

PROGRESS REPORT ON ELECTRIC VEHICLES IN INDIA

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Abstract: this paper present a progress or recent work on electric vehicle in the India. this paper provide the development of electrical vehicle ,advantages , disadvantages and the comparison of electrical vehicle with resents cars and also give the idea of parts of electrical vehicle. In India need of this type of vehicles because Electric vehicles have good ecological protection performance.this paper based on the current development status and problems of electrical vehicle occurs in India. the major components used in electrical vehicle are battery technology, charger design, motor, steering and braking etc. India is anxiety about environment protection and energy conservation due to this India is need to development of electric and hybrid vehicles (EV/HEV).the paper finally shows working of electric vehicle and model as a conclusion of the papers.

Keywords: Electric vehicles, Charging pole, electric drives and controller, DC Sources battery etc.

I. INTRODUCTION

An **electric vehicle** is representing by EV. Electric vehicle operate by force and power and this force create by using one or more than one electric motors or traction motors (which are used for driving traction force for example railway). An electric vehicle powered by two methods

- First method is we can collect the power from off-vehicle sources and this power can be supplied to the electric vehicle with the help of collector system .Second is self-contained with a battery, solar panels or an electric generator which is convert fuel to power.[1]

Electric Vehicles are used in following places

- Electric vehicles are used as Electric Cars, Electric bike and Electric rickshaw these are run on Road and some electric vehicles are used as electric train which is used in railways.
- Some Electric vehicles are used in underwater surface.
- Many electrical vehicles are used in the form of electric aircraft vehicle (it is used for fighting purpose) and spacecraft vehicle (it is used for space research).

Mainly Electric vehicle (EV) is design as a road vehicle which involves with electric driving force. Electrical vehicles include

- Battery electric vehicles (BEV)

- Hybrid electric vehicle (HEV)
- Fuel cell electric vehicle (FCEV).

Electric vehicle is a big subject which covers broad and complex topics. However, Electric vehicle work on following technologies,

- Chassis and body technology,
- Impulsion technology
- Energy source technology [2]

There is the meaning of EV is Electric Car and in this paper we discuss about mainly Electric car. Electric car is type of electric vehicles. In Electric Vehicles category Electric car and bike are include and also solar power operator vehicles are also including.

In India we are need to think about electric vehicles technology and an increased focus on renewable energy. For development of electric vehicle, engineers began to sharing technical details and ideas. For this processes they are use renewable energy sources.[3]

In the United States and the European Union Growth of Electric vehicles is probable to increase from 2% of global share in 2016 to 22% in 2030.

This paper including the charging station status for electrical vehicles and also current data of electric vehicles in India [4]

II. HISTORY OF ECLECTIC VEHICLES IN INDIA AND OUT OF INDIA

In 1827 electric motive power started by Hungarian priest. He was created the first practical electric motor, this electric motor included stator, rotor and commentator. This electric motive power was used in tiny cars it was used as a toy car. History of electrical vehicle in out of India is listed below.[5]

Year	Name of inventor	Powered by	Name of Electric Vehicle
1835	Sibrandus Stratingh	Powered By Non-Rechargeable Primary Cells	Small-Scale Electric Car
1832	Robert Anderson	Powered By Non-Rechargeable Primary Cells	Crude Electric Carriage
1835	Thomas Davenport	Primitive Electric Motor	Toy Electric Locomotive

1902	Studebaker Automobile Company	Automotive Business	Electric Vehicles
1913	Henry Ford	Gasoline-Powered	Gasoline Cars

In that time the UK was the world's leading user of electric road vehicles.

At that time storage batteries was not available in larger amount Due to this reason, electric cars did not gain much fame but at that time electric locomotive was used in larger scale and it was used in electric trains due to this electric trains gained vast popularity and achieved economies and fast speeds .

