

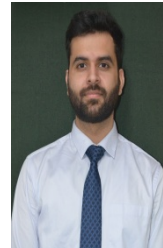


ISSUE BRIEF

No. 338

May 2022

Pursuing Energy Independence for Expanding India's Strategic Autonomy



Mohak Gambhir is a Research Assistant at CLAWS. He holds a Master's Degree in International and Area Studies from Jamia Millia Islamia and a Bachelor's Degree in Commerce (H) from University of Delhi. He has previously worked as an analyst at PricewaterhouseCoopers India (PwC). His areas of focus include China-South Asia Relations, India's Foreign & Strategic Policies towards Smaller South-Asian States (SSAs) of Bangladesh Bhutan and Nepal, and Non-Traditional Security in South Asia.

Introduction

Since its independence, India has long strived to pursue strategic autonomy. During the Cold War era, this was ensured by careful balancing of the two competing world powers —USA and USSR, by following the path of non-alignment. Post Cold War, India opened its economy to the world and sought to pursue the path of multi-alignments under the rubric of 'strategic partnerships', with an aim to secure its national interests. While strategic autonomy may simply be referred to as any country's ability to exercise relative independence in its decision-making process to safeguard its national interests, its initial usage was majorly restricted to the domains of politics and defence. However, the last three decades have witnessed an exponential growth in globalisation and complexities posed by interdependencies created across multiple domains. During this period, the concept of

Key Points

- Since its independence, India has strived to maintain and augment its 'strategic autonomy' in global politics.
- One of the key areas of vulnerability is India's high import dependency to meet its energy needs which mainly comprises oil, natural gas and coal.
- India is actively looking at alternative energy sources like renewable energy and green hydrogen to reduce its energy import dependency to shield itself from global price shocks and supply disruptions due to geopolitical events.
- There are key shortcomings of technical, economic and policy nature that may hamper largely independent future energy pathways that need attention and government support.
- To support India's economic growth and global ambitions, better fiscal and policy planning is needed to structure an economical, reliable and independent energy mix.



security itself has undergone a monumental expansion to include critical facets like energy, climate, technology, health etc.

Energy remains a crucial sector for any country's overall security and prosperity. India is a net importer of energy and thus, this sector can be termed as vulnerable for India's strategic autonomy. Strategic autonomy in itself cannot be the goal for any responsible country like India— it rather remains only a 'means' of achieving national objectives decided by India itself, with minimal external influence over India's policies in key areas of energy and defence. Pursuing independence in such areas to expand strategic autonomy does not mean decoupling from the global economy. On the contrary, India needs globalisation to expand its economy and alleviate poverty. Therefore, reducing dependence on external sources for energy and defence can strengthen a India's bargaining position on other matters at the global stage and make diplomacy easier during times of crisis.

For India, energy security should not be limited to uninterrupted supplies by ensuring source diversification, which India has already achieved to a great extent. Apart from reliability, for a developing country like India, affordability is an almost equally important factor— hundreds of million of people live under poverty or fall in the lower-class economic category and are financially extremely sensitive to the inflationary impact that rising fuel prices are posing to the economy. During times of global energy price escalation, India has to strike a delicate balance between exercising fiscal discipline, fostering growth and shielding the vulnerable segment of its population. This paper aims to highlight the current vulnerabilities in India's energy consumption, with focus on only crude oil, natural gas and coal. The paper will analyse solutions for minimising this vulnerability.

