



In a new orbit

ISRO lifts India into the elite group capable of putting heavier satellites into a precise orbit

The Indian Space Research Organisation has crossed a significant milestone with the successful developmental flight of the country's heaviest Geosynchronous Satellite Launch Vehicle, the GSLV Mark-III. This is the first time a satellite weighing over 3.1 tonnes has been launched from India to reach the geostationary orbit about 36,000 km from Earth. The Mk-III can launch satellites weighing up to four tonnes, which almost doubles India's current launch capacity. With communication satellites becoming heavier (up to six tonnes), the capability for larger payloads is vital. This can be done by switching over to electric propulsion for orbit rising and to keep the satellite in the right position and orientation in the orbit through its lifetime (that is, station keeping). The switch-over would reduce the weight of the vehicle as it can do away with nearly two tonnes of propellants and carry heavier satellites. Towards this end, ISRO has started testing electric propulsion in a small way; the South Asia Satellite (GSAT-9) that was launched last month used electric propulsion for station keeping. On Monday, an indigenously developed lithium-ion battery was used for the first time to power the satellite. Another key achievement is the use of an indigenously developed cryogenic stage, which uses liquid oxygen and liquid hydrogen; the 2010 GSLV launch using an indigenous cryogenic stage ended in failure. It can now be said without hesitation that India belongs to the elite club of countries that have mastered cryogenic technology. In the December 2014 experimental flight of the GSLV Mk-III, a passive cryogenic stage was used. Though the cryogenic stage was not meant to be ignited, the launch provided invaluable data on aerodynamic behaviour of the vehicle.

The Mark-III will be operational with the success of one more developmental flight, which is set to take place within a year. This will make India self-reliant in launching heavier satellites, bringing down costs substantially. Till now, heavier communication satellites have been launched on Europe's Ariane rockets; in fact, ISRO will soon be using Ariane rockets to launch two of its heavier satellites. But as has been the case with lighter satellites, it is likely that other countries will soon turn to ISRO for the launch of heavier satellites at a lower cost. With fewer propulsion stages and, therefore, control systems, the Mk-III is far more reliable than the GSLV and the PSLV. Combined with its ability to carry eight to 10 tonnes into a low Earth orbit, the Mk-III can be considered for human-rating certification (to transport humans) once some design changes are made. Compared with the two-member crew capacity of the GSLV, the Mk-III can carry three astronauts and have more space to carry out experiments. The next developmental flight, therefore, will be crucial.

Theresa may not?

The Prime Minister may have erred in turning the election into a presidential-style contest

Under the looming shadow of exit negotiations with the European Union, British Prime Minister Theresa May had good reason to call a snap general election on June 8. By putting her faith in the hands of the voters, she sought a strong, unequivocal mandate to take the fight to Brussels. In April, opinion polls suggested that she might even match the majorities of former Prime Ministers Margaret Thatcher and Tony Blair, of 144 in 1983 and 179 in 1997, respectively, in the 650-seat House of Commons. Yet that dream appears to be crumbling as the race has gradually tightened, with multiple terror incidents, including the Manchester bombing and the London Bridge attack, further muddying her prospects. The initial 20-plus points lead held by the Tories when the election was announced in April has withered into a mere five points, according to an Ipsos MORI poll. A YouGov poll, an outlier, projected the Tories losing 20 seats – Ms. May's outgoing government enjoyed a 17-seat working majority. Other models, however, show her winning a sizeable majority, in some cases by as much as 142 seats. These variations in poll projections must, however, be considered alongside the recent setbacks endured by the U.K. polling industry, which in some measure failed to read the tea leaves correctly for the 2015 general election and the 2016 Brexit referendum.

