

ISGF Study Report

Electric Vehicle Policies and Electricity Tariff for EV Charging in India

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Abstract

Enabling policy framework is necessary for rollout of electric vehicles (EV) and electric vehicle charging infrastructure. A number of Indian states have issued electric vehicle policies and electricity tariffs for EV charging. This study provides a comparison of the EV policies and electricity tariffs for EV charging in different states and presents select global EV promotion initiatives. The paper also suggest certain policy improvements that the Indian states can make to ensure successful adoption of EVs.

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About India Smart Grid Forum

India Smart Grid Forum (ISGF) is a public private partnership (PPP) initiative of Government of India for accelerated development of smart grid technologies in the Indian power sector. ISGF was set up in 2010 to provide a mechanism through which academia, industry, utilities and other stakeholders could participate in the development of Indian smart grid systems and provide relevant inputs to the government's decision making. More information on ISGF at www.indiasmartgrid.org

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1.0 Introduction

India, being on the verge of transition from developing to a developed economy, is targeting GDP growth rate of more than 7.2 % in the next five years¹. This will subsequently lead to increase in consumption of crude oil and oil products. With transport sector being one of the biggest consumer of oil and oil products, increased consumption along with import dependency will not only increase GHG emission but will also have substantial impact on the energy security scenario of the country. Therefore, transportation sector needs to undergo a significant transformation from oil-based system to a more environment friendly electricity based system. Considering this, Government of India launched National Electric Mobility Mission Plan (NEMMP) 2020 which envisages introduction of about 6-7 million electric/hybrid vehicles in India by the year 2020. Under this NEMMP, Faster Adoption and Manufacturing of Electric Vehicles (FAME) India scheme was introduced in 2015, with the objective to support hybrid/electric vehicles market development and manufacturing eco-system. The FAME scheme was extended in the form of the FAME-II in 2019 with a total outlay of INR 100 billion. Eight states have released draft and final versions of electric vehicle (EV) policies for their respective states; while many other states are working on their EV policies. Few states have also introduced separate electricity tariff for charging of EVs. This Study Paper aims to provide a comparison of the EV policies in different states and select global EV promotion initiatives. The paper also suggests certain policy improvements that the Indian states can make to ensure successful adoption of EVs.

2.0 Comparison of Electric Vehicle Policies in Various States in India

Eight Indian states namely, Andhra Pradesh, Delhi, Karnataka, Kerala, Maharashtra, Telangana, Uttarakhand and Uttar Pradesh have issued their individual draft/final electric vehicle policies till June 2019 focusing mainly on manufacturing and deployment of electric vehicles in their respective states.

Twelve State Electricity Regulatory Commissions (SERCs) have also issued tariffs for EV charging. These are Andhra Pradesh, Chhattisgarh, Delhi, Gujarat, Haryana, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Telangana and Uttar Pradesh. The Joint Electricity Regulatory Commission for Union Territories also issued electricity tariff for EVs in Chandigarh.

In this study, we have attempted to capture the key measures adopted by the states in their respective policies and also made a comparative table of EV charging tariffs in different states.

For the comparison between the EV policies, four main parameters have been selected: Objectives, Incentives, Targets and Other Significant Features envisaged in the policies of each of these eight states. Important features under these four parameters are analysed in this paper.

2.1 State EV Policies

Although a national mission on e-mobility has been launched, India has yet to issue a national level EV policy. But eight states such as Andhra Pradesh, Delhi, Karnataka, Kerala, Maharashtra, Telangana, Uttarakhand and Uttar Pradesh have designed individual state level EV policies to cater to their respective requirements based on available resources. The state of Karnataka was the first in India to release an EV policy titled “Karnataka Electric Vehicle and Energy Storage Policy” in September, 2017.

¹ <https://www.statista.com/statistics/263617/gross-domestic-product-gdp-growth-rate-in-india/>



Government of Kerala, was the last in this list that issued their final version of the EV policy in June, 2019.