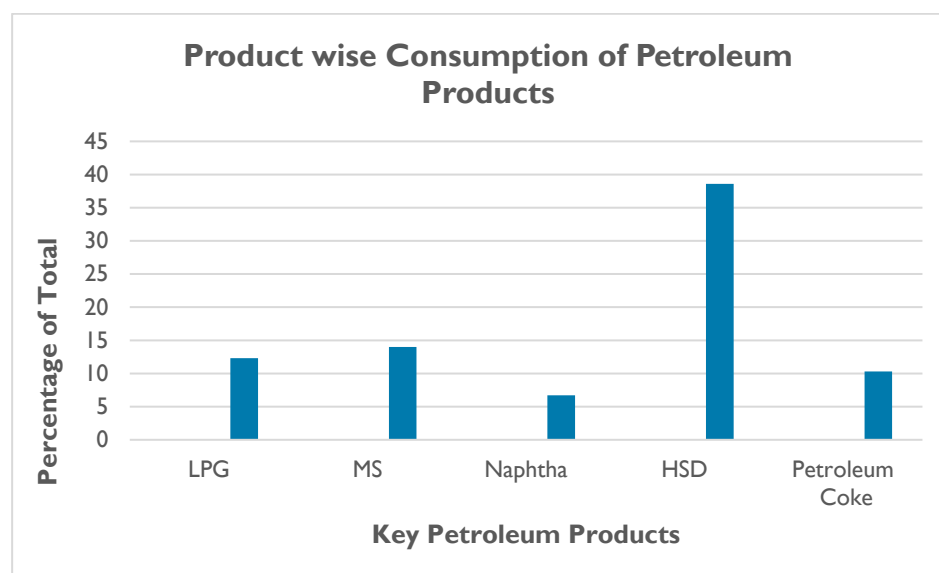
Fossil Fuel Consumption Patterns and Import Dependency

India has been a net energy importer since its independence. As the country opened its economy in 1991 following economic liberalisation, India witnessed a period of robust economic growth which propelled its demand for energy. Since, increasing number of people were lifted out of poverty into an expanding lower and middle class, therefore, the country's demand for electricity and fuel saw steady growth. For addressing vulnerabilities

related to some key fuels, it is important to first understand the main consumption sectors and the degree of import dependencies of these fuels. Pre-pandemic data from the year 2019-20 is used for this analysis.

- **Crude Oil.** With limited domestic reserves, India imports majority of its crude oil needs. According to data from the Ministry of Petroleum and Natural Gas (MoPNG), India imported 85 per cent of its crude oil consumption in 2019-20¹, rest being met from domestic production.

Graph 1: Product Wise Consumption of Petroleum Products



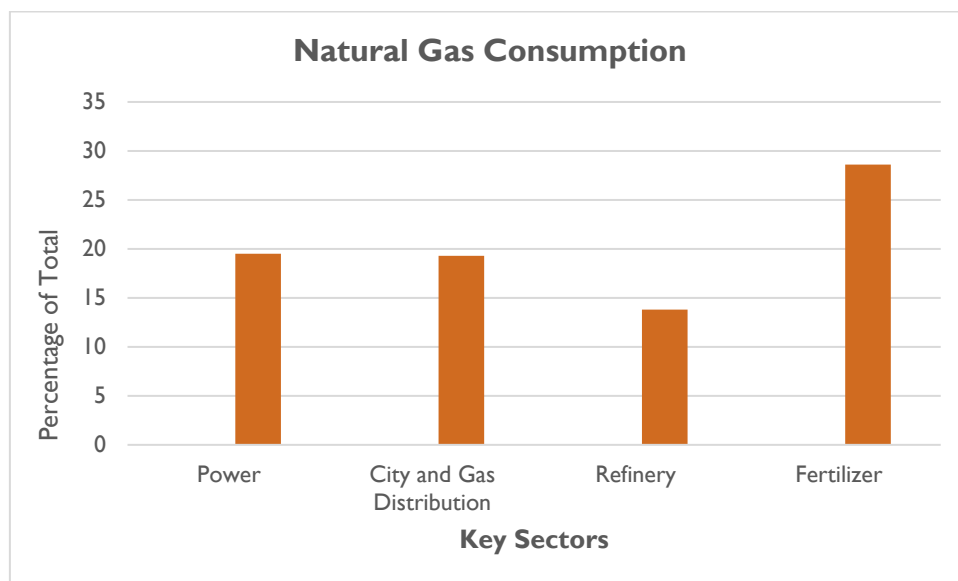
Source: MoPNG.² Graph Prepared by the Author

