



A FORTNIGHTLY NEWSLETTER ON NUCLEAR DEFENCE, ENERGY AND PROLIFERATION FROM
CENTRE FOR AIR POWER STUDIES



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OPINION – Manpreet Sethi

Growing Capability

India's journey into placing its own satellite in outer space using indigenous launchers started with the modest goal of launching a 40 kg satellite into a 400 km circular orbit. This was achieved in 1980 with the development of the SLV 3.

Thirty five years since then, and having traversed enormous, and often difficult, ground in its space capabilities, India placed the IRNSS – 1D into space on March 28, 2015. This is the fourth of the constituents of GAGAN – the Indian GPS-Aided Geo Augmented Navigation system – that India started launching from July 1, 2013 to put in place its own geospatial positioning system.

Starting small, India plans to put into place a regional (not a global) positioning system with the help of seven such satellites initially, going up to 11 eventually, which would provide it positional accuracy of 10 m over the Indian landmass and 20 m over a range of 1500-2500 km from the Indian border. For comparison, it may be stated that the US GPS and the Russian GLONASS comprise of 24 satellites each and provide global coverage through a global network of stations. So, will the Chinese Beidou comprising of 35 satellites.

In the case of India, however, the initial plans were to build ground stations only on Indian

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territories. All seven satellites were to be placed at a height of 36,000 km. Three of them were to be in the geostationary orbit just over the equator while the remaining four would be in pairs in two inclined geosynchronous orbits. The system would assist navigation, vehicle tracking and fleet management, integration with mobile phones besides providing the more restricted encrypted service for the military and other government users.

Spearheaded by the ISRO, the Indian space programme has primarily been tailored to meet socio-economic and scientific objectives. The focus was decided early as concentrating on applications that were most needed and best suited to uplifting the

quality of life of the Indian masses to facilitate societal transformation.

With this precise objective in view, India built a goal oriented applications programme where the initial research and development energies and investments were spent on launching communication satellites for enabling mass education, meteorology satellites for the benefit of a predominantly agricultural economy (with collateral benefits of disaster predictions and management) and remote sensing satellites for better resources utilisation.

This dedicated approach has made India a big time user and beneficiary of space based applications for the socio-economic growth and development of the country. The country, however, is fledgling in exploiting the benefits of the high ground for its military needs.

In fact, India's space programme is unique to have wilfully and consistently maintained a peaceful orientation. It is only in recent times, no more than in the last five years, that the country has launched earth observation (RISAT series), navigation (IRNSS series) and communications (GSAT) in service of the defence forces of the nation.

India's security challenges emanate primarily from its nuclearised neighbours. Considering this reality, a crisis situation is likely to demand capabilities of an order that can accurately assess the adversary's intent and actions with penetrating and persistent intelligence, surveillance and reconnaissance (ISR) and domain awareness. Modernised sensors and platforms as well as robust, agile and resilient communication networks are critical to this requirement. Space enabled applications, in turn, are crucial to ensure these. With this understanding, India has begun to invest in some dedicated military satellites.

While the country is steadfastly against the weaponisation of outer space, the use of this medium for military applications falls within the purview of peaceful uses of outer space as

interpreted under the Outer Space Treaty (of which India is a member). India cannot afford to ignore these military support functions. As more dedicated military satellites are launched, India would be able to better utilise the benefits of space for force enhancement and other support functions.

Integration of Missions: The former will enhance deterrence by exhibiting better capability to execute war fighting through superior control over and integration of missions such as communications, early warning, ISR, targeting, meteorology, navigation etc.

These capabilities will allow India to discern the actions of its adversaries better, observe the battlefield more clearly to anticipate likely events, and respond with greater speed and precision.

Given the vantage position, persistence and pervasiveness offered by assets in outer space, the military advantages of real time information and timely action cannot be discounted. One can read the adversary better from one's own side and manage own forces more effectively.

Space based sensors offer the advantage of not deploying troops in forward areas for ISR, thereby keeping them out of harm's way and making it possible to exploit short-lived opportunities by coordinating and synchronising attack assets to conduct precise operations. Meanwhile, having others know that you know what is happening and that you can respond quickly can be a powerful deterrent by itself.

A network of earth observation, radar imaging, ISR, meteorology, navigation and communication satellites can offer a tremendous advantage for operations on earth. Obviously, given its threat perceptions, India cannot afford to ignore the benefits of force multiplication that can be achieved through the exploitation of outer space.

Source: The writer is Senior Fellow affiliated with the Centre for Air Power Studies, New Delhi, <http://www.deccanherald.com/>, 07 April 2015.

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OPINION – W.P.S. Sidhu

What the Iran Nuclear Deal Means for India

The Iran deal—or the “Parameters for a Joint Comprehensive Plan of Action (JCPOA) Regarding the Islamic Republic of Iran’s Nuclear Program”, to use the wordy official moniker—has been evaluated by most experts in only nuclear terms and measured in the number of centrifuges and Tehran’s break-out timeline to build a nuclear weapon. While this is, doubtless, the crux of JCPOA, the yet to be signed agreement is equally significant for US-Iran relations, the future of the Middle East as well as India’s regional and global geopolitical future.

At the very least the deal ensures a non-attack guarantee for Iran not only by the US but also its estranged allies Israel and Saudi Arabia; neither is likely to risk a military option as long as the deal is in place. It also raises the possibility for normalizing relations between Washington and Tehran, estranged since the 1979 Islamic revolution. Indeed, this prospect makes the US opening to Iran as significant as the US opening to China in 1972 under the Nixon-Kissinger combine (with Qatar playing the backchannel role that Pakistan performed vis-à-vis China) and holds similar potential to change world order. Consequently, it makes US secretary of state, John Kerry, and Iran’s foreign minister, Mohammad Javad Zarif—the chief architects of the deal—frontrunners for this year’s Nobel Peace Prize.

This deal, if it comes to fruition, also recognizes Tehran’s legitimate role in contributing to the future of the Middle East and, possibly, even the evolving world order. This is evident in Pakistan’s overtures to engage Iran in resolving the Yemen conflict diplomatically, much to the chagrin of Islamabad’s patrons in Riyadh who are seeking a military resolution. Clearly, Tehran’s voice will now resonate louder in the region.

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While sanctions compelled India to undertake a tightrope walk between Iran and the US, the lifting of sanctions will witness New Delhi trying to walk between raindrops as it seeks to strengthen relations with Israel and Saudi Arabia on the one hand (both of whom are vehemently opposed to the deal) and Iran on the other.

For India, the Iran deal holds several lessons and implications. First, it underlines the crucial leadership role of the US in achieving breakthroughs and also holding its allies opposed to the deal in check. Indeed, in 2003 the Europeans were unable to reach an agreement because the US was uninterested and had labelled Iran an “axis of evil” country. As India seeks to reshape the existing nuclear order through membership of the various nuclear and missile related export control regimes, it would be vital for New Delhi to work closely with Washington and leverage US leadership in achieving its objectives.

Second, while the deal will also allow India to increase oil imports from Iran (which had dropped to zero), it will also face greater competition from other countries, particularly US allies such as Japan and South Korea, as well as China. Moreover, increased

oil imports from Iran will also skew the bilateral balance of payments against India with little prospects of improving them.

Third, sanctions played a part in compelling Tehran to finally give the go ahead (after a decade’s delay) to New Delhi’s request to develop its Chabahar port, which is strategically significant as an entreport in providing India access to Afghanistan. The lifting of sanctions might on the one hand

reduce Iran’s enthusiasm for India’s participation in the Chabahar project and on the other bring in competitors with deeper pockets, such as China, who can easily outspend India’s puny \$85 million initial investment in the port project.

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it remains to be seen if a final nuclear agreement is signed in July, especially as Iran's Supreme Leader, Ayatollah Ali Khamenei, cautioned that there was "no guarantee" of a deal, India's long-term interests, ironically, might be served even if there is no deal.

Source: <http://www.livemint.com>, 12 April 2015.

OPINION – Jaideep A Prabhu

India's Nuclear Deal with Australia Running into Turbulence over Fuel Safeguards

India and the world's nuclear fuel suppliers have not seen eye-to-eye recently on the issue of nuclear tracking. The suppliers, particularly Australia, Canada, and the US, have been rebuffed by India on their demand to monitor the passage of the nuclear fuel they sell to us. The issue came up during President Barack Obama's visit to India for the Republic Day celebrations and has been debated in the Australian parliament in recent months. India's hesitation to share the data is being read as an attempt to wriggle out of its non-proliferation commitments – without such monitoring, experts say, it is possible for uranium meant for civilian purposes to end up in India's nuclear weapons programme.

India's position is that all imported nuclear material is subject to safeguards under the guidelines of the IAEA and further bilateral intrusions are unnecessary. After Canada and the United States gave up their tracking demands, the last battlefield in this debate has shifted to Australia.

There has been a lot of opposition to what some consider the diluted standards of nuclear safeguards between Australia and India, and to nuclear energy in general. This has been voiced in the Australian parliament over the past few months. The key is, however, to understand the

implications of additional nuclear safeguards demanded by critics in the form of nuclear tracking; there is little point in countering (again) the tired old arguments of the anti-nuclear crowd, and some of the criticism of India's nuclear programme is plain calumny.

