Electric Vehicles: An Economic Indian Overview

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Abstract- ***Transport is a necessity in modern life, but the traditional combustion engine is quickly becoming obsolete. The world is shifting to more environmentally friendly and sustainable alternatives such as biodiesel and renewable diesel, natural gas, battery electric, hydrogen fuel cell, and so on. Changing the fuel in transportation machinery will be a significant change and a significant step toward reducing carbon footprints. The presentation of a new study on energy balances at the 14th Congress of the World Energy Conference on World energy perspectives 2000-2020 in relation to India's New Delhi Conference in 1983 was seen as a watershed moment. There is now a widespread belief that the energy crisis is a thing of the past, and that we consumers need only profit from favorable market conditions that appear to be here to stay for the foreseeable future. Transport is a necessity in modern life, but the traditional combustion engine is quickly becoming obsolete. Vehicles that run on gasoline or diesel emit a lot of pollution and are being phased out in favor of all-electric vehicles. We must comprehend the international scenario in order to comprehend the surrounding environment and market flows.***

Indexed Terms- ***Electric Vehicles, Carbon emissions, Indian Prospective. Electric Battery.***

I. INTRODUCTION

Transport is an essential part of modern life, but the conventional combustion engine is rapidly becoming obsolete. On the account of same the world is shifting to more sustainable and environmental alternatives such as Electronic Vehicles (EVs), biodiesel and renewable diesel, natural gas, battery electric, Hydrogen fuel cell etc. Since changing the fuel in the transportation machinery is going to be a big change and a huge step towards changing the carbon footprints, lowering carbon emissions, and create anenvironmentally friendly environment. When we talk about the shift in fuels for the Transportation or changing from conventional fuels to the renewable, we also think about it being climatically favorable, and economic at the same time. But here is the question why did we need to switch from Conventional sources of energy renewable. The following are some of the environmental and economic advantages of using renewable energy:

A. Creating energy from fossil fuels that emits no greenhouse gases and reduces some types of air pollution.
B. Diversifying energy supplies and decreasing reliance on imported fuels.
C. Economic development and job creation in manufacturing, installation, and other fields.

- Why are we concern about the environment, carbon emissions?

Nitrogen sources from human activities such as electric power generation, industry, transportation, and agriculture can disrupt the natural nitrogen balance in the environment. Airborne nitrogen pollution affects not only the quality of the air we breathe, but also the land and water. Nitrogen is the most abundant element in the atmosphere and is necessary for plant and animal life. When fossil fuels are burned, nitrogen oxides are released into the atmosphere, contributing to the formation of smog and acid rain. Nitrogen oxides are the most common nitrogen-related compounds emitted into the atmosphere by human activities. Ammonia is another nitrogen compound that is released into the atmosphere, primarily from agricultural activities but also from fossil fuels. The majority of nitrogen oxides released in the Global Stata by human activity are from the combustion of fossil fuels used in transportation and industry.

II. RESEARCH METHODOLOGY

I have mostly used qualitative, secondary, and descriptive methodologies in our research design. In addition, this article evaluates several reports and indications via different national research

organizations. Several blogs, articles, and contentious pieces were highlighted, and solutions to a perceived issue were proposed.

III. HISTORY

According to, 14th Congress of world energy conference on World energy horizons 2000- 2020, in respect to India New Delhi Conference in 1983, was seen as a turning point with the presentation of a new study on energy balances. Majorly the approach which would permit this study and methodology was completely centralized and it was made with keeping in mind the character of World Energy Conference since it's the biggest conference since it covers all the forms of energy without exception and all this was with the horizon year to be set as 2020.

Some other Important conferences were,

a. Istanbul Conference in 1977
b. Munich Conference in 1980
c. New Delhi Conference in 1983
d. Cannes Conference in 1986
e. Montreal Conference in 1989

The fact that the current economic situation is hardly favourable for long term analyses provides all the more justification to the present study, there is feeling that the energy crisis is a thing of the past and that we consumers need only profit from favourable market conditions that would appear to be with us for a long time to come.