From the graph above, it can be seen that High Speed Diesel (HSD), Motor Spirit (MS) and Liquefied Petroleum Gas (LPG) forms the bulk of petroleum product consumption with a share of 38.6, 14 and 12.3 per cent respectively. Of these, 88 per cent of LPG is used by domestic households, while 99 per cent of MS is used by retailers/resellers (used in the transport sector); 92.3 per cent (7.3 per cent for state transport companies and 85.6 per cent for retail sellers) of HSD is majorly used in the transport sector, however, a clear breakup of the same is not available in ministry

reports(Note: This assumption is based on a report submitted to the petroleum planning and analysis cell in 2013-14 on the use of diesel in the country³).

- **Natural Gas.** With respect to Natural Gas, India is better positioned than in the case of crude oil. India imports nearly 50 per cent of its natural gas consumption.⁴ This is primarily due to low gas use in Indian economy with main sectors of consumption being power (19.5 per cent), city and gas distribution (19.3 per cent), refineries (13.8 per cent) and fertilisers (28.5 per cent).⁵

Graph 2: Natural Gas Consumption



Source: MoPNG. Graph Prepared by the Author

- **Coal.** In India, the Power Sector is the largest consumer of coal. However, despite holding the third largest coal reserves in the world, India imports significant quantity of coal for several reasons. Indian coal generally has lower calorific value and higher sulphur content that affects the efficiency of power plants and makes meeting pollution control norms difficult. Private power plant operators, in particular, prefers to use imported coals for these reasons. Another key reason is related to the supply end. Domestic production has not been able to keep up with demand for reasons like monsoon, therefore hampering coal mine operations. Frequent labour strikes is another reason for disruption in coal production. In 2019-20, India's coal consumption

was around 950 million metric tonnes (MMT)⁶; the domestic offtake i.e. coal purchased by consumers was only 707 MMT⁷ while the rest was met with imports of nearly 248 MMT.⁸

India's import dependency for FY 2019-20 for crude oil and natural gas was 85 and 77 per cent respectively.⁹ The same for coal was around 26 per cent (248 MMT import out of 950 MMT).

Energy Independence Solutions for Key Sectors

Hydrogen Economy

As major countries around the world get serious about battling climate change, therefore, hydrogen is being looked at with great confidence as a solution for decarbonisation of economies. It is also a great tool for attaining energy independence, particularly green hydrogen. Green hydrogen refers to the process of using renewable power to generate hydrogen from water through a process called electrolysis. India has had an exponential growth in installing highly cost-effective renewable energy capacity, particularly solar, and is well poised to materialise a transition towards a hydrogen economy. According to some studies, by 2050, India may be able to achieve a delivered cost of hydrogen of USD 1/kg (USD 7.4 per million British thermal units or MMBtu).¹⁰ To put it in perspective, as of 01 April 2022, the price of domestically produced natural gas in India was fixed at USD 6 MMBtu.¹¹

However, due to several factors like cost of existing electrolyser technologies and availability of cheaper energy alternatives to hydrogen, the hydrogen fuel will need to be adapted in a very targeted manner i.e. one that balances energy independence and also the economics involved. This transition would indeed require great fiscal and policy support from the government. Three key sectors where hydrogen can play a significant role are power, transportation and fertilisers.

- **Power Sector.** The power sector is key for moving towards energy independence. This is not simply because majority of coal and nearly 20 per cent of natural gas consumption is by the power sector, but also because achieving energy independence in this sector will also make other sectors more independent by way of electrification of certain industries that heavily relies on imported fossil fuels.

