and deploying an innovative, proliferation-resistant, low-waste alternative to current fuel designs and we are tremendously encouraged by the ongoing testing and verification process. The PIE agreement is an important milestone and an example of our long and successful collaboration with the Kurchatov Institute. Elsewhere, we continue to make good progress on our consulting engagement with the UAE and we are encouraged by the growing interest in the region. In November, I will speak before the MENA Nuclear Energy Forum, an unprecedented gathering of governmental, business and industry leaders from the Middle East-North Africa region. Dr. Tidu Maini, a member of Thorium Power's International Advisory Board, will chair the Forum in his capacity as Executive Chairman of the Qatar Science & Technology Park.

Industry News and Developments

Last month, we witnessed a number of industry reports that reaffirmed the growing scope and scale of the worldwide nuclear renaissance. First, the IAEA released a landmark report – *Energy, Electricity and Nuclear Power Estimates for the Period up to 2030* – which noted that nuclear power capacity could double by 2030. Secondly, the World Nuclear Association's *Nuclear Century Outlook* detailed key growth projections and concluded that "a global clean-energy revolution will require an enormous contribution from nuclear energy and full realization of its worldwide growth potential." Finally, the American Council on Global Nuclear Competitiveness released a report – *Economic Benefits of Nuclear Energy in the USA* – which concluded that "up to 350,000 jobs and $542 billion in GDP could be created over 20 years if the USA embarks on a program of substantial investment in nuclear energy."

In addition to the key reports, we were also encouraged by some of the major developments in the US-India Civil Nuclear Agreement during September. The 45-nation Nuclear Suppliers Group (NSG), which controls the export and re-transfer of nuclear materials and technology, approved the deal on September 6th. The NSG waiver is a major breakthrough that opens the way for India to engage in nuclear commerce while adhering to non-proliferation safeguards. Now that the deal has been approved by the

U.S. House of Representatives, it is headed to the Senate for a final vote. Provided there is Senate approval, Secretary Rice is expected to sign the 123 agreement, which will operationalize the deal, during her planned (October 3rd) visit to New Delhi.

Very Truly Yours,
Seth Grae
Chief Executive Officer

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Company News

Central Chronicle (India) – N Power: Windfall for foreign firms (09.26.08) – The Indian newspaper analyses the business opportunities for international nuclear companies, and notes that "US players are bracing up for a share in the $100-billion nuclear energy opportunities' pie."

Asia Sentinel – Nuke Deal to Benefit India Business (09.12.08) – The publication comments on the NSG waiver, and notes that the "world's nuclear industry salivates over the prospects of an open atomic spigot to the subcontinent." The reporter points out that "power shortages have long hampered the fast growing Indian economy, with nuclear power now being seen as an important component of an energy mix comprising thermal, gas and alternate energy sources."

The Peninsula – Qatar gears up for meeting on nuclear energy (09.28.08) – The local newspaper reports on the upcoming MENA Nuclear Energy Forum, which will take place in Doha on November 10 and 11. Seth Grae is scheduled to speak and Dr. Tidu Maini, a member of Thorium Power's International Advisory Board, is chairing the forum.

India Today – It's [a] big deal for business (09.01.08) – India's newsweekly reports on the US-India nuclear deal and the growth potential for some of the best-positioned companies: "Investments of Rs 1,00,000 crore have poured in amid joint ventures and strategic alliances with Areva, Alstom, Westinghouse, Thorium Power and General Electric (GE) for building nuclear power plants, generation of power and upgradation of technology."

Gulf News – Expert favours French nuclear technology business (09.25.08) – In commenting on the UAE's ongoing exploration of nuclear power, the paper notes France's potential role and Thorium Power's key role in helping the UAE to establish the Federal Authority for Nuclear Regulation, an independent nuclear regulatory agency.

Latest Industry News

Business Standard – Nuclear deal through with NSG waiver (09.07.08) – Commenting on the NSG waiver, the Business Standard notes that India "[became] a class of one [after winning] a major victory in Vienna when delegates at the 45-nation Nuclear Suppliers' Group (or NSG) finally reached a consensus and approved the Indo-US Civil Nuclear Agreement."

AFP – US House approves historic India nuclear deal (09.27.08) – The wire service reports that the U.S. House of Representatives passed the US-India nuclear deal, noting that it "offers India access to Western technology and cheap atomic energy provided it allows UN nuclear inspections of some of its nuclear facilities." The bill is now headed to the U.S. Senate.

The Hindu – Strategic partnership sealed (09.27.08) – The newspaper reports on the recent meeting between the Indian Prime Minister and President Bush, and reiterates their mutual commitment to securing the deal as part of a new "strategic partnership." Now that the deal has been approved by the U.S. House of Representatives, both sides are hopeful of the Senate's approval.

World Nuclear News – Report: 350,000 new US jobs from nuclear revival (09.30.08) – WNN references a new report by the American Council on Global Nuclear Competitiveness (ACGNC). The report - entitled *Economic Benefits of Nuclear Energy in the USA* - concludes that "up to 350,000 jobs and $542 billion in GDP could be created over 20 years if the USA embarks on a program of substantial investment in nuclear energy."

Reuters – Government steps up call for nuclear power (09.18.08) – The wire service reports on recent comments by John Hutton, the UK industry minister, at the Nuclear Development Forum. Hutton noted that "he's determined to press all the buttons to get nuclear built in [the UK] at the earliest opportunity - not only because it's a no-brainer for our energy security, but also because it's good for jobs and our economy," he will say.

World Nuclear News – High hopes for Brazil (09.16.08) – The trade journal reports on the recent pro-nuclear developments in Brazil, and notes that Electronuclear, the national nuclear company, has submitted a six-reactor plan to government, while ministers talk of building more than one per year until 2050.

World Nuclear News – IAEA: Nuclear capacity could double by 2030 (09.12.08) – WNN reports on the 2008 edition of the IAEA's *Energy, Electricity and Nuclear Power Estimates for the Period up to 2030*, which concludes that nuclear power capacity could double by 2030: "Nuclear power, in step with growing global demand for energy, will continue expanding into the next two decades." The latest figures predict net growth of at least 100 GWe.

World Nuclear News – Stop talking, start building (09.04.08) – The trade journal reports on the World Nuclear Association's 33rd Annual Symposium in London, which saw the launch of the *WNA Nuclear Century Outlook*: "Built on a country-by-country projection keyed to the years 2030, 2060 and 2100, the *Outlook* presents 'high' and 'low' case scenarios. The lowest scenario, which predicts a world nuclear capacity of 2000 GWe by 2100, represents a six-fold increase of world nuclear capacity over current levels."

World Nuclear News – Most German businesses support nuclear extension (09.03.08) – WNN reports on a survey conducted by the German association of Chambers of Industry and Commerce (DIHK) indicates that "almost 80% of businesses are in favour of extending the operating lives of country's nuclear power plants beyond current phase-out dates."

N Power: Windfall for foreign firms
By Shivaji Sarkar
Central Chronicle
September 26, 2008

International nuclear companies are keenly looking towards India to give their sagging business the much-needed boost. If viewed carefully, the Indo-US nuclear deal will benefit them more than the Indian business houses, despite technically throwing open the global roads to them. And so the western, primarily US players are bracing up for a share in the $100-billion nuclear energy opportunities' pie.