Acc. To UNHRC there are 3 components of each humans' rights,

1. Civil and political
2. Collateral
3. Individual

And right to environment is an Individual right. Which is recognised as important as both the together civil and collateral rights in October, 2021.

- Global Transportation

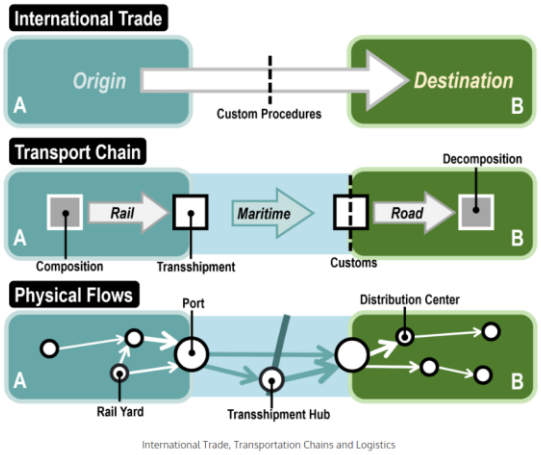
In the terms of economy, it is said that the company that can transport freight in the most cost-effective and timely manner reigns supreme in their industry. Transport is an essential part of modern life, but the traditional combustion engine is rapidly becoming obsolete. Petrol and diesel vehicles emit much pollution and are being phased out in favor of all-electric vehicles. Fully electric vehicles (EVs) emit no tailpipe emissions and are therefore much better for the environment. Trade and commodity exchange are the bigger part of it. According to The Mihfield Mile an overseas transportation and logistics company, phrases that *"Building an efficient supply chain from the six main modes of transportation: road, maritime, air, rail, intermodal, and pipeline is an important part of transportation management."* is true in the todays scenarios where we talk about the energy balances in all spheres offshore, on shore, etc. Subsequently, as we all know the golden rule of transportation that *"Employ the carrier who possesses four characteristics: whoever can transport the greatest volume of product at the greatest speed over the greatest distance at the lowest cost."* And it's true across the world.

Some Statistics on International trade, Transportation chains, and Logistics International trade is a series of commercial transactions between export markets that tracks the value of what is traded as well as the types of goods involved. The value or volume of trade is an abstract expression because it does not represent the actual physical flows that support trade transactions. We need to understand the international scenario in order to have better understanding of surrounding and market flows.

The flow of any trade of commodity including energy resources such as fuel, and natural gases which we import from different respective countries have different stages in their transportation mechanism, since we do not have any full proof mechanism so that is costing us more than the in house generation of the energy resources.

A. Composition is the first stage in the transport chain, where loads are assembled at the origin, often on pallets and containers. Composition is an important process because it attempts to achieve economies of scale across a transportation chain by providing larger and easier-to-handle load units required for international trade.

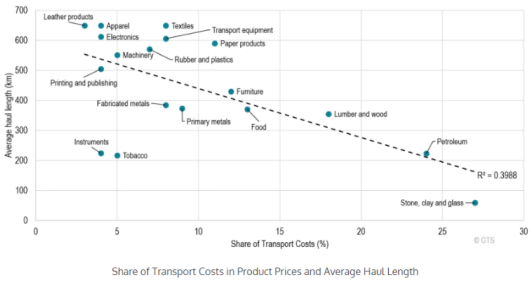
B. Customs procedures and delays are two of the most significant constraints in global freight distribution.
C. The final stage of the transportation chain, decomposition (the last mile), takes place near the final destination. Loads are divided into units that correspond to effective demand, such as purchase orders. With the increase in the physical flow of trade, trans-shipment hubs have evolved into strategic intermediary locations that aid in the consolidation of maritime flows.



Source: Rodrigue, J-P (2012) "Supply Chain Management, Logistics Changes and the Concept of Friction", in P.V. Hall and M. Hesse (eds) Cities, Regions, and Flows, London: Routledge. ISBN 978-0-415-68219-0.

