



Electric Vehicles

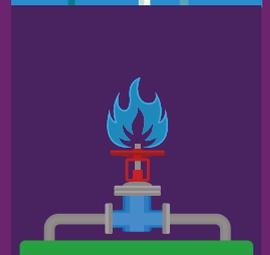
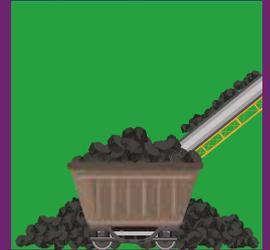
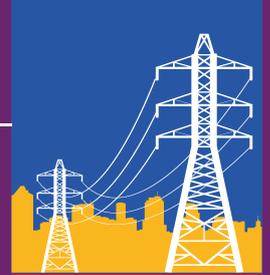
A case for a proactive approach

ENRich 2017

Changing Indian energy landscape
- Adapting to a new normal and reality

November 2017

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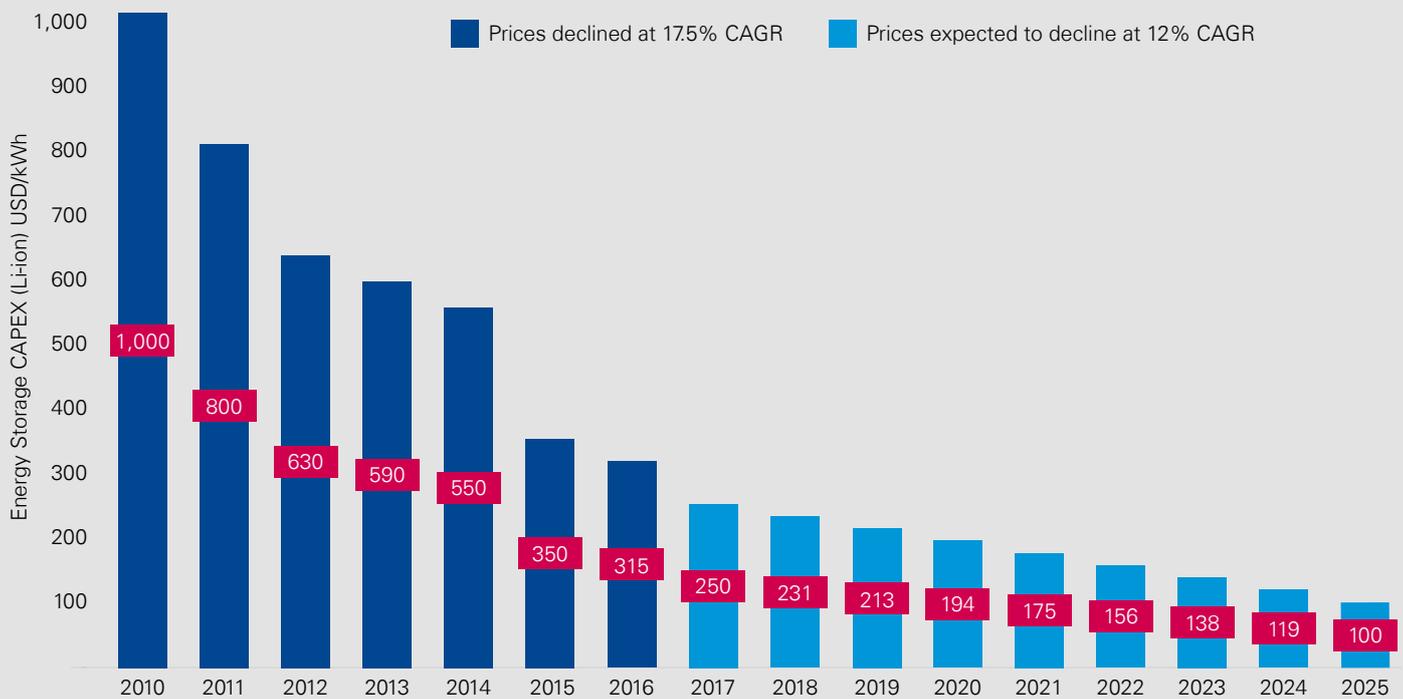
In the world of technology disruptions, a new force which is emerging is electric vehicles (EVs). Should this movement succeed, it has the potential to significantly disrupt the auto sector, the oil sector and even the electricity sector.