For instance, it is alleged that India's nuclear behaviour has been problematic in the past: India tested nuclear weapons in 1974 under the pretext of peaceful nuclear explosions. This was done by diverting nuclear material intended for civilian use, and India allegedly obtained centrifuge designs from Pakistan's infamous AQ Khan network. For these reasons, it is argued, India must sign the Non-Proliferation Treaty, the Fissile Material Cut-Off Treaty, and the CTBT before any serious nuclear deal is considered. The only thing missing from this list is world peace and Markandeya's eternal youth.

To cut to the matter at hand, objections have been raised because Canberra's administrative agreement with Delhi differs in a few small, but important, ways from the 23 other treaties Canberra has entered into with 41 countries, including the United States. One concern is the status of the Australia-Obligated Nuclear Material (AONM), which is

legalese for nuclear material supplied by Australia. According to Australian law, the Australian Safeguards and Non-Proliferation Office (ASNO) is obligated under its Safeguards Act, Section 51(2), to prepare annual reports accounting for all nuclear material supplied by Australia to its various partners in terms of location, quantities and intended use. This means that Australian uranium would have to be tagged and its passage through a nuclear fuel cycle recorded at every stage. If India refuses to share such information, the ASNO would not be able to fulfil its obligations to Canberra's lawmakers.

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From an Indian perspective, any information shared must serve a purpose. Canberra wishes to maintain close tabs on its nuclear material to ensure that its non-proliferation responsibilities are met. If this can be guaranteed without the submission of extra information, there should be no need to submit such minute details about how India uses its imported nuclear material. To this end, India has entered into an agreement with the IAEA that puts 14 of its 20 reactors under international safeguards. The details of the analysis and reports produced by IAEA remain classified but may be shared with other countries if permitted by Delhi.

Even if these reports are not shared by Delhi with Australia or its other partners in nuclear commerce, the IAEA will nevertheless flag any violation of safeguards. This meets confidentiality requirements as well as verification needs. As long as the IAEA gives assurances that India is not making unauthorised use of any imported nuclear material, it should not matter to ASNO whether AONM in particular has been used exclusively for civilian purposes. It should also be noted that Australia's treaties with Russia and China do contain specific language that obligates the recipient state to share information, but this involves only the overall conclusions which the IAEA has drawn from administering safeguards. The agreement with India does not diverge significantly from this.

The problem with these broad IAEA assurances, critics argue, is that bilateral treaty agreements may supersede international obligations. Australia's nuclear commerce treaties are usually stricter than international safeguards norms. However, Canberra's understanding with Delhi is more flexible than its agreements with other states. Some in Australia argue that if India wishes to be treated on a par with other members of the nuclear club, it should accede to the same standards of scrutiny as the others; furthermore, Australian safeguards standards should not be lowered in a moment of commercial weakness to cater to the lucrative Indian market. Given India's labyrinthine bureaucracy and governmental opacity, it is not clear whether any benefits of Australian understanding would be reciprocated

in a timely manner.

The fears over the discrepancies between treaties is mostly exaggerated. For example, one fear is that the IAEA safeguards allow India to substitute safeguarded weapons-grade fissile material for unsafeguarded reactor-grade material (Art. 30(d)). A closer reading of the clause will show, however, that any substitution must be done with the permission of the IAEA and that the weight of the substituted material must match that of the material to be substituted in weight of fissionable isotopes as well as the ratio of fissionable isotopes to total mass. As per IAEA definitions (Art. 20 of the IAEA Statute), this means plutonium 239, uranium 233, and uranium 235. Thus, the fear that uranium 235 can be substituted for uranium 238 is unfounded.

A second concern is that the IAEA allows India to use safeguarded material in unsafeguarded facilities. While this is true, it poses little risk of proliferation for any facility that accepts safeguarded material comes under safeguards itself. Furthermore, depending upon the amount of material involved, India will have to submit the facility to inspections. One assumes that Delhi will not take kindly to any inspection of its military facilities and so will not transfer safeguarded material to such facilities. It is also alleged that India can use safeguarded fuel in a blend with unsafeguarded material. Again, this conveniently ignores context – India is allowed to do so only as long as (a) the safeguarded material is 30 percent or less than the total fuel, and (b) the ratio of the fissionable isotope to the total mass does not increase. If it does, then the whole blend comes under safeguards. Similarly, any nuclear material exempt from safeguards under Art. 25 has strict conditions on proportion if it is to go unsafeguarded. India will not, therefore, be able to spirit away any imported nuclear fuel for its weapons programme.

Concern has been expressed over the increased flexibility Canberra has shown India which it does not extend to other states – even close allies. One issue is that India has been given a pre-emptive right to reprocess fuel whereas other states may do so only with permission from Australia. Again,

this is broadly true, but one aspect overlooked is that any such reprocessing is subject to IAEA safeguards as well as the modalities of India's agreement with the United States. What makes India stand out in terms of reprocessing is that it is one of the few countries still interested in a closed nuclear fuel cycle. Reprocessing would be as routine in an Indian programme as enrichment is in the American one. For such a regular activity, it makes sense to give a one-time, pre-emptive permission under safeguards than at regular and frequent intervals.

Opponents of India-Australia nuclear commerce also worry that there are no fallback safeguards in the agreement between the two countries. If, for some reason, the IAEA cannot maintain safeguards over India's imported nuclear material, Australian nuclear material would be in India without any non-proliferation cover. This is not quite correct: the India-Australia Agreement on Cooperation in the Peaceful Uses of Nuclear Energy is not dependent upon the IAEA safeguards being operational. While the agreement refers to some of the stipulations of India's treaties with the IAEA and the United States as applicable to India-Australia nuclear trade, there is no suggestion that these rules apply only as long as those treaties are in force. In fact, Art. XIV ensures that even if the India-Australia agreement were to terminate, the safeguards provisions of the treaty would still hold.

Complaints that the India-Australia agreement does not contain any explicit right of return in case of termination have also been made. This, however, is merely a technicality and not a non-proliferation weak link. If India is in violation of the safeguards norms, there will be international attention on Delhi. The terms of the agreement between the two Indian Ocean Rim countries prohibits India from using Australian nuclear fuel

in an unsafeguarded manner under any circumstances and repeatedly violating the terms of the non-proliferation agreement could lead to the matter being raised in international fora that are important for India's development.

A right of return is a fairly standard clause in nuclear contracts but India has made its opposition to the idea known in all its negotiations. In the India-US agreement as well, Washington's right to demand the return of its nuclear material is not absolute but tempered by four considerations Delhi has placed...including a year before the right could be exercised. India's fear is that its partners may unilaterally terminate

their agreements with India and leave the country in a fuel crunch. Any demand for return must allow for the Indian nuclear fuel stockpile to be compensated with material from other sources before the fuel from the offended country is returned.

Finally, the lack of any mechanism for dispute resolution is flagged as worrisome, particularly in conjunction with all the other objections raised. Australia

usually includes arbitration mechanisms within its treaties with other states but that in itself is of little value except, perhaps, some clarity. It would be a safe guess that were any dispute to arise between Delhi and Canberra, the representatives of each country would sit down to discuss the situation. The representation would include nuclear lawyers, engineers and bureaucrats. The omission of this commonsensical procedure hardly raises the risk of nuclear proliferation. Additionally, to state the obvious, the Vienna Convention on the Law of Treaties allows either party to suspend its treaty obligations at any time if it is felt that the other side is in material breach of the terms and conditions.

India is a special country, of that there is no doubt: it is a nuclear weapons state that stands outside

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the NPT and has yet made inroads into international nuclear commerce. Making demands of Delhi that ignore this Trishanku-esque reality is futile. The attempt to hold India to standards it has not accepted by trying to interpret non-proliferation norms as common law, especially when the Nuclear Five violate the spirit of the NPT with abandon, will only be met with disappointment. The Canadians and the Americans eventually dropped their demands for nuclear tracking because they realised this (and probably also because the use of nuclear fuel can be modelled by intimate knowledge of the reactor). Canberra cannot allow non-proliferation lobbyists to hold hostage the environment and the development of over a billion people over a fabricated issue.

Source: <http://www.firstpost.com/>, 31 March 2015.

OPINION – Ramesh Thakur

Iran Deal: A Geopolitical Game Changer

Score one for Presidents Barack Obama and Hassan Rouhani for negotiating a nuclear deal that could be a regional and global geopolitical game changer. Given the unravelling of US relations with Russia over crises in Europe, the stalled pivot to Asia to counter China's rising regional profile and the failed effort to abort the China-led Asian Infrastructure Investment Bank, the successful Iran deal could well become the defining foreign policy legacy of the Obama presidency. Conversely, should an obstructionist US Congress derail the deal, international support necessary for maintaining an effective sanctions regime on Iran will wither away.

International Suspicions: Suspicions have persisted for a long time that Iran has been using its peaceful nuclear programme as a cover for clandestine weapons acquisition. The development would have negative consequences

for every component of the nuclear arms control agenda, from increasing proliferation pressures in and beyond the region to heightened risks of nuclear terrorism, use of nuclear weapons, and setbacks to efforts to cut global nuclear stockpiles and reduce their role and salience in national security doctrines.

