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Strategy and Measures for Enhancing India's Energy Security in the Coming Decade

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I offer my congratulations on the 14th Foundation Day of the Institute. I feel privileged and honoured to be invited not only because of the eminence of the occasion, but also because of the long-standing friendships that I share with many members of the Pune International Centre.

Energy security in India: an overview

The issue at hand pertains to energy security which has to be understood in the broader context of the current global turbulence. For a country with a population of 1.4 billion, an economy growing at reasonably good rates and energy demand growing at three times the global average, discussing energy security divorced from the present geopolitical situation fails to fully capture the essence of the challenge that India must navigate.

Constant availability the fundamental tenet of energy policy

Experts across academia and government decision-making positions agree that ensuring energy security involves addressing three essential challenges: energy availability, energy affordability,

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This essay draws from the lecture. It has been suitably modified by the author for the purposes of publication.

and the transition to sustainability. Insofar as energy availability is concerned, one imperative stands above all others – energy must be available at all times. That is the fundamental dharma of energy security, and no political administration can afford to disregard it without significant risk.

India currently consumes 5.4 million barrels of crude oil per day, an increase from five million barrels per day over three years ago. Regardless of fluctuations in the international price of crude oil, projections indicate that India's energy demand will grow at a rate three times, if not more, than the global average in the coming decades. As a large economy which is also growing at rates three to four times the global average, India is expected to account for 25 per cent of the increase in global energy demand through 2040, according to reputable global agencies. Energy serves as the lifeline of any economy, and this is particularly true for India, which must overcome certain legacy challenges to drive economic growth. For India, ensuring a constant and reliable energy supply is not a choice but a necessity.

Exploration and Production (E&P) of oil has been neglected in the past

India's import dependence on crude oil currently stands at approximately 88 per cent. In the case of natural gas, the situation is comparatively better, with import dependence ranging from 45 to 50 per cent, depending on the reference period used. This naturally raises the question: why is India's dependence on fossil fuel imports so high? If one were to forsake diplomatic cadence for some straightspeak, it would not be an overstatement to say that

the root of this challenge lies in the historical neglect of exploration and production (E&P) in the oil sector. This neglect, which borders on what some, might call criminal oversight, stemmed from a belief that if energy could be purchased cheaply from abroad, large investments in domestic prospecting could be avoided. Over time, this approach resulted in significant dependency on external sources for energy.

Without attributing the issue to any specific political agenda, it is fair to conclude that India took its focus off the critical area of E&P for an extended period, the consequences of which are being felt today. Discussions with Chairpersons and Managing Directors of oil marketing companies (OMCs) reveal their perspective on this historical aversion. While their viewpoint is understood, it is not necessarily shared. Their concerns often revolve around the financial implications of large-scale investment. Without strong government direction and commitment, these entities are unlikely to take bold steps. Hypothetically, if companies like ONGC or Oil India Limited were asked to expand their E&P efforts, their initial response would be to point out that an investment of hundreds of millions of dollars would have significant short- and medium-term consequences for their balance sheets.

While E&P activities have been ongoing, they have not been pursued in a concerted, comprehensive, and determined manner for much of the past. India's exploration journey began in 1867 in Digboi, Assam, where the first oil discovery was made. The name 'Digboi' is said to have originated from the phrase 'dig, boy, dig,' reportedly used by colonial overseers directing local workers. More than 150 years later, India has amassed significant experience in

the field of exploration and production (E&P). Notable progress has been made in the Western offshore region, and more recently, ONGC has discovered gas reserves off the coast of Kakinada on the eastern coast. This discovery is expected to yield a production of 45,000 barrels per day. Only in recent years has India begun to regain momentum in this critical area.

Modi government's actions to increase E&P and refining

So what has changed? Recent years have seen a significant shift in India's approach to exploration and production (E&P), driven by a clear vision from the Modi-led NDA government aimed at both the private sector and state-run oil marketing companies (OMCs). One of the key factors behind this shift has been the measures introduced by the government to facilitate E&P.

