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ASIAN NUCLEAR ENERGY

Powering Global Nuclear Commerce

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India, Canada Sign Deal to Facilitate Uranium Supply

INSIDE

Westinghouse Electric Company has a proven track record for providing the safest, most advanced and cost-effective technologies for the commercial nuclear power industry. Our research and technology is the basis for nearly half of the world's operating nuclear power plants, and we continue to make investments in new technology and processes that will take safety to even higher levels.

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In This Issue

ASIAN NUCLEAR ENERGY
Powering Global Nuclear Commerce

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Editor: B.K. Sinha

EDITORIAL

Dear Reader,

One of the fundamental rules of nuclear non-proliferation has been an agreement among supplier nations not to engage in nuclear commerce with states that have not been granted the International Atomic Energy Agency's seal of approval by accepting "full scope safeguards" on all of their nuclear facilities.

The other question that pops up is with what is the hidden agenda of these nuclear power or nuclear industries. It's a paradoxical situation, because on one hand you don't want countries to go nuclear, but at the same time, those who go nuclear become a big potential for you to sell nuclear know how and material to those same nations. Because India is not a party to the Nuclear Non-Proliferation Treaty and has not signed the Comprehensive Test Ban Treaty, New Delhi has no constraints on testing nuclear weapons and is free to pursue the production of fissile material for its nuclear stockpile. Eleven of India's fifteen nuclear reactors are not safeguarded.

The Nuclear Suppliers Group was established in 1974 after New Delhi conducted a "peaceful nuclear explosion." It now consists of 45 nations that are committed not to contribute to proliferation by means of nuclear exports. The United States was the first nation to subscribe to the full-scope safeguards rule in 1978, and has worked tirelessly to convince other members of this club to accept it.

The other issue that oscillates like a pendulum is the question of nuclear safety. Just to get more business and profits; are you ready to put your citizens at risk? Some NSG members have helped construct civilian nuclear power plants in states that have troubling proliferation records, on the basis that NSG provisions allow for the completion of agreements and contracts entered into before these suppliers joined the club. On this basis, China is helping Pakistan, and Russia is helping India to construct nuclear power plants. Russia is also helping Iran to complete the nuclear complex on the grounds that Tehran has accepted full-scope safeguards and because special precautions will be taken to prevent Iran from using this complex to produce nuclear weapons. When completed, all of these nuclear power plants are to be under IAEA safeguards.

The nuclear power industries in the United States, France, Russia, China, and other supplier states would welcome the relaxation of export controls and India definitely is a better business case with a better track record. Deciding on a case-by-case basis is a tricky business because potential suppliers are likely to reach self-interested judgments on future cases, and because relaxing the rules in one case could set an unwelcome precedent for others.

The Indian Opposition party BJP is also debating, that the limits set for compensation and cut-off for claims are not good enough and that the basic liabilities are not taken care of. It needs to be analysed whether the right to recourse offered to operators of nuclear power plants under section 17 was being wrongfully circumscribed by the rules in order to provide relief to US suppliers.

But one thing is for sure, there are hardly any nation where energy is not an issue, and considering green options for energy... nuclear though not easily accessible is one of the few choices one can opt for. So Nuclear proliferation or no nuclear proliferation, Nuclear Commerce is here to stay!

Satya Swaroop

Managing Editor

India, Canada Sign Deal to Facilitate Uranium Supply

The prime ministers of Canada and India have finalised a deal that will allow a nuclear cooperation agreement signed over two years ago to be implemented, opening the door for trade worth millions of dollars between the two countries.

Canadian Prime Minister Stephen Harper and Indian Prime Minister Manmohan Singh announced the conclusion of negotiations on the administrative agreement, through which the 2010 nuclear cooperation agreement will be implemented, during a visit by Harper to India in November 2012.

Together, the two agreements will allow Canadian firms to export and import controlled nuclear materials, equipment and technology to and from India to facilities which are under International Atomic Energy Agency (IAEA) safeguards. The cooperation agreement provides assurances that Canadian-origin nuclear material, equipment and technology will only be used for civilian and peaceful applications.

India, which has ambitious nuclear energy expansion plans but limited uranium resources, represents a vast potential market for Canada's uranium. However, its nuclear weapons program and its status outside the international Nuclear Non-Proliferation Treaty (NPT) effectively isolated India from international nuclear trade for over three decades, until an agreement with the Nuclear Suppliers Group in September 2008 exempted it from prohibition. Although not a signatory of the NPT, India now has its own safeguards agreement with the IAEA.

In a joint statement, the two prime ministers reiterated their shared commitment to a world without nuclear weapons and reaffirmed their support for global non-proliferation efforts. Canada acknowledged India's strong non-proliferation credentials and expressed support for India's ongoing engagement with multilateral export control regimes.

In the same statement, Singh and Harper also recognized that "Canada, with its large and high-quality reserves of uranium, could become an important supplier to India's nuclear power program". Harper went on to say that he expected that the

arrangement would generate billions of dollars in new business contracts and generate employment opportunities in Canada.

The agreement will establish a new Canadian-Indian joint committee to ensure ongoing discussions and information sharing, covering areas including research and development, safety, and next generation nuclear facilities. The agreement will also ensure that Canada receives assurances that any exports to India are used for peaceful purposes.

The administrative agreement must now be formally signed by the Canadian Nuclear Safety Commission (CNSC) and India's Department of Atomic Energy, after which the two governments will be able to bring the nuclear cooperation into force. CNSC president Michael Binder expressed his delight at the successful conclusion of negotiation, which he described as an important milestone.

Brad Wall, Premier of the Canadian province of Sasketchewan where the country's uranium production is centred, also applauded his Prime Minister for the deal. "This is great news for Saskatchewan and our robust uranium industry," he said, describing Saskatchewan's uranium producers as "excited and ready" to supply uranium to India. ■

Nuclear cooperation ought to be a launch pad for India-Australia ties

The Kangaroos Offer Nuclear Power to the Tigers

Foreshowing a new chapter in bilateral relations, the decision of India and Australia to enter into civil nuclear energy cooperation is a significant step forward. The statement, which came during Australian Prime Minister Julia Gillard's recent visit to New Delhi, marks a significant departure from the past. It was only last year that Gillard's Labour Party overturned a long-standing ban on selling uranium to India. While the actual supply of nuclear fuel will have to await the end of negotiations on a safeguards agreement, the move is an implicit recognition of India's solid non-proliferation record, as well as its role as a key regional player. Besides, the nuclear issue had held up the leveraging of several complementarities that the two countries share. With this out of the way, bilateral ties are bound to receive a fresh boost.

For, the India-Australia relationship ought to be about much more than uranium. Areas of cooperation range from maritime security and clean energy technology to education and agriculture. India remains a significant source of migration for Australia, and Canberra's efforts towards tackling hate crimes against Indian students in that country have been well received. The whole focus is to emphasize on the people-to-people ties. Australia is one of the few countries that remained unaffected by the global economic downturn and notched up impressive growth despite it. Nevertheless Australia's booming mining sector, growth in other sectors such as scientific and technical services, and finance and insurance demonstrate strong economic fundamentals. This further strengthens the logic for bilateral economic cooperation between New Delhi and Canberra. Taken together, India-Australia relations ought to be a crucial component of New Delhi's strategic Look East policy.

The Australian state of Queensland lifted a 23-year ban on mining uranium on Monday, following a push by Australian Prime Minister Julia Gillard to reach an accord to export supplies to energy-hungry India. It's important to note that Australia, doesn't have any nuclear power plants, but is one of the world's top exporters of uranium.

Australia has signalled it will end its block on exports. India needs uranium for its expanding civil nuclear powerprogramme

"The Prime Minister Julia Gillard has just been in India selling the benefits of Australian-produced uranium to India, prompting many in the community to ask about the industry's potential in Queensland," Newman said in a statement.

Australia, which mined 7,529 tonnes of uranium in fiscal 2011/12, worth A$782 million, according to government figures, has until now refused to sell nuclear material to India because it is not a signatory of the Nuclear Non-Proliferation Treaty.

With 40 percent of the world's known uranium reserves, it supplies only 20 percent of the global market. Sales to India would open up a new frontier at a time when the global nuclear industry is still reeling from the fallout of the Fukushima nuclear reactor disaster in Japan last year.

"The first thing we can expect is an increase in uranium exploration expenditure in Queensland, but mining is probably still a few years away yet because there has been no prospect of mining until today," said Michael Angwin, president of the Australian Uranium Association.

Uranium prices have fallen since the Fukushima disaster with some countries questioning the safety and viability of nuclear energy. Uranium sells for $43.50 a pound UX-U3O8-SPT, compared with the February 2011 average spot price of $69.63.

The 46-nation Nuclear Suppliers Group, which includes Australia and the United States, waived a three-decade ban on exports to India in 2008 after agreeing assurances that New Delhi would not put any such nuclear trade to military use.