In India the idea of electric vehicles (EVs) has been around for a quite long time, but it has drawn important attention only in the earlier period decade. Normal fuel-based vehicles create carbon footprint and other environmental problems. Due to these problems Indian engineers working sincerely on the development of electrical vehicles. The Indian Government making many policy and plans so as to approach increasing a demand of electric vehicles in India and it can give benefit to automakers by provide large orders in auto industry. many tender for electric vehicles are already issued in India and at the time a very important tender for electric buses in many cities in India is possible to be released soon. [6]

III. INFORMATION ABOUT ELECTRIC VEHICLES

In this we are discuss about following data which is given below

- characteristics of an electric vehicle
- Battery in electric vehicle
- Battery Charging
- Ecosystem for electric vehicle
- Electricity sources
- Vehicle types

III.1) Characteristics of an electric vehicle:

Driving range: Electric Vehicle can cover the maximum distance when they are fully charged.

Charging time of batteries: it is totally depends that how many time is required to fully charge to battery.

Other important characteristics are including in charging time of batteries are applied voltage of battery and applied current of battery, types of battery and max life and capacity of battery.

III.2) Battery used in electric vehicle:

The batteries selection for electric vehicles are mainly depends on density of power and energy, load applied on battery and costs of batteries. Simple and low cost batteries units are used in Electric cycles, bikes and low range electric vehicle while heavy weighted and high cost batteries units are used in electric cars and heavy electric vehicles. Large number of batteries is also necessary for electric heavy vehicles and car. Generally lead acid batteries are used in mostly electric vehicles because these batteries have mature technology. These batteries are easily available and cost is low. The main features of good battery used in electric vehicles are good efficiency, low applied load,

lower power consumption time, excellent output power of battery , longer duration and not harmful for environment Following Types of battery are used in electric vehicle:

- Nickel cadmium battery
- Nickel Metal Hydride battery
- Lead Acid battery
- Lithium Ion battery
- Lithium Polymer battery

III.3) Battery Charging

With the help of Analog current to direct current conversion units and power control and stable units we can supply low power to batteries. These all devices are inherent in the battery charger. Main battery charging source is Battery executive or management System. BMS monitors voltage, current, and state of power and temperature of battery. BMS is also used in energy recovery system in electric vehicles and control the recharging of batteries .BMS is a collection of electronics equipments and it is manage the rechargeable batteries for reuse.BMS is gives protection to battery from outside operating area [7]

III.4) More Features of Electric vehicle

Sell Point	Good performance in market and good assurance
	Excellent servicing of Vehicles
	High initial cost and Financing
	Customer involvement
	Rare Resources for batteries
Technically Point	Good Accuracy of batteries
	Operate and control range of Electric Vehicles
	Security
	Charging time of battery
Strategy Point	Taxes of vehicles and equipments Electricity tax policies and financial support
	Charging Support
Framework Point	Smart and new technology based Grids
	Battery reused

III.4) Electricity sources

There are many sources to generate electricity.

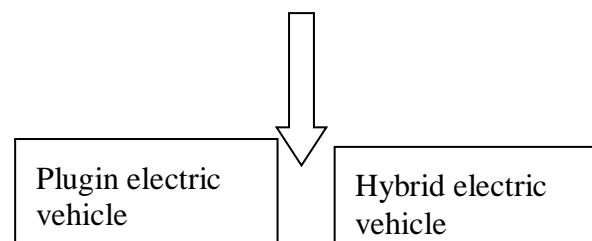
Connection to generator plants

Example: electric trains, Electric trolley buses

Onboard generators and hybrid electric vehicle

Diesel engine locomotive, Fuel cell, nuclear energy and solar energy are used as electricity sources in electric vehicles.