India possesses 3.5 million square kilometres of sedimentary basin, but only 0.5 million square kilometres have been exploited. This limited exploration is attributed to a lack of consistent prospecting efforts – a situation that defies common sense given the potential resource base. A landmark decision was made to reduce the 'No-Go' areas for exploration. Previously, one million square kilometres of the sedimentary basin had been classified as 'No-Go' due to objections from the navy, Coast Guard, DRDO, and the army, citing operational activity in these regions. It required direct intervention from the Prime Minister to override their objections. As a result, one million square kilometres of previously restricted area was opened for exploration, sending a clear message

to major global energy companies: 'India means business.'

A notable shift in India's approach to E&P has been the adoption of a healthier and more objective stance toward resource assets. Previous governments maintained that oil was a sovereign asset, but the new approach under Prime Minister Modi involves active negotiation with potential investors. This change reflects recognition that attracting foreign investment requires offering commercially viable terms.

Another significant challenge in E&P has been the lack of accessible data. To address this, India established a National Data Repository (NDR) and consolidated its data in a central facility housed at the University of Texas in Houston. The NDR now hosts all newly acquired seismic and well data, enabling easier access and analysis for companies. This initiative has garnered interest from several international oil companies, including ExxonMobil, Shell, Total Energies, ENI, Chevron, POSCO, JAPEX, Murphy Oil, and EOG, signalling growing confidence in India's E&P potential.

Significant progress has been made in the energy sector, but there remain ample opportunities for further growth and development. The successful implementation of key policy initiatives, such as the Open Acreage Licensing Policy (OALP), demonstrates the government's proactive approach to fostering exploration and production. The OALP recently concluded its ninth round of bidding, offering 28 blocks to investors seeking exploration opportunities.

The results from the first eight rounds have been promising,

with over $3.37 billion in committed investments from investors actively engaged in exploration activities. This has led to the drilling of 78 wells, with 15 currently undergoing testing. Notably, these efforts have already resulted in 13 oil and gas discoveries, significantly expanding the geographical area under exploration and aiding the government in moving upwards from 8 per cent area under exploration to a targeted 15 per cent. The ninth round marked a milestone as the largest area offered under the OALP in a single round, with bids received for all available blocks. Particularly encouraging is the fact that 38 per cent of the bids target exploration and production in the previously restricted 'No-Go' areas, now unlocked for development. This reflects growing confidence in India's energy potential and highlights the attractiveness of its evolving E&P landscape.

India is one of the most confident countries when it comes to its refining capacity. The country currently boasts a refining capacity of 252 million metric tonnes per annum. Ongoing projects are set to increase this capacity to 300 million metric tonnes per annum. Additionally, robust discussions are underway to assess the feasibility of further expanding capacity to 400 or 450 million metric tonnes per annum.

While such discussions may seem surprising in light of the imminent energy transition, the answers depend on one's assessment of future reliance on fossil fuels. The longevity of fossil fuels – whether for the next 10, 20, or 30 years – remains uncertain. However, an understanding of geopolitics suggests that fossil fuels will continue to play a significant role for the foreseeable future. This view may not align with the hopes of

some climate activists; however, it is important to note that the government remains committed to facilitating the transition to cleaner energy.

Situating India's import dependence in the global context

The hesitation in affixing a firm timeline to the transition stems from an understanding of the global situation regarding the availability of oil and the motivations of the producer nations. Is there a shortage of oil in the world? The answer is unequivocally no.

The OPEC+ group, which could be described as a producer's cartel, is playing a strategic game. When discussions are held with ministers from these countries, they are asked why oil prices are rising. Their response is typically, "We don't deal with price," to which the reply is, "What do you deal with?" They then explain, "We only manage the amount of energy we release." I do not claim to be an economist; however it must be blindingly obvious to even laypersons that reducing the supply of oil will inevitably impact prices. Nevertheless, this point is not pursued further. Unlike some predecessors who used to plead with OPEC+ to reduce prices, the present Indian government has chosen to address the situation in its own way.

