Green Growth:
Issues and Challenges

Dr. Sarika Rachuri

FORUM
OF FREE ENTERPRISE

“Free Enterprise was born with man and shall survive as long as man survives”.

- A. D. Shroff
(1899-1965)
Founder-President
Forum of Free Enterprise

SHAILESH KAPADIA

(24-12-1949 – 19-10-1988)

Late Mr. Shailesh Kapadia, FCA, was a Chartered Accountant by profession and was a partner of M/s G.M. Kapadia & Co. and M/s Kapadia Associates, Chartered Accountants, Mumbai.

Shailesh qualified as a Chartered Accountant in 1974 after completing his Articles with M/s Dalal & Shah and M/s G.M. Kapadia & Co., Chartered Accountants, Mumbai. Shailesh had done his schooling at Scindia School, Gwalior and he graduated in Commerce from the Sydenham College of Commerce & Economics, Mumbai, in 1970.

Shailesh enjoyed the confidence of clients, colleagues and friends. He had a charming personality and was able to achieve almost every task allotted to him. In his short but dynamic professional career, spanning over fourteen years, Shailesh held important positions in various professional and public institutions.

Shailesh's leadership qualities came to the fore when he was the President of the Bombay Chartered Accountants' Society in the year 1982-83. During his tenure he successfully organized the Third Regional Conference at Mumbai.

Shailesh was member, Institute of Fiscal Studies, U.K.; member of the Law Committee and Vice-Chairman of the Direct Taxation Committee, Indian Merchants' Chamber. He was also a Director of several public companies in India and Trustee of various public Charitable Trusts.

He regularly contributed papers on diverse subjects of professional interest at refresher courses, seminars and conferences organised by professional bodies.

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Green Growth: Issues and Challenges

Dr. Sarika Rachuri*

Abstract

The journey from Kyoto to Paris has been long and winding. It has built a more resilient world. A world sensitive towards growth that is more sustainable and futuristic. A world which is more sensitive to the menace of climate change. As the world gears up to challenges of climate change and fosters its commitment, a large number of options and choices of conducting business by reducing growth are emerging, and business houses are looking at doing business which enable them to offset their carbon foot prints. The commitment to reduce Green House Gas (GHG) emissions has opened up a plethora of opportunities which are coined as "Green Economy". What are the implications of this, for a country like India? Where do we feature in our commitments towards a more sustainable and cleaner economy? This paper makes a humble attempt to look at the opportunities and challenges of the Green Economy for a country like India. After a brief introduction to climate change, it delves deeper into the issues and challenges of the green economy. The subsequent section covers the

* *The author is a faculty with IBS ICFAI Business School and a columnist to Nikkie Asian Review with several co-authored books and research papers to her credit.*

specificity of power sector and transport sector that hold a promise to push the Indian commitment towards reducing carbon foot prints.

Introduction

The world has not been the same, after the realization that climate change is happening and is a product of anthropogenic (man-made) interventions. The grey world of industrialization and huge Green House Gas (GHG) emissions is altering the environmental and economic landscape. Across the world, the impact of climate change is getting pronounced, manifesting in the form of dry spells, and floods. A broad consensus is emerging among policy makers, politicians and climatologists about climate change and its catastrophic influence on our society. The negative externalities of climate change on the lives and livelihood patterns cannot be ignored now. Countries are also evolving in their commitments to combat climate change

In December, 1997, the world first got together to work on mitigating climate change at the Kyoto Protocol. It came into force only in the year 2005. That is how, the onus of reducing GHG came to rest on the developed world. The initial climate talks in Kyoto spoke of common but differentiated responsibilities, where the developed world through positive scores for the Clean Development Mechanism (CDM) would undertake projects in the developing world to abate their emissions. Having green energy projects in developing countries would have two benefits. For the developing world, it would mean cheaper means of financing projects while reducing their carbon foot prints. On the other hand, for the developed world,

it would ensure sustainable technology upgradation. This was a scheme whereby investing companies acquire Certified Emission Reduction (CER) credits when it has been confirmed that they have made investments in energy conservation and new energy projects in developing countries in accordance with the rules and methodologies determined by the Conference of the Parties (COP) and the CDM Executive Board, and also that the investments have contributed to reductions in carbon emissions.