Australia is not only Cricket for Indians anymore, the nuclear ties is going to stay a long way. ■

US N-Firms Optimistic about Obama's Continued Support

The US nuclear energy industry appears confident that President Barack Obama's second term in the White House will oversee a continued central role for the nuclear industry at the heart of the country's energy policies.

Martin Fertel, president and CEO of the Washington-based Nuclear Energy Institute (NEI), has said that Obama had explicitly mentioned in his comprehensive economic plan "the need for a significant contribution from nuclear energy to achieve the administration's goals."

“President Obama had spoken of "the need to expand domestic energy production and implement a cohesive national energy policy during his second term," Fertel said, and that "low-carbon nuclear energy facilities must be a key part of this new electricity generation mix for the nation to successfully achieve its economic and environmental goals."

Fertel said that despite a slowly recovering economy, the US Department of Energy was predicting a 21 percent growth in electricity demand by 2030, requiring the equivalent of more than 200 large power plants and this would have to include nuclear facilities. "Energy security and national security are intertwined and neither should ever be a partisan issue," he said.

During the election campaign, the views of both Obama and his rival Mitt Romney were consistent with respect to nuclear energy, "which echoes in large part the bipartisan support that long has prevailed in Congress and among all Americans," Fertel said.

According to the NEI, the US nuclear industry hopes and expects several issues to be addressed by the new administration when it takes office in 2013. In a recent report, the NEI said that in a comparison of five leading nuclear supplier nations "the US export control regime places (US companies) at a serious disadvantage next to their competitors in the international export market."

The analysis, conducted by the law firm Pillsbury Winthrop Shaw Pittman, said the US system was "more complex and difficult to navigate, evidenced by the division of export licensing and authorization powers among four agencies versus one or two at the most in the other nations." It contained added restrictions and legal and bureaucratic hurdles that exceeded international norms, concluding that the US was "significantly less efficient in processing export licences."

In August, Fertel was a joint-signatory to a letter to Hilary Clinton, the current Secretary of State, urging the Obama administration to "pursue a pragmatic approach" towards international nuclear energy cooperation agreements, noting concern that "if the US insists that countries forswear uranium enrichment and reprocessing as a condition for a US nuclear cooperation agreement, most countries would refrain from concluding such agreements with the US and would turn instead to other nuclear energy suppliers."

Fertel said that the coming years would bring challenges on energy policy but the nuclear energy industry was confident that these challenges could be met "and that nuclear energy facilities will play a key role in bringing about a brighter, stronger future for our nation." ■

Nuclear Commerce Equals more Proliferation?

Nuclear Proliferation Treaty… My Food, Your Poison!

One of the prime rules of nuclear non-proliferation has been a treaty among supplier nations not to engage in nuclear commerce with states that have not been granted the International Atomic Energy Agency's seal of approval by accepting "full scope safeguards" on all of their nuclear facilities.

What it also means is, more nuclear commerce would increase material stocks that could be used for nuclear proliferation and nuclear terrorism. The relaxation of existing international regulations for nuclear commerce would also mean that when the Non-Proliferation Treaty and the norms, institutions, and agreements that back it up are under heavy pressure.

Most nations who have not signed NPT, would see it as "My Food,Your Poison" kind of strategy. What results is that I have tested, geared by nuclear armoury and proven my might and now I don't want other nations to do that. So everyone wants to show their might and nuclear tag makes the country feel they are the super power.

The Treaty on the Non-Proliferation of Nuclear Weapons, also Nuclear Non-Proliferation Treaty (NPT or NNPT) is a treaty to limit the spread (proliferation) of nuclear weapons. The treaty came into force on 5 March 1970, and currently there are more than 185 states party to the treaty, five of which are the permanent members of the UN Security Council, namely the United States, Russia, the United Kingdom, France and China.

Four non-parties to the treaty are known or believed to possess nuclear weapons: India, Pakistan and North Korea have openly tested and declared that they possess nuclear weapons, while Israel has had a policy of opacity regarding its own nuclear weapons program.

Because India is not a party to the Nuclear Non-Proliferation Treaty and has not signed the Comprehensive Test Ban Treaty, New Delhi has no constraints on testing nuclear weapons and is free to

pursue the production of fissile material for its nuclear stockpile. Eleven of India's fifteen nuclear reactors are not safeguarded.

On the other hand, India is an energy deficit nation and cannot survive without new sources of energy. With regards to trade, and now with President Obama winning the elections for 2nd term, US and Indian national security interests overlap in many key areas, and there is widespread support in the United States to broaden and deepen US ties with India.

The India growth story is good for both countries, and India cannot survive with energy deficit, and requires new sources of energy. Moreover, global warming is a significant problem that warrants far more serious remedies than have been contemplated to date. Properly safeguarded nuclear power has clear advantages over other means of making electricity that spoil the atmosphere.

The nuclear power industries in the United States, France, Russia, China, and other supplier states would welcome the relaxation of export controls. India definitely can make a far better case than Pakistan and Iran for becoming an exception to the existing rules of nuclear commerce, but exceptions can quickly become the new rule. Deciding on a case-by-case basis is a tricky business because potential suppliers are likely to reach self-interested judgments on future cases, and because relaxing the rules in one case could set an unwelcome precedent for others.

The two most widely valued barriers against proliferation are a complete end to nuclear testing and

a verified termination of fissile material production for nuclear weapons. At present, the United States and India are not excited about both of these steps to stop proliferation.

Issue here is not whether, but how the United States and India will broaden and deepen their strategic partnership. A relaxation of the international rules for nuclear commerce could do more harm than good unless President Obama and Prime Minister in Waiting in India can implement good ideas to strengthen global norms against proliferation. So what do they have in mind to prevent a bad situation from becoming worse? Whichever Government comes to Power in India…looking at Nuclear energy is a need and not an option anymore.

Considering the global state of economy, nations who want to go nuclear would like to have hold on the nuclear uranium and nuclear power industries would like to supply the raw material, the equipment, the know how or have a presence in these nations. But the challenge is on how these nations are going to control over the supply, and ensure that the same will not be used for any nuclear weaponry program. This is the issue of proliferation.

Also in future, when other nations who want to go nuclear for their own reasons, in long run, once you go nuclear, these Nuclear Power Industry nations, would convince their own countries to do business with the new nuclear nations, that is when the world will become a nuclear bomb. ■

Author: Ramdas Shenoy, Ramdas is Vice President Marketing & Business Excellence at GIBSS. In the past has held leadership positions in Tata Power Subsidiaries, and has contributed in major mainline and trade publications in technology and energy domain.

India, Ukraine Sign Pact on N-Safety & Co-operation

An agreement between India's Atomic Energy Regulatory Board (AERB) and the State Nuclear Regulatory Inspectorate of Ukraine has been signed for exchange of technical information and co-operation on nuclear safety and radiation protection.

The agreement was signed in New Delhi on 10 December 2012 by AERB Chairman Satinder Singh Bajaj and the Head of Ukrainian Nuclear Regulator Ms. Olema A Mykolaichuk in the presence of Prime Minister Manmohan Singh and the visiting Ukranian President Viktor Yanukovych.

The Agreement will allow both sides to cooperate in a structured bilateral format. The agreement envisages cooperation in some very important regulatory activities, including legislative regulations, safety guides and technical criteria on nuclear safety; siting, design, construction, operation, decommissioning of nuclear facilities; waste management and environment impact, assessment methodologies and procedures; reports on operating experience; exchange of information on research and development programmes; joint working meetings and training, seminars etc. Among other areas, the two organisations have common interest in regulation of nuclear power plants with VVER type reactors, two units of which are coming up at Kudankulam in Tamil Nadu. ■

Dr. Patrick Moore

Patrick Moore Advocates Strong Forestry Programme

India Holds Huge Potential for Geothermal Power

Noted environmentalist *Patrick Moore* believes that geothermal power could provide an answer to power-starved India as it is cost-effective in the long run compared to solar and wind power. In an exclusive interview with *Virendra Bhargava* of Asian Nuclear Energy, Moore, who was in Mumbai recently, talks about the urgency to preserve and protect forest wealth in India. Excerpts.

You have done a lot of work on geothermal systems. You are also involved with a firm making geothermal heat pumps for residential heating and cooling using renewable earth energy. To what extent the geothermal systems can help India to bridge the gap in power generation, especially to meet the needs of remote areas?

Geothermal systems are more useful in temperate climates. In tropical climates they are more efficient as air conditioning systems to make it cool in the room. They are more efficient than the air conditioning systems but the latter are cheap comparatively. Because for geo thermal, you have to drill or dig the ground. So geothermal is more expensive to install. But in the long-run, it is cost-effective, because it uses less energy, to produce the same amount of comfort. It certainly has an application. I am not an expert on the tropical applications of geothermal heat pumps. Making heat pumps more efficient is a very important aspect of engineering. I have said, for example, that nuclear energy is one of the pinnacles of human technology achievements. Heat pumps are probably in the top five or ten of them. Because every refractory, every freezer, every air conditioner, every geo thermal system needs a heat pump, using the same technology, in order to move heat from one place to another. It is a very powerful technology.