- Economy and Society

Transport systems are evolving within a complex set of relationships between transport supply, which reflects the network's operational capacity, and transport demand. Where transportation infrastructures can ensure access to markets and resources, economic opportunities are likely to emerge. Transportation is a commercial activity that benefits from operational characteristics such as cost, capacity, efficiency, reliability, and speed. Transport is an important part of *the economy and a common development tool.*When transportation systems are inadequate in terms of capacity or performance, it can result in economic costs such as missed or reduced opportunities and a lower quality of life. Herein, we have a graph, determining the international trades and share of transport costs of the same



Adapted from US Department of commerce

Agriculture, forestry, and fishing are the most transport-intensive industries. Goods that require a lot of transportation have a low added value. In a global context, wholesale and retail activities are becoming increasingly reliant on transportation.

The direct benefits are related to increased capacity and efficiency, which affect users and operators. The indirect benefits are primarily related to increased accessibility and better economies of scale. A country's economy becomes more competitive, attracting new and expanded economic activities, and incorporating more complex distribution networks.

- What are Electronic Vehicles: an explanation.

An EV is an abbreviation for an electric vehicle. EVs are vehicles that are partially or entirely powered by electricity. Electric vehicles have low operating costs because there are fewer moving parts to maintain, and they are also very environmentally friendly because they use little or no fossil fuels (petrol or diesel). While some EVs used lead acid or nickel metal hydride batteries, lithium ion batteries are now considered the standard for modern battery electric vehicles because they have a longer lifespan and are excellent at retaining energy, with aself discharge rate of only 5% per month. Despite their improved efficiency, these batteries still pose challenges because they can experience thermal runaway. An electric vehicle (EV) is one that runs on electricity rather than an internal combustion engine , which generates power by burning a mixture of fuel and gases.

As a result, such a vehicle is viewed as a potential replacement for current-generation automobiles in order to address issues such as rising pollution, rising temperatures, depleting natural resources, and so on.

Though the concept of electric vehicles has existed for a long time, it has gained a lot of attention in the last decade due to rising carbon footprints and other environmental impacts of fuel-based vehicles.

- India

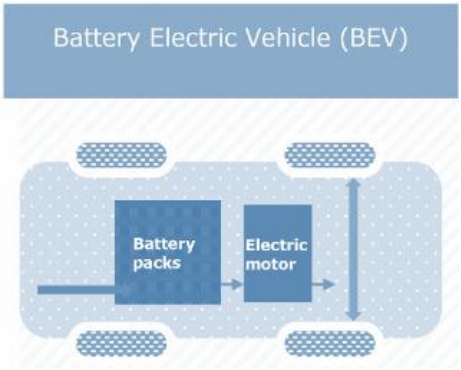
In the view of India in 2010, the first concrete decision to incentivize electric vehicles was made. The scheme, which went into effect in November 2010, provided incentives of up to 20% off ex-factory vehicle prices, subject to a cap. The MNRE later withdrew the subsidies in March 2012. India unveiled the 'National Electric Mobility Mission Mission Plan (NEMMP) 2020 in 2013 in order to make a significant shift to electric vehicles. The scheme's main goal is to encourage faster adoption of electric and hybrid vehicles by providing upfront incentives for the purchase of electric vehicles as well as establishing necessary charging infrastructure for EVs. The Union Cabinet approved a Rs 10,000-crore program under the FAME-II scheme in February 2019. This scheme went into effect on April 1, 2019.

- Types of EVs

Electric vehicles are classified into four types: fully electric, plug-in hybrids, hybrid electric vehicles, and fuel cell electric vehicles. Chemical energy is converted into electric energy, as in a hydrogen FCEV. It can also be powered by an internal-combustion engine and an externally charged battery.