Before the current geopolitical uncertainties, the international energy community was extracting 102 million barrels per day. However, 5 million barrels were removed from the market, reducing the total to 97 million barrels, with the aim of pushing the price per barrel above $80. Fortunately, the international energy

landscape has evolved, and prices are no longer solely dictated by a few countries. New sources of oil are emerging on the global market. For instance, significant oil reserves have recently been discovered in Guyana, and Suriname is another example. Brazil, which currently produces 3.3 million barrels per day, is set to add another 400,000 barrels to the market. These are just a few examples of new oil supplies entering the global market.

Secondly, China, with its $19 trillion GDP, is, by all indications, not in a position to utilise the large quantities of oil it had been importing previously. This shift may be due to a variety of reasons, such as the increased adoption of electric vehicles or certain structural and demographic changes occurring within its economy. The United States, which is arguably the largest oil producer in the world, currently producing 13 million barrels a day, is also expected to increase its oil output after the November 2024 elections. India, it is worth noting, imports nearly $20 billion worth of energy from the United States annually. While there is ongoing debate within the US about the merits of fracking, the expectation is that, regardless of the political outcome in November, the US will increase its oil production. It is anticipated that this could result in an additional one million barrels per day entering the global market.

India the only country where oil prices have come down recently

This lengthy explanation ultimately serves to emphasise that there will be no shortage of oil. India has effectively leveraged its strategic position to secure favourable deals while simultaneously

increasing exploration and production (E&P) efforts to ensure both availability and affordability of energy. It is one of the few countries that have managed to lower retail oil prices over the past three years. Between October 2021 and September 2024, the prices of petrol and diesel in India were reduced by more than 7 per cent and nearly 3 per cent, respectively. In contrast, developed economies have experienced an average increase of nearly 10 per cent in both petrol and diesel prices. Countries in India's neighbourhood have seen even sharper and more volatile price hikes.

This achievement was made possible by decisions taken by the Prime Minister on two occasions — November 21, 2022, and May 22, 2023 — to lower the Central government's cess, thereby reducing the price of petrol and diesel. States governed by the BJP also reduced their VAT accordingly. As a result, petrol and diesel prices were cut by 13 rupees and 6 rupees on those two occasions, delivering further benefits to consumers.

Biofuel blending has taken off since 2014

Another noteworthy aspect of the Modi government's reform-oriented approach towards the oil and gas sector has been its focus on biofuel blending. In 2014, biofuel blending was a modest 1.5 per cent. The government made a concerted effort to increase this, achieving the target of 10 per cent blending by November 2022, five months ahead of schedule. Originally, the blending target for 2030 was set at 20 per cent, but due to significant progress in biofuel production, this target has been moved forward to October 2025, the 'Ethanol Blending Year.'

There is growing confidence in the biofuels blending initiative across the entire ecosystem. Ethanol is now being produced not only from sugar, but also from maize, agricultural waste, and bamboo. In short, ethanol blending has gained significant traction. A common question is why the target is limited to 20 per cent. The reason lies in the conventional understanding that 20 per cent blended fuel does not require any modifications to a vehicle. However, with advancements in modern technology, inexpensive kits are now available for those who wish to make such changes.

Biofuels blending will aid green transition and agrarian economy

Going forward, biofuels blending is expected to play a crucial role in facilitating a rapid green transition. Brazil, a traditional pioneer in biofuels, once had a biofuel blending rate of about 25 per cent. During a recent visit, it was noted that Brazil is now increasing this to 37 per cent, which only goes to further highlight the significant progress India has made to come from near obscurity to 20 per cent blending in a short time period. Ethanol has been a key driver in India's clean energy transition, leading to substantial reductions in carbon emissions and considerable foreign exchange savings. Additionally, biofuels blending has supported the agrarian economy and enhanced food security. By the time India achieved 10 per cent blending; it had saved Rs. 41,000 crores and provided Rs. 42,400 crores to its farmers.

Further diversification is needed, as extracting ethanol from sugar is water-intensive. India has made good progress using maize as a feedstock. Current efforts are focused on deriving ethanol and other products from seaweed, micro-algae, and other

innovative solutions that are readily available in the market. Pilot projects for generating ethanol from seaweed are underway in Pune and Bangalore. Overall, India has saved Rs. 98,000 crores on its import bill through the biofuels blending program. Thus, in India's case, the energy economy is both sustaining and benefiting the agricultural economy, particularly during a time of global turbulence.