Sixteen US intelligence agencies concurred that Iran halted its nuclear weapons programme in 2003 and had not restarted it. Former IAEA head Mohamed El Baradei found not "a shred of evidence" that Iran was weaponising.

Iran has made many offensive and belligerent threats both against the Jewish nation and the state of Israel. It has sponsored acts of terrorism. It has nurtured and supported anti-Western factions in Iraq, Afghanistan and Lebanon.

For all this, there was no consensus in Tehran on getting the nuclear bomb. There is nothing to suggest that the religious elite is not serious when it declares – as it has for three decades – that the nuclear bomb is un-Islamic because of its inhumane, indiscriminate and devastating lethality. Ayatollah Ali Khamenei, the final authority on Islamic law and arbiter of government policy, insisted that "Iran is not seeking to have the atomic bomb, possession of which is pointless, dangerous and is a great sin from an intellectual and a religious point of view." Additional risks and costs of weaponisation include military strikes by Israel and the United States.

No credible evidence exists that Iran ever crossed the threshold into weapons production. Efforts to procure nuclear-related and dual-use material and equipment, develop means of producing undeclared nuclear material, tap into clandestine networks for obtaining weapons-related information and documentation, and work on an indigenous nuclear weapons design largely took place before 2003. Sixteen US intelligence agencies concurred that Iran halted its nuclear weapons programme in 2003 and had not restarted it. Former IAEA head Mohamed El Baradei found not "a shred of evidence" that Iran was weaponising.

From 'No Enrichment' to 'No Bomb': The aim of stopping Iran from developing a nuclear capability

became a lost cause in this century. The real policy challenge was how to accept it as nuclear-capable but not accept it as, nor provoke it into becoming, nuclear-armed. Israel, itself an NPT-illicit nuclear power, has been demanding that Iran be forcibly prevented from acquiring the bomb. Its protestations fell on increasingly deaf ears as Israel progressively sidelined itself by its uncompromising stance and bellicose rhetoric.

A military strike can be counter-productive directly and through demonstration effects. Israel's attack on Iraq's reactor in 1981, instead of destroying an existing capability, may have spurred Saddam into the search for nuclear weapons. In 2003, a UN-disarmed Saddam was attacked by a US-led coalition and in 2011, a nuclear-disarmed Libya was attacked by NATO. Referring to Gaddafi, Ayatollah Khamenei said: "This gentleman wrapped up all his nuclear facilities, packed them on a ship and delivered them to the West and said, 'Take them!' Look where we are, and in what position they are now."

Iran continued to work on its nuclear enrichment and energy programme that moved it technologically ever closer to a weapon. Its centrifuges multiplied from 164 in 2003 to 19,000 in 2013 (although only 11,000 were usable) and a stockpile of 8000kg of enriched uranium. The interim deal in November 2013, whereby Iran agreed to scale back its weapon-sensitive material and activities under IAEA oversight in return for some sanctions relief, paused this. The tough UN, US and European sanctions to try and abort the march to weapons capability had hurt Iran. But America too paid a heavy price militarily, financially and reputationally for its addiction to invading Islamic countries and killing Muslims.

The 2013 deal resulted not from Tehran's capitulation but from the election of a new President keen to explore a rapprochement with the EU and US, and the shift in the US red line, over vociferous Israeli objections, from "no enrichment" to "no bomb." Any effort to verifiably and irreversibly roll back Iran's nuclear breakout capability would prove futile. For reasons of

security – history and geopolitics give both Iran and Israel a nightmarishly bad neighbourhood – as much as national pride, Iran insisted on maintaining material and infrastructure that give it some minimum capability to weaponise in future if necessary. The key challenge ahead was to define the precise terms of the nuclear programme Iran is permitted to keep in return for the complete lifting of all UN, multilateral and national nuclear-related sanctions.

The Unfinished Agenda: The agreement marks a triumph of Obama's nuclear diplomacy. The Bush years (2000–08) proved to be disastrous for efforts to contain the nuclear weapons programmes of both North Korea and Iran. Neoconservatives – who believed in using US power to transform the world, were openly disdainful of arms control treaties and diplomacy, and aimed to eliminate regimes rather than

Political and financial challenges remain on the road to a comprehensive political agreement by the June 30 deadline. But the agreed inspections, verification and transparency measures will successfully close off all pathways (uranium and plutonium) to the nuclear bomb by Iran.

weapons – gained policy ascendancy in the administration. When President Bill Clinton left office, Iran had a tentative nuclear research programme with few centrifuges; by the end of Bush's tenure Iran had an industrial-sized uranium programme and thousands of operational centrifuges.

The surprisingly detailed specificity of the framework agreement should mollify critics and satisfy opponents in Washington but could prove problematical for Tehran. Iran has been wary of falling into the Oslo trap. In the 1993 Oslo accord, the Palestinians made many concessions but failed to reap any benefits owing to Israeli intransigence which Washington proved unable or unwilling to overcome. Hardliners in Tehran will mobilise to try and scupper the sellout deal that, in their view, seeks to drink from the poisoned chalice of a flawed agreement with Washington. US Sunni allies in the region, in particular Saudi Arabia, may also demand matching enrichment capability.

Thus legal, political and financial challenges remain on the road to a comprehensive political agreement by the June 30 deadline. But the agreed inspections, verification and transparency measures will successfully close off all pathways

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The Lausanne agreement also has the potential to unfreeze the bitter Iran-US enmity that has framed Middle East geopolitics since 1979. By ending Iran's isolation and bringing it back into the international fold, the West can help to rebuild its once-powerful secular middle class, dilute the influence of the radical clergy, turn Tehran into an ally to defeat the Islamist jihadists, and accelerate negotiations on regional issues like Afghanistan, Syria, Iraq and Lebanon. Bringing closure to the 36-year conflict with Iran will also reduce Washington's energy and geopolitical dependence on Riyadh and give it more latitude to focus on China's continued rise in the Asia-Pacific and Russia's return to nuclear brinkmanship in Europe.

However, hurdles remain on the road to a final agreement. Potential deal-breakers include the conditions and timing for phasing out and reimposing sanctions. Another important stumbling block is just how to reduce Iran's stockpile of enriched uranium. Compared to the detailed US fact sheet, the joint EU-Iran statement is vague: this could portend turbulence ahead.

A provision in the framework agreement "encourages" international cooperation to help Iran in research and development. The deal will make it possible for countries that had been reluctant to engage with Tehran to assist Iran on its technological and scientific progress. Iran had slipped from being India's second biggest supplier of oil in 2006 to seventh by last year. There are potential commercial gains for India from the return of Iran's

There are potential commercial gains for India from the return of Iran's oil to the world market and regional geopolitical gains from the end of Iran's international isolation. Even after all elements of the deal expire in 10-15 years and Iran resumes some enrichment activities, its permanent NPT obligation not to acquire nuclear weapons will remain in place.

Iran's number of installed centrifuges will be cut from 19,000 to 6,104; their operational number will fall from about 11,000 to 5,060; their quality will be restricted to first-generation IR-1s; and these constraints will remain in place for ten years. Iran will not enrich uranium to above 3.67 per cent (well below weapons-grade), its total stockpile of LEU will be cut from 10,000 kg to 300 kg, and it will not build any new enrichment facilities or proliferation-sensitive heavy water reactors, all three parts to run for 15 years.

oil to the world market and regional geopolitical gains from the end of Iran's international isolation. Even after all elements of the deal expire in 10-15 years and Iran resumes some enrichment activities, its permanent NPT obligation not to acquire nuclear weapons will remain in place. Containing Iran's nuclear weapons programme does not

complete the agenda of lifting the shadow of the nuclear weapons threat from the Middle East and the world.

However, the framework agreement will be a big morale booster when delegates assemble later this month in New York for the five-yearly NPT review conference. ... The trick therefore was to

widen the technological and detection gap between capability and weaponisation, to cap Iran's capability at a point that provides the necessary reassurance by aligning the detection probability with the time required for effective international intervention to stop any attempted breakout. This has been successfully achieved in the framework agreement which envisages halting and reversing Iran's weapons-sensitive nuclear programme over the next 10 years, with parts of the agreement extending to 15

and 25 years. The deal marks a careful balance allowing Iran to keep a sharply reduced enrichment capacity and level and LEU stockpile, under international restrictions and inspections:

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these constraints will remain in place for ten years. Iran will not enrich uranium to above 3.67 per cent (well below weapons-grade), its total stockpile of LEU will be cut from 10,000 kg to 300 kg, and it will not build any new enrichment facilities or proliferation-sensitive heavy water reactors, all three parts to run for 15 years.

All excess centrifuges and enrichment infrastructure will be placed in IAEA monitored storage. Natanz will be Iran's sole enrichment facility: Fordow will be converted into a science and technology research centre, the Arak heavy water reactor will not produce plutonium and its spent fuel will be exported.