Clearly, the western power agencies were keen to see the Indo-US deal through. They have been campaigning that the deal would fuel a host of businesses from spin-offs, for Indian business, in technology transfers to erection of plants. It would, they aver, create opportunities for both small and big enterprises.

However, the major beneficiaries of the deal are likely to be the US-based GE, French Alstom, among other players like Areva, Thorium Power, and Westinghouse Skoda Power and Russia's Atomstroy Export once the Atomic Energy Act 1962 is amended. The atomic sector has since 62 been in Government control and the Nuclear Power Corporation of India (NPCIL) owns N-generation, assisted by a host of Government organizations and a few private ancillary units.

On the Indian side, the business tycoons which have shown interest are Ratan Tata and Anil Ambani. The indirect beneficiaries are likely to be the public sector National Thermal Power Corporation (NTPC), BHEL-NPCIL and L&T. All want to ride piggyback on some or the other foreign company.

For instance, Tata Power is keen to enter with Areva for supply of N-generation equipment, Reliance Power with NPCIL, GE, Areva and Atomstroy for manufacturing N-plants. L&T is talking to GE and Westinghouse, while BHEL-NPCIL is looking for a joint venture on technology with Alstom for steam generators. BHEL is also in talks with Areva, while NTPC wants to set up N-plants with Thorium Power and GE.

In the given scenario, the western and US companies hope to capture a sizeable share of the Indian civil N-sector, says President of US-India Business Council (USBIC) Ron Somers. Ratan Tata says, "We have indicated our interest". Anil Ambani says, "We will develop 2000 mw N-power". And, the small Indian ancillary units, suppliers to NPCIL and BARC hope to benefit as the business grows.

India's nuclear era began soon after Independence with Jawaharlal Nehru clearing in the '50s the setting up of the first experimental reactor - Apsara, still functional at the Bhabha Atomic Research Centre in Mumbai. Few recall that Vienna was chosen as headquarters of the International Atomic Energy Agency (IAEA) thanks to the casting vote of Homi J Bhabha, who pursued his passion for music along with the meetings held in the city. And, except for the initial nuclear plant at Tarapur, which was set up with the US and Canadian assistance, all other plants were set up in the country with indigenous skill and technology since Pokharan I test in 1974. Together they contribute about three per cent of the energy requirement, a mere 3900 mw. Would we gain?

Well, the global nuclear business industry is the throes of a crisis thanks to anti-nuke lobbies. There is a virtual cap in the West on making additions to N-energy capacity owing to the complicated radiation waste disposal problems. A case in point is that of France. In the 70s, nuclear energy contributed to 70 per cent of its energy needs, which today have been reduced to roughly 61 per cent. The West no longer accepts it as clean energy as the waste remains radiation active for almost the next 10,000 years and involves huge costs.

What about us? The radiation waste disposal graveyard is presently situated in a secure place in Mumbai. It eats up a sizeable budget for atomic energy. If there is proliferation of private N-plants, it is doubtful the graveyard would be able to absorb all the dangerous waste.

Another aspect that few have taken note of is the land requirement for N-plants. Each plant requires about 1,000 to 1,500 acres. But an area in a six-km periphery has to be sanitized to ward off the impact of a possible radiation leak. Where would the land come from? Would it not create many Singur-Nandigram like situations?

This apart, it is certainly incorrect to suggest that N-energy is cheap. The installation cost at Rs 7 crore per mw is quite high, wherein thermal and hydro energy costs less than Rs 5 crore per mw. Besides, the gestation period is longer. While a thermal plant can come up in three years, an N-plant takes six to seven years. In addition to this cost, add another one of the high waste disposal graveyard, which is seen as long term and ignored.

Moreover, global nuclear power lobbies have created an impression that the nuclear plants would be major power suppliers. But, there are far too many constraints, even at the technological level, to turn this into a reality. It is a fact that uranium production is not very high in India and the Thorium-based technology, developed by our scientists too has its limitations. In sum, making the country dependent on expensive fuel imports. In fact, the Uranium prices are at moderate level as of now, but no sooner does India enter the market, international prices are bound to soar. How would then the NPCIL be able to keep the per unit price at Re 1?

Last but not the least, so far the country has not witnessed a major disaster as the N-plants are Government-controlled. But would the Atomic Energy Regulatory Board be able to maintain this record once the private players, who are primarily profit-oriented, enter the market? There is no denying that despite regulatory mechanism disasters have taken place in the US and Russia.

Regrettably, under pressure of various lobbies no one has critically assessed the situation. The nation needs to have a re-think before going whole hog for N-power. Far from being a boon, it could become a bane.

Nuke Deal to Benefit India Business
BySiddharth Srivastava
Asia Sentinel
September 12, 2008

The world's nuclear industry salivates over the prospects of an open atomic spigot to the subcontinent

The lifting of the ban on nuclear trade with India by the 45-nation Nuclear Supplier's Group last week appears likely to open business opportunities worth as much as US$100 billon for companies around the world and within India itself – if the agreement can get by the US Congress.

Defying domestic political opposition by the left parties and a reported attempt by China to derail the waiver at the NSG, India's nuclear exemption is a victory for New Delhi's diplomatic and strategic initiatives, helped along by its new post-cold war partner, the United States. India's eligibility to access nuclear power technology and fuel from the international market has come about despite the country not being a signatory of the nuclear non-proliferation treaty.

The pact, if it passes, would perhaps be the one standout achievement of the Congress-led government headed by Prime Manister Manmohan Singh, amid failures to check inflation, revamp the social sector and improve infrastructure, which is impacting growth. The Congress government has been accused of mishandling India's soaring need for energy. China's per-capita energy consumption, for instance, is three times India's. Power shortages have long hampered the fast growing Indian economy, with nuclear power now being seen as an important component of an energy mix comprising thermal, gas and alternate energy sources. Rolling blackouts are endemic in Mumbai and New Delhi, a threat to the country's high-tech industries.

Business of nuclear power
The Indian industry body the Confederation of Indian Industry (CII) has said that 18-20 new nuclear power plants are likely to be set up in India over the next 15 years at a cost of more than over Rs1.2 trillion (US$26.27 billion). Companies such as France's Areva SA, Electricite de France, Japan's Hitachi, Russia's Rosatom and American General Electric (GE) and Westinghouse Electric Co (WEC) are expected to benefit, though US-based companies will need to await final ratification of the Indo-US nuclear pact, hopefully this month.

Although officials on both the US and Indian sides profess optimism, there is very little time for the Bush administration to overcome the resistance of Congressional critics of the pact. It took years of effort by the Bush administration to secure the cooperation of the countries in the NSG in the wake of India's refusal to sign the Nuclear Non-Proliferation Treaty. Some Democrats, who control both houses of Congress, remain skeptical, saying that giving India an exemption to the treaty sets a dangerous precedent for other countries wishing to go nuclear but fearing sanctions. Also, with less than two months to go before US presidential elections, the Congress is preoccupied with both campaigning and with not doing anything that might conceivably alienate any voters.