The European Commission was operating the EU-Emissions Trading System (EU-ETS) alongside the CDM scheme, but the slumping price of the European intra-regional emission permits (EURs) became a cause for concern for the Commission. This was against a backdrop of economic stagnation in the former Soviet bloc countries in Eastern Europe. Imports of cheap natural gas from Russia, resulted in huge surpluses in emissions permits and high levels of unemployment across the region. Therefore, although the European Commission initially allowed CERs to be used in place of EURs, it withdrew that, and announced an isolationist policy under which the use of CERs was banned, starting in 2012.

The Fukushima nuclear disaster in Japan at the Fukushima Daiichi Nuclear Power Station following the Great East Japan Earthquake in 2011, caused a shutdown of the power station. A political decision was made to set no numerical target for the second commitment period from 2012 under the Kyoto Protocol. In addition, the Japanese government would not purchase CERs. Consequently, those actions

of the European Commission and the Japanese government, which happened to run counter to the CER trading apparatus, triggered the carbon panic, resulting in the CER price crash and the collapse of the CDM scheme.[1]

When the Paris Agreement was approved in 2015, its Article 6 was viewed as a major advance for achieving the objective of the United Nations Framework Convention on Climate Change (UNFCCC) and the evolving international climate regime, given that it embraced more clearly the notion that "cooperative approaches" (often indicating "markets") could help governments achieve their national carbon reduction and removal targets. However, in reality, the negotiators struggled to agree upon the detailed rules for them.

In 2021, the Conference of the Parties for 2026 (COP 26) climate negotiations in Glasgow led to the highly-anticipated conclusion of rules aimed to help put into practice the Paris Agreement's Article 6[2] – that establishes three approaches for Parties to voluntarily cooperate in achieving their emission reduction

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1. https://ajrc.crawford.anu.edu.au/department-news/19451/collapse-cdm-scheme-under-kyoto-protocol-and-its-spillover-consequences-carbon#:~:text=Naturally%2C%20it%20was%20also%20decided,collapse%20of%20the%20CDM%20scheme.

https://cepr.org/voxeu/columns/collapse-clean-development-mechanism-scheme-under-kyoto-protocol-and-its-spillover#:~:text=The%20factors%20that%20led%20to,commitment%20to%20its%20numerical%20targets.

2. https://www.iisd.org/articles/paris-agreement-article-6-rules

targets and adaptation aims set out in their national climate action plans.

In COP26, India, presented the following five nectar elements (Panchamrit) of India's climate action:

I. Reach 500GW Non-fossil energy capacity by 2030.

II. 50 per cent of its energy requirements from renewable energy by 2030.

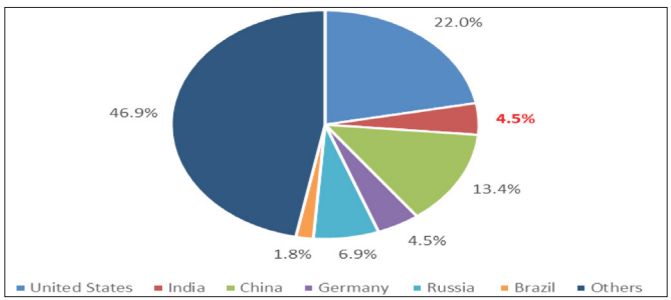
III. Reduction of total projected carbon emissions by one billion tonnes from now to 2030.

IV. Reduction of the carbon intensity of the economy by 45 per cent by 2030, over 2005 levels.

V. Achieving the target of net zero emissions by 2070.[3]

At the outset, let us assess India's contribution to GHG:

Figure 1: Country wise contribution to Green House Gases (GHG)



Source: Climate Equity Monitor

It is clear from the above figure that India has contributed little, and hence, its transitions need to be

3. Ministry of Environment, Forest and Climate Change.

juxtaposed with its development needs from a lower middle income country perspective.