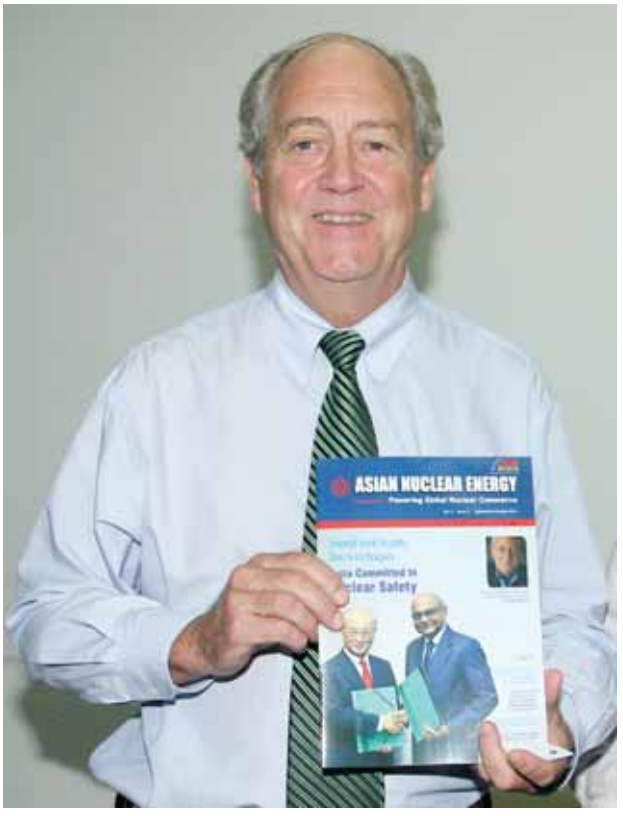
So, it can be applicable in India and can be popularized in this country. Especially its being cost-effective compared to solar power and also wind power.

Yes. I believe it is applicable in India. In terms of its being cost-effective, there is no comparison. My belief is that the geothermal heat pump technology in general applied for heating, cooling hot water is more important than solar and wind combined. The future of precision energy use as a technology is more important than both combined. As a matter of fact, I agree with the man who said to me that solar energy is a wealth-destroying technology. You spend so much money, you get so little energy. And it is not reliable. You could have spent that money on something better.

Like geothermal systems...

Yes, or nuclear power.

Surprisingly, the geothermal systems have not



been popular in India. Is there any particular reason for it?

Probably because they are being used in northern China, where there is a heating requirement, because you need both more efficient heating and cooling. I don't think you need too much heating in India.

In northern India, winters are getting colder. In Delhi and the northern parts, closer to the Himalayan regions, temperature is touching almost zero degree in winters.

Yes, in these places, you will have a good application of geothermal energy.

In most of the villages in the Himalayan region or the remote north eastern region could opt for geothermal energy. Actually, someone has to promote this concept.

In Sweden for example, 90 percent of the new residential construction is with geothermal heat pumps. In Austria and Finland, it is like 50 percent. So it shows that it has more to do with promotion, attitude and culture. It is not about what works and what does not work. It is about the choices made.

Apart from energy, that second issue that I would like you to talk about is forests. India has Immense forest wealth. But it is not looked after well. It is being destroyed wantonly and sometime by default. The concluding sentence in one of your speeches is, may the forest be with you... What is you advise to build public awareness about protecting forest wealth in India?

First, it is very important to have a good system of national parks and protected forest areas, for biodiversity, wildlife, birds, water and plants, etc. Also there should be large areas of land, managed for timber production. Wood can be used for energy, wood can be used for building. My policy is very clear. Grow more trees and use more wood. The environmental movement, the green movement, is saying stop cutting trees. This way we use more concrete and more plastic and use more energy, which is not renewable, while trees are renewable. So, for the environmental movement to be against the world's most important renewable resource, is stupid. But this is the case. China has actually a very strong forestry programme. They have created more new forests in China in the last 25 to 30 years than all the rest of the world together, in terms of reforesting land that was destroyed by overuse and unsustainable practices. They are now putting trees back. They will eventually use those trees. And that we should be doing. We should be increasing the forests and increasing the number of trees. When you grow trees you will be improving the habitat and wildlife. You clean the water, you clean the air; it is good to have trees. This is another reason why intensive agricultural production is important to grow more food and increase productivity. That is why, generic science, chemicals and technology are important in agriculture. Because, the less land you use for agriculture, the more land you will have for trees and for forests.

China is ahead of India in this regard. Perhaps, India will catch up with China in 10 years, since the heat is on. Now, another thing I would like to talk to you is the issue of ocean pollution.

In general, oceans are quite healthy from a pollution point of view. Overfishing is actually one of the biggest problems. That is why I am a strong supporter of aquaculture. For me, not taking out everything is a better approach. And today, in fact, nearly 50 percent of all our sea food is from aquaculture; a big increase, only in the last 30 years. And that trend should continue and we should be taking pressure away from water, You have to place the aquaculture correctly, you cannot put too many aqua farms. There is a thing called poly culture, where you grow sea weed, to absorb the nutrients coming from the shrimp and fish, so that we can have recycling of the nutrients. But the truth is if the shrimp farmer or the fish farmer makes the water poisonous, all the shrimp and fish will die. So the fish farmer must keep the water clean. ■

IEA Prunes N-Energy Growth Forecast

Global nuclear generating capacity will reach some 580 GWe in 2035, according to the latest edition of the World Energy Outlook from the International Energy Agency (IEA). This is 10 percent less than the IEA forecast a year ago.

Launching the World Energy Outlook 2012, the IEA said that its New Policies Scenario - its central scenario - shows that "several fundamental trends persist: energy demand and CO2 emissions rise even higher; energy market dynamics are increasingly determined by emerging economies; fossil fuels remain the dominant energy sources; and providing universal energy access to the world's poor countries continues to be an elusive goal."

The IEA expects global energy demand to increase from 12,380 million tonnes oil equivalent (toe) in 2010 to 16,730 million toe in 2035. China will account for the largest share of this growth, with its demand rising 60% by 2035, followed by India and the Middle East. Energy demand in the OECD in 2035 is expected to be just 3% higher than in 2010. Demand for oil, gas and coal is likely to grow in absolute terms up to 2035, but their combined share of the global energy mix falls from 81% to 75% between 2010 and 2035.

The IEA expects global demand for electricity to grow over 70% by 2035 to almost 36,637 TWh - over half of this growth will be from China and India alone. It noted that coal "remains the backbone of generation globally, particularly outside the OECD, but its share of the mix is eroded from two-fifths to one-third."

Renewables are set "become the world's second-largest source of power generation by 2015 and close in on coal as the primary source by 2035," the IEA suggests. Renewables' share of electricity generation will grow from 20% in 2010 to 31% by 2035. However, this rapid increase "hinges critically on continued subsidies."

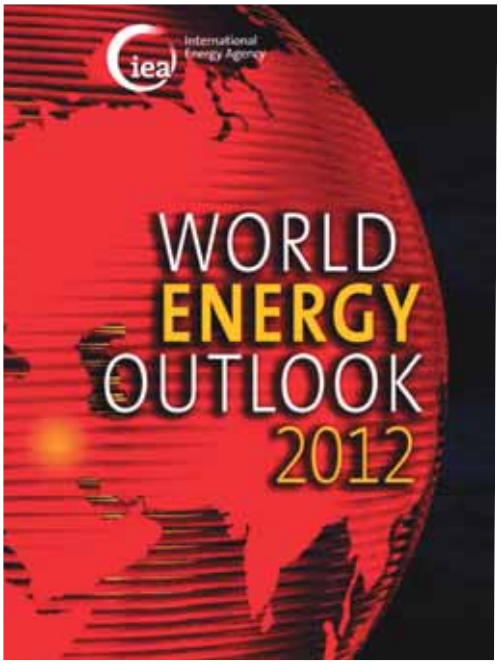
Unsustainable path

According to the IEA, energy-related CO2 emissions will increase from an estimated 31.2 gigatonnes (Gt) in 2011 to 37.0 Gt in 2035, pointing to a long-term average temperature increase of 3.6°C.

"Taking all new developments and policies into account, the world is still failing to put the global energy system onto a more sustainable path," the agency said. This is highlighted by a 30% increase in fossil fuel subsidies to $523 billion in 2011. IEA chief economist Fatih Birol said that the world is "going in the wrong direction on climate change," which has "slipped off the policy radar."

Nuclear Energy Outlook

The World Energy Outlook notes that, while "ambitions for nuclear have been scaled back" by some countries following the Fukushima accident in Japan, capacity is still projected to rise, led by China, Korea, India and Russia.



Asked about the nuclear phase-out in Japan, Birol expressed concern that higher energy prices would hamper the country's competitiveness. He also emphasized that restricting global warming to 2°C or less could not be achieved without nuclear.

World nuclear capacity, according to the IEA, will reach some 580 GWe in 2035 - about 50 GWe lower than last year's projection. Production will grow from 2756 TWh in 2010 to about 4370 TWh in 2035, an increase of almost 60%. Correspondingly, the share of nuclear in total generation falls from 13% to 12%.