The Democrats, however, are under pressure from the Bush administration, which argues that delaying Congressional ratification could allow other nuclear countries such as Russia and France to elbow aside US companies.

Assuming Congressional passage, the Federation of Indian Chambers of Commerce and Industry has said the NSG waiver will enable India to get nuclear fuel for all its nuclear reactors, which have been running at almost half capacity in the wake of a ban instituted after the country exploded a nuclear weapon.`

``The nuclear deal will also enable addition of new capacity and help fulfill the target of adding 63,000 MW by 2030,'' it said.

Observers say that India's nuclear power generation should involve private, public and foreign players. In order to realize plans of additional 60 gigawatts (GW) of nuclear power (to current capacity of 3 GW), investment of more than Rs6 trillion will be needed.

Earlier, the US Chamber of Commerce, US-India Business Council (USIBC) has estimated: ``India's nuclear-energy market - estimated to require $100 billion in foreign direct investment – if open for US companies can create a potential 270,000 American jobs in high-technology engineering over the next decade.''

Large trade missions of US business leaders representing top companies have been visiting India over the last couple of years to study the nuclear prospects.

They have been seeking out the Mumbai-based, state-run Nuclear Power Corporation India Ltd (NPCIL) that builds and operates India's nuclear power plants.

``Interest has been shown by companies, including French nuclear power major Areva NP, Atlanta-based GE and Russian nuclear-plant manufacturer Atomstroyexport,'' a director at NPCIL has been quoted to say.

The French, Canadians, Russians and the Japanese have been in talks with the NPCIL, apart from the Americans.

France has been steadfast in backing India at the NSG and signed a nuclear pact in February 2006, which, crucially, did not exclude the transfer of vital fuel reprocessing technology. India and France can start civilian nuclear trade almost immediately.

Areva has been lobbying hard for nuclear related contracts. The Asia-Pacific region has accounted for significant portion of Areva's sales. The company has erected plants in as many as 15 countries, including India.

Projects include construction of two power units (2,000MW total) in China and one power unit of 1,000MW in Iran.

Long-time ally Russia is already helping India build two 1000 Mwe (megawatt electric) light water reactors at Kundakulum in Tamil Nadu. The two countries have negotiated a bilateral agreement to pave the way for focused nuclear cooperation.

Reports suggest that New Delhi and Moscow have ‘informally’ agreed build 5-6 nuclear reactors, which will now be on fast track.

According to federal minister of state for power and commerce, Jairam Ramesh, ``the NSG waiver paves the way for foreign players players. Besides the Russians, we can now also look at Areva more seriously.

The increasingly larger US delegations to India in the recent past have included the Nuclear Energy Institute, the policy arm of the US nuclear-energy industry, the USIBC, GE, Thorium Power, WM Mining Co and the WEC that supplies technology to almost half of the world's operational nuclear power plants.

The chief of the nuclear-power division of GE has met with NPCIL officials and the state controlled Indian Atomic Energy Commission chairman Anil Kakodkar to discuss the possibilities of setting up light-water reactors in India.

New Delhi is also working on amending the Atomic Energy Act to facilitate private-sector participation in nuclear-power production that has so far been the sole fief of government agencies.

Domestic engineering players in India such as Reliance, JSW, Bharat Heavy Electricals Limited (BHEL) and Larsen & Toubro (L&T) are expected to pour in over Rs 1 trillion into the nuclear sector.

Reliance Energy Ltd (REL) has approached the NPCIL with a proposal to set up nuclear-based power projects.

L&T, India’s biggest engineering company, is reportedly planning a-Rs 20 billion venture with NPCIL.

L&T’s senior vice president, MV Kotwal has been quoted to say: “We have the capability to manufacture the main pressure vessels and core equipment for those reactors. But we don’t design those reactors. It is only here that we may need a tie-up.”

L&T has been talking to leading foreign firms for making reactors and nuclear equipment. BHEL is reportedly in talks with Siemens, Alstom, GE and Areva.

Infrastructure group GMR’s Energy head, Raaj Kumar has been quoted to say that the group is in talks with companies in USA, Canada, France and Korea.

Qatar gears up for meeting on nuclear energy
September 10, 2008
The Peninsula

DOHA – After clearing the deck for going in for nuclear power, Qatar is busy preparing to host a major conference on nuclear energy. The two-day MENA Nuclear Energy Forum will be held at the Ritz-Carlton on November 10 and 11.

Leading experts and nominees of political leaderships from various nations in the region have confirmed their participation in the event.

The Nuclear Energy Forum is expected to bring together experts and exchange plans and experience by MENA nuclear energy authorities and the wider global nuclear community. The event is aimed at enhancing the region's developmental goals through peaceful cooperation.

Supported by Qatar Petroleum (QP) and Qatar Science and Technology Park (QSTP), the event will be held under the patronage of HE Abdullah bin Hamad Al Attiya, Deputy Premier and Minister of Energy and Industry, Qatar.

Ambassador John Ritch, Director General, World Nuclear Association (WNA), Dr Adnan Shihab-Eldin, Director, Division for Africa, east Asia and the Pacific, International atomic Energy Agency (IAEA), Dr Akira Omoto, Director, Nuclear Power Division, IAEA, Dr Mahmoud Nasreddine, Arab Atomic Energy Agency (AAEA), Dr Hassan Younes, Minister of Electricity and Energy, Arab Republic of Egypt, Amre Moussa, Secretary General, League of Arab states (LAS), Abdul Rahman al Attiyah, Secretary General, GCC, Dr Tidu Maini, chairman, QSTP, Yousuf Janahi, manager, Corporate Planning and Business Development, Qatar General Electricity and Water Corporation (Kahramaa), Mohammed Al Mahrouqi, Oman, Dr Khaled Toukan, Chairman, Jordan Atomic Energy Commission (JAEC), Dr. Moustafa Bahran, Chairman, National Committee for Atomic Energy (NATEC), Yemen and Seth Grae, president and CEO, Thorium Power are among other prominent figures to attend the event.

Qatar, which is struggling to meet its growing demand for electricity and water, is busy exploring the possibilities of going for nuclear energy. Ever since the six-member GCC announced its decision, in December 2006, to go for nuclear energy for peaceful purposes, Qatar has been actively involved in the initiative.

In July, Jackie Wolcott, US Special Envoy for Nuclear Non-Proliferation, announced in Doha that the US will sign a Memorandum of Understanding (MoU) with Qatar elated to nuclear energy. During her Doha visit, she had also met with officials of the Ministry of Foreign Affairs and the Qatar Foundation (QF).

It's big deal for business
By Nivedita Mukherjee
September 1, 2008
India Today

Bangalore-based Avasarla Technologies Ltd has been supplying products crucial to nuclear power plants in the country like fuel transfer equipment and calandria- a vessel that holds uranium in the reactor core. Now, the growing buzz over the Indo-US nuclear deal has given a new spin to the Rs 160-crore company's business.

Avasarla is gearing up to increase its production capacity multi-fold, in anticipation of the big business orders which will flow in once the deal goes through. On the cards is a possible joint venture with a US-based technology group which will boost the indigenisation of technology for small players like itself.