The skeptics opine that the transition has to gain momentum even though, the progress has been tardy, and that this transition should have happened much early on. The transition towards a green and clean economy is an evolution and among other factors has its theoretical underpinnings in the concept called as environmental Kuznets curve.

Environmental Kuznets Curve

The concept states that the correlation between economic growth and environment degradation is positive in early years of GDP growth, but as countries traverse their growth trajectory, then higher economic growth fuels sustainable development and arrests environmental degradation. Higher levels of GDP growth initially create negative environmental externalities. This has empirical validity where the Industrial revolution fostered huge environmental degradation in Europe, but with passage of time production patterns became environmentally clean. Higher GDP growth fostered cleaner technologies. Technologies which were green overtook the less environmentally friendly ones. As these technologies develop and evolved, they will have a spillover effect in other developing countries of the world. The Environmental Kuznets Curve (EKC) hypothesis further was buttressed with a study of **Grossman and Krueger (1991),** who strongly confirm that the transition is not automatic and institutions and policies have to play a defining role in evolving and promoting green and clean technologies. Hence the prerequisites

of clean and green technology are both GDP growth traversing higher growth trajectories and strong policy support by government. Since a U-shaped Kuznets curve is an empirical reality, the hope is that, as India embarks on a higher growth path along with the policy support of government, as well as its commitment to abating climate change, the greener economy will become a norm rather than an exception.

India strives to formulate and communicate long-term low greenhouse gas emission development strategies (LT-LEDS), mindful of Article 2, taking into account their common but differentiated responsibilities and respective capabilities. In the light of its different and unique national circumstances, as per its LT-LEDS, strategy document, India, undertakes strategic transitions:-

I. Low Carbon Development of Electricity Systems
II. Develop an Integrated, Efficient, Inclusive, Low-Carbon Transport System
III. Promoting Adaptation in Urban Design, Energy and Material-Efficiency in Buildings, and Sustainable Urbanisation
IV. CO2 Removal and Related Engineering Solutions
V. Enhancing Forest and Vegetation Cover, and
VI. Economic and Financial Aspects of Low-Carbon Development and Long-Term Transition to Net-Zero by 2070.[4]

The two most advanced in implementation, among the above, are the transitions related to Low Carbon

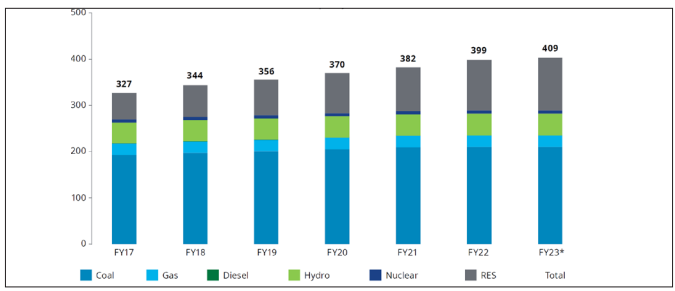
4. India LT-LEDS Strategy Report - India's Long Term Low Carbon Development Strategy, Ministry of Environment, Forest and Climate Change. Government of India.

Development of Electricity Systems, and Develop an Integrated, Efficient, Inclusive, Low-Carbon Transport System

Low Carbon Development of Electricity Systems (Renewable Energy)

As a country, India is the third-largest producer and third-largest consumer of electricity worldwide, with an installed power capacity of 409.16 GW as of 30 November 2022. It has one of the most diversified portfolios ranging from conventional sources, such as coal, lignite, natural gas, oil, hydro and nuclear power, to viable non-conventional sources, such as wind, solar, agricultural, and domestic waste. Given that India has become the country with the largest population, it has also become one of the biggest producers of domestic waste. According to a report by The Energy and Resources Institute (TERI), India generates over 62 million tons (MT) of waste in a year. Suitable development and harnessing of technologies and programs can synergise all of these available classes of fuels in an optimum manner, and to the desired extent.

