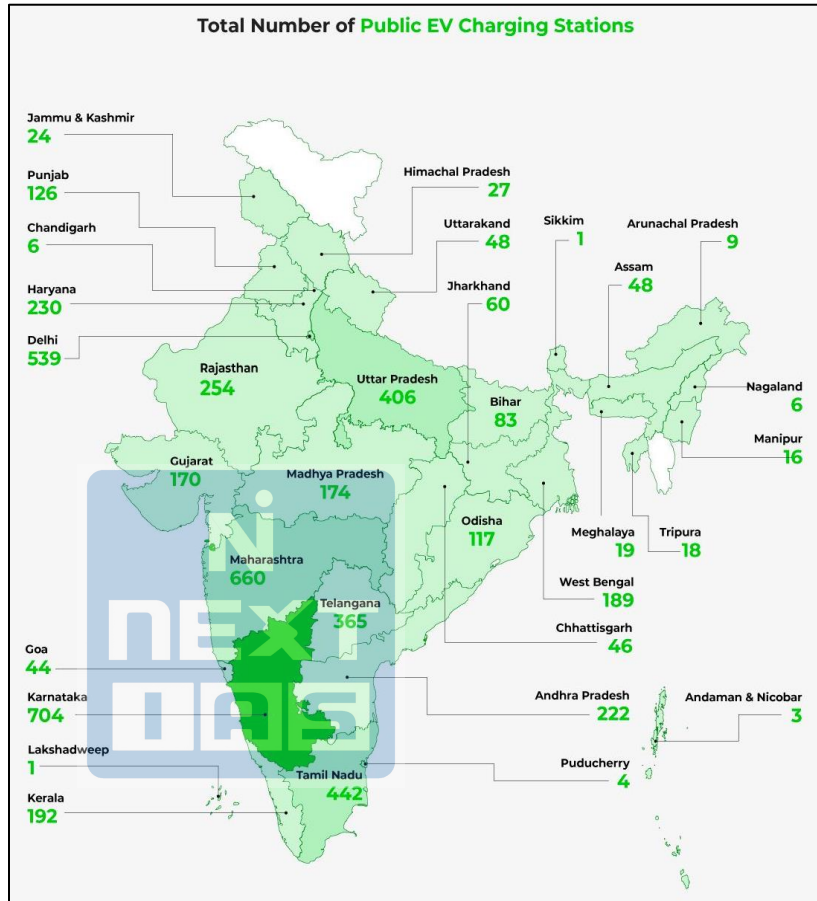


What are the challenges faced By India in adopting Electric Vehicles?

<p>1. Cost of EV</p>	<ul style="list-style-type: none"> • One of the biggest challenges with electric vehicles in India is the high cost. • EVs are still expensive when compared to traditional petrol or diesel cars. • For comparison, the Tata Nexon(XMA AMT S) Petrol and EV Prime model whose ex-showroom prices are ₹994,900 and ₹1,663,000 respectively. <div data-bbox="695 760 1279 970" style="text-align: center;"> </div>
<p>2. Extreme Weather Conditions</p>	<ul style="list-style-type: none"> • India is known for its extreme weather conditions, and it has a significant impact on the performance of electric vehicles. • The battery life of an EV can be reduced by up to 50% in extreme temperatures. • The ideal range for electric vehicles to operate is 15- 40 degrees Celsius. • Moreover, charging an EV in hot weather can lead to thermal runaway, which is a significant safety concern.
<p>3. Lack of Charging Infrastructure:</p>	<ul style="list-style-type: none"> • The infrastructure required for EVs is still in its nascent stages in India. • There are only a few public charging stations in the country, making it difficult for EV owners to travel long distances.

- Currently **India has 934 charging stations**, most of which are located in urban areas.
- In comparison, **China had 1.8 million electric charging stations as of 2022.**