Avasarla is not the only one to pin hopes on the poster boy of reforms Prime Minister Manmohan Singh and his promise of a new civil nuclear cooperation agreement.

Tata Power, Reliance Power, Jindal Steel, Bharat Heavy Electricals (BHEL), Larsen and Toubro (L & T) and a clutch of smaller players are betting heavily on the deal to pave the way for import of fuel, transfer of technology, and most importantly, private sector partnership in setting up of nuclear power plants in India.

Investments of Rs 1,00,000 crore have poured in amid joint ventures and strategic alliances with Areva, Alstom, Westinghouse, **Thorium Power** and General Electric (GE) for building nuclear power plants, generation of power and upgradation of technology.

Amit Mitra, noted economist and FICCI general secretary, is not exaggerating when he points out the business community's anxiety to see the Indo-US nuke deal go through. "It is a good sign and they have been waiting for long. "

Nuclear power generation has, since 1962, been completely under government control with a role only for Nuclear Power Corporation of India Ltd (NPCIL) or Uranium Corporation of India Ltd (UCIL).

The Atomic Energy Act, 1962 bars private players from the sector even if companies like L & T are capable of setting up a nuclear plant in India. Needless to say, it is these antiquated laws which have kept India's nuclear power generation capacities confined to 3,900 MW.

Provided the gates of international supplies of fuel, equipment, expertise and funds are opened up, the nuclear power capacity can be ramped up to 20,000 MW by 2020 and another 20,000 MW can be added by 2030.

There, of course, is the cost effectiveness, claim companies involved in constructing nuclear plants and supplying nuclear fuel. The per-unit tariff from the plants would be quite cheap. While in the US, it is 2 cents a kilowatt, NPCIL sells it below Re 1 in India.

According to M.V. Kotwal, L & T's senior vice-president, heavy engineering, roughly the cost of putting up a light water reactor- which is what India needs-is Rs 7 crore per

megawatt. "Keeping in mind each reactor of 1,500 MW, that is the kind of money spinner we have. "

Mitra says at least 400 firms would jump on to the nuclear bandwagon to get a share of the $100 billion-plus business, ranging from equipment supply to generation.

American companies hope to capture a sizeable share of the Indian civilian nuclear sector, says Ron Somers, president, US-India Business Council (USIBC). Of course, neither party can do this alone.

The plan requires more than just fuel, so companies are talking to overseas players and Indian PSUs, for everything from equipment to turnkey ability to set up plants. Tie-up talks are in the preliminary stages but the great nuclear tango has begun.

So, while uranium mining major WM Mining has agreed to sell 500 metric tonne uranium a year to India's Nuclear Fuel Complex, Tata Group is likely to partner French major Areva SA that is involved in construction of nuclear plants.

Tata Group companies have done considerable homework for the venture, said Ratan Tata, chairman of the group, while addressing shareholders at the last annual general meeting of Tata Power.

"Tata Power may partner with Areva SA for projects and has aligned with some major nuclear equipment suppliers," Tata said. He added Tata Consulting Engineers Ltd would also be associated with the nuclear sector. "It's not surprising to have Indian companies getting in touch with us," says Julien Duparrey, a spokesperson of Areva.

*The next steps: Operationalisation of 123 Agreement, including exchange of diplomatic notes, and fixing a date when it will come into force, are likely to take four months (up to December 2008).Bilateral agreements for civil nuclear cooperation with other countries to take two months.Amendment of Indian Atomic Energy Act, 1962 for opening up to private companies (which is contingent on the Government deciding on partners) will need parliamentary approval.Enacting Civilian Nuclear Liability Law will take one House session (a month and a half).Acquiring the fuel needed for the pressurised heavy water reactors running at low capacity to take six months to end of next year.Formal accord with the IAEA for safeguards to specifically meet India's nuclear weapons status to take six to seven months.Setting up plants: Fixing sites, acquisition of land and nuclear plant construction to take five years.

Anil Ambani's Reliance Power, which is looking at nuclear energy as another way to boost its presence in the power sector, has also been holding talks with Areva, GE, Russia-based Atomstroy Export for a possible joint venture to manufacture nuclear power reactors.

"Once the necessary legislative changes are enacted, we will develop, in the first phase, 2,000 MW of nuclear power at a cost of Rs 12,000 crore approximately," Ambani said at the 78th AGM of his Anil Dhirubhai Ambani Group.

It is not that Indian companies don't have the know-how but having a tie-up with a foreign expert would go a long way in ramping up their expertise for serving the Indian market better and keeping a door open for exports, explains Kotwal.

L & T is looking at GE, Alstom and Siemens as technology partners even as it cements a Rs 2,000 crore joint venture (JV) with NPCIL to build forging facilities to tap nuclear power sector.

On its part, GE Hitachi Nuclear Energy (GEH), which built the Tarapur units during the 1960s, has gone a step further in sharing with the Government and industry information about its technology offerings and how it might best fit the needs of the Indian nuclear industry.

"Should the agreement eventually be endorsed by the Nuclear Suppliers Group (NSG) and adopted by both countries, GEH would be very interested in the business for new reactors as well as in the services sector, such as providing fuel for existing and new units," says Daniel Nelson of GE Infra.

Domestic majors like National Thermal Power Corporation (NTPC), which aims at 6,000 MW of nuclear power generation by the middle of the 12th Plan, is looking at Thorium Power and Atomstroy Export, a Russian player for technology and fuel, say industry sources.

Among the other nuclear giants, Skoda Power has joined hands with Atomstroy Export to offer technology and expertise for nuclear reactors with turbines from 200 MW to 1,200 MW range.

Westinghouse foresees suppliers from India joining the global supply chain for the Westinghouse AP1000 (TM) nuclear power plants. Robert T. Pearce, director, Global Business Development, Westinghouse Electric Company, says, "We are in dialogue with customers and stakeholders, including potential suppliers, throughout India. "

The JV between BHEL and NPCIL is likely to forge an alliance with French engineering titan Alstom's subsidiary Alstom Projects India Ltd (APIL) to drive its exploration of the various technology options available for steam turbine generator sets with 700MW, 1,000 MW and 1,600MW capacities.

The size of the opportunity is undoubtedly big. Of India's total installed power generation capacity of 1,44,564.97 MW, nuclear energy makes up for a mere 2.9 per cent. Given the high octane energy crisis it is but natural that India will look to diversify its energy portfolio.

Even then it could take 8-10 years for trading in nuclear power to take off after the NSG gives a nod to its members to sell nuclear technology to India. The deal would then have to be passed in the US Congress.

Clearly there is still some distance before nuclear power travels the grids and reaches homes and industrial plants. But there is no denying the potential of the idea and the segment. India Inc is obviously excited and has reason to be.

Once the steps are through, the deal will fuel a host of businesses- from spin-offs in technology transfers that will happen to equipment manufacturing, to erection of plants and, of course, generation-creating opportunities for both small and big enterprises to profit from. And who doesn't get excited by profits.

Expert favours French nuclear technology
By Himendra Mohan Kumar
Gulf News
September 25, 2008

Abu Dhabi: The UAE should choose the French nuclear technology known for its impeccable record on safety and reliability to build the country's own nuclear reactors for electricity generation, a top-ranking expert at a Dubai-based think tank has recommended.