Nonetheless, the state of national politics may offer the Conservative leadership fewer reasons to feel sanguine. Prime Minister May miscalculated in framing the race as a presidential-style contest against Labour leader Jeremy Corbyn. This not only opened the window of opportunity to him to stage a comeback, but also brought a host of domestic policy issues on to the table for voters to dissect and criticise. Indeed, according to some polls Mr. Corbyn is only a few points shy of Ms. May's net favourability rating, and has gained even more traction by critiquing her government's cut of 20,000 police officers at a time when the U.K. has been vulnerable to the sort of terror attacks witnessed in recent weeks. Similarly, Ms. May's campaign has taken a beating from the awkward backtrack on what has been dubbed the "dementia tax", a proposal whereby care for an elderly person would be paid for by the sale of his or her house after death, depriving the heirs. Other austerity policies proposed by Conservatives, including a controversial plan to end universal free school lunches for children, have sent the jitters among some sections of voters. The lesson from this pre-election turbulence in support for the Tories is that even if they succeed in retaining or increasing their parliamentary majority, it would be unwise to take their opposition for granted, or be overly optimistic in assuming that the European Union would soften its negotiating stance owing to the internal politics of the U.K.

Expensive, hazardous and inequitable

The government's recent approval to ten new nuclear reactors deserves to be carefully appraised



SUVRAT RAJU & M.V. RAMANA

By all accounts, nuclear power has had a bad year. In March, Westinghouse, the largest historic builder of nuclear power plants in the world, declared bankruptcy, creating a major financial crisis for its parent company, Toshiba. The French nuclear supplier, Areva, went bankrupt a few months earlier and is now in the midst of a restructuring that will cost French taxpayers about €10 billion. Its reactor business is being taken over by a clutch of companies, including the public sector Electricité de France, which is itself in poor financial health. In May, the U.S. Energy Information Administration announced that it expects the share of nuclear electricity in the U.S. to decline from about 20% in 2016 to 11% by 2050. The newly elected Presidents of Korea and France have both promised to cut the share of nuclear energy in their countries. And the Swiss just voted to phase out nuclear power.

Both Areva and Westinghouse had entered into agreements with the Indian government to develop nuclear plants. Areva had promised to build the world's largest nuclear complex at Jaitapur (Maharashtra), while last June, Prime Minister Narendra Modi and U.S. President Barack Obama announced, with great fanfare, that Westinghouse would build six reactors at Kovvada (Andhra Pradesh). The collapse of these companies vindicates critics of these deals, who consistently pointed out that India's agreements with Areva and Westinghouse were fiscally irresponsible. If these projects had gone ahead, Indian taxpayers would have been left holding the bag – billions of dollars of debt, and incomplete projects. This narrow escape calls not only for a hard



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look at the credibility of those members of the nuclear establishment who advocated these deals for a decade, but for a comprehensive re-evaluation of the role of nuclear power in the country's energy mix.

Therefore, the government's recent decision to approve the construction of ten 700 MW Pressurised Heavy Water Reactors (PHWRs) deserves to be scrutinised carefully. Strictly speaking, there is little that is new in this decision. A list of all the sites where the PHWRs are to be constructed had already been provided to Parliament by the United Progressive Alliance government in 2012. But delays with the first 700 MW PHWRs already under construction, the changed international scenario for nuclear energy, and the ongoing reductions in the cost of renewable energy all imply that these earlier plans are best abandoned.

It doesn't come cheap

First, although the 700 MW PHWRs are cheaper than imported reactors, their electricity is likely to be costly. These reactors are commercially untested, since the largest PHWRs constructed so far in India are the 540 MW twin units at Tarapur. There are two 700 MW PHWRs under construction at Rawatbhata (Rajasthan) and Kakrapar (Gujarat), but these have been delayed by over two years, and the government has not revealed the resultant cost increases.

Nevertheless, assuming a capital cost of ₹10 crore per megawatt,

suggested by the government's press release on its decision, and using the pattern of expenditure seen at Rawatbhata and Kakrapar, a rough estimate suggests that the cost of electricity during the first year of operations at these reactors is likely to be around ₹6 per unit at current prices. The Central Electricity Regulatory Commission's published tariffs show that almost all currently operating Indian coal, natural gas and hydroelectric power plants produce cheaper electricity.

Even prices for solar power have dropped below those of nuclear power. For example, the winning bid at the auction for the Bhadla Phase-IV Solar Park in Rajasthan held last month was ₹2.44 per unit, which is fixed for 25 years. This is not an isolated example, but part of a trend of falling prices in the renewable sector.