Figure 2: India Installed capacity addition Trend



Source: Central Electricity Authority (CEA)

As can be seen from the figure above, the RES category – Renewable Energy Sources, is steadily increasing its contribution. Few years back India's energy portfolio was heavily skewed towards fossil fuels. India draws heavily on thermal energy. Thermal Energy accounted for 76% of India's Electricity Generation. The thermal plant stations are the oldest power plant stations, contributing to the national grid. Majority of India's needs come from coal fired consumption and these coal fired plants add a lot to our imports, due to the superior quality of imported coking coal. As per one estimate, India spends more than Rs. 3.85 lakh crore to import nearly 200 million tons of dry fuel every year. This places a huge burden on our foreign exchange and adds to the woes of being a huge carbon emitter. The indigenous production of coal – mining, extraction, washing, and increasing the thermal; quality of the coal, as well as the generation and distribution of power, require huge fixed costs and is beset with challenges.

Hence both from the point of sustainability and decarbonizing, it is imperative that India transits towards a more diversified energy portfolio. The conventional fuel mix dominated by coal and gas, is riddled with environmental anxieties and does not promote sustainable development.

Renewable energy has a menu of choices: Wind energy, Solar and Biomass being few of them.

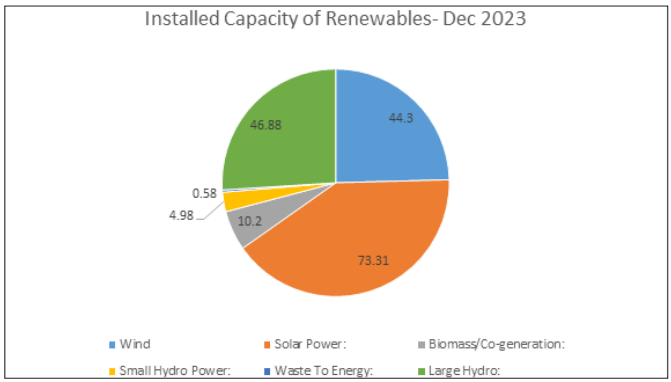
Our policy makers, and environmentalists have shown a keen interest in transforming our energy portfolio. However, the efforts to shift to more renewable alternatives is merely two decades old. Our policy makers are steadily and surely pushing to

make renewable energy the back bone of the Indian economy. Two important sources of renewable power where there is an untapped potential, even though significant strides have been made are:-

- Wind Energy
- Solar Energy

Today, they make up 65 percent of the installed renewable energy.

Figure 3: India Installed Renewable Energy Capacity



Source: https://www.investindia.gov.in/sector/renewable-energy

Wind Energy:

Wind energy has been making impressive strides, and in 2021 it saw a capacity addition to the tune of 94 GW, as per the Global Wind Report of 2022. As on December 2023, it made up nearly one-fourth of installed capacity.

Wind is a source of infirm power since its electricity production depends on vagaries of winds. The critical variable influencing wind power is the capacity factor,

which in turn depends on speed of the wind and power density. Rapid technological advancements have been made in improving the capacity factors and exploring wind corridors. The wind corridors are created on the basis of wind power density in different areas. In India, Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu have popular wind corridors.