"France generates about 80 per cent of its electricity through nuclear power, their technology is proven and their safety record is extremely high," Mustafa Alani, Director of Security at the Gulf Research Centre, told Gulf News on Thursday.

By the end of the next decade, the UAE is poised to join the ranks of nations generating nuclear power for peaceful purposes. The UAE has already signed memorandums of understanding (MoU) on cooperation in peaceful uses of nuclear energy with the US, UK and France.

US-based Thorium Power, which provides advisory services for emerging nuclear programmes, is advising the UAE on establishing an independent nuclear regulatory agency, the Federal Authority for Nuclear Regulation, which is an international requirement.

"It will take 7-10 years to build a nuclear power station in the UAE. Since an MoU with France on cooperation in nuclear technology is already in place, it will help speed up the whole process. As well, using the French nuclear technology will be politically more acceptable in the Middle East region than using the American technology," said Alani.

Nuclear deal through with NSG waiver
Business Standard
September 7, 2008

India became a class of one and won a major victory in Vienna today when delegates at the 45-nation Nuclear Suppliers' Group (or NSG) finally reached a consensus and approved the Indo-US Civil Nuclear Agreement after almost three days of continuous debate and consultation.

What India needed was a waiver from the NSG to engage in nuclear commerce without signing the Nuclear non-Proliferation treaty (NPT). However, against the background of illegal sale of nuclear technology to countries like DPR Korea, at least three countries said they needed many more assurances from India that it would never conduct a nuclear test again. These countries also wanted assurances that India would not pass on uranium enrichment technologies to other non-signatories of NPT.

Ireland and Austria demanded India amend the draft. Yesterday, Foreign Minister Pranab Mukherjee issued a covering statement (full text on Page 12), which spelt out and emphasised India's voluntary moratorium on testing. However, he said nowhere that India would not test again. This was repeated by Chairman of the Atomic Energy Board, Anil Kakodkar. Mukherjee also stressed India's commitment to non-proliferation but added that as NPT was discriminatory, India would not sign it.

This testament of India's nuclear doctrine appears to have been accepted as India's commitment to non-proliferation. Achieving this cannot have been easy because, as India is not a member of NSG, it was the United States that was doing the heavy lifting for New Delhi.

Understandably, at the end of the day, Prime Minister Manmohan Singh was jubilant. President Bush called him personally to congratulate him, as did the heads of half a dozen countries. Sonia Gandhi feted both him and Pranab Mukherjee. Political sources said that the BJP would repeat that the deal was done in secrecy. But the government has its arguments ready.

Officials told news agencies in Vienna that talks had overcome misgivings expressed by Austria, Ireland and New Zealand. As a result, Saturday's session produced "a total consensus" on the deal, a delegate was quoted as saying.

Earlier in the day, Prime Minister Manmohan Singh held discussions with Pranab Mukherjee and National Security Adviser M K Narayanan. The Prime Minister discussed with Mukherjee and Narayanan reservations expressed by countries like Austria and New Zealand over the draft waiver as well as reported Chinese opposition to the move to grant India the waiver.

Sources said the Indian leadership was a little surprised by the Chinese vehemence late in the NSG discussions last night. It finally left the discussions altogether. India's argument for retaining the option of testing has consistently been that it lives in a rough neighbourhood inhabited by two nuclear powers, China and Pakistan.

For obvious reasons, this annoyed China. The assessment of the Indian political leadership is that without China, the opposition of the other countries – Ireland, New Zealand and Austria – weakened.

Although the ‘concessions’ made by the Indian side to secure the NSG waiver are yet to be made public, a cost benefit analysis suggests India is unlikely to lose much. All that India did was to reiterate its unilateral moratorium on testing: subject to the neighbourhood threat perception remaining at the level it is.

It is an objective reality that it will take another 15 years for India to be in a position to become a net exporter of nuclear and enrichment technology, so concessions made now can always be renegotiated later. Sources said President Bush’s assurances to Congress on testing and exports could curtain India’s maneuverability. But this was a small negotiating sacrifice. “It will help them overcome opposition and say they’ve won,” a source said.

US House approves historic India nuclear deal
AFP
September 27

WASHINGTON (AFP) — The House of Representatives has passed a civilian nuclear pact with India that lifts a three decade-old ban on civilian nuclear trade with India.

The agreement, passed by a 298-117 vote, will now head to the Senate for its vote, but it was unclear if it would be passed before Congress adjourns ahead of the November 4 elections.

Signed by President George W. Bush and Indian Prime Minister Manmohan Singh in July 2005, the deal offers India access to Western technology and cheap atomic energy provided it allows UN nuclear inspections of some of its nuclear facilities.

Bush on Saturday congratulated the House on the vote.

"The passage of this legislation by the House is another major step forward in achieving the transformation of the US-India relationship," he said, urging Senate now to adopt the bill.

But the deal has faced criticism from opponents who argue that India, which first tested an atomic weapon in 1974, is not a signatory of the nuclear Non-Proliferation Treaty (NPT).

Representative Edward Markey, a senior member of the House Energy and Commerce Committee, denounced the vote, saying in a statement: "This is a terrible bill that threatens the future of the global nuclear non-proliferation regime."

And he argued during a late night debate Friday that opposing the bill did not mean opposing India.

"This is a debate about Iran. This is a debate about North Korea, about Pakistan, about Venezuela, about any other country in the world that harbors the goal of acquiring nuclear weapons," he said.

House Speaker Nancy Pelosi sought to allay any lasting concerns, saying the legislation would boost US oversight on any US civilian nuclear assistance to the South Asian nation.

She welcomed the vote saying in a statement that the accord "furthers our countries' strategic relationship while balancing nuclear non-proliferation concerns and India's growing energy needs.

"The legislation recognizes India's past support for non-proliferation initiatives and strengthens congressional oversight of any future US decision to assist India's civilian nuclear program."

Democrat Representative Joseph Crowley said Saturday's vote was a "historic moment."

"We are uniting the world's oldest and the world's largest democracies in an effort to expand peaceful and responsible development of nuclear technology," he said.

The House Foreign Affairs Committee member also recognized "the Indian American community for their incredible advocacy and efforts to educate members of Congress on the importance of this agreement and the US-India relationship."

The agreement had long been stalled in Congress, and on Thursday Bush told the visiting Singh that he was working hard to get it passed as quickly as possible."

New Delhi, which is critically short of energy to fuel its booming economy and its burgeoning population of 1.1 billion people, is looking at investments worth billions of dollars in its power sector.

The draft bill proposed by the White House says: "Civil nuclear cooperation between the US and India pursuant to the agreement will offer major strategic and economic benefits to both countries, including enhanced energy security."

It also promised "an ability to rely more extensively on an environmentally-friendly energy source, greater economic opportunities and more robust non-proliferation efforts."

If the Senate now endorses the agreement it would finally end a three decades-old ban on nuclear trade with India imposed after it carried out its first nuclear test in 1974 and refused to sign the NPT.