The IAEA will have enhanced access through agreed procedures to Iran's nuclear facilities, uranium mines and the supply chain that supports Iran's nuclear programme. As a result, over the next decade Iran's breakout timeline – the time needed to acquire enough fissile material for one weapon – will be extended from the currently assessed 2-3 months to at least one year. In return, Iran gains early easing and the promise of eventual lifting of the crippling sanctions regime: US and EU nuclear-related sanctions will be suspended after the IAEA has verified that Iran has taken all of its key nuclear-related steps. Should Iran fail to fulfil its commitments, the sanctions will “snap back into place.” The “architecture” of US nuclear-related sanctions will be retained, allowing for snap-back of sanctions in the event of significant non-performance. A new Security Council resolution will terminate all previous nuclear-related UN resolutions upon Iranian compliance.

Implications for India: Iran's second biggest oil customer after China before, New Delhi curtailed shipments in deference to the sanctions regime. India will be able to source more of its energy needs from Iran under an easier payments process that is not routed, for example, through Russia and Turkey. In March 2015, for the first time in a decade, India recorded zero oil import from Iran.

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Re-normalised energy equations will also have a positive spinoff in realigning Iranian and Indian strategic interests in Afghanistan (and possibly Central Asia) that are independent of and become more crucial with the drawdown of the US and NATO military presence. After India voted against Tehran at the IAEA in 2005, there was strain. Once Iran can source globally and supply world markets, Indian buyers and sellers will face stiffer competition. This could spur the construction of regional transportation networks connecting the Middle East to Central and South Asia.

Source: The writer is Director, the Centre for Nuclear Non-Proliferation and Disarmament, Australian National University. <http://www.tribuneindia.com/>, 08 April 2015.

OPINION – Dan Yurman

India's Prime Minister Narendra Modi Goes Shopping for Nuclear Reactors

One of the things the head of state gets to do when on an international, multi-nation trip is draw up a list of things to buy and bring home. In terms of a trip to France, this isn't about bringing back vintage wines. For Modi, it is about finally settling on the terms of a long pending contract for six nuclear reactors in Jaitapur, and the uranium to fuel them, which top the list.

For Areva, which has sought to break ground on the massive power project since 2008, the ink on a contract to proceed cannot come a moment too soon. Facing massive debt, and a skeptical French government seeking a compelling reason to cough up several billion euros in new capital, the Jaitapur project is just what the company needs.

The deal comes with a price for Areva, and that is to outsource some of the major, long lead time components to Indian companies and deliver the reactors at a lower cost. Rates for electricity from the plants is also an issue. But what is a nuclear reactor, or six of them, without the uranium to

fuel them? For that PM Modi will talk with the Canadian government about getting supplies from Cameco, the country's largest producer, via a 10 year contract for yellowcake. Canada does not operate any enrichment facilities. India will produce the nuclear fuel for its commercial reactors enriching the uranium to 3-5% U235.

Two Reactors Now, Four More Later:

Areva's deal with India is actually with the NPCIL which owns and operates all nuclear reactors in that country. As part of the arrangement, Areva will build two reactors at a location on India's western coastline 320 km (200 miles) due south of Mumbai. Once these units are complete, the plan is to build four more of the 1650 MW giants. When completed years from now, the 10 Gwe power station it could be the biggest power station in the country if not the world.

Almost all countries that import nuclear reactors have what are euphemistically called "localization" policies. What they mean, in effect, is that the firm selling the reactor will buy as much as possible from firms in the host country. Typically, this has not included components like reactor pressure vessels, steam generators, turbines, and other long lead time item. But India is not just any country. It has heavy industry capable of fabrication of some of these items. For instance, L&T manufactured the turbines for the two Russian built 1000 MW VVERs recently commissioned at Kudakulam in Tamil Nadu on India's southern tip.

For this reason, PM Nodi's bargaining chip for moving the Jaitapur job ahead is that Areva will buy heavy forging from Indian

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For this reason, PM Nodi's bargaining chip for moving the Jaitapur job ahead is that Areva will buy heavy forging from Indian firms. L&T will be the first Indian firm to produce them though competition is planned by Bharat for heavy forge components for a planned American deal with GE-Hitachi for 1530 MW ESBWR reactors at Srikakulam, Andhra Pradesh.

firms. L&T will be the first Indian firm to produce them though competition is planned by Bharat for heavy forge components for a planned American deal with GE-Hitachi for 1530 MW ESBWR reactors at Srikakulam, Andhra Pradesh. Like Jaitapur, it is a coastal site 900 miles due west of Mumbai on India's eastern shore.

For its part L&T told the Times of India the pact to supply

heavy forgings will also put ink on the company's order books for valves, pipes, electrical components, and engineering services. However, it appears France's Alstom will supply the turbines for the power stations. Another reason for the localization agreement, and investment in heavy industry with Indian firms, is that Japan has refused to sign off on a trade agreement with India for nuclear reactor technology due to long standing differences over India's refusal to sign the Nuclear Nonproliferation Treaty.

Japan Steel Works is one of the world's few places where the heavy forgings needed for reactor pressure vessels can be built. Cut off from access to that firm, and its products, India hopes to develop a domestic capability for its planned 21

Gw of new nuclear power. The Areva EPRs, and sourcing the large forgings to L&T, are the first steps in that direction.

Canada's Offer to Fuel the Reactors:

Some of the world's richest uranium deposits, with yields of 15 lb s/ton of the stuff, come from Saskatchewan. There the mining giant Cameco operates the Cigar Lake hard rock uranium mine. When PM Modi comes to Ottawa next

week, the uranium from that mine is at the top of his shopping list.

This is a major change for Canada which was royally teed off decades ago when India used an imported CANDU reactor to drive its nuclear weapons program. In response, Canada cut India off from buying its uranium which is where matters stood since the 1970s. It wasn't until 2013 that Canada relented and signed a cooperation agreement with India authorizing new uranium exports. Modi's trip there is the first by an Indian PM in 40 years. ...

Flaws Found in Areva EPR Pressure Vessels: Areva's EPR under construction at Falmanville, France, has added a new source of worries for the beleaguered firm. In addition to being behind schedule, and over budget, tests of the reactor pressure vessel have turned up areas in the steel which might be less resilient to stress than others. The problem is reported to be the amount of carbon in the steel. The wrong mix of it makes the steel weaker.

The French government's nuclear regulatory agency, ASN, has notified other countries where EPRs are under construction about the preliminary test results. The units include one EPR in Finland and two in China. Areva is on tap to supply its EPR design to the Hinkley Point project in the UK. French energy Minister Segolene Royal told the Reuters wire service that more tests are expected to determine conclusively whether the carbon issue is serious or if the reactor pressure vessels can be accepted as is. She said a report is due to ASN in about six months.

Source: <http://theenergycollective.com>, 13 April 2015.

OPINION – *The Hindu*

Breakthrough on Iran

The JCPOA on Iran's nuclear programme announced by Iran and the EU 3+3 in Lausanne, Switzerland, is a significant breakthrough that will have long-lasting implications globally. The

possible reward for Iran's promised steps, namely ramping down its uranium enrichment capabilities and stockpiles of enriched uranium, reducing the number of centrifuges, allowing for thorough inspections by the IAEA and giving up nuclear reprocessing is the lifting of the tough sanctions regime against the country.

That the 18-month-long negotiations between the various parties finally bore fruit had much to do with the fact that Iran's current regime is headed by a pragmatist in President Hassan Rouhani who was elected in 2013 on the premise of bringing about an entente with the West, among others. The determination of US President Barack Obama to reverse the rigid stance of his more conservative predecessor, George W. Bush, over repairing ties with Iran and bringing about an agreement

over the latter's nuclear programme had also helped. Mr. Obama managed to overcome the stiff opposition to the deal from the right-wing Republican Party in the US, which had become politically stronger over the past year.

Iran has always maintained that its nuclear programme was meant only for peaceful purposes and that as a signatory to the NPT, it was entitled to enrichment of uranium for energy generation. But the unrelenting pressure from the West in the past decade, including recurring talk of open hostility from the US and Israel, had led to defiance from the Mahmoud Ahmadinejad-led regime. Iran went on to expand its nuclear programme by furthering enrichment capabilities and building clandestine nuclear facilities.

These actions had invited sanctions from not only the US and the EU, but the UN as well, which had hurt Iran economically and also made it difficult for countries such as India to engage in trade with the country. India's imports from Iran – particularly petroleum products – had been severely curtailed due to the sanctions. The nuclear agreement with Iran should also help ease the long-standing

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hostile ties between the US and Iran eventually helping to change at least some equations in the conflict-ridden West Asian region. Can Iran's changed relationship with the US persuade Saudi Arabia and other Arab countries to bring a halt to the Sunni-Shia hostilities that have threatened to destabilise the region? The possibilities following this breakthrough are indeed high.

Source: <http://www.thehindu.com/>, 04 April 2015.

NUCLEAR STRATEGY

INDIA

India Test-Fires Nuclear-Capable Surface-to-Surface Missile

India has successfully test-fired a new domestically-developed nuclear-capable missile with a range of 350 kilometers (nearly 220 miles) in the country's eastern state of Odisha. The surface-to-surface Dhanush (Bow) missile blasted off from a naval ship in the Bay of Bengal at 11.02 a.m. local time (0528 GMT)..., in a trial launch conducted by the Strategic Force Command (SFC) scientists.