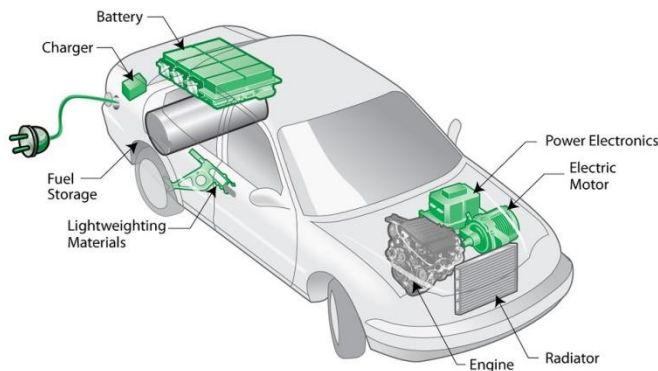
III.5) Vehicle types



2007	ELECTRIC BIKES	ULTRA MOTOR
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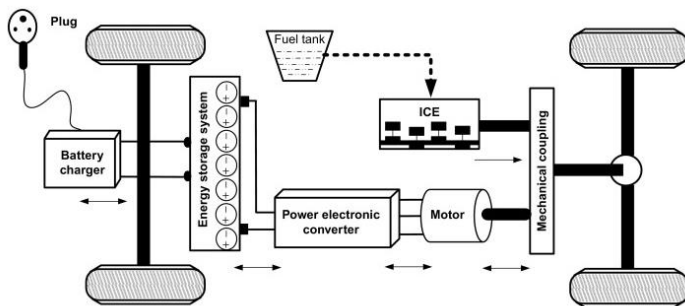
Plug-in electric vehicles are charge from any external source like socket.

Hybrid Electric vehicle are used fossil fuel power technology [8]



Plug in Electric Vehicles

IV. BLOCK DIAGRAM



Schematic diagram of PHEVs'

TATA Motors, Maruti Suzuki, Toyota and many other companies started entering & play important role in Indian market with battery and hybrid electric vehicle products. In India in electric vehicles market three wheeler E- rickshaw and four wheeler electric cars very popular. In this we are discuss about little bit of E- rickshaw popularity in India.[9]

What is E- Rickshaw?

As per Indian Motor Vehicle Act (with Recent Amendment), e-rickshaw is three-wheeled vehicles run by Electric battery , approx four 12V battery run a 650 W motor. Other features are:

- Maximum speed is 25 kmph.
- Approx carry 4-5 passengers and 40 kg luggage.
- Neither requires any registration nor license plate.[10]