Changing Global Energy Map

According to the IEA, the USA will become the top oil-producing country by 2017, while Iraq will account for almost half of all new oil production to 2035.

Meanwhile, several countries - including Japan, China, and the USA - have recently passed legislation aimed at improving their energy efficiency.

IEA Executive Director Maria van der Hoeven said: "This year's World Energy Outlook shows that by 2035, we can achieve energy savings equivalent to nearly a fifth of global demand in 2010." ■

Blend of Nuclear & Hydro Systems Help Cut C-Emission

The most sustainable national power systems in the world combine nuclear with hydro for mass low-carbon generation, a World Energy Council study shows.

WEC's Energy Sustainability index compared 90 countries in terms of the so-called trilemma that every government faces in setting its energy policy: balancing the needs for energy supply to be reliable, socially equitable and environmentally acceptable.

Ten countries were highlighted as achieving the best solutions and therefore having the most sustainable national systems. These were: Sweden, Switzerland, Canada, Norway, Finland, New Zealand, Denmark, Japan, France and Austria. All of them use low-carbon sources for a large portion of their electricity.

For this report, WEC said it decided not to include the nuclear shutdowns and ongoing policy uncertainty in Japan that came as repercussions of last year's Fukushima accident, implying that the share of electricity previously supplied by nuclear still counted in its considerations of that country.

On that basis, six of the top 10 are able to use large hydro for over 30 percent of their power (Sweden, Switzerland, Canada, Norway, New Zealand and Austria), while five use nuclear to that extent: Sweden, Switzerland, Finland, Japan and France. The top three countries - Sweden, Switzerland and Canada - use large amounts of both nuclear and hydro, while Austria is 68% powered by hydro; France 75% by nuclear, complimented by 15% hydro; and Denmark 29% by wind with its exports complimented by nuclear imports that mean 10% of power comes from nuclear plants in Sweden.

“Get real"

The executive chair of the report, Joan MacNaughton, said that while using a larger share of low-carbon sources would help a country's sustainability score, "What distinguishes these countries from the others is that they have more effective and coherent policies.”

Pierre Gadonneix, the chair of WEC, said, "What makes the difference is how they set their final goals, how they balance market economics and public policies, and how they design the smartest policies in order to promote efficiency and to optimise costs, resources and investments for the long term.”

"If we are to have any chance of delivering sustainable energy for all and meeting the +2°C goal, we need to get real."

Noting that it takes cooperation from government and industry to achieve a good energy system, Mark Robson of consultants Oliver Wyman that compiled the report said "businesses must be assured that the economics of their investments won't be destroyed by changes in energy policy. This policy risk is a key factor holding back energy investments today."

Self-declared environmental leader Germany just missed out on a place in WEC's top 10 dropping one place to 11th and facing criticism for "weak" environmental performance due to high carbon intensity, particularly in its electricity sector. In 2009 it called nuclear energy a 'bridge technology' that could to bide time for other low-carbon sources to mature, encouraging utilities to invest in upgrades to older plants. This policy was abruptly reversed in 2011 when eight older reactors were shut overnight to satisfy public opinion after the Fukushima accident. The impact on German utilites has been huge, counting thousands of job losses, a multi-billion euro lawsuit against the government and their withdrawal from overseas nuclear investment due to the impact on their balance sheets.

Also in 2011, policymakers in Switzerland decided to stop using nuclear power by 2034, forcing utilities to scrap plans for new reactors. Swiss leaders, however, are yet to devise a way to replace nuclear's 40% contribution when it is not possible to increase hydro and while gas and wind are both unpopular with voters.

While Japan remained among the leaders noted by this report, it was considered without the ramifications of the Fukushima nuclear accident. These include the prolonged shutdown of 48 of 50 operational reactors and a corresponding huge increase in fossil fuel imports with associated carbon emissions. Policy, too, is in flux, with the cabinet relegating much-vaunted strategy to end the use of nuclear by 2040 to the status of a 'reference document'. The country will hold a general election in in the middle of this month and the incoming administration will have to balance the public's desire to use less nuclear energy with the country's economic needs.

Next step for nuclear robotics 21 November 2012

Robots have been useful in surveying dangerous areas of the Fukushima Daiichi nuclear power plant, but a walking robot revealed by Toshiba today promises to undertake more complex tasks in future.

The new robot, known only as 'the tetrapod robot', can avoid obstacles, deal with uneven surfaces and climb stairs, enabling it to reach places in dangerous environments out of reach for current wheeled or tracked robots. It stands about waist-high and weighs 65 kilograms, carrying a dosimeter and main camera of its own as well as a secondary camera deployable into small spaces via a folding arm. In addition to on-board equipment, the robot can carry up to 20 kilograms and it is powered by a battery that lasts up to two hours.

Tokyo Electric Power Company has used robots several times to survey the contaminated reactor buildings at the Fukushima Daiichi nuclear power plant. In April, for example, a tracked robot completed a circuit of the torus room deep within the reactor building of unit 2. This two-hour operation, in an area too radioactive to send workers, returned images that confirmed the basic integrity of the torus and ended speculation that it had ruptured during the accident.

Toshiba said research will continue with the aim of developing future models that can "position and install shielding, stop flows of water and remove obstacles" as well as conduct surveys. ■

Work Begins on Three Chinese N-Reactor Projects

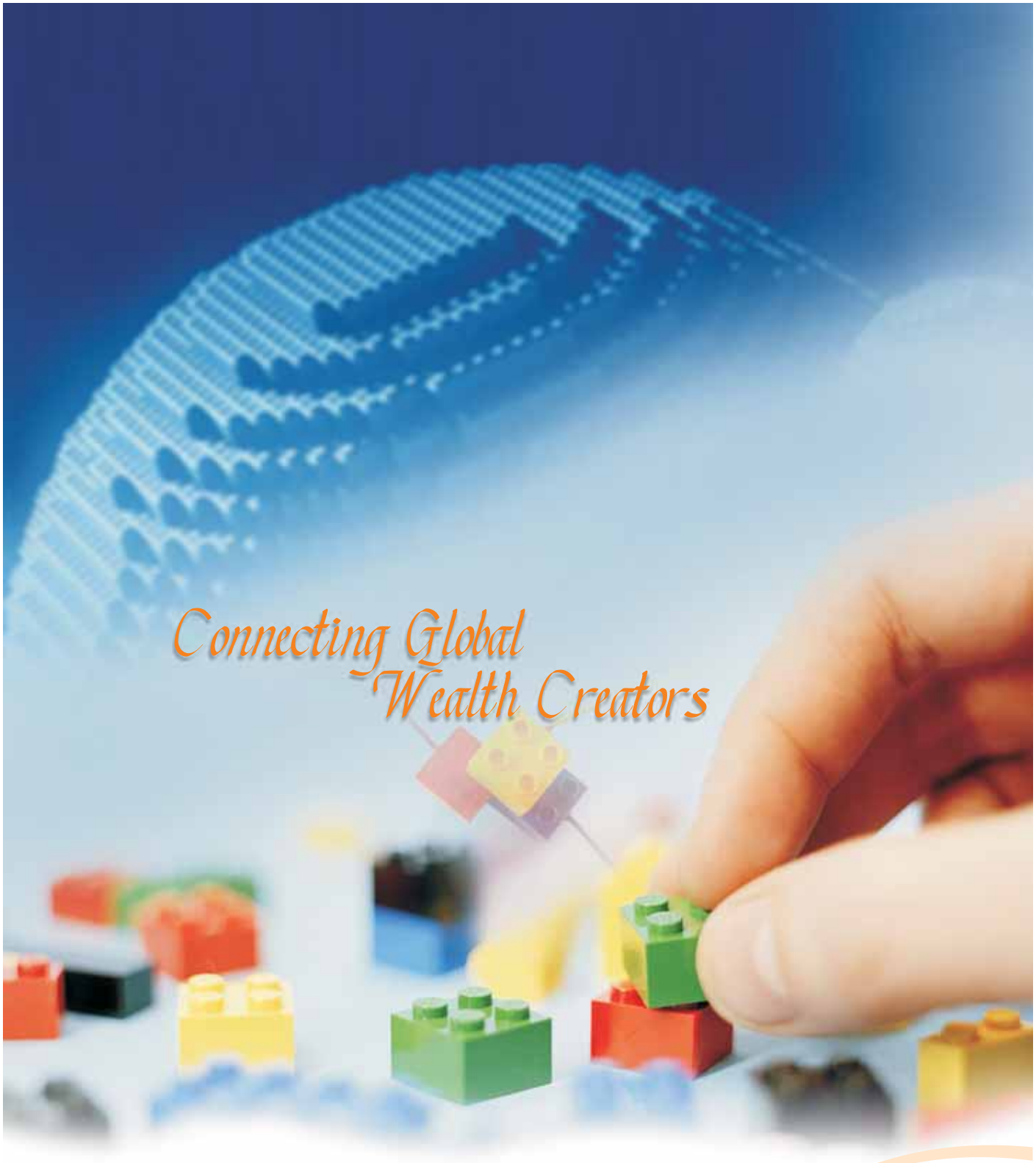
Construction of three new Chinese reactors has started since the country's announcement in October that it would approve only a 'small number' of projects in each of the coming five years. First concrete has now been poured for Fuqing unit 4 in Fujian province and Yangjiang unit 4 in Guangdong province - both 1080 MWe CPR-1000 units. In addition, construction of the Shandong Shidaowan HTR-PM project - a demonstration high-temperature gas-cooled reactor - has also started in Shandong province.