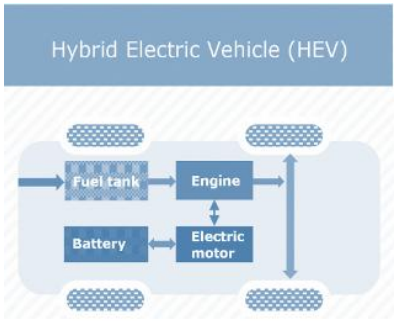
1. Battery Electric Vehicles (BEVs):- BEV-powered electric vehicles rely entirely on a battery-powered electric drive train. The vehicle's electricity is stored in a large battery pack, which can be charged by plugging into the grid. The charged battery pack then powers one or more electric motors, which power the electric vehicle. That can be charged at home overnight, providing enough range for average journeys. However, longer journeys or those that require a lot of hill climbs may mean that the fuel cells require charging before you reach your destination, although regenerative braking or driving downhill can help mitigate against this by charging the battery packs. The typical charging time for an electric car can range from 30 minutes and up to more than 12 hours. This all depends on the speed of the charging station and the size of the battery. In the real world, range is one of the biggest concerns for electric vehicles, but is something that is being addressed by industry.

E.g.:- MG ZS, TATA Nexon, TATA Tigor, Mahindra E20 plus, Hyundai Kona, Mahindra Verito.



2. HEVs are also referred to as series hybrids or parallel hybrids. HEVs are powered by both an engine and an electric motor. The engine is powered by fuel, and the motor is powered by batteries. Both the engine and the electric motor rotate the transmission at the same time.

E.g.: Engine, Electric motor, Battery pack with controller & inverter, Fuel tank, Control module.



3. PHEV (Plug-in Hybrid Electric Vehicle) : PHEVs are also referred to as series hybrids. They have an engine as well as a motor. You can choose between conventional fuel (such as gasoline) and alternative fuel (such as bio-diesel). A rechargeable battery pack can also be used to power it. External charging is possible for the battery. the same disadvantages that apply to combustion engine vehicles also apply to PHEV's

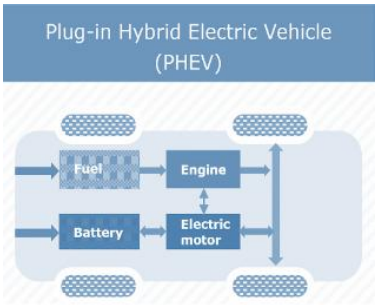
such as the need for more maintenance, engine noise, emissions and the cost of petrol. PHEVs also have smaller battery packs, which means a reduced range.

a. PHEVs can operate in at least two modes:

i. All-electric Mode, where the motor and super capacitor provide all of the energy for the vehicle.

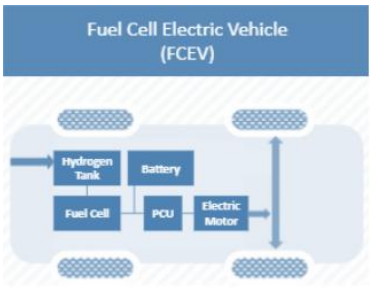
ii. Hybrid Mode, which uses both electricity and gasoline/diesel.

E.g. :- Porsche Cayenne S E-Hybrid, BMW 330e, Porsche Panamera S E-hybrid, Chevy Volt, Chrysler Pacifica, Ford C-Max Energi, Mercedes C350e etc.



4. Fuel Cell Electric Vehicle(FCEV): FCEVs are also referred to as Zero-Emission Vehicles. They use 'fuel cell technology' to produce the electricity needed to power the vehicle. The energy released of the fuel is directly converted into electrical energy.

E.g.:- Toyota Mirai, Riversimple Rasa, Hyundai Tucson FCEV, Honda Clarity Fuel Cell, Hyundai Nexo.



Government measures or regulation regarding EV policies

1. FAME - I and II: Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles (Policies Blue Print)

D. FAME - I: Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles FAME, or Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles, is currently India's flagship electric mobility promotion scheme. The National Electric Mobility Mission Plan (NEMMP) 2020 is a National Mission document that provides a vision and roadmap for the country's faster adoption and manufacturing of electric vehicles. The Department of Heavy Industry developed the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) Scheme as part of the NEMMP 2020 'National Electric Mobility mission Plan , 2020' . This Scheme's Phase-I was initially launched for a two-year period beginning on April 1, 2015. DHI (Department of Heavy Industries) introduced it in 2015. Under this465 buses were sanctioned to various cities/states under this scheme.