Several fiscal and promotional benefits have been given to wind power investments. Accelerated depreciation benefits has been one of them, and the wind energy sector has been a significant beneficiary of this scheme. This tax benefit has been a prime mover for the growth of wind power projects in India. This tax benefit allows projects to deduct up to 80% of value of wind power equipment during first year of project operation. The scheme had a chequered territory, it was introduced in early nineties, then stopped, and this hampered the growth of the sector. It had been in force for the industry since 2003 till 2012. The sector made rapid strides in this period, it was later halted, the halting of the schemes axed the competitiveness of small and medium enterprises who make a discernible contribution to the wind power sector. Given the long gestation period of typical projects, the halting of the scheme led to steep fall in installation of wind power projects. It was resurrected again to provide relief to the ailing wind power projects. The government also provides other incentives such as concessional custom duty exemption on certain components of wind electric generators. It nudges distribution companies through a trajectory of renewable purchase obligation. Under the Act, the state electricity regulators mandate

to purchase a minimum level of renewable energy out of the total consumption by the Obligated Entity. All this has provided a great ecosystem and strengthened wind power as a potential source of renewable energy.

Solar Energy

The story of Solar energy is a more promising one and has seen a faster transition. The policy initiatives like allowing Foreign Direct Investments (FDI) in solar energy through automatic route, competitive tariff for solar power, streamlining open access rules for solar power and waiver of interstate transmission charges for sale of solar power interstate, are steps in right direction, to name a few.

All this has brought a monumental transformation and has seen a discernable growth in capacity addition of solar power. The biggest impetus to the solar sector is its addition into the exclusive orbit of sectors for Production Linked Incentive scheme (PLI), where subsidy is given to select few sectors. This buttresses the government commitment to add 500 GW of renewable energy to the grid by 2030.

Another feature of strengthening a renewed commitment is announcement of huge incentives to promote Solar parks. The concept of Solar Park is to bring and establish a hub of solar generation, so that, these producers achieve economies of scale. Large tracts of land are given to station multiple solar power plants that harness solar energy and bring down the average cost of production. Solar parks makes it feasible to harness bulk power. The aggregator model has been encouraged by several states. These Solar parks have been a success story and continue

to attract foreign capital. With more than 40 solar parks, the Bhadla solar park has emerged as one of the largest in the world. Such initiatives, infusion of foreign capital, cheaper cost of financing available, have made solar power rates very competitive Such initiatives have led to drastic reduction in solar tariffs. The current solar tariffs in India, are between Rs. 2.50-2.87 per kilowatt hour (kwh), and are below tariffs from coal fired plant. This is the biggest feat and by far the strongest achievement of India, Solar power just two decades old is achieving a comparative cost advantage. The critics, of course, however opine that lower solar tariffs are not just a product of economies of scale, but also massive subsidization. Besides, a huge captive market for solar power, and other renewable energy that state regulators have created through renewable purchase obligation. Whatever is the narrative, the solar power cost has declined.

However, from a strategic perspective, the Achilles heel of the solar industry in India, is the manufacturing of sola photo voltaic (PV) cells. To address this, the government has included this in PLI. There was no existing manufacturing capacity in India for the initial stages of the photovoltaic (PV) value chain, namely from polysilicon to wafer. For these raw materials, Indian solar manufacturers were, and are still dependent on imports, mainly from China. Prolonged dependence on the imports raises the severity of the associated risks. Shortage of raw materials, a power price hike in China and a surge in international freight charges have inflated module prices in 2021 by more than 25%. To encourage vertically integrated facilities, the Indian Government introduced the

Production Linked Incentive (PLI) scheme for 10 GW capacity of integrated manufacturing of "High Efficiency Solar PV Modules" with a financial outlay of Rs. 4,500 crore (US$ 616 million). The PLI tender received a tremendous response (54.8 GW of bids, a fourfold over-subscription) from the industry, pushing the government to increase the PLI amount by an additional Rs.19,500 crore (US$2.5 billion) for solar module manufacturing. This augurs well for India's semiconductor ambitions. Solar PV cells are at the bottom of the value chain for semiconductor manufacturing. The nodes here (nodes, essentially are the sizes in nanometers, for doped poly silicon wafers) for solar PV cells peak out at 100 nm (nano meters), whereas for semiconductors chips, are moving towards 3 nm, with as yet no sign of peaking out, and still subject to Moore's Law.