Just days after the Fukushima accident in Japan in March 2011, China's State Council decided to halt approvals and licensing for new reactors until a safety plan was in place and there was assurance that existing plants were adequately designed, sited, protected and managed. It also suspended work on four approved units - Fuqing units 4, 5 and 6, and Yangjiang unit 4 - due to start construction in 2011. The Shandong Shidaowan HTR-PM project, although ready for first concrete, was also delayed. Power generation continued at reactors in operation at the time, as did construction of the 25 units then approved. Two of those have since been completed and come into operation, bringing China's total number of operating nuclear power reactors to 15.

However, on 24 October 2012, Premier Wen Jiabao announced that China will "steadily return to normal construction" of new nuclear power plants, based on a

"steady advance in an orderly manner". Officially covering the period 2011-15, the 12th Five Year Plan will call for a "small number" of nuclear projects to be approved each year after full discussion.

It is understood that only coastal sites will be approved in the 12th plan period, meaning significant rescheduling for inland projects at Taohuajiang, Xianning and Pengze, which had previously been expected to start construction before 2015. The new construction starts bring the total under construction in China to 29 units with a combined capacity of 30,000 Mwe. ■



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Reports of Monazite Exports from India Denied

Reports of private companies being allowed to export millions of tonnes of monazite used in the production of thorium have been denied by the Indian nuclear authorities.

The coastal region of peninsular India contains economically important minerals such as garnet, ilmenite, leucoxene, monazite, rutile, sillimanite and zircon, commonly known as beach sand minerals. Of these, monazite is defined as a 'prescribed substance' under the Atomic Energy Act, 1962,

The Atomic Minerals Directorate for Exploration and Research (AMD) of the Department of Atomic Energy (DAE) has carried out extensive surveys along the coastal region of the country to assess the distribution of beach sand minerals, including monazite. A licence from DAE is necessary for exporting monazite. Violation of this provision is a cognisable offence and is punishable with imprisonment up to five years and fine.

DAE has not issued any licence to any private entity either for mining of monazite or for its downstream processing for extracting thorium, or the export of either monazite or thorium. Export of beach sand minerals other than monazite, falls under Open General Licence and does not require any authorization from DAE.

Since the other beach sand minerals and monazite (which contains thorium) occur together, companies handling beach sand minerals have to get a licence under the Atomic Energy (Radiation Protection) Rules 2004 from the Atomic Energy Regulatory Board (AERB). As per the licensing conditions, the licencee, after separating the beach sand minerals

has to dispose of the tailings, which contain monazite, within its company premises or as backfill, depending on the monazite content. These institutions are under strict regulatory control. They send quarterly reports to AERB stating the amount of tailings disposed of safely either in the premises or as backfill. Inspectors from AERB survey these areas to ensure that the licensing conditions are met. Export of monazite without a licence from AERB is a violation of the Atomic Energy (Radiation Protection) Rules 2004.

Indian Rare Earths Limited (IREL), a wholly owned Public Sector Undertaking of the Government of India (GOI) under DAE, is the only entity which has been permitted to produce and process monazite, and handle it for domestic use as well as for export.

Apart from thorium, monazite contains rare earths too. On account of its radio-activity and other characteristics, extracting rare earths from monazite is commercially not attractive, unless mixed rare earths have to be separated as a by-product following extraction of thorium.

The annual requirement of thorium-oxide for the 300 MWe Indian Advanced Heavy Water Reactor will be about five tonnes, with a one-time requirement of less than sixty tonnes (which should remain nearly the same, even if power was increased) for the initial core.

The information available in IAEA documents, about the national nuclear programmes of different countries, does not give any indication that any country, other than India, is planning significant use of thorium either in the reactors currently under operation or in those being considered for deployment in the near future. Hence, it is unlikely that there is a demand overseas for large amounts of thorium. ■

Japan to end Nuclear Energy regime

Only the Wearer knows where the Shoe Pinches!

Who will understand the wrath of nuclear energy better than the Japanese population? Whether it was the Hiroshima disaster or the tragedy at the Fukushima plant in 2011, they have seen it all.

Looking at all this, Japan has decided to end its reliance on nuclear power by 2040.The move to close all 50 of the country's functioning reactors by around 2040 marks a dramatic change of course by a country that had previously championed atomic energy, putting Japan alongside Germany and Switzerland, which also turned away from nuclear power following the disaster.

Japan, the world's third biggest user of nuclear power before the disaster, had planned to increase nuclear's share of the energy mix to more than half of its requirements by 2030. But the country's affection to nuclear power was severely weakened after the Fukushima accident sent radioactive materials into the ocean and atmosphere, contaminated the food and water supply, and forced the evacuation of 160,000 residents. This led the Government into a dizzy state, where it felt it could not risk the life of its citizens.

Based on facing the reality of this grave accident and by learning lessons from the accident, the government has taken a brave step to review the national energy strategy from scratch. One of the key columns of the new strategy is to achieve a society that does not depend on nuclear energy as soon as possible.

The decision came after two months of public consultations and the largest anti-nuclear protests Japan has ever seen. Resident media reports said the cabinet had already agreed to approve the panel's recommendation, with a formal announcement expected soon.

The plan entitled for renewable energy to comprise about 30% of Japan's future energy mix – an eightfold rise from 2010 levels – and the development of sustainable ways to use fossil fuels.

In the immediate, however, the move will force Japan to increase its already heavy dependence on oil and natural gas, calling into question its ability to reach internationally agreed CO2 emissions targets.

There is an approach to create a new future and it's more practical. The report says Japan should aim to reduce greenhouse gas emissions by about 20% from 1990 levels and to reduce energy consumption through greater efficiency by about 10% from 2010 levels.

Environmental campaigners welcomed the decision, but felt the phase-out should have come much earlier. "The government's strategy involves a nuclear phase-out nearly two decades later than needed," said Kazue

Suzuki, Greenpeace Japan nuclear campaigner. "It also provides clarity for the business community that renewable power, not nuclear, is the future.

For a long time now Japan's political leaders have ignored their people and gambled the health, safety and economic stability of every citizen on nuclear power, and as the people of Fukushima lingers to suffer, so does the rest of the Country.

With lot of investments already gone, it would be difficult to shift to renewables and the bigger challenge would be how to minimise the environmental impact of greater fossil fuel use.

When a Country like Japan, feels its incapability towards pulling on its nuclear energy program, because of safety issues, the question therefore is whether they will actually be able to do so? So to move out of a nuclear regime to a non-nuclear one, is going to be an extremely difficult challenge.

However it also needs a political will to have a no-nuclear policy. Japan was briefly without nuclear power earlier this year after all 50 working reactors were closed for safety checks. No restarts were permitted until the reactors passed stress tests introduced in the wake of the Fukushima crisis and gained the approval of local authorities.

The move away from nuclear has caused concern among Japan's buddies. Japan provides nuclear technology expertise to companies in the US, while France and Britain, which reprocess its spent nuclear fuel, have sought assurances that it will continue to accept high-level radioactive waste created by reprocessing.

Japan has come under sustained pressure from business leaders not to abandon nuclear, amid warnings that power shortfalls and the high cost of renewables could stifle production and derail attempts to kick-start the country's export-led economy.

But some analysts feel that a shift to renewables could benefit the economy. A total exit from nuclear is positive for the economy, on balance; it incentivises Japan's political economy to focus on efficiency and renewables. Japan lags in both these areas and they offer the greatest opportunities for growth.

The phase-out will be achieved by retiring reactors, which were built between the early 1970s and 2006, when they reach the end of an agreed 40-year life span. However, that some could be restarted before they are closed permanently provided their safety is confirmed by a new regulatory body.

Until the total phase-out happens Japan will only have to use nuclear reactors that are confirmed safe. ■

By New Media, Business Analyst

The Disappearing Market for Nuclear Electricity

MENAI BRIDGE, (Source-PRNewswire)

By the time any new nuclear power station could be built in the UK (2020 or later), the market for its electricity will be disappearing-because of explosive growth in photovoltaics (PV) and because consumers will be able to buy electricity from anywhere in Europe. This is one of the conclusions of a report by the Energy Fair group.

The falling cost of photovoltaics (PV) will lead to a booming market for solar panels, generating large amounts of power during the day when the demand for electricity is greatest. And there will be stiff competition from wind power and other renewables that work at night.

The likely completion of the European internal market for electricity and strengthening of the European transmission grid will enable consumers, including large commercial and industrial consumers, to buy their electricity from anywhere in Europe.