The details of funds earmarked and utilized under Phase-I of FAME India Scheme is tabulated below:

S. No.	Financial Year	Fund Allocated	Fund Utilization
1	2015-16	Rs. 75 Crore	Rs. 75 Crore
2	2016-17	Rs. 144 Crore	Rs. 144 Crore
3	2017-18	Rs. 165 Crore	Rs. 165 Crore
4	2018-19	Rs. 145 Crore	Rs.145 Crore
TOTAL		**Rs. 529 Crore**	**Rs. 529 Crore**

S.No	Total Approximate Incentives	Approximate Size of Battery
1	**Two Wheeler:** Rs 15000/- per kWh upto 40% of the cost of vehicles	**Two Wheeler:** 2 kWh
2	**Three Wheeler:** Rs 10000/- per kWh	**Three Wheeler:** 5 kWh
3	**Four Wheeler :** Rs 10000/- per kWh	**Four Wheeler:** 15 kWh
4	**E Buses:** Rs 20000/- per kWh	**E Buses:** 250 kWh
5	E Trucks: Rs 20000/- per kWh	

Ministry of heavy industries (National Automotive board)

b. FAME 2: The government has approved Phase-II of the FAME Scheme, with a budget of Rs. 10,000 crores for a three-year period beginning April 1, 2019. Approximately 86 percent of total budgetary support has been allocated for Demand Incentive in order to create demand for EVs in the country. This phase's goal is to generate demand by supporting 7000 e-Buses, 5 lakh e-3 Wheelers, 55000 e-4 Wheeler Passenger Cars (including Strong Hybrid), and 10 lakh e-2 Wheelers. However, due to the provision for inter and intra segment fungibility, these numbers may vary depending on the offtake of different categories of EVs.The scheme will only incentivize advanced battery and registered vehicles. The scheme will be applicable primarily to vehicles used for public transportation or those registered for commercial purposes in the e-3W, e-4W, and e-bus segments, with a greater emphasis on providing affordable and environmentally friendly public transportation options for the masses. However, as a mass segment, privately owned registered e-2Ws are also covered by the scheme.

Sr. No.	Vehicle Segment	Vehicle Category[#1]	Vehicle Model Eligibility Criteria (to be measured as per the standards/procedures specified in Annexure)			
			Minimum Range [#2] (km)	Maximum Electric Energy Consumption [#2] (kWh/100 km)	Minimum Max Speed[#3] (km / hr)	Minimum Acceleration[#3] (m/s^2)
1	e-2W	L1 & L2	80	Not Exceeding 7	40	0.65
2	e-3W	E-Rickshaw [#4,5] & E-Cart [#4,5]	80	Not Exceeding 8	NA	NA
3	e-3W	L5	80	Not Exceeding 10	40	0.65
4 (a)	e-4W (Passenger Carrier)	M1 (Length less than 4 m)	140	Not Exceeding 15	70	1.04
4 (b)		M1 (Length ≥ 4 m)	140	Not Exceeding 20	70	1.04
5	e-4W (LCV/ State Carriage / Maxi Cabs etc)	N1	100	Not Exceeding 30	50	1.04

c. Guidelines to be followed by OEM (Original equipment manufacturer) at the time of the sale of the vehicle: Under rule 126 of the CMVR, 1989, each OEM is required to get its model certified from recognized testing agencies in order to be eligible for the FAME India Scheme Phase-Il. Once the model has been certified, it will be sanctioned by DHI/NAB on an online platform, after which the incentive amount for the specific model will be determined.

d. National Mission on Transformative Mobility and Storage: The Mission for Electric Vehicles, Components, and Batteries aims to localize production across the entire electric vehicle value chain by implementing a clear Make in India strategy for electric vehicle components and batteries. It will collaborate with key stakeholders in Ministries, Departments, and States to incorporate initiatives aimed at transforming India's mobility. The Mission will outline India's strategy and road map for developing a competitive local manufacturing ecosystem for e-mobility. The goal is to promote 'Ease of Living' and improve our citizens' quality of life while also creating job opportunities through 'Make in-India' across a wide range of skill sets.