Hydrogen can play an important role in reducing these imports, particularly natural gas. In January 2022, natural gas accounted for just 6.3 per cent of India's power sector.¹² In 2017, the Indian Government announced a target of increasing that share to 15 per cent by 2030.¹³ India needs to adopt a strategy of green hydrogen blending with natural gas to be used by power sectors on a large scale. The current government's plans of blending 15 per cent green hydrogen¹⁴ with gas using existing transmission pipelines with modest modifications is good for short term but long term solutions will need to be devised to reach a much higher rate of reducing import dependency of India. One such solution is using the captive green hydrogen production facilities around existing natural gas power plants. This will be based on the 'power-hydrogen-power' model already demonstrated in a pilot project in Saillat-sur-Vienne, France where plans are underway to gradually modify the plants to increase hydrogen blending to up to 80 per cent by 2024.¹⁵

- **Transportation.** Hydrogen fuel cells based vehicles are being looked at world over as a means of fighting climate change. However, for a country like India a more targeted approach would be required to adopt hydrogen in the transport sector. India's middle-class population does not have the purchasing power to consider hydrogen cars as an affordable alternative to internal combustion engine cars. Large subsidies may be required from the government to not only make these cars affordable but also to set up production, transportation, storage and refuelling infrastructure for hydrogen at a great scale to make any significant impact on reducing import dependency in the passenger vehicle segment. This may not be feasible for India's fiscal capacity.

However, opportunities exist in the long-haul commercial vehicles used for inter-state transport of goods throughout the country. Setting up hydrogen refuelling stations across the state and national highways with on-site hydrogen production facilities will reduce the transportation costs of hydrogen. While not all refuelling stations may have access to renewable energy or to an adjoining land for setting up co-located renewable energy capacity, therefore, they can be allowed subsidy for the difference in price between price of the cheaper renewable energy and conventional energy.. As the renewable energy's share in the power mix is expected to increase, based on the government's target of installing 450 gigawatts (GW) of renewable

generation capacity by 2030,¹⁶ the subsidy burden will reduce proportionately in the future. The Port of Antwerp in Belgium is already on path to produce 400 kg of hydrogen fuel using 1 MW electrolyser which can fuel “16 freight trucks up to 600 miles”.¹⁷ Systems as large as 20 MW have been developed by companies like Cummins.¹⁸ Integrated supply management portals may be set up to manage daily issues of over and under supply wherein excess hydrogen from one refuelling station maybe transported to a nearby station experiencing short supply.

- **Fertilisers.** The fertiliser industry, which accounts for around 28 per cent of natural gas¹⁹ consumption, is well poised to transition to hydrogen as a raw material. While India was considering introducing mandatory purchase obligations (MPO) for the fertiliser sector, the same was not included in the final Green Hydrogen Policy (GHP) declared in February 2022.²⁰ The draft hydrogen policy had proposed green hydrogen to account for nearly 5 per cent of their demand in FY 2023-24 and 20 per cent by FY 2028-29.²¹ The government was probably thinking about the risk of exposing itself to higher subsidy costs since fertilisers in India are subsidised to protect the farmers. However, a similar plan may be reintroduced a few years down the line as hydrogen costs start dropping due to increased demands in other sectors and declining renewable energy and electrolyser costs.

Challenges for Hydrogen

There are some key challenges with respect to hydrogen fuel. Currently, it is significantly more expensive than fossil fuel alternatives and has a far lower energy density compared to natural gas which means more storage and transport infrastructure is required. For the transport sector, it may not be able to compete with battery powered electric vehicles (EVs) due to its low efficiency. According to Volkswagen Group’s research, battery EVs have an efficiency rate of nearly 76 per cent compared to hydrogen cars’ 30 per cent.²²

For hydrogen to play a more significant role, much more fiscal and policy support is required from the government. The Indian Government’s GHP includes several key support measures like waiving the inter-state transmission charges for boosting hydrogen production capacity in the country. However, there are key shortcomings in the policy announced. For instance, the policy does not mention any tax breaks or subsidised credit facilities for setting up

production of either hydrogen plants or the electrolyser— a key component required for hydrogen production by way electrolysis. Hydrogen production costs are guided by two key factors— cost of electrolyzers (also factoring in their efficiency) and renewable energy. The government needs to continuously support these two segments to bring down hydrogen costs to make it competitive against natural gas.