4. Lack of Standardization:

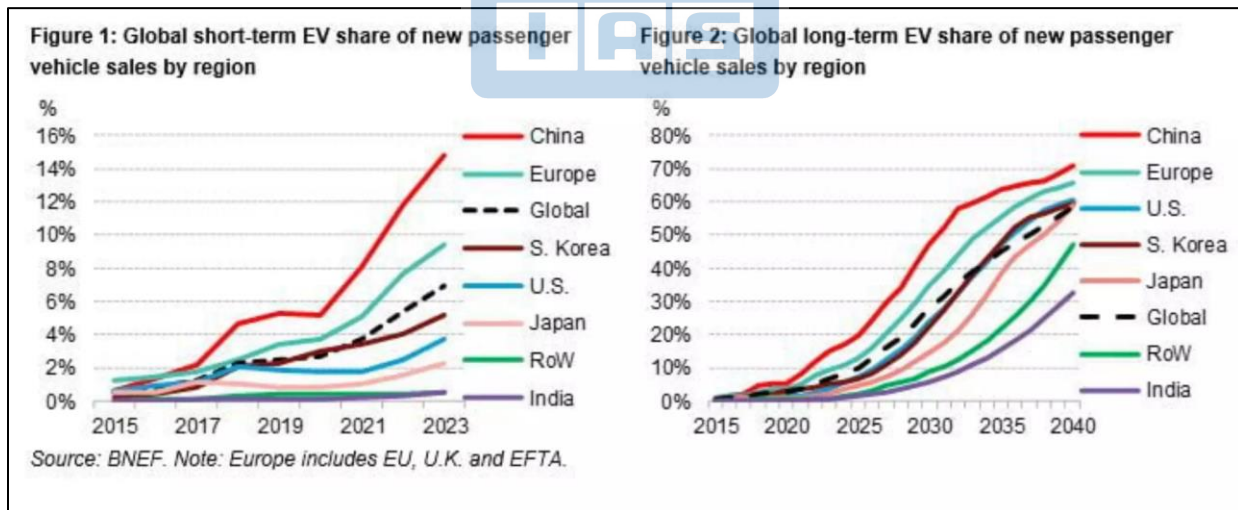
- EV charging infrastructure in India is still in its early stages, **leading to a lack of standardization.**
- Different charging connectors, charging speeds, and swappable batteries across OEM's make it difficult for EV owners.

5. Limited Range:

- **The limited range of EVs is still a significant challenge in India.**

	<ul style="list-style-type: none"> ● The majority of EVs available in India have a range of 100-150 km, which is not enough for long-distance travel.
6.Persistent Resistance to Change	<ul style="list-style-type: none"> ● Indian consumers are still resisting the adoption of EVs, despite their long-term economical and environmental benefits. ● This stems from a lack of awareness of EVs and a general reluctance to embrace new technologies, especially in rural areas.
7.Lack of Clean Energy	<ul style="list-style-type: none"> ● Much of India's electricity is generated from burning coal. ● Relying on coal to generate power for all the EVs would defeat the purpose of reducing carbon emissions through EV adoption.

What Can India Learn from Other Countries' Success?



Power, infrastructure, and financing all are primary antagonists in India's EV adoption story. But the country can take cues from others already making inroads towards full EV adoption. The countries leading global EV adoption paint an interesting picture.

But players in the Indian market must come together to address consumers' concerns. They should also build a supportive ecosystem to promote the widespread adoption of EVs in India. This can be done through the development of more affordable EVs, the expansion of charging infrastructure, and the creation of awareness and education programs to educate consumers about the benefits of switching to EVs.

What Can India Learn from Other Countries' Success?

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Graph-2.png

India can learn from other countries' successes and mistakes. Source: acea.auto

The top countries in the graph above are all wealthy countries in northern Europe. Combined, they don't even represent 3% of India's population. This may lead us to believe that their success will be impossible to replicate in a much more diverse and densely-populated country, like India.

However, China comes in second and turns that argument on its head. Let's delve into what different regions have done for EV adoption and what India can learn from these efforts.

The EU, EFTA, & UK

- **In 2021, electric car registrations in the EU-27 region was 1,729,000, up from 1,061,000 in 2020, representing a 17.8% increase.**
- **All EU countries, including Norway, which has the highest number of registrations in a year, offered financial incentives like tax reductions and exemptions.**
- **India is also offering tax incentives along the same lines.**

- And with favorable government policies and the presence of first-mover companies, the country will be able to improve the **adoption of EVs in the next three to five years.**