What is causing this disruption and is this force for real?

Two major factors driving the trend for higher penetration of EVs are steep reduction in the battery technology costs and decarbonisation policies introduced by different economies the world over. The trends in battery costs are promising with significant reductions witnessed during the last five years.

Battery technology roadmaps look encouraging.

Figure 1. Lithium ion battery pack costs are on the decline globally



Source: Bloomberg New Energy Finance; KPMG in India's analysis and estimates 2017 | *Industry best in class figures

Decarbonisation and the anti-pollution movement are taking a firm foothold globally. Public sentiment is backing government policy.

- An EU legislation has set 40 per cent mandatory emission reduction targets compared with the 2007 fleet average for new cars¹. This legislation is the cornerstone of the EU’s strategy to improve the fuel economy of cars sold on the European market. In November 2017, the Commission presented a legislative proposal setting new CO2 emission standards for cars and vans for the period after 2020².
- The Shanghai municipal government has introduced a contingency plan to deal with hazardous air pollution. According to the plan, once the air quality index exceeds 300, the number of government cars on the road are reduced by 30 per cent and all heavy trucks carrying dust-causing materials are banned in the city³. Further all construction is stopped and output of natural gas fired power station is increased to reduce emissions from coal-based power plants.

What inspires further confidence in this trend is the stance adopted by auto players globally:

- Volvo Cars has recently announced that from 2019 all Volvos will have electric motors marking an end to its Internal Combustion Engine (ICE)⁴ programme
- General Motors (GM) recently announced an ‘all-electric future’ where it aims to launch at least 20 electric vehicle models by 2023⁵
- BMW group announced that electrification is one of the central pillars of the BMW group’s corporate strategy as the company gears up to mass produce electric cars by 2020⁶.

So, are EVs economical?

Our analysis on Total Cost of Ownership (TCO) suggests the economic turnaround point is round the corner for many segments of the market globally. This is due to cost reductions in battery technology. In India, EVs are expected to become economical for various segments in the 2020-2023 time frame ⁷.

Table 1: Expected inflection point (Year) for EVs in India

Vehicle category	Inflection point* (Year)
Commercial cars	2020
Two-wheelers	2021
Buses	2022
Passenger cars	2023

Source: KPMG analysis

If the economic and carbon compulsions are true, then an-all EV scenario by 2030 is possible. Disruptive technologies follow S-curves and once a technology wins, it could lead to the demise of incumbent technologies very quickly. In this case, should EVs succeed, auto majors are unlikely to continue supporting Internal Combustion Engine (ICE) technology in a declining market and that could hasten the collapse of the ICE technology.

Table 2: Time taken by new technologies to reach 80 per cent penetration is shrinking

Technology	Time to 80% U.S. households
1900-20 technology (telephone, stove, electricity, auto)	30-40 years
1920-40 technology (radio, fridge, clothes, washer)	25-30 years
1940-60 technology (cloth dryer, AC, dishwasher)	30-40 years
1960-80 technology (color TV, microwave, VCR)	~20 years
Post 1980 technology (computers, cellphones, internet)	15-20 years

Source: Future of electricity, World Economic Forum (March 2017)

1. Reducing CO2 emission from passenger cars, Climate Action, European Commission, Publications Office of the European Union, 2014
 2. Reducing CO2 emission from passenger cars, Climate Action, European Commission, Publications Office of the European Union, 2014
 3. Clean Air Action Plan (2013-2017), Information Office of Shanghai Municipality, October 2013

4. Volvo cars to go all electric, Volvo Car Group, Global Newsroom, Press release, July 05 2017
 5. GM Outlines All-Electric Path to Zero Emissions, General Motors Press release October 02 2017
 6. BMW Group announces next step in electrification strategy, BMW Group Corporate Communications, July 2017
 7. KPMG in India’s analysis and estimates 2017

What could an all EV scenario look like in 2030?

We estimated its impact on the Indian economy on account of the following assumptions:

- 100 per cent incremental adoption of EVs in two-wheelers, passenger cars and taxi categories
- 100 per cent incremental adoption of EVs for buses.

However, our analysis excluded adoption of EVs in heavy transport vehicle category as it difficult to predict the commercialisation time.