Electrification

Electrification of some key sectors, where economically feasible, can reduce dependence on imported fuels due to the expanding renewable energy sector as also the increasing use of fossil fuels from domestic sources.

Transport

The transport sector accounts for 99 per cent of all the MS consumption in the country, which itself represents 14 per cent share of the total petroleum products in India (FY 2019-20).²³ As the country's economic growth continues and the middle-class expands, India is going to see a steady rise in the sale of passenger vehicles and MS consumption, mostly supported by imports. For the transport sector, a multipronged approach is required to reduce import dependence. As discussed above, for long-haul commercial transportation, hydrogen may provide a solution with rigorous support from the government. For the passenger vehicle segment, India is betting big on EVs. The Indian Government reduced GST of EVs to just 5 per cent in August 2019.²⁴ In 2021, India announced production linked incentives (PLI) worth INR 18,100 crore for manufacturing batteries for EVs.²⁵ The government is targeting "70 per cent of total commercial cars, 30 per cent of private cars, 40 per cent of buses and 80 per cent of two-wheeler and three-wheeler sales to be electric by 2030".²⁶

While this is an important step towards electrification of the transport sector, there are key challenges that require government attention. For instance, all EVs today are powered by lithium-ion battery (which also uses other rare minerals like cobalt and nickel). India does not have adequate reserves to meet the demand of the local industry. While lithium-ion, even with imported key minerals, would remain vital for quick transition to EVs, there is a need to have a long-term perspective about stabilising the supply of these rare metals. Encouraging

research and development to find battery solutions for EVs with other abundant metals available or extractable domestically is required. Sodium-ion battery technology, for instance, is being researched upon in many countries as an alternative to lithium-ion batteries.

Another important factor for sustaining the EV dream is recycling. India still does not have a dedicated recycling policy for critical EV components, mainly the batteries. This is crucial for reducing imports of new batteries or their constituent metals like, cobalt, nickel, graphite, manganese etc. which constitutes nearly 30 per cent of the lithium-ion battery.²⁷

Another area that needs improvement is government support for hybrid vehicles, which require external charging and thus eliminates the need for the charging infrastructure and associated costs. Hybrid vehicles are key for transiting towards an electric transport future and can “reduce energy consumption by 30-45 per cent over internal combustion engines”.²⁸ Presently, the GST for hybrid vehicles stands at 43 per cent in comparison to 5 per cent for battery EVs.²⁹

Conclusion

Given how advanced the phenomenon of globalisation is today, no country can be completely independent. India is at a very peculiar juncture in global politics today with few countries sharing the threats and interests mix that India has. Hence, pursuing a long-term policy of reducing import dependency in key areas like energy and defence becomes imperative. Geopolitical developments in a distant part of the world can exacerbate India's defence, energy and economic woes.

The Russia-Ukraine War supports this notion. As the war started, global crude oil and natural gas prices saw a sharp rise. This put India, where the economy was just starting to recover since the global coronavirus pandemic began in 2020, in a very difficult situation. India was offered crude oil from Russia at discounted rates. To protect its public from inflationary shocks of rising oil prices, India opted to buy the discounted Russian oil as one of the measures to safeguard its economic interests. While India did exercise its strategic autonomy in doing so, it was done in the backdrop of immense global pressure from the West. A western campaign ensued in the West, targeting India for importing Russian oil,

even as Europe continued to be the largest buyer of Russian energy supplies.³⁰ While firm Indian stance on the issue is commendable as the country stood for its national interests before anything else, it cannot be denied that it made diplomacy during the crisis, a challenge for India. Another key lesson that India must draw from the war is that, energy imports are susceptible to weaponisation in times of crisis. Russia had threatened to cut off gas supplies of the European Union as the US pursued plans to ban Russian oil. Sustained fiscal and policy support from the Indian Government is required to pursue a meaningful degree of energy independence to expand India's strategic autonomy.