But New Delhi, which agreed to open some of its reactors for inspection, now has approval to buy fuel and technology from the International Atomic Energy Agency and the Nuclear Suppliers Group (NSG), which controls global atomic trade.

Washington spearheaded the efforts that led this month in the Vienna-based NSG lifting a global ban on trade with India.

Strategic partnership sealed
By Harish Khare
The Hindu
September 27, 2008

We're working hard to get nuclear deal passed as quickly as possible: Bush

WASHINGTON: Prime Minister Manmohan Singh and President George W. Bush gave one last personal touch to the new "strategic partnership" between India and the United States, even as the two leaders were aware that the civilian nuclear agreement itself remained far from being consummated because of the American legislators' doubts and diversions.

The Prime Minister and his entourage travelled to Washington DC on Thursday afternoon for a three-hour interaction, including a working dinner, with Mr. Bush at the White House.

In their brief statements, made before the media at the Oval Office, the two leaders referred to the trouble the India-U.S. civilian agreement had run into in the U.S. Congress. "It has taken a lot of work on both our parts, a lot of courage on your part, and of course we want the agreement to satisfy you and get it out of our Congress. And so we're working hard to get it passed as quickly as possible," said Mr. Bush.

Dr. Singh, on his part, hoped that the agreement would be approved "in a manner which will be satisfactory from the point of view of both of our countries." But the Prime Minister wanted to put on record his appreciation of Mr. Bush's personal role in the "massive transformation" of the India-U.S. ties, centred on the nuclear agreement.

" ..with regard to civil nuclear energy, I know these are difficult issues, and at each stage it was your leadership, your personal intervention, which resolved all the difficulties that were affecting the progress of these negotiations," acknowledged Dr. Singh.

Later, Foreign Secretary Shivshankar Menon alluded to the difficulties the India-U.S. nuclear deal had run into in the U.S. Congress, both on account of the American pre-occupation with the massive financial crisis and opposition to the deal per se.

Mr. Menon said, "we have to learn as we go along" and that he was not an "astrologer" to predict how the Congressional approval process would work itself out. He, however, did suggest that Secretary of State Condoleezza Rice could visit India soon, possibly in the first week of October, by which time the American Congress would have finished its part.

However, Mr. Menon made it clear now that the NSG waiver was in place; New Delhi was ready to do nuclear business with France and Russia though it would not necessarily mean a disadvantage for the American companies.

"The 123 is an enabling agreement and once it is done, it would allow firms and companies to sit and do the detailed contracts for the supply of the equipment, etc. That

work is going to take a little time. It is not that once 123 is done, contracts would be signed overnight with anybody," Mr. Menon said.

He clarified the commitment made to place orders for 10, 000 MW from American firms: "The commitment to the U.S. is that we will place orders if they are commercially competitive which is the same as our commitment for anyone else."

Report: 350,000 new US jobs from nuclear revival
World Nuclear News
September 23, 2008

Up to 350,000 jobs and $542 billion in GDP could be created over 20 years if the USA embarks on a program of substantial investment in nuclear energy, according to the American Council on Global Nuclear Competitiveness (ACGNC).

In a report prepared for the ACGNC, Oxford Economics studied the economic benefits of a reinvestment program for the US nuclear power industry. The report - entitled *Economic Benefits of Nuclear Energy in the USA* - looked at the economic and employment effects of an investment scheme involving the design, manufacture, construction and operation of 52 new light-water reactors of 1400 MWe capacity each, one new recycling facility (with capacity to process 2500 tonnes of used nuclear fuel annually) and four new enrichment facilities (with a combined annual capacity of 14.3 million separative work units).

This program, the report said, would involve two overlapping phases of work: the 'investment phase' (the construction and manufacture of a new fleet of nuclear reactors, nuclear recycling plants and enrichment plants); and, the 'operation phase' (when the reactors and plants start commercial operation).

According to the report, the total economic benefits of the investment program would be up to $61.5 billion, with $33.6 billion arising during the reactor construction phase, $16.1 billion during the construction of the recycling and enrichment plants, and a further $11.8 billion during the operations phase. The number of jobs created during the reactor construction period would be 268,000, the report estimates, while a further 136,000 jobs would result from the construction of the recycling and enrichment plants. The operation of the reactors and plants would involve an additional 96,000 jobs.

Sea to shining sea

The US states expected to gain the most new jobs from a possible nuclear build program are:

- South Carolina (50,800)
- Texas (47,100)
- Illinois (43,400)
- Florida (29,300)
- California (22,100)
- Pennsylvania (21,500)
- New York (20,800)
- North Carolina (20,700)
- Ohio (20,600)
- Maryland (17,900)
- Arizona (17,300)
- Georgia (15,200)

The report also examines the extent to which each of these benefits are experienced in each US state, firstly according to current planned construction (33 reactors by 2021 in 15 states) and then by an assumed replacement of current capacity involving 19 more reactors by 2025 in a further six states.

"Without the substantal program of new investment," the report says, "the capacity of the US nuclear energy industry will dwindle to zero by 2050. The specific jobs and associated value-added and tax benefits that industry would support will also be lost."

According to the report, a large proportion of the jobs that would be supported by the nuclear investment program are manufacturing jobs in the production of the capital goods necessary to support the nuclear energy industry. "These are high-tech, high-

value-added jobs that reflect high spending on R&D and fixed investment: jobs that the US economy can ill afford to lose." It adds, "Alternative ways of meeting US electricity generation needs would be unlikely to create so many high-value-added manufacturing jobs."

The report notes that maintaining the current level of nuclear generating capacity in the USA would help the country save up to $49 billion annually on fossil fuel imports while reducing US CO_2 emissions by 450 million tonnes per year (compared to a zero-nuclear-generation baseline).

Scott Campbell, president of the ACGNC, commented: "This state-level analysis clearly and powerfully articulates the benefits of building new nuclear infrastructure. A serious program of new nuclear construction offers substantial gains in job creation, GDP growth and greenhouse gas reductions."

The ACGNC is a non-profit organisation that says it seeks the return of American leadership in the world through the emergence of a US-led global nuclear enterprise.

Government steps up call for nuclear power
By Jeremy Lovell
Reuters
September 18, 2008

By Jeremy Lovell

LONDON (Reuters) - Britain will step up its campaign for new nuclear power stations on Thursday, saying they are vital for energy security, climate change and job creation.

Industry minister John Hutton will tell the newly-created Nuclear Development Forum's first meeting that new nuclear power plants are also crucial in preventing power cuts as ageing coal and nuclear plants are progressively shut down.

"I'm determined to press all the buttons to get nuclear built in this country at the earliest opportunity - not only because it's a no-brainer for our energy security, but also because it's good for jobs and our economy," he will say.

"Insecure international sources of energy underline the case for a diverse mix. We are determined to get new nuclear up and running as soon as possible - securing clean low carbon energy and helping to keep the UK's lights on."

The Forum brings together top figures from across the nuclear industry to support and advise the new Office for Nuclear Development in creating the conditions for new nuclear power stations to be built in Britain.

Advocates of nuclear power say it emits no climate changing carbon and reduces reliance on imports of gas from Russia which has proved an unreliable supplier in the past and whose war with Georgia dramatically stretched diplomatic ties with the West.