"The launch was part of an exercise by the armed forces and the missile reached the designated target with high precision," an expert at India's DRDO said on condition of anonymity. "The missile launch and its flight performance were monitored from DRDO telemetry and radar facilities in the Odisha coast," he said. The single-stage and liquid-propelled Dhanush missile is capable of carrying a conventional as well as nuclear payload of 500 to 1,000 kilograms. It can strike both land and sea-based targets. ...India has routinely carried out missile tests since it first demonstrated its nuclear weapons capability in 1998. India has also been engaged in an arms race with its neighbor Pakistan since the partition of the two countries in 1947....

Source: <http://www.prestv.ir/>, 10 April 2015.

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UK

Trident Debate: 16,000 Nuclear Missiles in the World - But Who has them, and does UK Really Need its Own Arsenal?

The Conservative Party has put the issue of the UK's Trident nuclear programme at the heart of the election debate with less than a month to go to the general election.... Michael Fallon described £25 billion to refurbish the Trident programme as "a price well worth paying to keep this country safe".

It's a conservative estimate (with both a lower- and upper-case 'C') however. Paul Ingram, the director of the thinktank BASIC (The British American Security Information Council), says that when often-forgotten decommissioning work is included the capital cost of the new system will total £50.6 billion between 2012 and 2062. ...BASIC was responsible for setting up the independent all-party Trident Commission, which last summer issued a report setting out the verdict of MPs on whether Britain still needs a nuclear deterrent of its own.

Its headline discovery was that Trident isn't really that independent at all – if the US were to ever remove its support and know-how, the UK's nuclear capability would collapse in a matter of months. Nonetheless, in the short term at least, the commission found that even the slimmest of chances Britain could face "strategic blackmail or nuclear attack" made it "imprudent" to abandon Trident. "If there is more than a negligible chance that the possession of nuclear weapons might play a decisive future role in the defence of the United Kingdom and its allies" then they should be retained, the report said.

But What do the British Public Think?: In Scotland – which houses the Trident submarines at Faslane – the strongly pro-disarmament SNP is on course to win 40 of 59 seats, according to the latest polls.

In 2009, a ComRes poll for The Independent asked: "Given the state of the country's finances, should the Government scrap the Trident nuclear missile system?" Of all respondents, 58 per cent said "Yes", 35 per cent "No", while just 7 per cent said "Don't Know". Mr Fallon says security will be the key issue at the heart of the election in 28 days' time. The question of Trident is, if nothing else, polarising. With an election looming where do Northern Ireland parties stand on the Trident issue?

SDLP: SDLP leader Dr Alasdair McDonnell has reasserted the party's commitment to cutting the renewal of the nuclear deterrent programme Trident. Dr McDonnell said that any future Labour Government relying on SDLP support must reflect the considerable opposition to maintaining Trident in the devolved governments. He said: "The SDLP have consistently argued that the maintenance of a nuclear deterrent in the UK is a cold war era defence strategy that is embarrassingly out-dated.

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"The Tories seek to sink billions into this white elephant and in the same breath they claim that the most brutal cuts seen in decades are a necessity. This is an insult to the millions living under their austerity agenda and we along with the SNP and Plaid Cymru, would aim to ensure that this is not one continued by a Labour Government. "The most effective way a future UK government can protect the public is by defending frontline services in health, policing, social care, education and skills training. More lives in Britain and Ireland have been lost through cuts to hospitals than to nuclear war. It is time that our public spending reflected that."

DUP: South Belfast DUP candidate Jonathan Bell said that the defence of the United Kingdom should not be subject to party political bartering following the General Election. Mr Bell said: "One

of the primary tasks for any government must be to protect and defend its citizens. The UK as an important member of NATO shoulders the strategic nuclear burden alongside the US and France. The idea that strategic defence could be bartered away in a deal with the SNP should concern us all.

"The threats facing the UK and our allies are changing, but they have not diminished. Russia has demonstrated in recent times that it is very willing to use force to achieve its aims. Such countries may not pose a direct threat to the United Kingdom today, but we should not forget that the first new submarine is not due to come into service until 2028 and would be in place for a quarter of a century.

"Both the Conservative and Labour Parties have stated their support for replacing our nuclear deterrent. Such policies must be taken on the merits of the case, not on whether SNP votes might be needed to form a government. There will be negotiations which follow the General Election and the formation of

a government in a hung Parliament will require agreements to be reached. However, such negotiations should be focused on building a better and stronger United Kingdom, not weakening our strategic defences in return for a quick deal with the SNP."

Alliance: An Alliance Party spokesperson said: "Alliance has seen no evidence to suggest that the like-for-like renewal of the Trident nuclear weapons system is necessary or cost-effective." Alliance believes that other approaches can be found to ensure the security of the UK which reflect the security challenges of the future....

UUP: An Ulster Unionist spokesperson said: "The Ulster Unionist Party supports the renewal of Trident. We believe it remains essential that, in a world where many nations remain politically unstable, the United Kingdom retains a nuclear deterrent. To do otherwise would be gambling with national security."

Source: <http://www.belfasttelegraph.co.uk/>, 12 April 2015.

USA

US to Continue Opposing Requests to Limit Missile Defense Expansion

The US will continue opposing Russian requests to curb its deployment and development of missile defense systems, US Assistant Secretary for Arms Control Frank Rose said at the Center for Strategic and International Studies. ...Rose explained that the US "cannot and will not accept legally binding or other constraints" related to its homeland or regional missile defense systems. The United States expanded the development and deployment of ballistic missile defense systems following its 2002 withdrawal from the ABM Treaty.

The ABM Treaty, signed by the US and then Soviet Union in 1972, aimed to limit the numbers and locations of both countries' ABM sites. Former US ambassador to Ukraine and arms control expert Steven Pifer has argued that current Russian requests for limits and reassurances on US ballistic missile defense systems was a resurrection of the ABM Treaty. Russia has requested "legally binding" assurances from the United States to guarantee that its domestic and regional missile defense architecture is not aimed at Russian strategic ballistic missiles.

In recent years, the US has taken significant steps in deploying ballistic missile defense systems throughout Europe under the European Phased Adaptive Approach. The program includes the deployment of Aegis ballistic missile defense-capable ships deployed in the Mediterranean Sea and Aegis Ashore interceptor sites in Romania and Poland, scheduled for completion by 2017 and 2018, according to the US Missile Defense Agency. ...Russia's Foreign Ministry Non-Proliferation and Arms Control Director Mikhail Ulyanov referred to the US missile defense developments as "unrestricted" and "unilateral." Ulyanov further asserted that US ballistic missile developments have come at the expense of Russian security interests.

Source: <http://sputniknews.com/>, 08 April 2015.

BALLISTIC MISSILE DEFENCE

ISRAEL

Israel Declares Successful Stunner Intercept Tests

Israel's Missile Defense Organization (IMDO) on declared its successful completion of a third series of intercept tests for the Stunner missile. Developed by state-owned Rafael and Raytheon, the US-Israel-funded interceptor is part of Israel's planned David's Sling active defense system. "In the past few days, we conducted a series of tests. After evaluating all the data, we're defining the series as a full success," said Yair Ramati, IMDO director. , Ramati said the tests were conducted against targets representative of the long-range rockets and short-range missiles that David's Sling is designed to defend against.

He added that IMDO and the Pentagon's Missile Defense Agency are planning a fourth series of flight tests this year, after which the Israel Air Force should be prepared to declare initial operating capability. Israel plans to deploy David's Sling as its newest layer of active defenses above Iron Dome – operationally proven against Katyusha and Grad-type rockets – and below Arrow-2, which is designed to intercept Scud- and Shihad-class tactical ballistic missiles. Arrow-3, a joint US-Israel Upper Tier interceptor, will comprise Israel's highest layer of active defense and aims to destroy advanced, potentially nuclear-tipped ballistic missiles outside of Earth's atmosphere.

Source: <http://www.defensenews.com/>, 01 April 2015.

NUCLEAR ENERGY

CHINA

Construction Starts on Hongyanhe 5

China has resumed construction of new nuclear power plant projects after a hiatus of 15 months. Construction of the fifth unit of the Hongyanhe plant in Liaoning province began on 30 March 2015. The pouring of first concrete for the reactor's basemat marks the official start of

construction of the unit, the first of two that will form the second phase of the Hongyanhe plant. A total of some 4452 cubic meters of concrete will be poured to complete the foundation slab of the unit, plant constructor China Nuclear Engineering Corporation (CNEC) said.

Plant owner China General Nuclear (CGN) received approval from the National Development and Reform Commission on 10 March to build Hongyanhe units 5 and 6 – both CGN-designed ACPR1000 reactors – marking the first approval for new reactors in four years. The company aims to have both units in operation by 2021.

The Hongyanhe site already hosts four CPR-1000 units. Units 1 and 2 have been in commercial operation since June 2013 and May 2014, respectively. Unit 3 was connected to the grid on 23 March 2015, while unit 4 is also scheduled to start up this year. According to CGN, once all six units are in operation, the Hongyanhe plant will generate around 45 billion kWh of electricity annually, avoiding the need to burn more than 16 million tonnes of coal for power generation and the resulting emissions of some 40 million tonnes of carbon dioxide.