Karnataka, Telangana, Uttar Pradesh, Andhra Pradesh, Kerala and Delhi have set clear targets in terms of number of EVs and charging stations/battery swapping stations deployment during the policy period. Karnataka has committed to 100% e-mobility for most vehicle segments in the city of Bangalore by 2030. Telangana has set the ambitious goal of 100% EV migration by 2030. Uttar Pradesh has decided to adopt hybrid EVs (HEV) during the transition phase up to 2022. Andhra Pradesh has included hydrogen powered vehicles with fuel cells and other alternate fuels as part of its e-mobility plan. Kerala has included electric ferries to be deployed as part of its e-mobility goals. Similarly, Delhi has focused on making 25% of all new vehicle registrations by 2023 to be EVs. Primary focus in most states is on public transport, followed by government vehicles and private transport and then goods transport vehicles. In terms of charging station and battery swapping station deployment, most of the states have promised to encourage charging infrastructure along highways, government offices, shopping complexes, malls, parking spaces etc. Karnataka and Uttar Pradesh have proposed to build 5000 MWh and 2000 MWh battery manufacturing/assembling capacity during the policy period. Hydrogen powered fuel cells and solar powered cells manufacturing are included in Uttar Pradesh's target. Maharashtra has stated its intent to invest INR 250 billion in EV and its components manufacturing/assembling.

The states have also listed a range of supply-side and demand-side incentives such as capital subsidies, incentive subsidies, registration charge exemptions, interest-free loans, free parking, toll exemptions, electricity duty exemptions, etc. to EV buyers, EV and component manufactures/assemblers and EV charging station owners. Telangana will provide government land in Hyderabad on long-term lease at subsidised interest and two years moratorium period for setting up charging/battery swapping stations. Telangana will also allow private companies to utilise corporate social responsibility (CSR) funds for company buses for employee commute. Maharashtra has allowed petrol pumps to install charging infrastructure, subject to safety regulations. Uttarakhand has however added a caveat to their policy – 70% of staff in the EV enterprise must be from Uttarakhand for the enterprise to avail policy incentives.

Many states have placed importance for “Ease of Doing Business” in their state policies e.g. Karnataka Udyog Mitra for expediting clearance processes. Telangana, Uttar Pradesh, Andhra Pradesh and Maharashtra have put forward the idea of creating EV manufacturing hubs, clusters or EV automotive parks. Incentives for research and development and training have also been incorporated in the EV policies in some states to ensure improvement in indigenous EV technology and capacity building.

Telangana has also added an exit strategy mechanism to its policy that would be developed by the state government and the central government to facilitate EV enterprises within the state to extricate themselves if the situation arises. Telangana has also put forward the idea of listing the EV industry as a ‘public utility’ within the state, which would help to prevent flash strikes. Delhi and Andhra Pradesh have also mentioned measures for battery recycling, battery reusing and end-of-life battery usage. While a number of points overlap for the EV policies, the newer policies have been broader in their scope and have added more forward-looking points. Future policies can be devised based on building on these policies. The detailed comparison of state policies is presented in Appendix-A.



2.2 Electricity Tariffs for Electric Vehicle Charging in Various States in India

In 2017, Delhi was the first state to introduce a separate electricity tariff category for EVs in India. The EV tariff issued was Rs. 6-7/kWh, which was at par with the higher domestic slab category. Andhra Pradesh was the next state to follow, proposing a power tariff of INR 6.95/kWh for EVs as part of their Annual Revenue Requirement for the FY 2018-19. As of July, 2019, twelve states and one union territory have issued electricity tariffs for EV charging in India.

While Delhi, Punjab, Andhra Pradesh, Uttar Pradesh, Telangana, Chhattisgarh and Madhya Pradesh have refrained from adding fixed charges component to their EV tariffs, Maharashtra, Jharkhand, Haryana, Karnataka, Gujarat and Chandigarh have kept fixed capacity charges. Delhi, Maharashtra, Uttar Pradesh and Telangana have applied “Time-of-Day” (ToD) rebate/surcharge as part of their EV tariffs as a means to influence EV charging behaviour. The comparative EV tariffs are presented in Appendix-B.

3.0 Initiatives for Promoting Electric Vehicles – Global Scenario

United States of America, France, United Kingdom, China, Norway, Japan and Netherlands are the global frontrunners in EV adoption. Some of the key policy measures and incentives in these countries are summarized below.