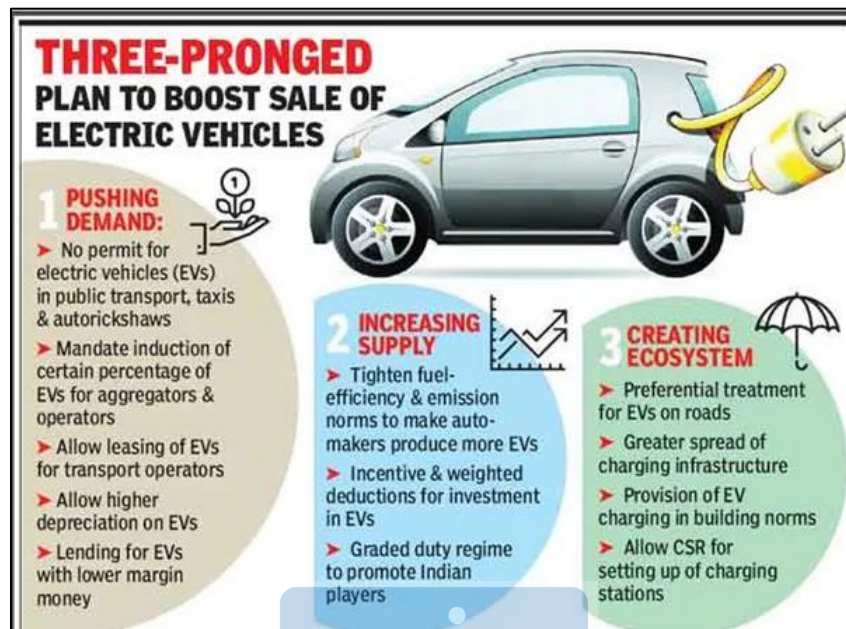
China

- According to the **China Association of Automobile Manufacturers (CAAM)**, China sold **6.89 million EVs in 2022 alone.**
- It also boasts the **largest electric car fleet in the world: 4.6 million + electric cars on roads in China.**
- This success story is attributed to **generous government support as well as intense domestic competition**, both of which fueled innovation and reduced car prices.
- In comparison, **India is also offering support, but the domestic market is not robust and competitive yet.** But that is expected to change in the coming years as the impact of the current policies becomes more widespread.

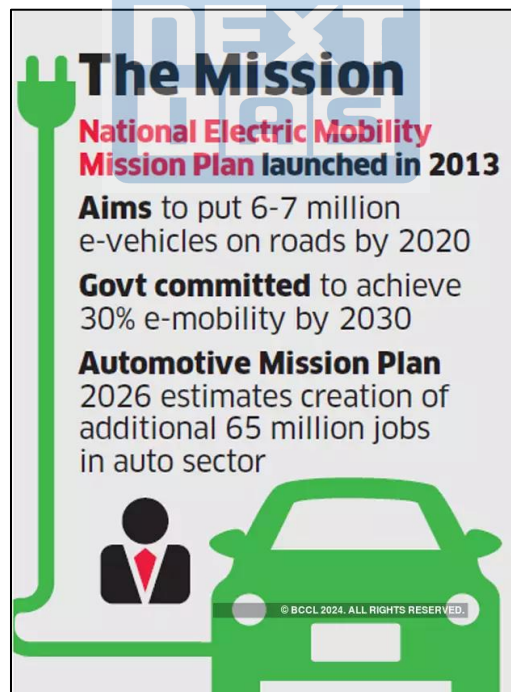
The USA

- EV car sales in the **US represent 5.8% of all vehicles sold, up from 3.2% a year ago.**
- However, the **overall sales fell by 8% in 2022 when compared to 2021.**
- Experts believe that **stricter requirements for claiming federal incentives, high car prices, and concerns about raw materials for batteries were the cause of the decline.**
- The EV car industry is still huge in the US, and it grew due to government investments and policies. Innovation by leading players like **GM and Tesla also added to the appeal.**

Enlist a few initiatives taken by India to promote adoption of Electric Vehicles ?