- Advancement in Electric Vehicle Infrastructure

1. Charging stations Electricity: presently there are over ten lakh electric vehicles on Indian roads. Across the country, approximately 1,700 charging stations are available in public places. Eight cities with populations of four million or more have

action plans in place (Mumbai, Delhi, Bangalore, Ahmedabad, Chennai, Kolkata, Surat, and Pune). The Ministry of Heavy Industries had requested proposals from any Government Entity or Public Sector Undertaking for the development and operation of public EV charging infrastructure on expressways and national highways. PSU Energy Efficiency Services Limited has been awarded the contract to install EV charging stations along 16 NH or expressways (EESL).

Charger Type	S. No.	Charger Connectors*	Rated Output Voltage(V)	No. of No. of Connector guns (CG)	Charging vehicle type (W=wheeler)
Fast	1	Combined Charging System (CCS) (min 50 kW)	200-750or higher	1 CG	4W
	2	CHArge de MOve (CHAdeMO) (min 50 kW)	200-500 or higher	1 CG	4W
	3	Type-2 AC (min 22 kW)	380- 415	1 CG	4W, 3W, 2W
Slow/ Moderate	4	Bharat DC-001 (15 kW)	48	1 CG	4W, 3W, 2W
	5.	Bharat DC-001 (15 kW)	72 or higher	1 CG	4W
	6.	Bharat AC-001 (10 kW)	230	3 CG of 3.3 kW each	4W, 3W, 2W
*In addition, any other fast/slow/moderate charger as per approved DST/BIS standards whenever notified. Note :Type -2 AC (min 22 kW) is capable of charging e-2W/3W with the provision of an adapter					

As per revised order guidelines in 2019.

2. Battery Swapping stations: According to a notification and paper by NITI Ayoug with the ICCT , it mentions TCO per kilometre (km) for both conventional two-wheelers and E2Ws is lowest when used for commercial operations with higher daily utilization rates, such as e-commerce deliveries and shared mobility, according to ICCT analysis. The diagram below, this is illustrated for the ride-hailing use case. Take note of how the E2Ws are consistently more cost-effective than gasoline vehicles, and point charging remains the most popular even with low and medium utilization rates (less than 100 km per day) Domestic electricity charges are relatively high. For a daily usage of 140 km and however, battery swapping is the most cost-effective option. Despite not being show ICCT discovered below that if the total cost per kilowatt hour (kWh) to battery swap is reduced to INR 20. Battery swap systems have built-in IoT and CAN that facilitate constant tracking and monitoring of battery performance through data analytics.

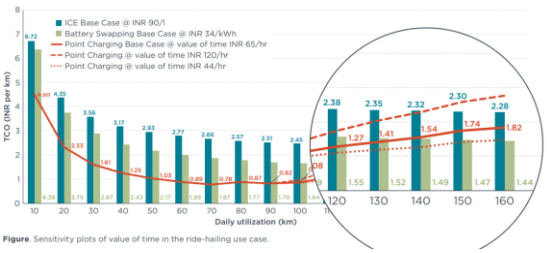


Figure. Sensitivity plots of value of time in the ride-hailing use case.

Icct report, 2022

1. Battery Manufacturing: EVs currently use lithium-ion batteries. Lithium-Ion batteries first became available commercially in the early 1990s and are now the preferred power source for electric vehicles. Demand for batteries has increased at an exponential rate, rising from 0.5 gigatonne-hours in 2010 to around 526 gigatonne-hours a decade later. According to Bloomberg, this demand is expected to grow 17-fold by 2030, lowering the cost of battery storage. India, too, has a large potential for large-scale battery manufacturing, with industry reports estimating that the country's annual battery. The production-linked incentive (PLI) scheme set aside Rs 180 billion for advanced cell chemistry, with the goal of bringing at least 50 gigatonnes (GW) of lithium-ion batteries to market. The heart of electric vehicles is thought to be lithium-ion cells (EVs). Most electric vehicle manufacturers currently import cells and batteries from China, the world's largest producer of lithium-ion cells. Companies are now speeding up plans to manufacture lithium-ion cells in the country, hoping to take advantage of Rs 180 billion in government subsidies, market could exceed US$ 15 billion by 2030.