Green Hydrogen – the fuel of the future

The biggest excitement comes from the fuel of the future: Green Hydrogen. Apart from solar energy, Green Hydrogen has the potential to become one of the cheapest energy sources. Producing Green Hydrogen requires the ability to reduce the cost per megawatt of solar energy, a feat India has already demonstrated by lowering the cost from 25 cents to three cents. Additionally, there is the need for electrolysers. During a visit to the United States, the U.S. Secretary of Energy stated that India could become a leading producer of electrolysers globally.

Green Hydrogen is expected to succeed in India because it addresses core transportation challenges, offering the potential of 'local demand, local production, and local consumption.' While further refinements are needed in areas like battery storage, significant progress is already underway in this regard. For example, work on pump storage is expected to make a major impact. The government has also made Rs. 19,700 crores available through the PLI scheme for Green Hydrogen. As a result, many electrolyser manufacturers worldwide are eager to partner with India. In Delhi, Indian Oil has 15 top-class buses running on

Green Hydrogen fuel cells. These buses are currently in the trial stage, awaiting certification, but they already demonstrate the immediate viability of Green Hydrogen. Furthermore, other public sector enterprises have committed to setting up Green Hydrogen projects with a capacity of nearly 1 MMTPA by 2030.

Refineries are another area where Green Hydrogen could see considerable demand. Once Green Hydrogen is accepted in refineries, its use is expected to expand rapidly. The main challenge in Green Hydrogen production is cost. According to a U.S. counterpart, the target is to reach one kilogram of Green Hydrogen for $1 within the next decade. Currently, the cost is about $5 to $5.50 per kilogram, but with advancements in pump storage and other technologies, this cost is expected to decrease.

A fundamental public policy question arises: Should India continue importing traditional energy worth $150 billion annually, or should it invest some of those resources into reducing the cost of Green Hydrogen to $2.50 or $3 per kilogram over the next five to ten years? Supporting Green Hydrogen production and research could be a critical step forward. Green Hydrogen-powered buses, for instance, would emit only water vapour compared to the harmful emissions from traditional fuels. This would certainly be a greener option than the current electric vehicle (EV) model, which does not yet operate on a green grid.

Increasing the share of natural gas in India's energy mix

Attention should also be directed towards the progress India

has made in the area of natural gas. At the beginning of the Modi government's functioning, a decision was made to increase the share of natural gas in India's energy mix from 6 per cent to 15 per cent by 2030. An investment of approximately $72 billion in natural gas infrastructure is required to achieve this, which will result in a three-fold increase in gas consumption—from the current level of around 188 MMSCMD to over 500 MMSCMD by 2030.

India has seen significant success in increasing the uptake of LPG (liquefied petroleum gas). In 2014, before the Prime Minister took office, there were 14 crore LPG gas connections. Today, the country has 33 crore connections, meaning nearly the entire population is covered, as each household averages between four and five people. Additionally, the length of the natural gas pipeline network has increased from 14,000 kilometres in 2014 to more than 24,000 kilometres today, with a target to expand it to 33,000 kilometres.

The widespread availability of connections and the expansion of the pipeline network have helped lower the price of LPG. The cost of clean cooking gas for a family is now approximately 15-16 rupees per day. This cost is even lower for beneficiaries of the PM Ujjwala scheme, with 10.3 crore beneficiaries enjoying a daily cost of just five rupees, a remarkable achievement even on a global scale. In comparison, countries like Brazil, a pioneer in biofuels, still have 30 percent of their rural population relying on firewood and other toxic cooking methods. The Ujjwala scheme, launched in 2016, has been particularly impactful in rural areas, with about 80 per cent of the new connections being made there.

The global turbulence today and the inefficacy of the UN

Before concluding, I shall draw your attention to the state of global affairs and its implications on the energy market. While there are varying assessments of the global turbulence, it is generally acknowledged that the world today is in a more vulnerable situation regarding peace and security than at any time in recent history.