The whole brigade of going green in India is beset with challenges. To reach 450-500 GW of renewable energy by 2030, India needs to incrementally add at least 40 GW of fresh power harnessed from renewable sources, and require huge funding. India, today, stands close to 165 GW of clean power, and hence the gap is enormous. The road to cleaner and greener energy is not without hurdles. Despite its strong commitment towards adoption of clean energy, India expressed its constraints of completely revamping its energy portfolio. The phase down and not phase out of Coal, shows India's constraint to quickly overhaul its energy portfolio. Grid reliability with infirm power added through renewables would also pose challenges. Hence, 500 GW of power commitment through renewables seems less probable.

Integrated, Efficient, Inclusive, Low-Carbon Transport System (EV and Hybrids)

Another source of green house gas emission comes from the transport sector. In a bid to reduce GHG emission in this sector, massive transition toward electric vehicles holds a lot of promise. Among the menu of choices such as, public or shared transport and safer infrastructure for walking and cycling, the aggressive launch of Electric Vehicles (EVs) is the most promising climate solution that urban transport can offer.

Not just in India, but across the world this sector is preparing for a tectonic shift in increasing penetration of electric vehicles. As per the Economic survey estimates between 2022 to 2030, it is estimated that Electric Vehicles (EVs) will grow at a compound annual growth rate of 49 percent amounting to nearly 10 million sales of electric vehicles. These are stupendous targets that present both an opportunity and a challenge. India needs to travel a long way and make path breaking changes before its vision of having all electric passenger vehicles becomes a reality.

In spite of the fact that the automobile sector in India contributes significantly towards GDP and is very employment and export intensive; yet paradoxically in terms of vehicle penetration, India lags far behind. At such a poor vehicle density, transforming the transport landscape with electric vehicles seem to be a herculean effort, but also presents opportunities.

The government at its level is very ambitious and is looking at electric vehicles as a panacea to address two challenges:-

a) The first is to slash the huge import bill on account of crude oil which is expected to touch USD $300

billion by 2030, as India imports 82% of its crude oil requirements.

b) The second is the high level of urban pollution India is grappling with in cities like Delhi and replacing the internal combustion engine (ICE) vehicles seems inevitable (As per WHO estimates, 10 out of the world's top 20 polluting cities are in India).

There are three pressure points in going totally electric –

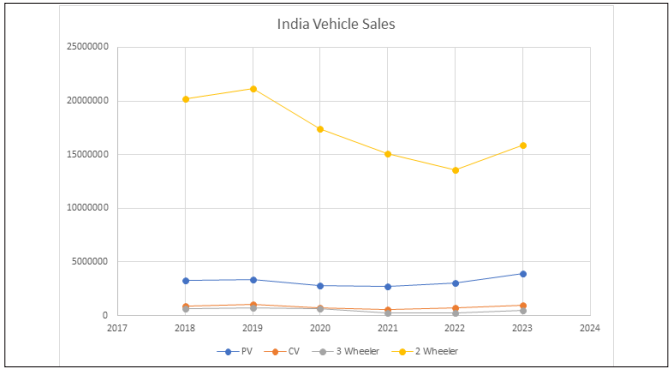
I. availability and spread of charging stations;

II. battery storage technology and materials, and

III. the viability of EVs for the buyer.

EV Vehicles

Figure 4: India Vehicle Sales



Source: Society of Indian Automotive Association (SIAM)

From the above, India's predominant vehicle is the 2-wheeler. This is also due to the lower middle-income status of India's per capita income, as well as the still predominantly rural nature of the country. The EV efforts, therefore, have to be focussed on 2 wheelers,

unlike the rest of the world, where it is focussed on passenger vehicles.