1. National Electric Mobility Mission Plan:

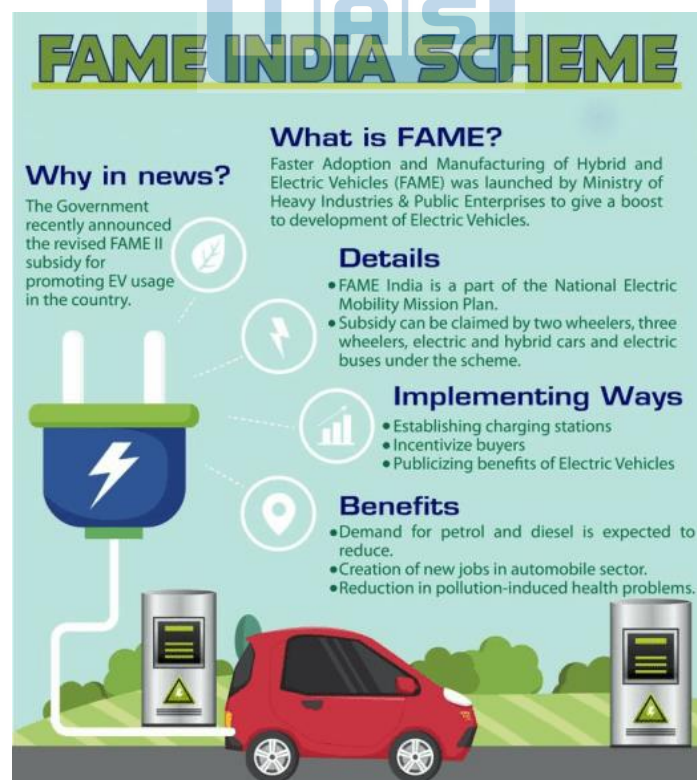


- **The National Electric Mobility Mission Plan was launched in 2013, which aims to have at least 30% of vehicles on Indian roads be electric by 2030.**

- It provides a roadmap for the faster adoption of electric vehicles in the country as well as their manufacturing in the country to achieve national fuel security.
- The initiative is expected to save 9500 million liters of crude oil or INR 62,000 crores.
- The NEMMP seeks to invest approximately INR 14000 crores in R&D activities and fledgling technologies, accelerate the adoption of electric cars, and establish critical infrastructure through public-private partnerships.

2. Electric Vehicles Promotion via FAME and FAME II:

- The FAME India (Faster Adoption and Manufacturing of (Hybrid and Electric Automobiles) Scheme is a government incentive program in India that promotes the **use of electric and hybrid vehicles**.
- FAME focuses on four important areas: **technology development, demand creation, pilot projects, and charging infrastructure**—all of which span electric and hybrid technologies such as mild hybrid, strong hybrid, plug-in hybrid, and battery electric vehicles.



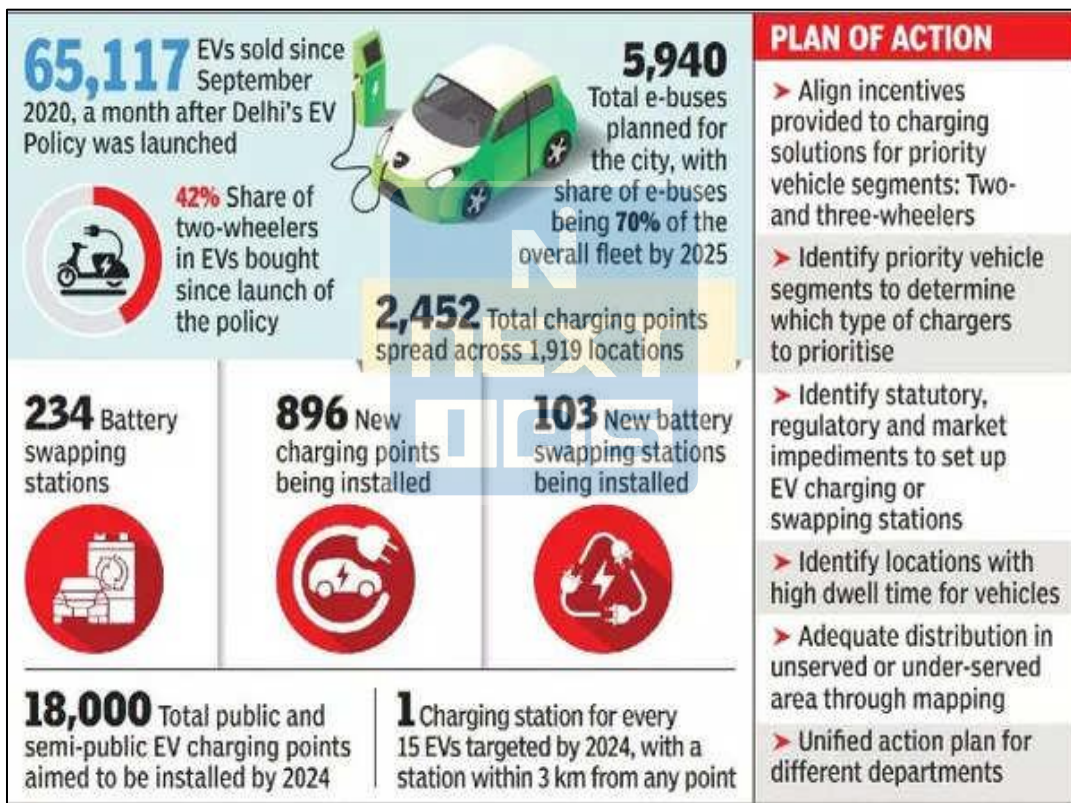
3. PLI:

- The government has announced a **Production Linked Incentive (PLI) scheme** to **boost domestic manufacturing** and attract global companies to invest in the Indian market.