“The disappearing market for nuclear electricity means that there is absolutely no case for subsidising nuclear power with 'contracts for difference' or any other subsidy," said Dr Gerry Wolff of Energy Fair. "If the Government presses on with that policy, we may be saddled with expensive nuclear white elephants that will be paid for by consumers for 25 years or more. This would be worse than the PFI fiasco or the debacle of the West Coast Main Line." ■

Green PAKISTAN …Nuclear Energy an Option?

Climate Change and Pakistan's Energy options.

Despite drawing international consideration in the past two years to its increased vulnerability to climate change, Pakistan allocated a meagre 135 million Pakistani rupees (US$ 1.43 million) to its climate change ministry – a fraction of the US$ 416 million given to the atomic energy.

Pakistan's 44 per cent hike in outlay for atomic energy in its 2012–2013 budget contrasts with a massive drop in funds for crop research and overshadows a much smaller hike in overall allocation for science. Experts are of the opinion that this allocation is dismal and such low budgetary allocations reflect the inconsiderateness of the policy makers towards climate change issues of the country.

Pakistan's ministry of science and technology, which oversees 16 research and development institutes, received a 12.58 per cent raise, up from US$ 12.19 million in the previous year to US$ 13.94 million. Agriculture research has received a paltry US$ 5.26 million to boost overall output of the crop, livestock, horticulture, fisheries and dairy sectors. This is a 90 per cent drop from US$ 54.26 million in last year's budget, mainly due to the devolution of the original agriculture ministry into provincial ministries in 2011.

The relatively low 13 per cent hike in the science and technology ministry's funds has left science ministry unhappy, where the expectations were US1.07 billion USD (one per cent of the GDP) in budgetary funds for S&T promotion, but with the paltry allocations it is going to be hard for them to achieve advancement in research and S&T fields..

As of now the Pakistan's present electricity supply deficit averages about 3000 megawatts, which is probably enough to power about 3 million households in Pakistan. This lack exacts a high toll on the Pakistani people, particularly in the summer when temperatures can exceed 115 degrees. The more insidious effects of Pakistan's electric shortfalls are economic.

The country now finds itself in a catch 22: the declining economy limits large investments in new or rehabilitated electric generation capacity, but won't register histrionic improvement without more and consistent electricity. Pakistan's ability to meet its energy requirements on its own is constrained by the relatively poor quality of its coal, the uncertainty of its monsoon put questions on its hydroelectric power and add to this a monsoon climate, and the political and security challenges of tapping effectively the natural gas reserves in its Baluchistan province.

The other challenge is the western world doesn't believe or show faith in Pakistan, in terms of fear of Pakistan using nuclear infrastructure for nuclear arsenal than for energy. As one element of a long-term strategy for energy diversity, nuclear power makes sense for Pakistan, as it does for many states. But whether it can solve Pakistan's current energy needs is definitely a question?

With the addition of 300 MW from Chashma 2 to the grid, Pakistan now produces 725 MW of nuclear power, about 2.4 percent of the current installed capacity. It plans to increase nuclear power production and to that end Pakistan signed commercial contracts with China in 2009 for the construction of two more nuclear power plants at the Chashma site. Each of these reactors will produce 325 MW, but they will not be completed until about 2016 at the earliest. It is notable that the reactors are first-generation designs that

lack modern safety features and which China no longer builds for its own country. Pakistan thus far has a very good nuclear safety record, but a newer design would be preferable.

If Pakistan's electricity deficit remains relatively constant over this period -- a reasonable assumption given Pakistan's stagnant economy -- these two additional reactors will only close the supply deficit by about 20 percent. To make a real and significant dent in Pakistan's electricity shortage, much larger reactors would be needed. Pakistan's pursuit of nuclear power on this scale, however, currently faces very tough political and economic obstacles that make it highly impractical.

The Challenge

The toughest challenges are political. The United States, France, the United Kingdom and others have balked at Pakistani requests for nuclear cooperation and for good reason. First, such an agreement would be difficult, if not impossible, to sell to their legislatures. In the United States, for instance, there is no backing for a nuclear agreement with Pakistan given negative perceptions of its proliferation record, growing nuclear arsenal, and alleged on-going support for militant groups that have killed American soldiers in Afghanistan. The killing of Osama bin Laden has made this worse to the extent Americans suspect collusion by Pakistani security forces. Second, an agreement would require the Nuclear Suppliers Group (NSG) -- the 46 nuclear supplier states which set guidelines for nuclear trade -- to make an exemption to its rules, which currently do not permit nuclear supply to Pakistan.

China's 2009 nuclear contract with Pakistan is patchy with these rules, but China argues the reactors are originated in because the original contract dates from before China joined the NSG. It is the only state currently willing to sell nuclear reactors to Pakistan. The NSG participating governments barely supported the U.S. effort to garner an exemption for India, despite the high interest of nuclear industry in India's market. A similar effort for Pakistan, which would have to pass by consent, at this point would have little support except from China.

The economic arguments against nuclear power are well rehearsed -- nuclear reactors are matchlessly expensive, take many years to build, and must operate for long periods in order to be cost effective. Pakistan is short on both cash and credit. Its 2009 agreement with China featured a discounted price for the two reactors and very concessionary loan rates, terms that no other state or reactor vendor would offer. In fact, it is

doubtful that any major reactor vendors would be willing to accept the political and financial risk involved with a project in Pakistan given its internal insecurity. And there is simply not a large enough nuclear market in Pakistan to interest international nuclear industries enough to lobby their governments to cut a deal.

Nevertheless the need for more immediate options to increase electricity generation, Pakistan remains committed to nuclear power. In fact, Fukushima did not seem to dampen Pakistani officials' enthusiasm, despite safety concerns. They remain on the offensive in search of a civil nuclear deal analogous to that negotiated with India beginning in 2005. Given the obstacles to more widespread adoption of nuclear power described here, Pakistan's interest has to be considered more symbolic than practical.

Rehabilitating Pakistan's electricity transmission and distribution system to increase efficiency, rebuilding or replacing aging turbines at hydroelectric facilities, and incorporating combined cycle systems into new thermal electric generation facilities are three ways in which Pakistan could increase available electricity in the short run. None of these potential options face as thorny political and economic obstacles as nuclear power. And, given global nuclear safety concerns, all of these options are inherently safer than operating more first-generation nuclear reactors. Symbolic investment in nuclear power does not serve the near-term interests of the Pakistani people.

For Pakistan…They definitely need power; whether it can be nuclear? That is the question. ■

By Staff Reporter

Lanka fears about safety of India's nuclear plants

Complaints to International Watchdog about India's Nuclear Plants

Sri Lanka has expressed concern over possible impact of radiation from India's nuclear power plants located in the southern region. The official raising of concern with the IAEA was to be made in September, Sri Lanka's Power and Energy Minister Champika Ranawaka said.

"We respect the right of India to have nuclear power stations. But our concerns are on the possible radiation affects they could have on Sri Lanka. We have already written a letter", Ranawaka said. The minister also said that Sri Lanka's concerns stem from disasters such as Chernobyl and Fukushima and that the country would work towards achieving guarantees of safety. Sri Lankan energy officials say at least three nuclear plants are located on the southern coast of Tamil Nadu which is separated from the island by a narrow strip of sea.

The minister said the IAEA had proposed that a mutual agreement on the matter should be reached between the two countries. "We have sent a proposal to India through the External Affairs Ministry and the Indians have sent back a note on the matter," he was quoted as saying by Colombo Page. According to Ranawaka, the Indian government has sent a proposal to commence a broad based discussion while Sri Lanka wants only to discuss and reach an agreement on a disaster mitigating programme in the event of a nuclear disaster in the South Indian plants, the paper said. Sri Lanka has no nuclear power plants but is just 20 kilometres away from Indian mainland at the closest point.

Taken aback by what it describes as "propaganda" in Sri Lanka against the Kudankulam nuclear power plant, India has offered to discuss the safety aspect of the pressurized water reactors with Lankan authorities. The dialogue mechanism between the two nations for cooperation on nuclear issues will include talks on Kudankulam safety when a Sri Lankan committee visits India later this year.

"The safety aspect will be a part of the broader agenda for talks over cooperation in nuclear energy but we are already telling them that India will abide by all international conventions over nuclear safety at Kudankulam," said an official dealing with Sri Lanka.

The Kudankulam nuclear plant in India's Southern coast is just 250 km from Sri Lanka's northwest coastal town of Mannar. Sri Lanka Atomic Energy Authority does not possess adequate facilities to face a threat of nuclear accident.

Although the government in Sri Lanka has not raised any objection to the reactors, the Indian establishment in Colombo has been stunned by a spate of reports in the local media — in the run-up to loading of fuel in the first unit at Kudankulam - about how these reactors were going to adversely impact the them. Earlier this week, the Indian high commission issued a clarification saying that safety measures instituted at the plant were of the highest order.

"India is party to the Convention on Nuclear Safety (1994), Convention on Early Notification of a Nuclear Accident (1986), and the Convention on Assistance in the case of a Nuclear Accident or Radiological Emergency and is fully aware of, and complies with, its obligations under these conventions," it said.