Unlike more developed markets, the Indian car buyer is most sensitive to price of purchase, then brand, and lastly mileage. Hence, adoption of electric vehicles in India will be driven by costs, especially the differential between ICE and Electric Vehicles (EVs). The government of course can speed up the process of EV adoption by lowering taxes like excise, and import duties, as well as provide a subsidy for EVs. In order to promote electric vehicles (EVs) in India, an industry body, the Society for Indian Automotive Manufacturers (SIAM) has suggested reduction of GST on such automobiles to 5 per cent (from the current range of 43% - 48%, including cess), besides one-time income tax deduction of 30 per cent of vehicle price for buyers, and an exemption on road tax for EVs. With climate changing rapidly, governments are waking up to promote EVs.

The investment world has certainly built the expectations that EVs would start undergoing mass market adoption in 2 – 4 years. Private Equity (PE) funds have invested in the electric subsidiary of Tata Motors. Ather Energy and Ola Electric have also seen PE investments in 2 wheelers. A slew of players are looking to invest in battery and component manufacturers for EVs.

Currently, EVs are almost one third more expensive for the sub-compact segment (biggest segment in India) in passenger vehicles, when compared to conventional Internal Combustion Engine (ICE) vehicles. The new FAME subsidies announced have narrowed the gap, and is only 25% more expensive

in 2 wheelers. Moreover, the rising petrol and diesel prices have started to make the long-term cost of ownership and running an ICE 2-wheeler is coming down below that of ICE vehicles.

However, the challenge for India, compared to more developed countries, is more complex. China, currently, is the world leader with EV to sales of vehicles accounting for 29%. Europe follows with 18%, and the U.S. is the last in the Big 3 at 15%. India, is yet to reach the take-off stage of 5% EV to vehicle sales. Perhaps the government targeting at least 50% local value addition to qualify for the earlier Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME) subsidies, and industry failing to achieve that at scale and competitive pricing, setback the industry by a couple of years.

Battery

The most important component of the EV is the battery. At present batteries contribute around 50 per cent in cost of EV. However, with declining cost of batteries, the share of batteries in upfront cost of EV is expected to reduce to less than 30 per cent by 2025, depending on raw material costs, and technological advancement. The current favourite re-chargeable electric battery is made of Lithium and ubiquitous across devices like mobile phones, laptops, and also electric vehicles. A sedan size electric vehicle contains close to ten kg of Lithium.

If the world's governments wish to wean the world off fossil fuels, they will have to wean two billion conventional passenger cars off fossil fuels. This will require close to 20 million tonnes of Lithium. If the

number of passenger cars grows by 2% a year and batteries last an average of eight years (the current warranty period on the Tesla), the annual demand for Lithium will be to the tune of 580,000 tonnes. Against this the entire global production of Lithium was 160,000 tonnes in 2015. The total amount of Lithium in the earth's crust is an estimated 13.1 million tonnes.

In India, the batteries in electric vehicles are imported. The country domestic reserves of Lithium are quite insignificant, though it is the second-biggest producer of graphite, another raw material used for making electrodes in rechargeable batteries.

For Lithium, how sensitive these prices are can be judged from the fact that the fall in price of Lithium reversed itself sharply at the end of 2015, when the major automakers committed themselves to making electric cars. By mid-2017, they had risen by 50% over the 2015 price. By just changing from ICE vehicles to electric vehicles, India could be just switching in terms of vulnerability from crude oil imports to Lithium imports. The government needs to either subsidize battery and Lithium imports or incentivize companies to set up this business in India.

Recognizing this vulnerability, as in the case of crude oil, India is pushing its public sector, and erstwhile oil majors to tie up mines and supplies for Lithium in the Andes. Bolivia, which has the world's largest Lithium deposits, has evinced interest on partnering with Indian companies for investments in mines that would also allow a portion of production to be brought back to the country. Similar arrangement is also being toyed with Chile and Argentina.

How soon that day – that EVs are at par in pricing with Internal Combustion Engine (ICE) vehicles, arrives is almost solely a function of the price of batteries. Battery prices, measured by the power they produce, have already fallen globally by more than half since 2011 and very recently by more than eighty percent. The unexpectedly rapid drop in prices has sped up the timetable. However, due to the rise in the cost of Lithium, it has started rising again. What can be more relevant apart from prices is Moore's Law in semiconductors – the size of the battery has also to fall, with at the same time increases in capacity.