3.1 United States

The United States has enacted numerous national and incentive programs to expedite EV adoption. The Department of Energy had released the “EV Everywhere” initiative which focused on R&D and consumer awareness to achieve cost and market parity for EVs till 2022. Different states in the US have announced their individual EV policy frameworks, of which California has been the most successful. Some of the support actions for EVs in California include:

- EV purchased during or after 2010 is eligible for a federal income tax credit of up to US\$ 7,500
- Up to 2,500 USD income state tax credit rebate
- Special parking allowance
- Separate EV Charging Tariff
- Special access to high-occupancy vehicle lanes
- Public charging infrastructure and state private charging infrastructure
- Workplace charging infrastructure
- Low-carbon fuel norms and regulations
- State EV manufacturing initiatives
- “Best.Ride.Ever”, “National Drive Electric Week” and other EV awareness campaigns
- Municipal and police EV fleets
- State transport EV fleet programs
- Shared e-mobility initiatives
- Target to convert 100% municipal fleet to run on alternative fuels by 2022

Many other states in the USA offer cash and non-cash incentives, such as carpool lane access and free parking. Some examples are:



- Arizona: Reduced vehicle license tax, carpool lane access and reduced electricity rates for EV charging
- Colorado: US\$ 5,000 tax credit
- Hawaii: Carpool lane access and reduced electricity rates for EV charging
- Nevada: Carpool lane access and reduced electricity rates for EV charging
- New Jersey: Sales tax exemption
- Washington DC: Excise duty exemption

3.2 France

- Bonus-malus system: up to 6,300 euros grant for purchasing electric vehicles
- Incentive for diesel car scrappage: up to 3,700 euros
- 25% purchase subsidy on low-emission vehicles, e-mopeds or e-bikes
- 15% subsidy for diesel/gasoline vehicle replacement with EV
- Zero-cost parking
- Weekday ban on vehicles causing high pollution
- Tax incentives for charging station installation
- Grants and loans for private charging infrastructure installation
- Ongoing research and trials on EVs in public transport sector
- Target of converting entire bus fleet in Greater Paris to clean buses
- Introduction of electric delivery vans
- Shared e-mobility programs
- Fleet electrification targets for public transport fleets and private transport fleets like rentals and taxis

3.3 United Kingdom

- EVs (with CO₂ emissions below 100g/km) are exempt from the annual circulation tax, while other alternative fuel cars receive a GBP 10 discount on the paid rates.
- Pure electric cars are exempt from the company car tax, while all cars with CO₂ emissions lower than 50g/km pay 5% for the tax year 2015/2016
- EVs are exempted from congestion charges
- Plan to establish Central Ultra Low Emission Zone
- Electrification of public bus fleets
- Grants for home chargers
- Plan to build rapid EV charging infrastructure network along United Kingdom's Strategic Road Network

3.4 China

China has the largest global EV stock. The country has announced and implemented number of central and state level policies and strategies to encourage EV uptake.



- The electric utility State Grid Corporation has been involved in the construction of fast charging stations across the country. The country has laid down an aim of constructing at least one charging station per every two thousand EVs. It also aims to establish charging facilities sufficient to cater to the requirements of 5 million EVs by 2020.
- The “Ten Cities, Thousand Vehicles” program has grown to have a total of 25 cities. These pilot cities employed incentives, charging infrastructure, and other promotion activities to facilitate EV adoption. Many major cities have placed various restrictions on vehicle registrations to combat congestion and emission, for which relaxation has been provided to EVs.
- Shanghai city holds the record for greatest EV adoption in the country. It ranks as the leading city globally in terms of EV sales. The EV revolution has been given impetus in Shanghai as it was conferred the status of “International EV Demonstration City” by the Chinese Government. The city has a designated “EV Demonstration Zone” that is part of the Jiading District. The zone acts as a platform for congregation and communication between the EV stakeholders. The city EV goals have been supported with a number of central and regional level subsidies and tax exemptions on EV purchase. The city government has established numerous public charging stations and has also planned to deploy fast charging stations in the near future. Subsidy has been made available to businesses that aspire to enter the EV charging scene. Shared e-mobility has been encouraged through programs like “EVCARD” and also through the electrification of public bus fleets.
- Shenzhen has organized a variety of local schemes for EV adoption and establishment of charging infrastructure. Close to 500 million yuan (US\$ 80 million) was spent by the Shenzhen government per year from 2009 to 2015 for subsidization of EV cars. The city has further committed to invest 5 billion yuan on charging facilities, EV purchase subsidies, and EV adoption policies, in 2015. The electric buses in Shenzhen have been fully electrified since December 2017. There are presently, 16359 electric buses in Shenzhen. Apart from the fiscal incentives, Shenzhen has also provided other incentives such as preferential parking spaces and registration relaxations for encouraging EV uptake. The city is one of the pioneers in the world for electrification of bus fleets. BYD, one of the leading lithium ion battery and EV manufacturers, is headquartered in Shenzhen.
- Battery electric vehicles dominate the EV market in Beijing due to EV purchase subsidy that is not applicable to plug-in hybrid vehicle models. Beijing has placed restrictions on new vehicle registrations to reduce congestion and traffic in the city. EVs have been exempted from these restrictions. The city has launched various consumer awareness campaigns, prominent of which is “Electric Vehicle into Community”. Beijing has established a “New Energy Vehicle Experience Centre” which informs the public regarding new energy vehicles and permits test drives in BAIC electric vehicles. The city also has “Beijing New Energy Vehicle Promotion Centre” and “Beijing Auto Museum” which hold EV test drive programs to raise awareness. Private and public car fleet electrification initiatives have also been implemented by the Beijing city government.