"The Kudankulam Nuclear Power Plant is a state-of-

the-art plant that is compliant with the highest safety standards available in the nuclear industry today," it added.

In the last week of September India issued a statement as follows.

It bears repetition that the Government of India assigns utmost attention to nuclear and radiation safety, including the safety of operating personnel, public as well as the environment. The principle of 'safety being the overriding priority' encompasses the entire gamut of activities associated with nuclear power plants, ranging from sitting, design, construction, commissioning, and operation to de-commissioning. Testing to demonstrate the adequacy of each system and the plant as a whole by actual performance tests to meet the design intent is carried out well before commencing operation of the plant. The Atomic Energy Regulatory Board reviews the operational limits and conditions for various system parameters and approves them before operationalizing the plant, to ensure safe operation.

All nuclear power plant sites in India are capable of managing the radioactive wastes generated at these sites. Each of them has adequate facilities for handling, treatment and disposal of such waste, in line with international standards. The establishment and verification of appropriate emergency response plans is a mandatory prerequisite for all nuclear power plants in India. The preparedness of the agencies involved is verified through periodic exercises.

The National Disaster Management Authority has drawn up a holistic and integrated program for 'Management of Nuclear and Radiological Emergencies'. India is party to the Convention on Nuclear Safety (1994), Convention on Early Notification of a Nuclear Accident (1986), and the Convention on Assistance in the case of a Nuclear Accident or Radiological Emergency and is fully aware of, and complies with, its obligations under these conventions. The Kudankulam Nuclear Power Plant is a state-of-the-art plant that is compliant with the highest safety standards available in the nuclear industry today. The safety measures instituted at the plant are of the highest order. India and Sri Lanka have an on-going dialogue on cooperation in the area of nuclear energy, including in the areas of isotope hydrology, radio-tracer studies and dam safety. A Sri Lankan delegation is scheduled to visit India in the coming months to discuss these and other areas of potential cooperation, including the area of safety. The relevant issues are being addressed in the spirit of close and friendly relations existing between India and Sri Lanka. ■

Madras atomic plant to reach rated capacity in six months

With the supply of fuel likely to improve in six months, the Madras Atomic Power Station's (MAPS) two atomic power reactors would be able to achieve their rated capacity, said a senior official. "We are now generating 350 MW (first unit 180 MW, second unit 170 MW). There is no shortage of fuel for this level of power generation. In six months' time, we hope the fuel supply position to improve so that both the units can operate at their optimum capacity which is 220 MW each," T J Kotteeswaran, station director told IANS. The two pressurized heavy water reactors (PHWR) of MPAS, belonging to the Nuclear Power Corporation of India Ltd (NPCIL), are located at Kalpakkam, around 70 km from here. Kotteeswaran said fuel supplies are expected to improve next year from the uranium mine in Tumalapalli in Andhra Pradesh. According to him, the difference between the generation and the two reactors' rated capacity is just 90 MW which could be easily bridged. Meanwhile, MAPS will shut down its second unit for around 35 days for bi-annual maintenance. "We plan to shut down the second unit sometime next Jan/Feb for bi-annual maintenance. Certain things have to be done only when the reactor is shut down," Kotteeswaran added. ■

Nuclear Accidents in India… is Safety Being Neglected?

Are Indian Citizens at Risk?

Nuclear establishment in India is known for its secrecy and the people, by and large, know little about how the functioning of nuclear activities. In the absence of an independent safety regulation body, people fear the safety standards are actually not very high in India. Following is a list of accidents that is known in the public domain.

The catastrophe is nuclear accidents are not like traditional industrial accidents and its effects on human kind can be far and dangerous, the problem is the side effects can pass on to generations, where many of the harm it can do to living beings are irreversible. For an energy starved nation, nuclear energy is one of the biggest options but at the same time being a nuclear power puts an added onus on both the Government and the strategic thinkers on whether nuclear energy can put its citizens at risk for need of energy or display its nuclear power.

Some of the nuclear accidents that were reported in media and research studies

April 2010 In a bizarre radiological accident in New Delhi, the improper disposal of a derelict gamma-ray research device at the University of Delhi found its way to a scrap market in West Delhi and resulted in the death of a scrap-metal worker. It was owned by the University since 1968, but unused since 1985, and was sold to a scrap dealer in Feb 2010. Scrap workers dismantled and cut it into pieces unaware of the hazardous nature of the device. Eight were hospitalized where later, one died of exposure.

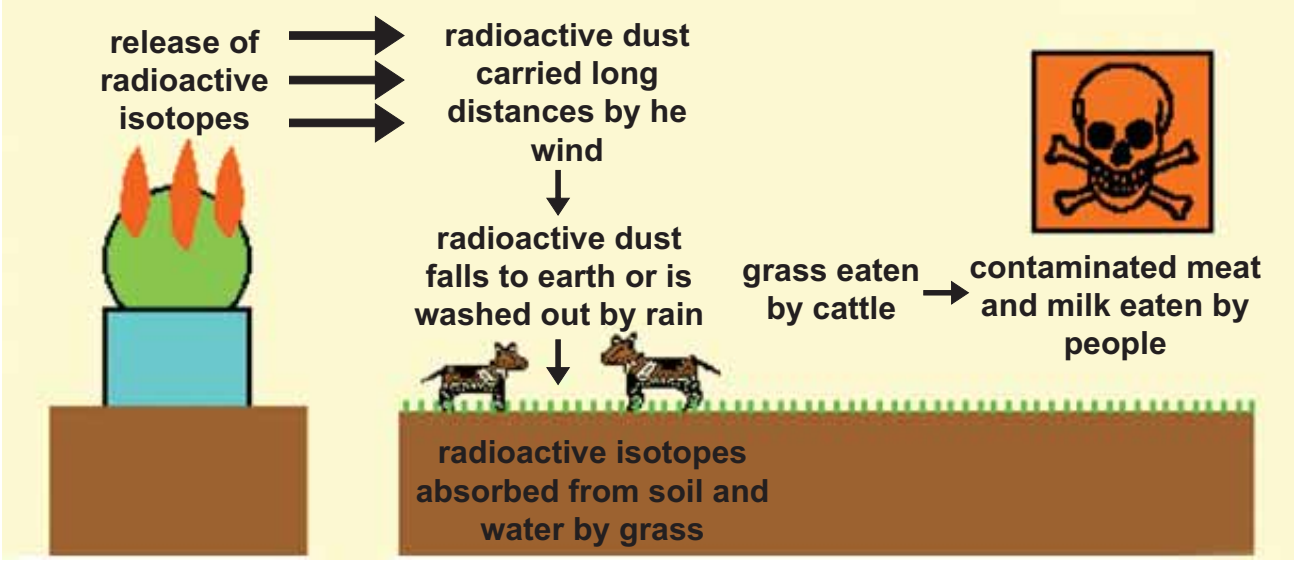
November 2009 Fifty-five employees consume radioactive material after tritiated water finds its way into the drinking water cooler in Kaiga Generating Station. The NPCIL attributes the incident to "an insider's mischief".

April 2003 Six tonnes leak of heavy water at reactor II of the Narora Atomic Power Station (NAPS) in Uttar Pradesh, indicating safety measures have not been improved from the leak at the same reactor three years previously.

January 2003 Failure of a valve in the Kalpakkam Atomic Reprocessing Plant in Tamil Nadu results in the release of high-level waste, exposing six workers to high doses of radiation. The leaking area of the plant had no radiation monitors or mechanisms to detect valve failure, which may have prevented the employees' exposure. A safety committee had previously recommended that the plant be shut down. The management blames the "over enthusiasm" of the workers.

May 2002 Tritiated water leaks from a downgraded heavy water storage tank at the tank farm of Rajasthan Atomic Power Station (RAPS) 1&2 into a common dyke area. Substantial amount of radioactivity was released into the environment.

November 2001 A leak of 1.4 tonnes of heavy water at the NAPS I reactor, resulting in one worker receiving



heavy dose of internal radiation.

April 2000 Leak of about seven tonnes of heavy water from the moderator system at NAPS Unit II. Various workers involved in the clean-up rereceived 'significant uptakes of tritium', although only one had a radiation dose over the recommended annual limit.

March 1999 Somewhere between four and fourteen tonnes of heavy water leaks from the pipes at Madras Atomic Power Station (MAPS) at Kalpakkam, Tamil Nadu, during a test process. The pipes have a history of cracks and vibration problems. Forty-two people were reportedly involved in mopping up the radioactive liquid.