Companies:

1. Amara Raja Batteries: -Amara Raja Batteries has taken the first steps towards its next phase of growth in the New Energy business by supplying li-ion battery packs to three wheelers. it has invested in two start-ups (Log9, InoBat) and is open for more partnerships, in addition to organically developing technology.
2. Exide Industries :- Exide is set to invest Rs 60 bn to establish a lithium-ion cell manufacturing plant in the country in collaboration with China's SVOLT Energy Technology.

3. Tata Group - Tata Power/Tata Chemicals:- Tata Power has partnered with real estate company Kolte-Patil Developers (KPDL) to set up e-charging stations across its projects in Pune, Mumbai and Bengaluru for convenience of electric vehicle owners. Tata Chemicals has also signed an MoU with the Indian Space Research Organisation (ISRO) for the transfer of ISRO's lithium-ion cell technology.
4. Hero MotoCorp:- Hero MotoCorp, along with Engine No 1 and one other investor has invested US$ 285 m in Gogoro and Poema Global Holdings, a special purpose acquisition company (SPAC).
5. Maruti Suzuki :- In March 2022, the parent company Suzuki Motor corporation along with its subsidiary SMG signed a memo of understanding with Government of Gujarat to invest Rs 104 bn in EV batteries. This would help the company to localize and expand its presence in EV space.

Charging Stations Manufacturing :-

1. Yo charge
2. 2.tata power
3. Jio – bp
4. Abb
5. Delta electronics

- Challenges In Electric Vehicles: An Indian Perspective

The primary goal of an electric vehicle (EV) is to reduce the vehicle's energy demand. A vehicle is built with lightweight materials such as glass, rubber, and special fibers. India must develop the most efficient vehicles with low Wh/Km, which will reduce battery size, and improve motors, tires, and aerodynamics. Infrastructure for charging and swapping is required because slow chargers, fast charging, and battery swapping are all required. For EV systems, Pb Acid, Ni, and Li-ion batteries are used. In the next five years, sodium ion, lithium-ion batteries with greater storage capacity than lithium-ion batteries will be introduced. Fuel cell vehicles are preferable to high-capacity batteries, which are difficult to build and expensive. Fuel cells are less expensive, and hydrogen is a safer fuel than gasoline, diesel, and compressed natural gas. Technology is constantly evolving, and with new battery technology comes faster charging times. Among production cars, Tesla Model S still holds the record for available range on a single charge.

To achieve large-scale and dynamic EV charging penetration, it is necessary to analyse EV charging points in real-time. Solar PV arrays in residential homes can help the grid supply power and are known as distributed generation. They can also be used to charge and discharge EV stations. When an EV charging station is switched on and off, the voltage and current pure sinusoidal signals change due to harmonics.

Vehicles with electric motors (EVs) have several environmental benefits, but there are some concerns about their safety and environmental impact. Because normal fossil fuels are replaced by electrical input in EVs, there is a significant reduction in pollutant particles such as CO, CO2, major hydrocarbons, and various nitrogen oxides. This factor takes into account all pollutants at all levels, such as fuel production, processing, distribution, and electricity generation, among others. Before driving, batteries should be fully charged, and fast chargers should be used during charging station installation.

In 2013, the Government of India launched National Electric Mobility under which V2G technology refers to a group of EVs that are connected to the grid for power transactions. EV chargers are also nonlinear loads that introduce harmonics into the power grid. V2G helps the grid by reducing peak demand, filling valleys, and levelling load demand. V2G communication requires a Gird Control Centre (GCC) ,an Aggregator, and an EV. GCC informs Aggregated

Electric Vehicles about their electricity requirements (EVs). It also attracts EV owners by offering incentives such as free parking lots with charging stations.

Aggregators can buy and sell energy as well as ancillary services in the Energy Market. For the interface between the charging station and the Smart Grid, IEC TR61859-90-8 is currently being reviewed. Recycling the battery is a better option for lowering the battery's life cycle cost. E-2-wheeler dedicated lanes may help reduce collisions with other

vehicles. High-priced materials typically have limited market availability, whereas high-volume materials have low unit prices. All factors must be considered when planning battery recycling. The main issue concerning the standard practices used in the design and manufacture of electric vehicles is vehicle testing and certification (EVs). Both mechanical and electrical components of EVs should be tested. Electrical testing is performed similarly to that of a standard vehicle and includes impact and vibration testing. These vehicles will be more expensive to service and maintain than conventional vehicles.