3.5 Norway

Norway is a pioneer of the EV revolution, in its efforts to reduce GHG emissions. The country generates most of its electricity through its hydropower plants. Norway has planned to harness this electricity to drive EV deployment and charging. Norway has set a 2020 target of reaching a CO₂ emission rate below 85 gm/km. This is applicable to the new passenger vehicles that will be launched. In order to facilitate these targets, Norway provided a number of progressive incentives for EV deployment that includes tax and toll exemptions, preferential parking benefits and the facility of free charging at certain EVSE stations. The government has also invested large funds for enabling charging infrastructure on highways.

- The city of Oslo is the global leader in terms of electric vehicle market penetration. Oslo has set defined targets EV to reduce GHG emissions by 40% from transportation sector in its



Climate Budget. The city has also implemented various passenger traffic restrictions in order to curb GHG emissions along with its EV initiative.

- For promoting EV deployment the Oslo government has granted a number of fiscal incentives that include relaxation on import duties and purchase tax on EVs, and lowering or complete removal of taxes on toll and leasing. The city has also defined strict “low-emission zones”, provided free parking for EVs at municipal parking spaces, implemented subsidized EV charging tariffs and granted “special lane access” for e-buses.
- Oslo has also invested heavily in public and private charging infrastructure installation and EV research, through collaborations with private sector companies and various research organizations.

Norway had previously implemented a mix of initiatives to promote e-mobility:

- Lower tax: EVs are subject to reduced circulation or road tax, and are exempt from VAT and other charges like registration fees. Moreover, tax on company EV cars is 50 percent lower than for traditional cars. Annual motor vehicle tax/road tax is lower too
- Free parking: Municipality-owned parking lots offer free parking for EVs
- Free or discounted road tolls and ferry costs: EV owners can use most toll roads and ferry connections for free. They may have to pay a fee in the future, but rates could still be discounted
- Special transport lanes: EVs enjoy access to dedicated, fast-moving lanes for public transport
- Free battery-charging points: An increasing number of publicly-funded charging stations allow EV users to charge their cars for free

3.6 Japan

- In 2013, Next Generation Vehicle Charging Infrastructure Deployment Promotion Project was launched to fund charging stations around cities and highway rest stations in 2013 and 2014
- CHAdeMO association was formed by the Tokyo Electric Power Company (TEPCO), Nissan, Mitsubishi and Fuji Heavy Industries (the manufacturer of Subaru vehicles) that developed the CHAdeMO fast charging system
- The Development Bank of Japan collaborated with a number of vehicle manufacturers and the power utility TEPCO to develop the Nippon Charge Service (NCS), a charging stations network spanning the country, that is currently operated as a private joint venture
- The Japanese government has exempted new next generation vehicles from acquisition tax and tonnage tax
- Reduced tax rates on EV purchase
- Purchase subsidies for EVs
- Substantial investments in charging infrastructure. As of 2016, there were an estimated 40,000 EV charging stations in Japan and only about 34,000 gas stations
- The government has also set an ambitious goal of making all Japanese vehicles sold around the world at least partly powered by electricity by 2050

3.7 Netherlands

- Netherlands has set a national target of 75,000 privately owned EVs by 2020, and 50% of all new cars sales plug-in electric—with minimum 30% of these vehicles fully electric—by 2025
- First action plan for EV adoption was published in 2009 with an investment of nearly 65 million euros