4. Tax benefits:

- The Government has announced plans to provide an additional income tax deduction of INR 1.5 Lakh on the interest paid on loans taken to purchase electric vehicles.

5. Electric Vehicle Policy 2024:




- The Union Government has approved a scheme to promote India as a manufacturing destination so that **e-vehicles (EV)** with the latest technology can be manufactured in the country.
- The policy is designed to attract investments in the e-vehicle space by reputed global EV manufacturers.

The policy entails the following:

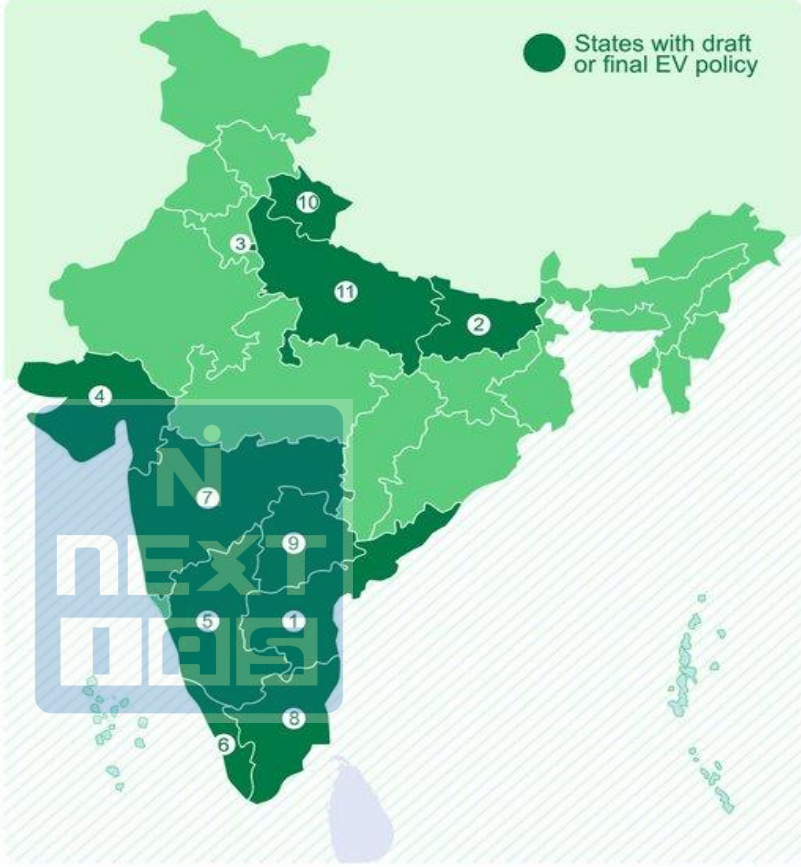
- **Minimum Investment required:**
 - Rs 4150 Cr (~USD 500 Mn) No limit on maximum Investment
- **Timeline for manufacturing:**
 - 3 years for setting up manufacturing facilities in India, and to start commercial production of e- vehicles, and reach 50% domestic value addition (DVA) within 5 years at the maximum.
- **Domestic value addition (DVA) during manufacturing:**
 - A localization level of 25% by the 3rd year and 50% by the 5th year will have to be achieved
- The customs duty of 15% (as applicable to CKD units) would be applicable on vehicle of minimum CIF value of USD 35,000 and above for a total period of 5 years subject to the manufacturer setting up manufacturing facilities in India within a 3-year period.
- The duty foregone on the total number of EV allowed for import would be limited to the investment made or ₹6484 Cr (equal to incentive under PLI scheme) whichever is lower. A maximum of 40,000 EVs at the rate of not more than 8,000 per year would be permissible if the investment is of USD 800 Mn or more.
- The carryover of unutilized annual import limits would be permitted.
- The Investment commitment made by the company will have to be backed up by a bank guarantee in lieu of the custom duty forgone
- The Bank guarantee will be invoked in case of non-achievement of DVA and minimum investment criteria defined under the scheme guidelines

6. State wise Electric Vehicle Policy



One Nation | One Association

STATE WISE EV POLICY - INDIA



1 Andhra Pradesh

1,000,000 EVs by 2024

Celebrate "green days" to create awareness among public

100% electrification of buses by 2029 (first phase in four targeted cities to be completed by 2024)