Charging Infrastructure

Another challenge is infrastructure network for charging batteries. Charging infrastructure and EV adoption is a chicken and egg problem. In India, the government has tried to take a lead through Public Sector Enterprises (PSEs) like NTPC and Indian Oil Corporation. Energy Efficiency Services Ltd. (EESL), in partnership with National Thermal Power Corporation (NTPC) has decided to set up almost 4000 captive charging stations at government offices, and is currently procuring the first 10,000 electric cars through the tender route, won by Tata Motors.

This is just a drop in the ocean, compared to more than 56,000 gasoline stations spread over India, and would need serious private sector participation for availability of charging infrastructure.

In effect, the government will also have to come out with policies and concessions to attract companies from India and abroad (French energy firm Engie SA has expressed interest) to set up the charging stations,

till demand and adoption of electric vehicles crosses a turning point when economics become viable. The expectation is that turbo chargers (of the likes of Tesla) conforming to Indian protocols and standards should be widely setup with private sector participation or incentives, as the total cost of ownership (TCO) increases for the buyer and pushes out EV adoption into later years.

As per the regulations for electricity sales in the country, under The Electricity Act, 2003, a distribution licence is required to distribute power from respective state electricity regulatory commissions (SERCs). Given the number of regulators involved, it makes sense for a pan-India license but that would require a lot of heavy lifting including a comprehensive review of existing laws and regulations.

Right now, there are distribution networks which are owned by the discoms (distribution companies) primarily. In some cities, it is privately owned, but most belong to the public sector and protocols need to be established on interactions with private players. Regulatory changes, infrastructure and incentives need to be setup for a widely available charging grid. Innovation is speeding up the efficiency and time taken for charging up an EV vehicle.

India's past track record for executing such projects or initiatives have been fraught with lack of planning, infrastructure and policy bottlenecks, and lack of transparency in awards for natural resources, thus resulting in court cases, stalled projects due to environmental concerns, and change of policies due to changes in government, or unrealistic import substitution norms. The push is coming from two sources – more rapid than expected climate change,

and investments jumpstarting the EV adoption, like in tech and mobiles. The private sector PE investments have the potential to jumpstart EV adoption in India, with the helping hand of government support, regulations, and charging infrastructure. Already, it is possible to drive an EV vehicle from Delhi to Mumbai, using company level shared charging stations.

Conclusion

The article presents the issues and challenges that engulf the country as it marches ahead towards its commitment towards clean and sustainable energy and reducing its carbon foot prints by 2030. Two sectors which are rapidly evolving are power and transport sector The targets set in both the sectors are daunting and are beset with challenges. However, government's avowed commitment towards cleaner environment is presenting a lot of opportunities and is slowly but surely transforming both the electricity and transport landscape. The article presents the progress and challenges that are faced in both sectors. At the outset whether these targets are elusive or achievable cannot be conclusively drawn, as the challenges are huge. But government policy support to the two sectors is critical, evolving and being honed, as well as geo-strategically tinged to focus on "Atmanirbharta". It is slowly but surely transforming the landscape of the Indian power and transport sector.

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* *The views expressed in this booklet are not necessarily those of the Forum of Free Enterprise.*

“People must come to accept private enterprise not as a necessary evil, but as an affirmative good”.

- Eugene Black
Former President,
World Bank
(1949-1962)

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In recent years the Forum has also been focusing on the youth with a view to developing good and well-informed citizenship. A number of youth activities including elocution contests and leadership training camps are organised every year towards this goal.

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Forum of Free Enterprise, Peninsula House, 2nd Floor, 235, Dr. D. N. Road, Mumbai 400 001. Tel.: 022-46088687
E-mail: forumfe1956@gmail.com; Website: www.ffeindia.com;
Twitter:@ffeconnect; YouTube: Forum of Free Enterprise

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