End Notes

¹ "Indian Petroleum and Natural Gas Statistics 2019-20", *Ministry of Petroleum and Natural Gas*, January 2021. Available at <https://mopng.gov.in/files/TableManagements/IPNG-2019-20.pdf>. Accessed on 05 April 2022.

² Ibid.

³ "70% of Diesel, 99.6 % of Petrol consumed by Transport Sector", *Press Information Bureau*, 28 January 2014. Available at [https://pib.gov.in/newsite/printrelease.aspx?relid=102799#:~:text=As%20per%20the%20All%20India,UVs\)%20and%203%2Dwheelers](https://pib.gov.in/newsite/printrelease.aspx?relid=102799#:~:text=As%20per%20the%20All%20India,UVs)%20and%203%2Dwheelers). Accessed on 05 April 2022.

⁴ N.1.

⁵ Ibid.

⁶ Swati D'Souza, "Transitioning from coal won't be easy. India must ensure support for people and communities dependent on the sector", *The Indian Express*, 16 April 2021 Available at <https://indianexpress.com/article/opinion/columns/transitioning-from-coal-wont-be-easy-india-must-ensure-support-for-people-and-communities-dependent-on-the-sector-7275473/>. Accessed on 05 April 2022.

⁷ "The Year at a Glance", *Ministry of Coal*, 2021, Ch-2. Available at <https://coal.gov.in/sites/default/files/2021-03/chap2AnnualReport2021en.pdf>. Accessed on 05 April 2022.

⁸ "Year Wise Import of Coal and Coke to India during Last Ten Years", *Major Statistics, Ministry of Coal*. Available at <https://coal.gov.in/sites/default/files/2021-01/Import-of-Coal-and-Coke-last-ten-years.pdf>. Accessed on 05 April 2022.

⁹ N.1.

¹⁰ "Hydrogen Economy Outlook", *BloombergNEF*, 30 March 2020. Available at <https://data.bloomberglp.com/professional/sites/24/BNEF-Hydrogen-Economy-Outlook-Key-Messages-30-Mar-2020.pdf>. Accessed on 05 April 2022.



-
- ¹¹ "India more than doubles price of locally produced gas", *Livemint*, 01 April 2022 Available at <https://www.livemint.com/industry/energy/india-more-than-doubles-domestic-natural-gas-price-to-6-1-mmbtu-for-6-months-beginning-1-april-11648729140812.html>. Accessed on 07 April 2022.
- ¹² "Power Sector at a Glance All India", *Ministry of Power*, 31 January 2022. Available at <https://powermin.gov.in/en/content/power-sector-glance-all-india> Accessed on 07 April 2022.
- ¹³ Flavia Lopes, "How natural gas could thwart or support India's renewables progress", *Business Standard*, 19 October 2021. Available at https://www.business-standard.com/article/current-affairs/how-natural-gas-could-thwart-or-support-india-s-renewables-progress-121101900140_1.html. Accessed on 09 April 2022.
- ¹⁴ "Govt planning to blend 15 per cent green hydrogen with piped natural gas", *The Hindu Businessline*, 30 December 2021. Available at <https://www.thehindubusinessline.com/news/govt-planning-to-blend-15-per-cent-green-hydrogen-with-piped-natural-gas/article38073350.ece>. Accessed on 09 April 2022.
- ¹⁵ Sonal Patel, "World's First Integrated Hydrogen Power-to-Power Demonstration Launched", *Power*, 04 June 2020. Available at <https://www.powermag.com/worlds-first-integrated-hydrogen-power-to-power-demonstration-launched/>. Accessed on 09 April 2022.
- ¹⁶ PTI, "India to achieve 50% clean energy share, 500 GW RE capacity targets before 2030 deadline: RK Singh", *The Economic Times*, 09 November 2021. Available at <https://economictimes.indiatimes.com/industry/renewables/india-to-achieve-50-clean-energy-share-500-gw-re-capacity-targets-before-2030-deadline-singh/articleshow/87604552.cms>. Accessed on 10 April 2022.
- ¹⁷ "Cummins Electrolyzers Power First-Of-Its Kind Hydrogen Refueling Station", *Cummins Inc*, 04 June 2021. Available at <https://www.cummins.com/news/2021/06/04/cummins-electrolyzers-power-first-its-kind-hydrogen-refueling-station>. Accessed on 10 April 2022.
- ¹⁸ Ibid.
- ¹⁹ N.1.
- ²⁰ "Green Hydrogen Policy", *Ministry of Power*, 17 February 2022. Available at https://powermin.gov.in/sites/default/files/Green_Hydrogen_Policy.pdf Accessed on 10 April 2022.
- ²¹ Reuters, "India to require refiners, fertiliser plants to use some green hydrogen", *The Economic Times*, 09 August 2021. Available at <https://economictimes.indiatimes.com/industry/renewables/india-to-require-refiners-fertiliser-plants-to-use-some-green-hydrogen/articleshow/85179977.cms?from=mdr> Accessed on 10 April 2022.
- ²² "Hydrogen or battery? A clear case, until further notice", *Volkswagen*, 07 November 2019. Available at <https://www.volkswagenag.com/en/news/stories/2019/08/hydrogen-or-battery--that-is-the-question.html#>. Accessed on 10 April 2022.
- ²³ N.1.
- ²⁴ "Tax boost for EVs, GST slashed to 5% from 12%", *The Economic Times*, 27 July 2019. Available at <https://economictimes.indiatimes.com/news/economy/policy/gst-on-evs-slashed-to-5-from-12/articleshow/70407309.cms?from=mdr>. Accessed on 11 April 2022.