In fact, the government's tariff model makes nuclear power appear more competitive than it really is. The capital invested in any plant yields no returns while the plant is being constructed. At the end of construction, the government fixes a tariff by calculating a rate of return on the nominal amount of capital invested, disregarding the value this amount could have accumulated during this idle time. As a result, the effective rate of return on equity invested in nuclear energy is significantly lower than the rate of return provided by other sources of electricity that have shorter gestation periods. Nuclear power would be even less economically attractive if a meth-

odology that consistently incorporates the time value of capital were to be used to establish tariffs.

While announcing its decision, the government claimed that these plants would "generate more than 33,400 jobs in direct and indirect employment". But this number ceases to be impressive when viewed in the context of the planned capital expenditure of ₹70,000 crore. The relevant factor in assessing the employment opportunities provided by a project is not just the total number of jobs produced but the ratio of the jobs produced to the capital invested.

A widely cited study by three analysts from the University of California, Berkeley, found that nuclear power created only 0.14 job-years per gigawatt-hour of electricity produced. In contrast, solar photovoltaic sources were more than six times as labour intensive, creating about 0.87 job-years per gigawatt-hour of electricity. Since solar energy is cheaper, this comparison is even more unfavourable to nuclear power when viewed in terms of jobs created per rupee spent.

Bad fit for climate change

The government also argued that these reactors would bolster "global efforts to combat climate change". While climate change is indeed a grave problem, it is not the only environmental problem confronting us. Nuclear power poses its own set of threats to the environment and public health, and is therefore an inappropriate tool to mitigate climate change.

All nuclear reactors produce radioactive waste materials because each fission event involving nuclei of uranium or plutonium gives rise to radioactive elements called fission products. Some of these remain radioactive for hundreds of thousands of years. Despite decades of research, nuclear waste remains an unavoidable long-term problem for the environment.

Nuclear reactors are also capable of catastrophic accidents, as witnessed in Fukushima and Chernobyl. A single nuclear dis-

aster can contaminate large tracts of land with radioactive materials, rendering these areas uninhabitable for decades. More than 30 years after the accident at Chernobyl, about 650,000 acres are still excluded from inhabitation.

The people's concerns

Local communities are keenly aware of the hazardous nature of nuclear power. Since the 1980s, every new site chosen for a nuclear plant has been greeted with a protest movement. Sometimes, these movements have succeeded in forcing the cancellation of plans, including at two sites in Kerala and one site in West Bengal. More recently, the plan to establish a plant near Patiala seems to have been dropped.

Other communities have been less lucky. In some proposed sites, such as Fatehabad (Haryana), the government has succeeded in using financial incentives to counter opposition to nuclear construction, in essence exploiting the economic vulnerability of the local population. But protests continue at other sites, such as Chutka (Madhya Pradesh). The sad irony in Chutka is that some of the affected people were previously displaced by the Bargi dam, and are now being asked to move a second time. Their plight typifies the social dynamics associated with nuclear power. The risks and costs are borne overwhelmingly by poor rural communities, who consume only a tiny fraction of the electricity that is generated.

The government claims that its recent decision displays "India's commitment to sustainable development". But does the path to sustainable development run through a source of electricity that is expensive, hazardous and antithetical to equity?

Suvarat Raju and M.V. Ramana are physicists associated with the Coalition for Nuclear Disarmament and Peace, and currently based in Bengaluru and Princeton, respectively. The views expressed are personal

The art of the free trade agreement

A European Court of Justice ruling will have bearing on India-EU pacts



PRABHASH RANJAN

During their recent meeting in Germany, Prime Minister Narendra Modi and German Chancellor Angela Merkel agreed on the need to resume India-European Union (EU) free trade agreement (FTA) talks. These negotiations, covering trade, investment protection and intellectual property, have remained deadlocked since 2013.

The recent and hasty unilateral termination of bilateral investment treaties (BITs) by India with many EU member countries including Germany has complicated things further, leaving many European businesses worried about investment protection in India. As India prepares to resume FTA negotiations on all issues including investment protection, a recent landmark decision by the European Court of Justice (ECJ) – the highest court in the EU in matters of EU law – which has not attracted much attention assumes importance.