Opponents reject atomic power as unnecessary and a security risk whose waste remains deadly for thousands of years.

Britain's nuclear power plants provide 19 percent of the country's electricity. However, all but one are due to be closed within 15 years.

The government, which said in 2003 new nuclear plants were unnecessary, changed its mind last year and called for a new fleet to be built with private money.

Earlier this year Prime Minister Gordon Brown said the new fleet must produce more power than the existing plants.

The government is in the process of streamlining the planning system which delayed Britain's newest atomic power plant, Sizewell B, by eight years and added millions of pounds in costs.

Hutton will tell the meeting that growth of a new nuclear industry in Britain could provide up to 100,000 jobs and create a vibrant export trade as the rest of the world starts to wake up to the nuclear call in the face of climate change.

"But we're facing stiff competition for this investment and for the equipment we'll need to build these power stations which is why I'm determined to ensure Britain remains a competitive environment for nuclear investment," he will say.

"I'm calling for a spotlight to be put on the opportunities available to our companies from the UK's and the world's nuclear new build programmes, and make sure they take advantage of it."

China, which is building a coal-fired power plant a week on average to fuel its booming economy, is also embarking on a major nuclear power programme with 24 plants planned and a further 76 proposed.

However, despite the rhetoric from government and expressions of interest from major utilities EDF and E.ON, no firm plans have been submitted in Britain and no new plant is even close to construction.

The nuclear industry is very cagey about the costs of building a new nuclear plant, but most estimates put the figure at around four billion dollars.

Negotiations between the government and the industry are understood to revolve around some sort of price guarantee making it safer for private investors to take the plunge.

High hopes in Brazil
World Nuclear News
September 16, 2008

Angra 3: To be the first of 58 new units? (Image: Eletronuclear)

Brazil's nuclear energy company has submitted a six-reactor plan to government, while ministers talk of building more than one per year until 2050.

Eletronuclear submitted a near-term plan to President Luiz Inácio 'Lula' da Silva last week which said six new reactors of 1000 MWe each were required in addition to the completion of Angra 3.

At present Brazil employs only the two nuclear power units at Angra, giving 1900 MWe, while the completion of the long-stalled Angra 3 would take this to 3120 MWe around 2014.

Looking beyond Angra, Eletronuclear's report said that new sites large enough for six reactors each are to be chosen in the northeast and southeast. The company said the selection process for the northeast site should start next month in order to meet the demands of the National Energy Plan to 2030, which specifies 6000 MWe of nuclear capacity by that date. Eletronuclear projected the completion of the first two northeast reactors in 2019 and 2021, and the southeast ones in 2023 and 2025.

Speaking at the Angra 3 site on 12 September, minister for mines and energy Edison Lobao said four states in the northeast had already expressed interest in hosting a plant: Pernambuco, Alagoas, Sergipe and Bahia.

He went on to say he thought Brazil would need 50 to 60,000 MWe of nuclear capacity by 2050, as compared to the country's current total electricity generating capacity of 100,000 MWe. Achieving that would put Brazil amongst the heaviest users of nuclear

power: The current top three are the USA with 100,599 MWe of nuclear capacity; France with 63,643 MWe; and Japan with 47,577 MWe.

Lobao's said his ambitions for the development of nuclear energy would not be hampered by conditions imposed by anti-nuclear environment minister Carlos Minc. The 60 tough conditions Minc recently set for Eletronuclear as requirements for the completion of Angra 3 did not worry Lobao: "There is not a chance that the plant will not be built as a consequence of these requirements," he said, according to *Brazzil* magazine.

Meanwhile, another development means Lobao's plans for nuclear energy could be further boosted by the time 2050 comes. Brazil has recently gained the support of the European Union for it to join the Iter nuclear fusion project.

The Iter consortium currently consists of China, India, Japan, Russia, South Korea, the USA and the European Union, and is building the world's largest ever fusion reactor at Cadarache in southern France. If experiments at Iter are succesful, it is hoped the first fusion power station - Demo - could begin construction in 2025. After a decade of operation, commercial nuclear fusion power plants could be built by firms from any of the participating nations, which would share the engineering knowledge.

IAEA: Nuclear capacity could double by 2030
World Nuclear News
September 12, 2008

Nuclear power capacity could double by 2030, according to the International Atomic Energy Agency (IAEA). The latest figures predict net growth of at least 100 GWe.

Announcing the publication of the 2008 edition of *Energy, Electricity and Nuclear Power Estimates for the Period up to 2030*, the IAEA said, "Nuclear power, in step with growing global demand for energy, will continue expanding into the next two decades."

The annually-produced publication provides high and low projections on the prospects for nuclear energy worldwide. The low projection assumes that "all nuclear capacity currently under construction or in the development pipeline gets constructed and current policies, such as phase-outs, remain unchanged." The high scenario is based on "government and corporate announcements about longer term plans for nuclear investments, as well as potential new national policies, such as responses to new international environmental agreements to combat climate change."

Under the low scenario, the IAEA said that nuclear generating capacity would increase from the current 372 GWe at an annual average growth rate of 1.3% to 473 GWe in 2030. However, under the high scenario, capacity would double, growing by an average annual rate of 3.3% to 748 GWe in 2030. The projections are higher than those given in the 2007 edition of the publication, which under the low scenario projected capacity of 447 GWe by 2030, and under the high scenario, 691 GWe by 2030.

Hans-Holger Rogner, head of the IAEA's Nuclear Energy Planning and Economics Studies Section, said that rising costs of natural gas and coal, together with energy supply security and environmental constraints, are among the factors contributing to nuclear's growth.

Rogner commented: "The IAEA's higher projection is in step with an anticipated level of 3.2% annual growth in global power generation. In the low projection, overall global electricity annual growth is 1.9% and nuclear's share is projected to drop to about 12.5% by 2030."

From 2007 to 2008 the report says, total global electricity generation rose 4.8% while nuclear power's share dropped to 14% from a nearly steady rate of 16-17% between 1986 and 2005.

Rogner said that new environmental constraints, such as entry-into-force of the Kyoto Protocol and the European carbon trading scheme, mean there is now a real financial benefit to avoiding greenhouse gas emissions, adding to the appeal of low-carbon electricity generation, including nuclear power and renewables.

The complete nuclear power chain - including uranium mining, reactor construction and waste disposal - emits only 3 to 24 grams of carbon dioxide per kilowatt-hour, about the same as wind and hydro power, and well below coal, oil and natural gas, Rogner added.

WNA looks to 2100

In its recently released *Nuclear Century Outlook*, the World Nuclear Association (WNA) has made both optimistic and pessimistic projections on the use of nuclear energy worldwide to 2100. The *Outlook* is built on country-by-country assessments of the ultimate growth potential of national nuclear programs, based on estimates of need and capability.

For 2030, the WNA projects global nuclear generating capacity under the low scenario of 552 GWe, while under the high scenario, 1203 GWe. This increases to 1136 GWe and 3488 GWe, respectively, by 2060. By the end of the century the WNA puts a maximum nuclear capacity of around 11,000 GWe under the high scenario.