Our analysis suggests the following outcomes:

- A 100 per cent¹⁵ EV nation is estimated to contribute 12 per cent⁸ of the INDC emission intensity reduction targets (33-35 per cent)⁹
- Oil imports saved due to 100 per cent¹⁵ incremental EV adoption by 2030 is USD60-70 billion annually¹⁰
- Due to 100 per cent incremental EV adoption by 2030, the Indian economy is expected to save INR5-6 lakh crores¹¹. These savings are net of power costs incurred less the oil purchase costs.

The need for a proactive approach

There are different levels of support that can be envisaged by the government. A business-as-usual approach will lead to a modest take-off of the programme in due course. Even without much effort, EVs will eventually pick up as the technology strengthens. However, in doing so, we will miss an important opportunity: the opportunity to build a robust ecosystem and develop a nucleus of innovation.

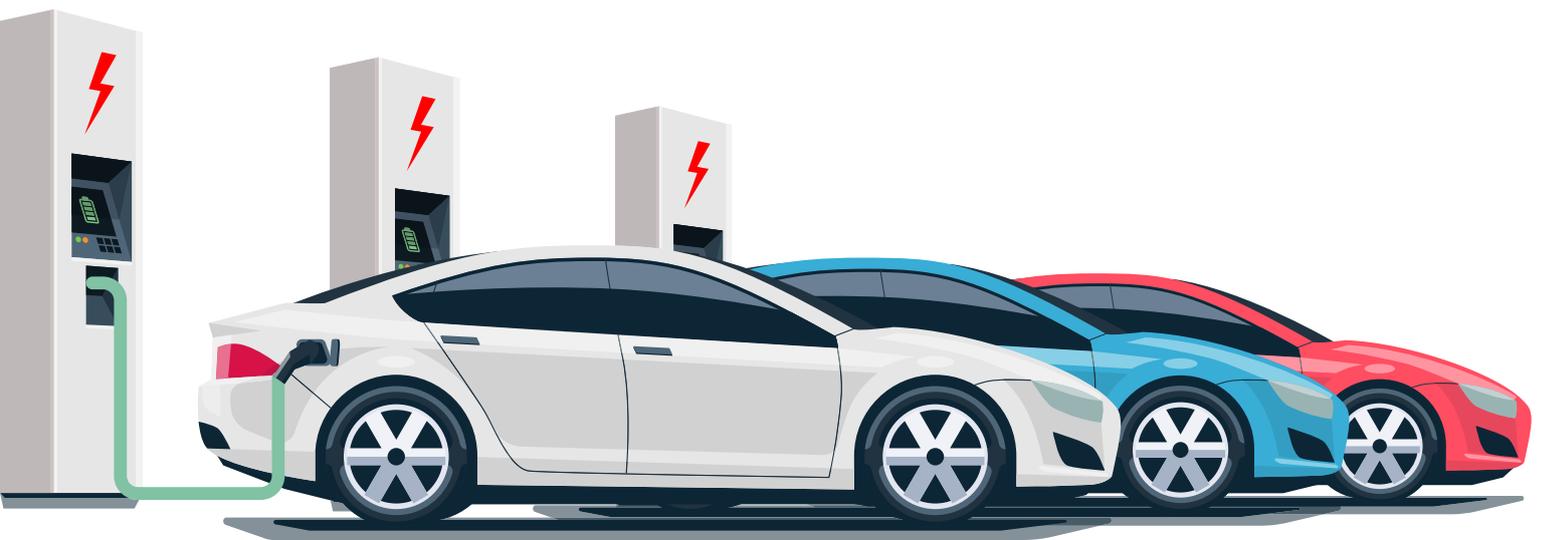
The auto industry has been among the few success stories of Indian manufacturing. We have built a global scale auto industry serving a global market. India is currently the sixth largest producer in the world with an average annual production of 25.3 million vehicles, of which 3.47 million are exported¹². India is the second largest two-wheeler manufacturer, the largest motorcycle manufacturer and the fifth largest commercial vehicle manufacturer in the world¹³. It provides jobs to 1.9 crore people directly or indirectly, with a turnover of INR3.6 lakh crores and accounts for 7.1 per cent of the country's GDP and 45 per

cent of the country's manufacturing sector¹⁴. We have innovated to make cheaper cars. This industry now has the opportunity to reinvent itself. It must seize it before the opportunity passes. The catch up game could be costly, and we could be at risk of stranding much of our existing ecosystem and suffer associated job losses, if the industry doesn't reinvent itself.