2 Bihar

Electrification of rickshaws a priority

Convert all paddle rickshaws to e-rickshaws by 2022

3 Delhi

Pollution cess on existing diesel cars and sale of new petrol/diesel vehicles

Prioritize 2Ws, 3Ws, buses and cabs

50% e-bus in public transport by 2023

Scrappage and deregistration incentives for high-polluting vehicle categories

Common mobility card payment system for energy operators and battery-swapping operators

4 Gujarat

Subsidy of INR 12,000 & 48,000 for a battery-operated e2W and e-rickshaw (3W)

Government aims to provide subsidy support to students studying above Class 9 to purchase two-wheelers

Financial assistance of INR 50 lakh to set up charging infrastructure

5 Karnataka

Policies focused on manufacturing and battery storage

Create a secondary market for batteries

Venture capital fund for e-mobility start-ups

Retrofitment for existing 3Ws

6 Kerala

1 million EVs on road by 2022

6,000 e-buses in public transport by 2025

EV component manufacturing a priority

Viability gap funding for e-buses and government fleets

7 Maharashtra

Manufacturing hub for EV and EV components

Package schemes of incentives for MSMEs and large manufacturing units

8 Tamil Nadu

Manufacturing-focused: aims to attract INR 50,000 Cr (\$7 billion) of investment in EV manufacturing and create 1.5 lakh new jobs

50% capital subsidy on land if the investment is in southern districts (15% for other regions)

Priority vehicle categories: e-2Ws, e-3Ws, taxis, public transport (e-bus), e-commerce and logistics fleets and institutional vehicles

One-time reskilling allowance for every employee working with EV manufacturing units

Special number plate for EVs

9 Telangana

Priority vehicle categories: shared mobility, public transport, institutional transport vehicles

Retrofitment for passenger vehicles, auto rickshaws, e-rickshaws

10 Uttarakhand

Manufacturing-focused policy

500 e-buses by 2030

11 Uttar Pradesh

Focused on manufacturing of EV, EV components and batteries

Target 2024: 2 lakh charging (fast, slow and swapping) stations;

Target 2030: 10 lakh EVs on road across all categories and 70% of public transport to be electric

Start-up and innovation programmes

What is the relevance of the topic for UPSC CSE?

For Prelims: Lithium, Faster Adoption and Manufacturing of Electric Vehicles (FAME) scheme, Vehicle Scrappage Policy, Production Linked Incentive (PLI) scheme

For Mains: EVs: Advantages, Challenges, Way Forward and Government policies

Some previous years prelims questions

Q1. In the cities of our country, which among the following atmospheric gasses are normally considered in calculating the value of the Air Quality Index? (2016)

1. Carbon dioxide
2. Carbon monoxide
3. Nitrogen dioxide
4. Sulfur dioxide
5. Methane

Select the correct answer using the code given below:

- (a) 1, 2 and 3 only
- (b) 2, 3 and 4 only
- (c) 1, 4 and 5 only
- (d) 1, 2, 3, 4 and 5

Ans. (b)

Some previous years mains questions

Q1. Describe the major outcomes of the 26th session of the Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC). What are the commitments made by India in this conference? **(2021)**

Q2. How is efficient and affordable urban mass transport key to the rapid economic development in India? **(2019)**

Some questions for QUIZ.

Q1. Consider the following statements regarding Hybrid EVs

1. They combine a conventional internal combustion engine (ICE) system with an electric propulsion system.
2. A hybrid EV's fuel economy is 1.5-2x times higher than in conventional ICE vehicles.
3. Plug-in hybrid vehicles combine the best of both hybrid and full EVs.

How many of the above statements are incorrect?

Select the correct answer using the code given below:

- (a) Only one
- (b) Only two
- (c) All three
- (d) None

Ans. (d)

Q2. Consider the following statements regarding Electric Mobility Promotion Scheme (EMPS) 2024:

1. It aims to promote the purchase of electric two-wheelers (e2W) and four-wheelers (e4W).
2. This scheme does not cover electric three-wheelers (e3W) and e-buses.

Which of the above statements are incorrect?

Select the correct answer using the code given below:

- (a) 1 Only
- (b) 2 Only
- (c) Both 1 and 2
- (d) None

Ans. (c)

Some questions for POLL.

Q1. Can India reach the desired target of EV by 2030?

- (a) YES
- (b) NO
- (c) Can't say.

Q2. Should EV be made tax free ?

- (a) YES
- (b) NO
- (c) Can't say.