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.

The last Chinese power reactor to begin construction was unit 6 of the Yangjiang plant in Guangdong province, first concrete for which was poured in December 2013.

Source: World Nuclear News, 31 March 2015.

INDIA

NPCIL Signs MOU with France's AREVA for Jaitapur Nuclear Power Project

NPCIL and M/s AREVA of France have entered into a Pre-Engineering Agreement (PEA) on April 10, 2015 in connection with the proposed Jaitapur Nuclear Power Project for setting up of two EPR (Evolutional Pressurised Reactor) reactors of 1650 MWe each to be set up in collaboration with France.

The PEA mainly pertains to assessment of licenseability of the EPR project as per Indian laws, codes, guides, regulations, manuals, practices and general acceptability, as well as an informed understanding of the EPR technology itself. The PEA will, therefore, facilitate NPCIL to obtain details of the EPR technology, make a

detailed safety assessment of the plant and take up the licensing process with AERB, as soon as the Jaitapur Nuclear Power Project is taken up for implementation.

The PEA will also contribute to explore the most efficient and cost-effective pathways for project implementation, and to maximise the scope of localisation of different components of the power plant, with a view to not only

make the project economical, but also enhance India's domestic capabilities in line with the campaign for "Make in India".

These preparatory steps are going to be necessary whenever the Jaitapur Nuclear Power Project is taken up, thus saving precious time and cost in the implementation of the project.

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EPR is an advanced LWR technology. Understanding the nuances of this technology will also be to our advantage as NPCIL strives to augment its capability in the LWR domain. The signing of PEA with AREVA is an important reflection of India's abiding interest in partnering with France in the civil nuclear power sector.

The DAE also welcomes the MOU signed between the Indian company L&T and M/S AREVA of France on April 10, 2015 for cooperation to maximise localisation for the EPR nuclear reactors in India. The collaboration, through transfer of technology, is expected to facilitate manufacturing in India of many critical components for the proposed Jaitapur Nuclear Power Project, which otherwise either are not accessible to India or would have to be imported. The collaboration is expected to have a multiplier effect in enhancing India's manufacturing capabilities with cutting edge technology, not only in nuclear power sector, but in other areas as well, such as petrochemicals and infrastructure. The MOU is in accord with the "Make in India" campaign of the Government aimed at enhancing indigenous technological and manufacturing capabilities of Indian industries.

Source: <http://www.indiafoline.com/>, 13 April 2015.

Canada, India in Advanced Talks on Nuclear Fuel Supply: Report

Canada's biggest uranium producer Cameco is in advanced talks with India on a deal to supply it fuel for nuclear power plants and Prime Minister Narendra Modi's visit next week is likely to provide impetus to clinch the agreement, a media report said.

"There is a fairly late-stage negotiation on and I think it's likely to conclude successfully. I just don't

know whether it's going to conclude," *Globe and Mail* newspaper quoted a source familiar with the Canada-India uranium supply talks as saying.

Stewart Beck, who was Canada's high commissioner to India between 2010 and 2014, said energy security ranks high for India. ...

Modi has made it clear that obtaining a commercial supply of uranium from Canada's Cameco Corp is a

major goal for him as he gets ready to visit Canada on April 14-16. "We look forward to resuming our civil nuclear energy cooperation with Canada, especially for sourcing uranium fuel for our nuclear power plants," Modi posted said on his Facebook page. ... A commercial deal to export Cameco's uranium to feed India's reactors would be another sign to the world that India is recognised as a safe, responsible nuclear power despite its refusal to sign the NPT. ...

Source: *The Economic Times*, 11 April 2015.

India Registers Record Production of Nuclear Fuel

In a major milestone for the nuclear industry, India has registered a record production of over 1,252 MT of uranium bundles, manufacturing close to double the annual fuel .The production has also exceeded country's annual fuel requirement of 650 MT for the PHWRs, which means the country has surplus nuclear fuel, for at least a few months.

The Hyderabad-based Nuclear Fuel Complex, which produces fuel for nuclear

reactors in the country, has produced over 30 per cent more fuel compared to its 961.023 MT production in 2013-14.... The news is a breather for the power reactors in the country, which for all these years had been "under- performing", primarily because of lack of fuel.

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NFC, set-up with an initial production capacity of 100 MT per year, was augmented several times to a capacity to 850 MT, to cater to the fuel requirement of all the 18 operating PHWRs and the two Boiling Water Reactors at Tarapur. ...The nuclear fuel production in the country has seen a steady increase over the last seven years. A lot has been attributed to the Indo-US nuclear agreement and the subsequent ones with Nuclear Suppliers Group that made the process of acquiring uranium simpler.

In 2008-09, NFC produced 226.89 – the year Indo-US nuclear deal was signed. In 2009-10, the figure increased to 600.91 MT. In 2013-14, it crossed its rated capacity of 850 MT for the first time and produced 961.23 MT of uranium fuel. India produces around 5,780 MW of nuclear power. Of this, 4,780 MW of electricity is generated by fuel processed at the NFC. Fuel for the KKNPP unit 1 is provided by Russia, as per the bilateral agreement.

Presently, our contribution as one of the seven partners in the ITER project in France is 10%. The knowledge that we gain will be used to set up our own demonstrator reactors at home. We will begin by setting up an experimental version of the Cadarache ITER reactor in France here.

Source: <http://www.defencenews.in/>, 09 April 2015.

Jaitapur Nuclear Project Makes Headway

After PM Narendra Modi's recent visit to France, the controversial and trouble-ridden Jaitapur Nuclear Power Project in Maharashtra's Ratnagiri district moved a step forward. The Nuclear Power Corporation and a French firm, Areva, signed what is known as a pre-engineering agreement conforming to the "Make In India" campaign, according to an announcement by the DAE.

The Rs 1000 billion project envisages the setting up of initially two Evolutional Pressurised Reactors each of 1650 mwe in collaboration with France. On June 18, 2014, the Shiv Sena launched an agitation against the plan. But Modi has assured the French government that there was "no rethink about the project". Spread over an area of nearly 968 hectares, the scheme eventually envisages the setting up of six reactors totalling 9900 mwes.

The new agreement firmed up on April 10, 2015, chiefly relates to the assessment of licenseability, adhering to Indian laws and codes and general acceptability and understanding of the technology itself. According to DAE, after a detailed safety assessment, the NPC will take up the licensing process with the AERB. A significant aspect of the agreement is that it will maximize the scope of localization of different components conforming to the "Make In India" campaign. According to the DAE, EPR is an advanced LWR technology. "Understanding the nuances of this technology will also be to our advantage as NPC strives to augment its capability in the LWR technology," it

added. The announcement however is silent with regards to the time line of this much-delayed project.

Source: *The Times of India*, 13 April 2015.

India to Set Up Its Own Mini N-Fusion Reactor

Nuclear energy production in India is set to get a major boost with the DAE giving nod

to set up the country's own thermo-nuclear fusion reactor. India is presently one of the seven partner countries in world's biggest energy research project – the ITER – that is coming up in Cadarache, France.

"Presently, our contribution as one of the seven partners in the ITER project in France is 10%. The knowledge that we gain will be used to set up our own demonstrator reactors at home. We will begin by setting up an experimental version of the Cadarache ITER reactor in France here," ITER-India's project director Shishir Deshpande said.

...Sources said that the central government has sanctioned Rs 2,500 crore to seed research in nuclear fusion. All nuclear plants in India at present are fission-based. Generating electricity through fusion is comparatively economical and safer. ITER-India, a division of the Gandhinagar-based Institute of Plasma Research, is the nodal agency under DAE, responsible for delivery of ITER

contributions from India.

To be executed over 10 years, European Union, China, Japan, Korea, Russia and the US apart from India are the seven nation partners in France project which is expected to be commissioned by 2024. Four Indian companies including two based in Gujarat have been awarded contracts to prepare large components which will be fabricated and sourced from India for ITER. Hazira-based L&T Heavy Engineering is manufacturing the cryostat (a 30 metre height x 30 metre diameter large vacuum vessel made of stainless steel) which will house the entire ITER reactor in France. "Manufacturing of the cryostat is progressing well and the first consignment is getting ready for shipment later this year," said Orlandi....

Source: <http://timesofindia.indiatimes.com/>, 01April 2015.

IRAN

Iran to Build Small Nuclear Plants

The Atomic Energy Organization of Iran (AEOI) plans to construct small nuclear power stations as well as small desalination plants in the coming years. Iran should draw up plans to be a fuel producer within the next 10 to 15 years and also to take steps towards the construction of small power plants, AEOI spokesman Behrouz Kamalvandi told IRNA. ...Iran is seriously pursuing plans to produce fuel for large power plants as well, Kamalvandi noted.

He also pointed to deals signed by Iran and Russia late in 2014 to construct two units at Bushehr nuclear power plant in southern Iran and said the Islamic Republic has good cooperation with Russia's Rosatom State Atomic Energy Corporation. A Rosatom delegation is expected to travel to Tehran late in April 2015 for talks on the construction of two power plants and production of fuel, the AEOI spokesperson added.