- Establishment of the Formula E-Team, a national public-private platform that brings together stakeholders to brainstorm and push the development of charging infrastructure and new zero-emission mobility policies in the country
- Zero-emission vehicles have registration and road tax exemptions
- Zero-emission vehicles enjoy discounted tax rates for the private use of company cars
- Netherlands has established extensive public charging network, with 0.8 public charging points per electric passenger vehicle at the end of 2015
- Netherlands introduced the Open Charge Point Interface (OCPI) protocol to support the national agreement on interoperability of charge points
- National Knowledge Platform for Charging Infrastructure launched in the country, supporting research and development to attain economies of scale for public charging infrastructure manufacturing
- Green Deal Initiative introduced to increase publicly accessible electric charging infrastructure
- Local government such as in Amsterdam and Utrecht, have also come up with a number of incentives such as EV purchase subsidy, establishment of low emission zones, exclusive parking permits, public and private transport fleet electrification, charging stations powered by renewable energy sources, research and development in EV space by local universities, etc.

4.0 Recommendations for Faster EV Rollouts and Adoption in India

ISGF has been working on the EV domain with different stakeholders in India since 2013. We have published several reports and recommendations. In our white paper on E-Rickshaws in Delhi published in 2014², we highlighted various problems related to operation of the E-Rickshaws, particularly safety. Soon E-Ricks were banned and re-introduced a year later with testing, certification and registration. As per Indian Electricity Act 2003, sale of electricity require a licence. So strictly going by the Act, sale of electricity from an EV charging station to an EV require license. This was flagged off by ISGF to Ministry of Power (MoP) requesting amendments to the Electricity Act. Since amendments to the Act is a laborious exercise requiring approval of the parliament, MoP issued an order in April 2018 clarifying that charging of an EV battery from the electric grid is a delicensed activity.³ ISGF in various forums suggested green number plates for EVs. In 2018, Ministry of Road Transport and Highways (MoRTH) in their order mandated green number plates for EVs⁴. Similarly, ISGF white paper ***“Electric Vehicle Charging Stations Business Models for India”*** published in September 2018 recommended to “Bundle EVSE as mandatory in new buildings through Building Codes for all categories of buildings exceeding certain built area - in this case the impact of EVSE infrastructure cost in the per square meter cost of the buildings will be negligible”⁵. In February 2019, Town and Country Planning Organization (TCPO) under the Ministry of Housing and Urban Affairs issued amendments to the building byelaws mandating 20% parking spaces to be built with EV charging stations.⁶ In December 2016, ISGF made a presentation to Forum of Regulators and advocated for separate tariff for EV charging in order to promote E-Mobility in the country. In 2017, Delhi Electricity Regulatory

² <http://www.indiasmartgrid.org/displayreport.php?id=12>

³ https://powermin.nic.in/sites/default/files/webform/notices/Clarification_on_charging_infrastructure_for_Electric_Vehicles_with_reference_to_the_provisions_of_the_Electricity_Act_2003.pdf

⁴ <http://morth.nic.in/showfile.asp?lid=3318>

⁵ <http://www.indiasmartgrid.org/reports/ISGF%20White%20Paper%20-%20EVSE%20Business%20Models%20for%20India.pdf>

⁶ [http://mohua.gov.in/upload/whatsnew/5c6e472b20d0aGuidelines%20\(EVCI\).pdf](http://mohua.gov.in/upload/whatsnew/5c6e472b20d0aGuidelines%20(EVCI).pdf)



Commission (DERC) for the first time introduced a separate tariff category for EV charging which they further fine-tuned in 2018. As of July 2019, 12 states and one union territory issued separate tariffs for EV charging.

Encouraged by these developments, ISGF continues to make bold policy recommendations for mass roll out and adoption of EVs in India. Our new set of recommendations (some repeated from previous reports) are presented in this section.

4.1 EV and EV Charging Basics

We wish to clarify certain fundamentals of EV and EVSE technologies and operational issues here that will bring clarity to the ongoing discussions on EVs by various stakeholders.