The ISDS mechanism

The European Commission negotiated an FTA with Singapore from 2010 to 2013 covering a wide range of issues such as tariff reductions,

intellectual property and investment protection including the investor-state dispute settlement (ISDS) mechanism. The ISDS provision in the EU-Singapore FTA gives investors a choice between bringing a dispute against a host state before the national court of the country where the investment has been made and submitting the dispute to international arbitration. The European Commission and the EU member states disagreed as to who had the competence to ratify the FTA. The ECJ decided that EU had the exclusive competence over almost all aspects of the FTA barring non-direct foreign investment – also known as portfolio investment – and the ISDS mechanism. In other words, for agreements containing non-direct foreign investment and/or ISDS provisions, EU member states enjoy mixed competence to approve such treaties. The court held that since the ISDS provision allowed the removal of the disputes from the jurisdiction of the courts of an EU member state, it could not be done without the consent of the member states.

This decision will impact the EU's ongoing FTA negotiations, including with India. As Anthea Roberts of the Australian National University has argued, to honour the ruling, the EU might consider different options. First, it could decide to jettison the ISDS clauses in all its future FTAs. In other words, it may negotiate FTAs where disputes between investors and states



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would be resolved using the state-state dispute settlement (SSDS) mechanism. Given India's protectionist stand on BITs and ISDS, as reflected in the 2016 Model BIT, India might be happy with this outcome. However, it is unlikely that the EU would totally abandon the ISDS system. Its FTA-text with Singapore and also the recently signed EU-Canada FTA reveals the EU's preference for ISDS. Though, one major change is that the EU, in its FTA with Canada, has moved away from arbitration to a bilateral investment court system to settle investor-state disputes. Under this system, both countries nominate a roster of 15 tribunal members for a five-year period, and three members shall be randomly selected to serve on one tribunal. In addition to this, an appellate tribunal will be established to review tribunal decisions. Not just this, the EU is also keen to set up a multilateral investment court (MIC) with an appellate mechanism as reflected in Article 8.29 of the EU-Canada FTA.

Second, the EU could negotiate an FTA with ISDS provisions subject to the treaty being approved by all EU member states. However,

this option is not feasible because all EU member countries might not ratify such an FTA. Third, it could negotiate the main FTA without an ISDS provision but make ISDS provisions a subject matter of an optional protocol provided this is permitted under EU law. The optional protocol could theoretically bind the EU's partner country and only those EU member countries that ratify it and thus give their consent to the removal of investor-state disputes from their jurisdiction.

Challenges for India

Assuming the EU exercises the third option and tailors the ISDS optional protocol on the lines of the EU-Canada FTA, India will have to think about its ISDS negotiating strategy carefully on three fronts. First, will India accept allowing foreign investors to submit cases to international tribunals without first resorting to domestic courts? The 2016 Indian Model BIT requires a foreign investor to litigate in national courts for at least five years before approaching an international tribunal. Second, is India prepared to accept the proposal of setting up a MIC and submit to the jurisdiction of such a court? This would mean that all BIT disputes would be settled by the MIC and not through ad hoc arbitration as India currently proposes in its Model BIT. There is a lot of merit in developing an MIC because it will help fight the vices of current ISDS system based on ad hoc arbitra-

tion. The MIC system will bring in tenured-judges with expertise in international investment law (IIL) unlike the party-appointed arbitrators, many of whom are not experts in IIL; usher in transparency in the ISDS system; introduce an appellate mechanism to correct errors of law made by tribunals of first instance, which is missing in the current ISDS system. Third, pending the creation of the MIC, will India accept the creation of a bilateral investment court system with tribunal members being appointed for a five-year period and with an appellate mechanism? The method of dispute resolution in the Indian Model BIT is based on ad hoc arbitration through party-appointed arbitrators though the possibility of creating an appellate mechanism is recognised.

India should use the ECJ decision to rethink the best way of approaching the ISDS, such as whether it should move forward with the option of negotiating for a MIC. As a democracy based on the rule of law, India should actively engage with the EU as part of its FTA negotiations, towards creating a robust and transparent international judicial system like the MIC that would protect foreign investment from state's regulatory abuse.