The AEOI head Ali Akbar Salehi and Rosatom Chief Executive Sergey Kirienko struck a deal last November 2014 to build eight more nuclear power plants in Iran. Under the deal, up to four of the projected facilities are planned to be built at the

site of the Bushehr nuclear power station. The remaining four are expected to be constructed elsewhere in Iran, but the exact location has not been determined yet.

Source: <http://www.presstv.ir/>, 11 April 2015.

URANIUM PRODUCTION

AUSTRALIA

Hope for Uranium Mines

Uranium miners will take some confidence from the federal government's announcement that it will monitor developments in the global nuclear industry. It comes after the unsurprising news that the Queensland Labor government will reinstate its ban on uranium mining in the state.

The decision has been slammed by industry figures and leaders of the North West, who are concerned the ban will stifle investment, industry and deny the region crucial jobs. The state government's policy is at odds with the federal government's stance, which has outlined it is open to developing the industry in the right conditions. Industry Minister Ian Macfarlane released the energy white paper, with a focus on improving market competition and energy productivity to reduce consumer costs.

There is a South Australian royal commission into nuclear energy under way and the paper says the federal government will keep a close eye on developments...."The royal commission will allow for a considered and informed community discussion on nuclear industries and energy, examining the opportunities and the risks. ...The draft paper acknowledged that safety standards for nuclear technology and the safety systems and regulation of nuclear power were continually improving. But it also noted some stakeholders were opposed to nuclear energy in Australia because it was costly in comparison to renewable technologies, required significant amounts of water and brought with it the problem of disposing of radioactive waste. ...

Source: <http://www.northweststar.com.au/>, 08 April 2015.

NUCLEAR COOPERATION**INDIA-AUSTRALIA****India-Australia Pact on Nuclear Fuel Supply to be Finalized Soon**

India and Australia will likely finalize an agreement by the end of this year that will enable supply of nuclear fuel to the South Asian nation, Australian foreign minister Julie Bishop said. Bishop, who arrived in New Delhi on a four-day visit, is also hoping to push through a comprehensive economic partnership agreement that will boost bilateral trade and investment. Officials from the two countries would hold another round of talks on problems concerning the processes governing the sale, transfer, transportation and use of uranium imported from Australia, Bishop said in a media briefing.

The agreement on administrative arrangements will also include an understanding on tracking uranium bought from Australia. According to India, all nuclear fuel would be tracked and inventoried by the IAEA, which works under the aegis of the UN. However, some countries such as the US had recently insisted that nuclear fuel bought from them should be tracked by the originating countries. That issue was resolved in January during the visit of US President Barack Obama. "On the administrative agreement, I am pretty confident that given that the US and Canada have come to an accommodation with India, Australia will be able to come to an accommodation," Bishop said.

... The pact on administrative arrangements would need to be passed by Australia and Bishop sounded confident of the deal getting parliamentary approval. "Our responsibility is to put the framework in place... the framework should be in place this year," she said. Putting the nuclear deal on track was part of Australia's efforts to become a reliable energy partner of India, Bishop said. "Australia is very keen to become a partner, if not the partner of choice, for energy security with India and that is comprising coal, LNG and, of course, uranium...."

Source: <http://www.livemint.com/Page/Id/2.3.1716203037>, 14 April 2015.

INDIA-FRANCE**India, France Sign 17 Agreements during PM Narendra Modi's Visit**

India and France signed 17 agreements, including on the stalled nuclear project in Jaitapur in Maharashtra, after Prime Minister Narendra Modi held wide-ranging talks with French President Francois Hollande. Pre-engineering agreements were inked between NPCIL and Areva which intend to bring clarity on all technical aspects of the plant so that all parties (AREVA, AlstomBSE -0.62 % and NPCIL) can firm up their price and optimise all provisions for risks still included at this stage in the costs of the project. After the two leaders held extensive talks, MoU was also signed between ISRO and French National Centre for Space Studies (CNES) on the Indo-French Megha Tropiques satellite which was launched on board the Indian launch vehicle PSLV on October 12, 2011.

The MoU shall extend by two more years, the joint project for sharing and use of data from the satellite. Under space cooperation, an agreement was also signed between ISRO and CNES. The agreement proposes cooperation in the areas of satellite remote sensing, satellite communications and satellite meteorology among others. The two countries also signed agreements increasing bilateral cooperation in the economic sector.

An MoU on cooperation in the field of renewable energy between the Ministry of New and Renewable Energy (MNRE) and France's Ministry of Ecology, Sustainable Development and Energy was signed that will help establish the basis for cooperation and relationship to encourage and promote technical bilateral cooperation on new and renewable energy issues on the basis of mutual benefits

Source: <http://economictimes.indiatimes.com/>, 11 April 2015.

IRAN-ISRAEL**Iran, Israel Cooperate in Nuclear Test Detection Drills**

Iran and Israel have been cooperating under the auspices of an international body set up to monitor a ban on nuclear bomb tests, its director said.

Negotiated in the 1990s, the CTBT enjoys wide global support but must be ratified by eight more nuclear technology states — among them Israel and Iran, as well as Egypt and the United States — to come into force.

In the interim, Middle East signatories have regularly held technical meetings, including in Jordan in November and December to practise detecting illicit testing. "Iran took part in the drill. Egypt was part of this drill. I think all the Arab countries were represented in Jordan for this exercise," Lassina Zerbo, executive secretary of the Preparatory Commission for the Comprehensive CTBTO, said during a visit to Israel.

The CTBTO has established a system to detect any nuclear blasts, with more than 337 monitoring facilities in the world. Among these are two seismic stations in Israel and another in Iran which, Zerbo said, has been inactive since 2006 when the international network was upgraded and sanctions on Tehran over its nuclear programme made taking equipment there difficult. ... Zerbo voiced hope of getting the Iranian site back on line, effectively putting Iran on the same detection grid as Israel, which accuses Tehran of harbouring designs on nuclear weaponry. ...

Source: <http://www.dnaindia.com/>, 13 April 2015.

RUSSIA-CHINA

Rosatom Plans Chinese Expansion with New Office

Rosatom plans to open a regional centre in China "as early as" the middle of this year, the Russian state nuclear corporation announced on 09 April

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2015. The announcement followed a decision taken by the company's committee on strategic partnerships, alliances, mergers and acquisitions.

"The activities of the [planned] regional office are designed to strengthen Rosatom's current position in the Chinese market, as well as to be a reference point for the further development of our business in that country," Rosatom said. This applies

not only to the construction of new reactors at the site of the Tianwan nuclear power plant in China's Jiangsu Province, Rosatom said, but also to the promotion of products and services offered by the company's subsidiaries in the Chinese market, as well as to closer cooperation with Chinese partners in "non-nuclear activities", Alexander Merten, president of Rosatom International Network, said in the same statement.

...Rosatom International Network already has regional offices in the Czech Republic, France, Singapore, South Africa and Ukraine. It says on its website that it has plans to open offices "in all the major economic centers: in the Middle East, Asia and the Americas".

The third of four Russian-produced steam generators was delivered to the construction site of Tianwan unit 3 last month. It was produced by Russian heavy equipment manufacturer ZIO-Podolsk - a subsidiary of Atomenergomash, which is part of Rosatom. Tianwan 3 is an AES-91 VVER-1000 unit designed by Hidropress and

supplied by Rosatom. AtomStroyExport is the main contractor, supplying the nuclear island.

The activities of the [planned] regional office are designed to strengthen Rosatom's current position in the Chinese market This applies not only to the construction of new reactors at the site of the Tianwan nuclear power plant in China's Jiangsu Province, Rosatom said, but also to the promotion of products and services offered by the company's subsidiaries in the Chinese market.

First concrete for the unit was poured in December 2012. It is scheduled to begin operating in February 2018. Two similar reactors (units 1 and 2) began operating at the site in 2007, while construction of a fourth began in September 2013. Each of the VVERs is rated to produce 1060 MWe.

Source: World Nuclear News, 10 April 2015.

USA-CHINA

US, China to Cooperate in Peaceful Nuclear Energy

US President Barack Obama has approved the agreement on US-China cooperation in peaceful uses of nuclear energy, according to a memorandum released by the White House. Washington and Beijing are parties to the NPT. "I hereby approve the proposed Agreement and authorize the Secretary of State [Kerry] to arrange for its execution," Obama said in the memorandum....The nuclear agreement between the United States in China will permit the exchange and joint development of traveling wave nuclear reactor and related technology between the two countries, according to the White House.

Source: <http://sputniknews.com/>, 11 April 2015.

NUCLEAR PROLIFERATION

IRAN

Iran Prepared to Extend Nuclear Deal Talks over Red Lines

Iran would extend talks for a final nuclear deal with world powers beyond a 30 June 2015 deadline if need be to satisfy red lines drawn by its supreme leader, Ayatollah Ali Khamenei, a senior Iranian official said. "Iran will work hard to reach an agreement within the specified time of three months or even sooner, but if the deal doesn't meet the criteria the leader has introduced for a good deal, we would extend the time," said Deputy Foreign Minister Abbas Araqchi, a member of the Iranian negotiating team, in televised comments....