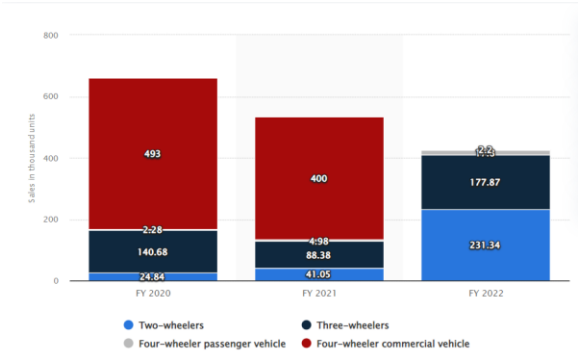
EV technology is also not widely used, so the overall cost is higher. The quality of the electricity used to charge the batteries is the most important factor. To charge the battery and store energy in EVs, AC power will be converted to DC. Some harmonics are generated in the output waveform during the conversion from AC to DC, and the quality of the output power degrades. This deterioration in power quality will also have an effect on battery charging.

Electric vehicle manufacturers will benefit from tax policies that favor them (EVs). Less tax on the components will result in a lower overall vehicle cost. For the production of electricity, India is primarily reliant on conventional power plants. The cost of electricity is decreasing day by day due to recent advancements in renewable energy generation.

- What would be the strategies for the Oil and Gas companies after the introduction of the EV's !

The time has come for oil and gas to capitalize on their inherent strengths and capitalize on the growing EV market. As early as 2027, EVs could offset annual modest increase in oil demand. According to LMC Automotive and Bloomberg, EVs will account for nearly half of global vehicle sales by 2030. The COVID-19 pandemic has slowed global manufacturing and travel, resulting in significant drops in demand and prices. As the oil and gas industry seeks new sources of growth, now is an excellent time to increase its concentrate on the EV market. Electric vehicles (EVs) are approaching cost parity with internal combustion engine vehicles. By pursuing the EV market, oil and gas companies can leverage their inherent strengths, such as strong brands, improved organisational infrastructure, and retail networks, to lay the groundwork for the future of mobility. EV initiatives will bring oil and gas companies into contact with a new and growing consumer base, as well as involve them in the evolution of green infrastructure and connectivity.

- Are we ready as per the market condition for switching from Conventional Transportation to Electric mode?



Sales of electric vehicles across India from the financial year 2020 to 2022,per (1,000)

If we analyse the stats regarding, we can see the changing face of transportation and whether are we ready for the future as per the requirement of our market. As per an open discussion held by indiabix.com, I was able to analyse that the Indian population and was very well aware of the fact we need to switch to electric vehicles instead of conventional transportation, but only view the aspect of battery charging and environment but not of the others aspects such as shift from oil and gas and other sources.

CONCLUSION

Transport is a necessity in modern life, but the traditional combustion engine is quickly becoming obsolete. The world is shifting to more environmentally friendly and sustainable alternatives such as biodiesel and renewable diesel. Changing the fuel in transportation machinery will be a significant change and a significant step toward reducing carbon footprints. World is shifting to more sustainable and environmental alternatives such as Electronic Vehicles (EVs), biodiesel and renewable diesel, natural gas, battery electric, Hydrogen fuel cell etc. Changing the fuel in the transportation machinery is going to be a big change and a huge step towards changing the carbon footprints. The 14th Congress of world energy conference on World energy horizons 2000-2020 in respect to India New Delhi Conference in 1983, was seen as a turning point. The

traditional combustion engine is rapidly becoming obsolete. Petrol and diesel vehicles emit much pollution and are being phased out in favour of all-electric vehicles. Such techniques should be used only once a solid data protection regulation is in place, with strict penalties for violations. Denying security services access to cutting-edge technology would be a severe injustice to victims of crime and the nation as a whole.

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