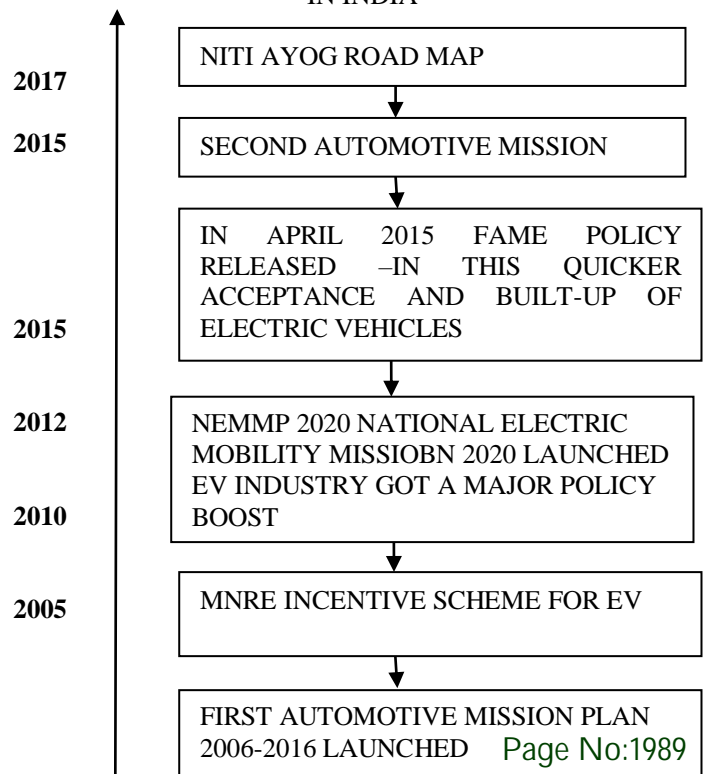


Picture of E- Rickshaw

V. ELECTRIC VEICHELs SCENARIO IN INDIA

Year	Electric Vehicles	Company Name
1996	VIKRAM SAFA	SCOOTERS INDIA PVT LTD, LUCKNOW
1999 & 2001	BIJLEE	MAHINDRA AND MAHINDRA LTD.
2000	EIGHTEEN SEATER ELECTRIC BUS	BHEL
2001	SEATER ELECTRIC RICKSHAW	BAJAJ AUTO LTD, PUNE
2001	ENTERED THE EV SECTOR IN THE CAR INDUSTRY	REVA, BANGALORE,

VI. POLICY AND PLAN OF ELECTRIC VEHICLES IN INDIA



VII. FALL DOWN IN ELECTRIC VEHICLES INDUSTRY FROM 2005 TO 2015

in India starting period of electric vehicles was not good many companies did not know about the electric vehicles due to this reason electric vehicles are not got more successes in India.

In 2005-2006 most of the traders just forget about the electric 2 wheelers due to poor battery quality services and lack of maintenance center, customer were not happy and industry felt a huge setback.

- (2005-2006) More than 200 dealers and 50-55 traders entered Indian market in the year 2005. But "sold and forget business model" destroyed their ambitions.
- (2006-08) then the serious players like BSA, Electrotherm, and Hero Electric started trying to salvage the market with reliable product and maintenance schemes.
- (2008-12) the central government of India in Nov 2010 offered subsidies equivalent to \$ 80 for those who purchased electric vehicles but the program was poorly funded and ended in March 2012 without being renewed.
- (2012-14) withdraw of financial subsidy, higher local tax and drastic decrease in petrol and diesel price forced the consumers to shift their focus to traditional 2 wheelers and electric 2 wheelers sales reduced to 20,000/ year during this period.[11]

VIII. CURRENT STATUES OF ELECTRIC VEHICLES IN INDIA

National Electric Mobility Mission Plan (NEMMP) 2020

- The main purpose of this policy is increasing the number electric vehicles in the India by 2020.
- For starting the business of Electric vehicles India government providing the incentives and subsidy also.
- Agenda of NEMMP is to launching large no of passenger Electric cars by 2020 and reducing the number of vehicles operating by oil, diesel and gas operating cars by 2020.
- NEMMP will launching large number of electric buses for public transport by 2015-2030.[13]
- Government of India will be installing larger power grid which is operate by solar power by 2022 it will be helpful for improvement and deployment of electric vehicles.
- First electric vehicles policy launched in Karnataka. Telangana and Andhra Pradesh is also working on the direction to release the electric vehicles policy.
- REVA (Mahindra) introduced first electric car in 2001 after that company has about 7,100 electric cars.
- At present time many company produced electric vehicles but four famous company providing new models of electric cars recently.
- Hyundai Kona company providing electric car cost approx 23 lakh ,Tata Tiger Company providing

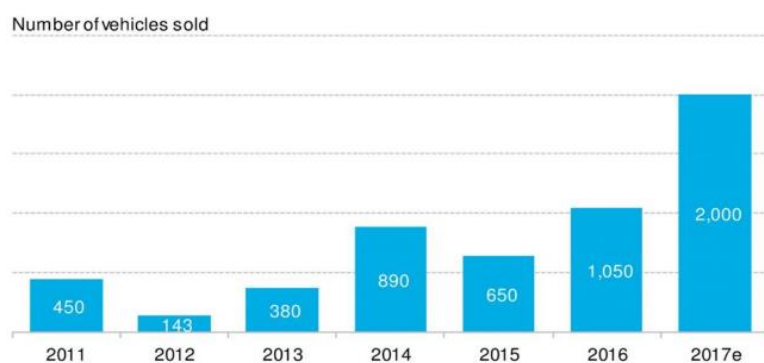
Electric car cost approx 10 to 11 lakh and Mahindra Company providing 2 electric car cost approx 12 and 8 lakh .