The current global order was established at the close of the Second World War, with efforts to define the coordinates of a post-war world. Meetings took place in the small New Hampshire village of Bretton Woods, where numerous eminent economists and decision-makers gathered to shape the new world order. The most active participants included Harry White, John Maynard Keynes, and US Treasury Secretary Henry Morgenthau Jr. From this, the International Monetary Fund and the World Bank were created.

However, international trade issues were not as straightforward, as the United States, the world's largest economy then and still the largest today, was reluctant to cede authority over international trade matters to a supranational body. As a result, discussions for an International Trade Organization (ITO) were stillborn. Instead, Chapter Four of the Havana Charter, concerning tariffs and trade, was used to form the General Agreement on Tariffs and Trade (GATT), given legal cover by the Interim Committee for International Trade Order (ICITO). The Uruguay Round multilateral trade negotiations eventually led to the creation of the World

Trade Organization (WTO) in 1986, but only as part of what had originally been envisioned as the ITO.

Since those ambitious beginnings, the UN system has seen a decline, with the current situation considered to be the lowest ebb. It is believed that the UN system has become dysfunctional. The greatest dysfunction is seen on the peace and security front, as the world was intended to be reordered according to the philosophy of "to the victor belong the spoils." Five permanent members, the so-called victors, were granted veto power on the UN Security Council, which is significant because, as the only designated agency authorised to determine threats to international peace and security, it holds the power to authorise "all means necessary," a euphemism for the use of force.

Has the Security Council been effective since its establishment? Opinions vary, and this is a subject of heated debate. From personal experience, there remains ambivalence over its ability to maintain international peace and security. During the time spent representing India on the Security Council, two notable situations arose: Libya, linked to UN Security Council Resolution 1973, and Syria. In Libya, the Security Council authorised the use of "all means necessary," with the consequences being well-known. In contrast, in Syria, where a similar situation unfolded, the Security Council chose not to authorise the use of force, having learnt from the consequences of its earlier actions in Libya. Of the five permanent members, two decided against military action in Syria.

Today, the Security Council stands paralysed. After the Libya and Syria situations, it is unclear what remains of the credibility

of the UN Security Council. While some matters are not even referred to the Council, the key question remains: What power or effectiveness does the Security Council hold if, in the event of a major crisis, action is required?

The impact of geopolitical uncertainty on India's energy security

I shall conclude on a more hopeful note. It is unlikely that large-scale war will break out, as all stakeholders understand that the consequences would far outweigh any potential gains. Much will also depend on the outcome of the US presidential elections, as countries continue to seek leadership and alignment in a fragmented world.

How will this impact India's energy considerations? If tensions escalate, the traditional assumption is that oil prices will rise. However, my thesis is exactly opposite: today, most countries realise two key things. First, that fossil fuels will not be around forever. Even if a country possesses vast oil reserves, once the transition to cleaner energy occurs, the utility of fossil fuels will diminish. Second, the international price of oil, currently propped up at around 80 dollars per barrel, is artificial. An escalation of tensions cannot fundamentally alter this reality. Recently, oil prices spiked, but within days, they returned to 68 dollars per barrel, and some estimates suggest they could fall as low as 60 dollars per barrel or even lower in the near term.

What does this mean for India? For a country largely dependent on energy, lower or stable oil prices are good news. While some

producer companies may worry in the short term, their adjustment to greener energy sources is expected to benefit their balance sheets. Nonetheless, India's exploration and production (E&P) should not become complacent because of this. The country must continue preparing for a future where, in the event of conflict, imports are reduced or halted, and India has ample strategic petroleum reserves. While progress has been made, given India's unique energy needs, much more should be produced.

Conclusion

India is now one of those countries, alongside the permanent members of the UN Security Council whose voice is being increasingly listened to. Our message to the world has been consistent. There is scope for positive, collaborative development that benefits every stakeholder. But, as students of history, we also know that accidents can sometimes create turbulence. India remains vigilant, and if that were to happen, it is strategically equipped to deal with any situation.

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