Stop talking, start building
World Nuclear News
September 4, 2008

The time is right for a major change in world attitudes to energy - and the world cannot afford to wait before embarking on building the hundreds of new nuclear reactors that will contribute to a secure and clean energy future.

Opening the World Nuclear Association's (WNA's) 33rd Annual Symposium in London, WNA director general John Ritch announced the launch of the *WNA Nuclear Century Outlook*, a projection of where nuclear power could potentially be headed over the course of the century. Built on a country-by-country projection keyed to the years 2030, 2060 and 2100, the *Outlook* presents 'high' and 'low' case scenarios.

The lowest scenario, which predicts a world nuclear capacity of 2000 GWe by 2100, represents a six-fold increase of world nuclear capacity over current levels. "The nuclear renaissance," said Ritch, "is on." The high scenario sees over 11,000 GWe. So far so good - but there is a downside. Even making the most robust assumptions about the growth of renewables and the contribution of carbon sequestration and storage (CCS) technology, the low scenario would leave a huge 'clean energy gap'.

"The *Outlook* underscores that our world has no more time for psychological denial, political timidity, greenwash hypocrisy, environmentalist myth-mongering and technological fantasy"

John Ritch, director general, World Nuclear Association

The high scenario, while ultimately meeting clean energy requirements by 2100, offers "hope but hardly reason for optimism" because a large deficit in low-carbon energy will continue for at least the next 50 years. In facing this challenge, nuclear and renewables should no longer be seen as competitors but as clean energy partners, Ritch said, concluding that "We must act now."

"The *Outlook* underscores that our world has no more time for psychological denial, political timidity, greenwash hypocrisy, environmentalist myth-mongering and technological fantasy," Ritch declared.

The call to action was echoed by US assistant energy secretary Dennis Spurgeon. Speaking in a keynote address to the Symposium, Spurgeon said that he is confident that, as far as the USA is concerned, the nuclear renaissance is imminent. However, energy matters are now on a cusp - growing concerns about energy security and climate change will provide the trigger for a major change in approaches to energy, he said.

Dennis Spurgeon

The substitution of electricity for fossil fuel, with features such as the use of electricity for personal transport coming into the mainstream, would raise the main question of how to

make the most of existing energy resources in the short term, Spurgeon said. Indeed, the USA could use liquid fuel derived from coal to eliminate all of its oil imports - and would need to rely on nuclear energy to do so effectively and efficiently. The technology to convert coal to liquid fuel already exists - the Fischer-Tropsch process - but is very expensive in terms of coal and water. Not only is the process energy hungry, but also relies on coal as the feedstock. The combination of hybrid use of nuclear energy and proven technology to produce liquid fuel from coal cleanly could allow the USA to do this - a win-win situation, bringing widespread economic benefits. US domestic coal resources, used in this way, would be sufficient to last for at least two centuries.

The technology already exists, Spurgeon said, and future technological developments, such as the advent of high temperature gas cooled reactors (HTGRs) that would be even more efficient at producing hydrogen, would of course make it even easier. Some 400 light water reactors, or 250 HTGRs, would be needed to generate the hydrogen for the process. Wind or solar electricity could also contribute to hydrogen generation.

Hydrogen generation and coal conversion notwithstanding, Spurgeon said that to achieve a 50% nuclear share by 2035 the USA would need to build 165 nuclear plants of 1400 MWe - nine per year coming on line from 2016 onwards, a target that is eminently possible, said the Spurgeon, provided adequate capital is made available.

"We have the technology today to make the US energy secure... we can get started now," Spurgeon emphasized. "The era of cheap oil is over. It is time to stop talking and start building."

Making it happen

The companies tasked with delivering the much talked of renaissance are developing strategies to help reach the goal. New approaches to managing nuclear new build programs to lessen the risks attached to such high capital projects, the need for knowledge transfer, embracing technological advances and the need to communicate the manifold benefits of nuclear were amongst the themes addressed by a raft of speakers in a keynote panel.

That the industry must not neglect its existing fleet in the excitement of new build was a warning issued by several speakers, with the continued safe operation of plants an essential part of the picture. Said Raul Deju, Energy Solutions' chief administrative officer: "Both government and industry have roles and responsiblities and we must earn continued confidence and acceptance by the public through safe operation of nuclear power plants."

Most German businesses support nuclear extension
World Nuclear News
September 3, 2008

A survey conducted by the German association of Chambers of Industry and Commerce (DIHK) indicates that almost 80% of businesses are in favour of extending the operating lives of country's nuclear power plants beyond current phase-out dates.

The online survey of more than 1150 businesses (46% in the industrial and construction sector; 21% traders; and 33% in the services sector) was conducted in mid July to gauge the opinion of companies on the country's climate and environmental protection measures.

Neckarwestheim. All German reactors are supposed to shut down by 2015 (Image: EnBW)

The results indicate that businesses view some measures and policy decisions very sceptically, while others are seen more positively. Concerning some issues, the majority of companies were more concerned about how some government moves would affect their competitiveness, rather than how they would help the government attain its climate protection goals. This was particularly true for the government's eco-tax and its toll on trucks.

There was therefore great support for companies to increase energy efficiency, but also to extend the operating lives of the country's nuclear power reactors and for the meaningful use of renewable energy sources.

Almost 80% of companies said that, as a result of the Renewable Energy Law, they consider the impact of higher electricity prices for renewable energies on their businesses as negative or very negative. Currently, about 1% of the cost of electricity (per kilowatt hour) is used for the promotion of renewable energy.

The businesses were asked to select three measures from of list of six that they considered most suitable for the government to meet its climate protection goals. The six options were: extending the lives of nuclear reactors; promoting energy efficiency; increasing the proportion of renewable energy; emissions trading; bans; and ecotaxes. 78.1% of the companies selected the extended use of the country's nuclear power plants as one of their choices, followed by 75.8% calling for energy efficiency and 60.8% wanting the increased use of renewable energy sources.

The DIHK is the central organisation for 80 Chambers of Industry and Commerce across Germany. All German companies with the exception of handicraft businesses, the free professions and farms, are required by law to join a chamber. The DIHK therefore speaks for more than three million enterprises.

The DIHK said that the relocation of German businesses abroad, particularly in the industrial and construction sector, should be regarded as a warning. Using the results of the survey as a pointer, it suggested five measures to improve the situation. These were:

extending the operating lives of nuclear reactors; a wide-ranging waiver auction of emission allowances; a waiver to increase truck tolls; the promotion of energy efficiency consultancy; and strengthening of energy research.

Nuclear power plants generate about one third of Germany's electricity, but a coalition government formed after the 1998 federal election made the policy of phasing out nuclear energy under Green environment minister Jurgen Trittin. Currently, under a 2000 compromise, the operational lives of German power reactors are limited to an average of 32 years, although operators can apply to transfer generation time from lesser to more efficient plants. Two reactors have already been shut down early, and although some generation time has been passed from older to newer plants for economic reasons, the agreement would eventually see all reactors shut down by 2015. Many similar power reactors in other countries are licensed to safely operate for up to 60 years. Now, the new coalition government formed in 2005 led by Angela Merkel is less certain of the inherited phase-out policy.