..."Everything done so far neither guarantees an

agreement in principle nor its contents, nor does it guarantee that the negotiations will continue to the end," Mr. Khamenei said in a speech broadcast on state television and posted to his official website. The speech was his first public response to the preliminary deal. Among the red lines for Iran, Mr. Khamenei said, is that his country won't allow for outside inspections of military sites, a condition that the US and five other powers in the talks – China, Russia, France, Germany and the UK – are unlikely to accept.

... Under the framework deal, Fordow, a former Islamic Revolutionary Guard Corps base, is to be converted from an underground enrichment site into a research center. ...Mr. Araqchi said it would be hard to close the remaining gaps before the end of June. "As Ayatollah Khamenei noted, we have a very difficult task ahead," he said, adding that Iran was "not in a situation of agreement or guaranteed agreement."

Under Iran's political setup, the government has latitude to decide how to execute Mr. Khamenei's directives, but any international agreements they reach must be approved by the supreme leader. ...Michael Singh, an Iran expert at the Washington Institute for Near East Policy, said that Mr. Khamenei's negative take on the deal could Iranians opposed to it political cover from which to voice their disagreement. Many of Iran's hard-liners remain skeptical of a longer-term mending of ties with the US, an adversary since the country's Islamic revolution in 1979.

Source: The Wall Street Journal, 10 April 2015.

NORTH KOREA

North Korea has deployed its new road-mobile KN-08 intercontinental ballistic missile and is capable of mounting a miniaturized nuclear warhead on it, the US's top homeland security commander said. "Our assessment is that they have the ability to put a nuclear weapon on a KN-08 and shoot it at the homeland," Admiral William Gortney, the head of the US Northern Command, told reporters the Pentagon. "We have not seen them do that"

and “we haven’t seen them test the KN-08.” ...

Gortney’s remarks are the strongest to date by a US military official about the status of the KN-08 missile and North Korea’s progress in making a nuclear weapon small enough to put on it, although they reflected the customary caution about what’s going on in the insular country....

Possible Range: The KN-08 may have a maximum range of 9,000 kilometers (5,592 miles), far enough to reach the West Coast, aerospace engineer John Schilling and security analyst Henry Kan wrote in a report on “38 North,” a blog monitoring North Korea. Past statements by the US and South Korea that the North has gained the ability to miniaturize a nuclear weapon have been “followed by oddly parsed statements suggesting that maybe they haven’t,” Jeffrey Lewis, a specialist on East Asia nonproliferation issues at the Middlebury Institute of International Studies at Monterey, California, wrote in February on 38 North.... North Korea probably needs to improve the reliability and accuracy of its intercontinental ballistic missile, “hurdles that even more advanced industrialized countries would find challenging,” Schilling and Kan wrote....

Source: <http://www.bloomberg.com/>, 08 April 2015.

NUCLEAR SAFETY

GENERAL

Retired Nuclear Safety Officer and Spanish Journalist Duo File Case against Firms

The world’s largest, most powerful particle accelerator -the Large Hadron Collider (LHC) -is scheduled to switch on in the next few days, according to a report in Nature. However, two men are not amused: retired nuclear safety officer, Walter Wagner and Spanish journalist, Luis Sancho. Months before the \$6-billion, 30-year project was scheduled to turn on for the first time

in 2008, the duo filed a lawsuit against the firms behind the “monster” machine. They claimed that they were trying to that they were trying to save the world from, what they thought, was almost-certain annihilation. The lawsuit was dismissed since the men failed to prove a “credible threat to harm”. Here are three concerns that the duo proposed in their lawsuit:

Death by Black Hole: While black holes are generally huge, it’s possible that a small amount of matter, on the order of 10s of micrograms, could be packed densely to make a micro black hole.

Before the LHC was turned on, the duo feared that by accelerating subatomic particles to 99.99% the speed of light and then smashing them together, it would create a particle mash-up so dense, as spawn a micro black hole. However, CERN physicists discounted the possibility.

Death by Strange Matter: Strange matter is made up of

individual, hypothetical particles, called strangelet. Wagner and Sancho worried that this could fuse with normal matter, eventually converting Earth into a single strangelet. However, the precise behavior of a single strangelet is unclear. To support this, physicists at the Brookhaven National Laboratory in New York, have been trying to create a strangelet particle with Relativistic Heavy Ion Collider. So far, nothing ...

Death by Magnetic Monopoles: In nature, magnets come with two ends – a north pole and a south pole. But in the late 19th century, physicist Pierre Curie predicted there’s no reason why a particle with just one magnetic pole could not exist. A century later, this particle called a magnetic monopole, has not been made in the lab or observed in nature. But that didn’t stop Wagner from suggesting a powerful machine like LHC could create a magnetic monopole that could destroy Earth.

Source: <http://economictimes.indiatimes.com/>, 07 April 2015.

The KN-08 may have a maximum range of 9,000 kilometers (5,592 miles), far enough to reach the West Coast, Past statements by the US and South Korea that the North has gained the ability to miniaturize a nuclear weapon have been “followed by oddly parsed statements suggesting that maybe they haven’t.

USA

Flaw Found in Harris Nuclear Power Plant Reactor Head

The ABC11 I-Team has learned of a new problem at the Duke Energy Shearon Harris power plant in New Hill. The plant was off-line for refueling when a so-called "flaw" was discovered in the reactor head. The reactor head is the cap to the nuclear reactor that can be removed for refueling and repairs. The "flaw" occurred close to one of the 65 monitoring rods that run through the cap and into the reactor. Duke Energy officials describe the flaw as a small depression in a welding seam. They say the public was never in danger. Critics aren't so sure.

...Duke Energy officials acknowledge that reactor heads do, routinely, wear down.... Crawford said the head on the Shearon Harris reactor needed similar repairs in 2012 and 2013 and told ABC11 that in 2012, inspectors missed a "flaw" in the vessel head, sparking an investigation which lead to procedural changes. ...Critics found little comfort in the company's explanation, citing other "flaws" in other reactors around the country. "It's the cap on the can that helps them superheat water and create electricity," said Warren, "but it serves a really important safety function too. So if you have flaws in that head on the reactor vessel, that's a very serious problem." ...

Source: <http://abc11.com/>, 09 April 2015.

NUCLEAR WASTE MANAGEMENT

USA

Moving Forward to Address Nuclear Waste Storage and Disposal

Thirty years ago, our world looked very different. The Berlin Wall still divided Germany. The US was still embroiled in a nuclear arms race with the Soviet Union. In 1985, a decision was made to "comingle" defense waste from weapons production and civilian nuclear waste from energy production – to dispose of them in one and the same repository. Back then, it was assumed that the

production of new nuclear weapons would continue indefinitely, so a combined repository seemed natural. It was also assumed that more than one repository would be needed and available for this combined inventory, the first in 1998 and a second soon thereafter.

However, history has taken a different course and proven these assumptions false. Under the New START Treaty, the Energy Department is reducing, not expanding, our number of deployed strategic warheads to the lowest level since the 1950s. It has been 22 years since the last live US nuclear test. And because of the Department's Stockpile Stewardship Program, we understand more about how nuclear weapons work now than during the period of active nuclear testing. Meanwhile, the path to a common repository has been significantly more controversial, costly, and delayed than was anticipated in 1985. Since that time, we have also seen several nations make

significant progress toward siting nuclear waste facilities using a phased, adaptive, and consent-based approach.

President Obama authorized the Energy Department to move forward with planning for a separate repository for

high-level radioactive waste resulting from atomic energy defense activities. In remarks before the Bipartisan Policy Center, Secretary Moniz discussed this path forward and also made clear that the Department will undertake a consent-based approach to siting storage and disposal facilities, as called for in the Administration's 2013 "Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Radioactive Waste," and building upon the work of the bipartisan Blue Ribbon Commission on America's Nuclear Future.

The announcement reflects important considerations. Among other things, as the US is no longer generating defense high-level waste associated with weapons production, today the inventory and composition of defense high-level waste is finite, which creates opportunities to look at separate disposal pathways for some waste streams. In addition, some defense waste is less radioactive, cooler, and easier to handle than

Today the inventory and composition of defense high-level waste is finite, which creates opportunities to look at separate disposal pathways for some waste streams.

commercial waste, which means a simpler design and potentially fewer licensing and transportation challenges for a defense repository. Separate disposal of defense high-level waste could allow greater flexibility in site selection – and that could help keep costs down.

To be clear, moving forward with planning for a separate repository for defense waste does not mean that the Administration will put on hold efforts to find a solution for storage and disposal of commercial nuclear waste. Secretary Moniz also

announced that the Energy Department will start with one or more interim storage facilities that could accept spent fuel from shut down commercial reactors. ...In order to ensure the long-term viability of the nuclear industry, we must solve the issue of nuclear waste disposal and we must do it in a way that will ensure public trust and confidence in decision-making throughout the process.

Source: <http://breakingenergy.com/>, 03 April 2015.



Centre for Air Power Studies

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