²⁵ “Four firms selected for Rs 18,000 crore PLI scheme for ACC battery”, *The Business Standard*, 24 March 2022. Available at https://www.business-standard.com/article/economy-policy/four-firms-selected-for-rs-18-000-crore-pli-scheme-for-acc-battery-122032400524_1.html. Accessed on 11 April 2022.

²⁶ “Financing India’s Transition to Electric Vehicles”, *Council on Energy, Environment and Water*, December 2020. Available at <https://cef.ceew.in/solutions-factory/publications/financing-india-transition-to-electric-vehicles>. Accessed on 11 April 2022.

²⁷ Anil Satapathy, “India needs an EV battery recycling policy to become truly Atmanirbhar: Nitin Gupta, CEO, Attero Recycling”, *The Economic Times*, 23 November 2021. Available at <https://economictimes.indiatimes.com/industry/renewables/india-needs-an-ev-battery-recycling-policy-to-become-truly-atmanirbhar-nitin-gupta-ceo-attero-recycling/articleshow/87862790.cms>. Accessed on 12 April 2022.

²⁸ Neeraj Thakur, “Hybrid, EV Auto Lobbies Competing To Get Modi On Their Side”, *The Outlook*, 10 December 2021. Available at <https://www.outlookindia.com/website/story/business-news-ahead-of-budget-hybrid-car-lobby-fights-against-electric-vehicles-for-incentives/404509/amp>. Accessed on 12 April 2022.

²⁹ Ibid.

³⁰ Dipanjan Roy Chaudhury, “Europe biggest importer of Russian oil & gas even as India is targeted”, *The Economic Times*, 26 March 2022. Available at <https://economictimes.indiatimes.com/industry/energy/oil-gas/europe-biggest-importer-of-russian-oil-gas-even-as-india-is-targeted/articleshow/90465528.cms>. Accessed on 12 April 2022.

The views expressed and suggestions made in the article are solely of the author in his personal capacity and do not have any official endorsement. Attributability of the contents lies purely with author.



CENTRE FOR LAND WARFARE STUDIES (CLAWS)

RPSO Complex, Parade Road, Delhi Cantt, New Delhi 110010

Tel.: +91-11-25691308, Fax: +91-11-25692347, CLAWS Army No. 33098; Email: landwarfare@gmail.com

Website: www.claws.in