Prabhash Ranjan is an Assistant Professor of Law at South Asian University. The views expressed are personal

LETTERS TO THE EDITOR

Letters emailed to letters@thehindu.co.in must carry the full postal address and the full name or the name with initials.

Launch by launch

The Indian Space Research Organisation is doing a commendable job and is slowly but surely proving that in terms of space technology, India is on a par with any other developed nation ("India successfully fires heaviest launch vehicle", June 6). Its role in making India a cost-effective and reliable partner in heavy satellite launching cannot be ignored. It is fortunate that it is one organisation that has been allowed to be guided by foresight.

VINOD C. DIXIT,
Ahmedabad

Rounding on Qatar

It is clear that geo-economics is at play in the rift between Qatar and Saudi Arabia and its allies (Editorial - "Diplomatic

mayhem", June 6). As the world has started moving to use natural gas, a much cleaner fuel than oil, Qatar has the potential to reap this opportunity. Other than Iran and Russia, Qatar is the only other country known to have significant reserves of natural gas. The rift is yet another instance of the U.S. meddling in the affairs of the Middle East in order to secure its fossil fuel supplies without getting its boots on the ground. Diplomatically for India, it is a case of wait and watch. India's reaction should be very cautious.

AMIT KUMAR UPADHYAY,
New Delhi

■ Leaving aside the rights and wrongs in the unprecedented decision, the move seems to have more to do with inter-factional rivalries in the

Muslim world in the power struggle in West Asia than about isolating a nation aiding terrorism. India has wisely distanced itself from the stand-off.

S. VASUDEVAN,
Chennai

CBI raid

It is perplexing that when the banking sector has been crippled by unpaid loans disbursed to industrialists over the years, and with no criminal cases being filed against them by the CBI, the agency should now hasten to act against a private and leading television channel. It is evident that the CBI continues to be a "caged parrot" even under the present dispensation and will remain so until it is brought under the Lok Pal, which the Modi government is intriguingly unwilling to

operationalise. Is the raid a result of refusing to act as the one of the government's cheerleaders? The CBI's action is an unmitigated attack on the independence of the media.

S.K. CHOUDHURY,
Bengaluru

Three years in power

Too much is being talked about in the article, "Accounting for three good years" (June 5) but little has been achieved on the ground. True, there has been a slew of welfare measures aimed at improving the lives of poor people, but these well-intentioned schemes remain mired in corruption and faulty implementation. The forceful legitimisation of Aadhaar in almost everything and consequent reduction of leakages is not

supported by any study. There have been instances where people's entitlements have been stopped for non-construction of toilets. There is also haste in declaring gram panchayats open defecation free without even examining the quality of construction of toilets built. In the case of drinking water, LPG cylinder supply and electrification in rural areas,

the focus is on achieving fixed targets without proper evaluation. Three years is a fairly good enough time to deliver on promises made but distress in the countryside, poor growth in manufacturing and lower job creation are all causes for concern.

KUSH MEHENDIRATTA,
New Delhi

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CORRECTIONS & CLARIFICATIONS:

One of the highlights in the front-page (June 6, 2017) graphic - 'Fat boy' in space - erroneously said GSLV Mk-III can launch commercial rockets as heavy as 4 tonnes. It should have been satellites.

A sentence in "Accounting for three good years" (Op-ed page, June 5, 2017) read: "After the Prime Minister's appeal 1.2 people have surrendered their LPG subsidy ..." It should have been 1.2 crore people.

It is the policy of The Hindu to correct significant errors as soon as possible. Please specify the edition (place of publication), date and page. The Readers' Editor's office can be contacted by Telephone: +91-44-28418297/28576300 (11 a.m. to 5 p.m., Monday to Friday); Fax: +91-44-28552963; E-mail: readerseditor@thehindu.co.in; Mail: Readers' Editor, The Hindu, Kasturji Buildings, 859 & 860 Anna Salai, Chennai 600 002, India. All communication must carry the full postal address and telephone number. No personal visits. The Terms of Reference for the Readers' Editor are on www.thehindu.com