- Mahindra's electric vehicles manufacturing plant is placed in Bangalore and a new one plant will be place in Nashik[14]

No. of electric vehicles & Hybrids sold under FAME

Category	2016-17	2017-18
Electric 2 wheelers	23000	54,800
Electric cars	2000	1200
Total electric vehicles	25000	56000

Approx number of EV passenger cars sold in India



These are the details of Mahindra Company

Location of other branch: Bangalore, Mumbai and Delhi
Location of charging station operated by Mahindra Company: Delhi, Kolkata, Bangalore and Pune.
Locations of availability of electric vehicles: Public places include shopping malls and Mahindra showrooms .[15]

IX. CHARGING STATION FOR ELECTRIC VEHICLES IN INDIA

National Thermal Power Corporation (NTPC) started a business of Electric vehicles-Charging station and they lunched first charging stations in Delhi and Noida. BHEL and ISRO both company has been signed on MOU for making battery for Electric Vehicles. ISRO is giving R&D technology to BHEL for making efficient and low cost lithium - ion battery
 EESL - Ministry of Energy asked 4000 EV chargers to obtain an open offer of one of the power supplies.
 Recently the first electric vehicles charging facility installed at Vikhroli in Mumbai by Tata Power Company. Now Tata Company moves to set up 2 new charging stations in North & Central Mumbai
 More than fifty pulse charging stations are locating at four different places in Nagpur .[16]



X. ADVANTAGES AND DISADVANTAGES OF ELECTRIC VEHICLES

Advantages	Disadvantages
Highly efficient	Storage of electricity is very expensive
High performance and low maintenance	Battery charging is time taking
Very responsive and have a very good torque	Range anxiety
EV motors are quite and smooth	Sufficient public charging station is still Lacking
Simple power train	Cause indirect pollution
Low electricity consumption	Evs are very heavy due to batteries
Clean, cheap, safe and a convenient	Battery has to be regularly charged

XI. CONCLUSION

In this article we examine the state of the present vehicles operate from diesel And petrol and the realization of a new era of electric vehicles which are operate from electricity, solar power and battery .This document represents the research on the current status of electric vehicles and policy lunched in India and illustrates the challenges, features and the introduction of electric vehicles. This document also presents a general description of the electric vehicles and e-rickshaw. If the electric vehicles are fully established in India, then more pollution problems are overcome, but it will take time. this paper also present overview on electric vehicles policy. This paper also shows that all features of electric vehicles.

XII. REFERENCES

- [1] From wikipedia
- [2] From wikipedia
- [3] From wikipedia
- [4] From wikipedia
- [5] From wikipedia
- [6] From wikipedia
- [7] <http://vikaspedia.in/energy/energy-efficiency/electric-vehicles-in-india>
- [8] From wikipedia
- [9] <https://evautocars.blog/2017/05/18/electric-vehicle-history-india/>
- [10] <https://evautocars.blog/2017/05/18/electric-vehicle-history-india/>
- [11] <https://www.innovasjon Norge.no/contentassets/815ebd0568d4490aa91d0b2d5505abe4/india-ev-story.pdf>
- [12] <https://evautocars.blog/2017/05/18/electric-vehicle-history-india/>
- [13] <https://www.innovasjon Norge.no/contentassets/815ebd0568d4490aa91d0b2d5505abe4/india-ev-story.pdf>
- [14] <https://evautocars.blog/2017/05/18/electric-vehicle-history-india/>
- [15] <https://www.innovasjon Norge.no/contentassets/815ebd0568d4490aa91d0b2d5505abe4/india-ev-story.pdf>
- [16] <https://www.innovasjon Norge.no/contentassets/815ebd0568d4490aa91d0b2d5505abe4/india-ev-story.pdf>