Further, the auto industry is at the cusp of a major innovation in its history. There are three major technology trends that are driving this – autonomous vehicles, shared mobility and electrification. It is important to leverage these innovation themes and electrification is an early thread we should hold on to.

The bus has arrived. It is time to board!

8. 4 per cent in absolute terms – Considering around 300 million tonnes of CO2 emissions on a 2030 GDP base of USD15 trillion in PPP terms
9. KPMG analysis; India's Intended Nationally Determined Contributions; CO2 emissions, World Bank open database; GDP, World Bank open database
10. KPMG analysis; India Energy Security Scenario 2047, NITI aayog (default scenario)
11. Assuming Petrol price of INR69 per litre and power price of INR6 per unit
12. Statistics published by Society of Indian Automobile Manufacturers (SIAM)
13. Make in India
14. KPMG in India's analysis and estimates 2017
15. Uptake starting from 10% incremental share in 2022 reaching 100% in 2030



What does the government need to do to boost this aggressively?

Create certainty of demand to instigate investments by the auto industry

The EV agenda will have to be spearheaded by the auto industry through investments in the manufacturing set up and related eco-systems. However, a key factor influencing their decision to invest is the assurance and stability of consumer demand. We believe an incentive programme to encourage adoption is desirable in the initial period. Some of the ways this can be targeted is through interest subventions on EV car loans or outright incentives on car purchases by providing a subsidy on the base price of EVs. Other measures include a waiver of road taxes and other local charges and non-fiscal incentives like preferred access and parking benefits.

This should be coupled with some level of mandated procurement for corporates (on the lines of renewable purchase obligations in the electricity sector) and by government bodies. A system of tradeable emission credits which corporates can use to trade against other mandates such as the energy efficiency mandate or renewable energy purchase mandate, can provide stimulus.

Public transport vehicles can be early adopters as economics can be worked out sooner. They should be supported by necessary charging infrastructure and enabling regulatory framework to encourage adoption.

Subsidy is not always a bad word

While in general, subsidies are being discouraged for programmes like these, in the case of EVs, we believe the case for subsidies in the initial days is strong. A programme to support 100,000 four-wheelers annually for five years will require INR2000¹⁶ crores of annual subsidy (assuming 20 per cent of the vehicle cost is subsidized). Interest subvention schemes (with subvention of 5 per cent) will require funding to the tune of INR720¹⁷ crores per year.

This should be treated as an insurance against disruption to the auto manufacturing sector, which provides jobs (direct and indirect) to 1.9 crore people¹⁸. Should we adopt a status quo approach, the uncertainty will lead to a delayed response and possibly loss of competitiveness in a global industry.

Encourage creation of charging infrastructure

A big factor driving adoption is addressing consumer concerns on range. Termed 'range anxiety', this can be addressed if a network of fast chargers is developed across cities and nationwide. This is a classical chicken and egg syndrome, not knowing which one should be developed first. In such a scenario, public investment in charging infrastructure can be a solution. Distribution utilities can be encouraged to build this network through suitable incentives and grants. The case for investment is strong as they

will be beneficiaries of power demand creation and possible new revenue streams.

Further, creation of private infrastructure should be liberalised. The current interpretation of the electricity regulations suggests that such infrastructure requires regulatory licences or concessions with the local utilities. Liberalising these regulations would help unleash private market forces into creation of the infrastructure. A suitable amendment to the legislation allowing for this should be made.

Need for a nodal authority at the central level for programme monitoring

Given the criticality of this programme, a well-defined nodal authority to drive and monitor this programme is necessary. Currently, there appears to be dispersed responsibility among various agencies resulting in a lack of concerted ownership and insufficient pace of the programme. This needs to be urgently changed.

The programme needs to be driven and monitored in mission mode if India is to make the most of this opportunity. It is a one-time opportunity to build competitiveness in a new area and ride on our successes in the conventional auto sector. It is key to act quickly and not miss the bus!

16. KPMG analysis

17. 4 per cent in absolute terms – Considering around 300 million tonnes of CO₂ emissions on a 2030 GDP base of USD15 trillion in PPP terms

18. Make in India



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