February 1994 Helium gas and heavy water leak in Unit 1 of RAPS. The plant was shut down until

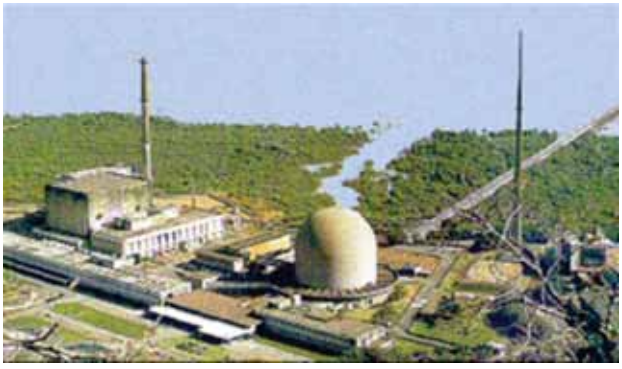
March 1997. March 1993 Two blades of the turbine in NAPS Unit I break of, slicing through other blades and indirectly causing a raging fire, which catches onto leaked oil and spreads through the turbine building.

The smoke sensors fail to detect the fire, which is only noticed once workers see the flames. It causes a blackout in the plant, including the shutdown of the secondary cooling systems, and power is not restored for seventeen hours. In the meantime, operators have to manually activate the primary shutdown system. They also climb onto the roof to open valves to slow the reactions in the core by hand. The incident was rated as a Level 3 on the International Nuclear Event Scale, INES.

May 1992 Tube leak causes a radioactive release of 12 Curies of radioactivity from Tarapur Atomic Power Station.

January 1992 Four tons of heavy water spilt at RAPS.

December 1991A leak from pipelines in the vicinity of CIRUS and Dhruva research reactors at the Bhabha Atomic Research Centre (BARC) in Trombay, Maharashtra, results in severe Cs-137 soil contamination of thousands of times the acceptable limit. Local vegetation was also found to be contaminated, though contract workers digging to the leaking pipeline were reportedly not tested for



radiation exposure, despite the evidence of their high dose.

July 1991 A contracted laborer mistakenly paints the walls of RAPS with heavy water before applying a coat of whitewash. He also washed his paintbrush, face and hands in the deuterated and tritiatedwater, and has not been traced since.

March 1991 Heavy water leak at MAPS takes four days to clean up

The question that must be asked, is whether India is willing to compromise on its laws and the safety and rights of its citizens to shield the business interests of reactor suppliers

In 2010, under pressure from multinational nuclear suppliers, Dr. Manmohan Singh government pushed through a law to protect them from the consequences of a nuclear accident. The law makes it impossible for victims to sue the supplier, even for an accident that results from a design defect. Liability is effectively transferred to the Indian taxpayer, first to the public sector Nuclear Power Corporation of India Ltd. (NPCIL) and then the government. Even this is capped at a maximum of Rs.2,500 crore and victims need not be compensated for any additional damage.

However, the law also includes a clause that, unde rcertain circumstances, allows the NPCIL, although not the victims, to sue the supplier and recoup the money it has paid out. It is this relatively minor clause that nuclear suppliers, and their friends in the Indian

establishment, have been railing against for the past two years.

The Russian Deputy Prime Minister warned India, on his recent visit, that if the Russian company Atomstroyexport (a subsidiary of Rosatom) was forced to obey this law, then the cost of power from the Kudankulam third and fourth reactors would go up. He must have been hoping that no one would tryand square this threat with earlier claims of safety made about these plants.

In a paper, published by "Nuclear Engineering and Design" in 2006, three NPCIL officials claimed that, in any given year, the probability of a severe accident at these plants was one in 10 million. If Atomstroyexport can persuade insurers that this figure is correct, then to obtain cover even for accidents where the highest possible liability of Rs.2,500 crore is applicable, it would need to pay a premium of only about Rs.2,500 per year. For the 1,000 MW Kudankulam reactors, operating at an 80 per cent load factor, this should lead to an increase in tariff of about a third of a millionth of a rupee per unit!

This absurdly low figure arises because both the factors in the calculation earlier make little sense. As preliminary data from Fukushima shows, a nuclear accident can cause economic damage that is more than a hundred times larger than the artificial cap on liability in the Indian law. Moreover, empirical evidence — in a total of about 15,000 reactor-years of operation, there have been several "core-damage" accidents including Fukushima, Chernobyl and Three-Mile Island — suggests that the probability of severe accidents is about a thousand times higher than what the industry claims.

Suppliers have successfully wielded their influence in other countries to avoid economic liability for accidents. Their argument that the Indian law will lead to cost escalations is meant to veil the real reason for their worry: the law sets a bad precedent and, in the future, either in India itself or in another country, it may lead to a more rational law centred on victims rather than the industry. In such a law, there would be no cap on liability, and suppliers would be held jointly responsible with the operator for paying out damages.

In fact, the Supreme Court has already admitted a petition, by the lawyer Prashant Bhushan, requesting precisely these changes in the law. Making the operator and supplier share liability is not only fair but crucial from the point of view of safety.

Design and accidents

Apart from the untenable claim about higher tariffs, nuclear suppliers and the Indian government have made other disingenuous arguments to get rid of the clause on supplier liability. One of them is that the law is hurting India's domestic manufacturers, some of whom are involved in supplying small parts of the plant.

In general, as in other industries, exposing all manufacturers along the supply chain to tort claims helps make them more conscious of safety and quality. Manufacturers who are supplying parts to a hazardous industry need to be more careful about reliability.

Nevertheless, the law does not, as such, prevent the NPCIL from signing subcontracts that indemnify smaller suppliers along the chain. The NPCIL's problem is that it is politically infeasible to extend this indemnity to the manufacturer of the plant itself, as it discovered when it tried to provide blanket indemnity to Atomstroy export for the Kudankulam third and fourth units.

Industry on Indian law

The nuclear industry also argues that India's current law is out of sync with international conventions on nuclear liability. This is a poor argument because these conventions were all drafted under pressure from nuclear manufacturers who, historically, were in a stronger position than they are now. In the early days of nuclear power, American suppliers exploited this to impose the idea that liability should be channelled to the operator. Later, suppliers from other countries also adopted this self-serving argument.

Until recently, the United States itself never joined any international liability convention, because under its domestic law, victims retain the right to sue suppliers. Economic compensation is channelled through a complicated insurance system, but manufacturers can be found legally liable and this has consequences.

In 1997, the U.S. engineered the Convention on Supplementary Compensation for Nuclear Damage (CSC), with a special rider for itself. When Bush communicated the convention to the U.S. Senate for ratification, he emphasised that "The United States in particular benefits from a grandfather clause that allows it to join the convention without being required to change certain aspects of the Price-Anderson system that would otherwise be inconsistent with its requirements."

India's own law is largely borrowed from an annex of the CSC. After showing no inclination to join any of the existing treaties for half a century, the Indian government rushed to sign this discriminatory convention soon after the Indo-U.S. nuclear deal. This shows that it was acting under external pressure, and not out of any concern for potential victims.

Even granting that suppliers should be liable in

principle, many well-meaning people argue that India must acquiesce to the demands of the industry because it desperately needs electricity. Leaving aside the debate on the role of nuclear power in general, it is clear that India's push towards importing reactors has less to do with electricity, and more to do with other factors.

Even by the standards of UPA II, the process of handing out multi-billion dollar contracts for reactors to various multinational companies has been opaque and arbitrary. In Jaitapur, the government has promised to buy up to six European Pressurised Reactors (EPR) from Areva. No EPR is in commercial operation anywhere in the world and in France and Finland, Areva is running into severe construction-difficulties. Two nuclear complexes have been promised to the U.S., again involving designs that have never been built before.

In a rare candid admission, the former chairperson of the Atomic Energy Commission, Anil Kakodkar, provided the rationale behind these seemingly bizarre decisions.

Writing in the Marathi daily *Sakaal*, in January 2011, Kakodkar explained: "America, Russia and France were the countries that we made mediators in the efforts to lift sanctions, and hence, for the nurturing of their business interests, we made deals with them for nuclear projects."

As the debate on liability continues both in public and in the courts, the question that the country must ask is whether it is willing to compromise on its laws, and the safety and rights of its citizens to protect the business interests of reactor vendors. ■

China Valves' Subsidiary Becomes a Qualified Supplier of China Nuclear Power Engineering Co. Ltd.

China Valves Technology, Inc. (Nasdaq: CVVT) ("China Valves" or the "Company"), a leading Chinese metal valve manufacturer, today announced that one of its subsidiaries, Able Delight (Changsha) Valve Co., Ltd. ("Able Delight"), has been certified as a qualified supplier of China Nuclear Power Engineering Co., Ltd. ("CNPE"). Able Delight is China Valves' second subsidiary after Kaifeng High Pressure Valve Co., Ltd. to receive the certification.

The certificate applies to butterfly valves, ball valves and cage guided globe valves for the conventional island of nuclear power plants and also covers Able Delight's butterfly valves with a diameter of 5.5 meters, which are the largest produced inChina. The certificate is reviewed every three years.

"We are pleased for Able Delight to be certified as a qualified supplier of CNPE, another great milestone in our effort to gain more market share in the nuclear power industry," said Mr. Siping Fang, the Company's Chairman and Chief Executive Officer. "The demand for valves for nuclear power applications is growing but the inspection of prospective suppliers is strict. We believe the addition of Able Delight as a qualified supplier will become another catalyst for

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