1. Batteries cost 40% to 60% of the cost of an EV depending on the battery size and the driving range offered by the EV
2. Popular Lithium-ion Battery (LiB) chemistries deployed on EVs are:
 - a. Lithium-ion Iron Phosphate (LFP)
 - b. Lithium-ion Nickel Cobalt Aluminum (NCA)
 - c. Lithium-ion Nickel Cobalt Manganese (NMC)
 - d. Lithium-ion Titanium Oxide (LTO)
3. Each of the above battery types have their own advantages and dis-advantages with respect to energy and power densities, number of cycles, charging speed (C-Rate), temperature tolerance etc.
4. A battery that can be fully charged in 1 hour has 1C-Rate; a battery that can be charged in 30 minutes has 2C-Rate and a battery that takes 2 hours to charge has 0.5C-Rate
5. While LFP, NCA and NMC can have maximum 2C-Rate (full charge in 30 minutes), LTO can go up to 10C –Rate which means full charge in 6 minutes. Most of the popular EVs come with LFP, NCA or NMC batteries that charge at 0.33C-Rate (3 hours for full charge) or 0.5C-Rate (2 hours for full charge) or 1C-Rate (1 hour for full charge) depending on different battery chemistries. LFP can function up to 40°centigrade temperature, NCA and NMC are best below 35°centigrade; but LTO can operate efficiently up to 60°centigrade. LTO has relatively higher weight per kWh compared to other battery chemistries which is a disadvantage for mobility applications. LFP, NCA and NMC batteries are available at price range between US\$ 200-250/kWh (2019 prices). LTO prices are still around US\$ 800-900/kWh. Life of LFP, NCA and NMC are between 3000 and 10,000 cycles; for LTO⁷ it is 15,000 to 20,000 cycles. So the total cost of ownership (TCO) of LTO batteries is lower than other types of batteries for most applications. We wish to state here explicitly that by no means this paper is advocating for or promoting LTO; but merely indicating the facts for bringing clarity to the discussions.

4.2 EV Charging Stations – Standards and Pubic Charging Stations

Bureau of Indian Standards (BIS) issued IS:17017 Part-I in August 2018 which is the basic standards for EV chargers. The associated standards for communication protocols and connectors are in advanced

⁷ There are only very few companies who have LTO technology: Toshiba from Japan, Kokam from South Korea and Le Clanche from Switzerland. The total production capacity is also limited and hence the prices are still higher.



stages of finalization by the BIS technical committee ETD-51. IS:17017 recommends both CHAdeMO and CCS-2 (besides AC Type-2 chargers) as the EVSE standards for India. It also allows Bharat Charger Standards issued by Department of Heavy Industries in 2017 which are based on Chinese GB/T standards to be in use. About 7000 electric cars running in India presently are made with systems imported from China and they follow GB/T standards. All these vehicles have batteries that require almost 3 hours to fully charge. Hence high capacity chargers (50 kW) are of no use for these vehicles.

Electric bus manufacturers supply (or recommend) proprietary chargers that may be installed in the bus depots and bus terminuses. It is not recommended to charge electric buses (which have large batteries) at any public charging stations and hence inter-operability and availability of public charging stations are not a constraint for roll out of electric buses. 3-Wheelers are ideal candidates for battery swapping. 3-wheelers will be sold without batteries; and Battery Leasing Agencies (BLA) will own the batteries; and they will rent charged batteries to 3- Wheelers. BLAs will setup and operate charging stations for mass charging of 3-Wheeler batteries. These charging stations may or may not follow IS standards. 2-Wheelers may be allowed to charge from any single-phase electricity connection or public charging stations as permitted by the vehicle manufacturer. So public charging stations are required primarily for cars only; and the volume of which are not expected to be large enough to justify investment in public charging stations as envisaged/planned presently.

4.3 Fuel Stations are not Ideal Locations for EV Charging Stations

Several agencies are in discussions with oil marketing companies for setting up of EV chargers in existing fuel stations. This is not the ideal solution for a host of reasons explained here. First of all, present generation of EVs need 30 minutes to 3 hours for charging; blocking charging stations for such long durations will result in long line of vehicles on the road creating traffic jams. The typical revenue from charging an EV for over two hours is maximum INR 150 to 225.⁸ Compare this with fueling a typical car in 3-5 minutes for revenues of INR 2000 to 3500 – that is average INR 50,000 per hour from petrol/diesel versus less than INR 100 per hour from EVs! Which fuel station owners would consider that as a viable business model? Maruti Suzuki is expected to launch an electric car in 2020 with LTO battery (Suzuki is building a LTO battery manufacturing plant in Gujarat in partnership with Toshiba and Denso) that can be fast charged. If that Suzuki EV will have a 15kWh LTO battery, it requires a 150kW charger to fast charge at 10C-Rate in 5 minutes. 150kW charger operates at 500 Volts (300 Amperes) or above which is a safety risk in fuel stations – maximum 415 Volts only allowed in fuel stations presently. All the fast chargers of 250 to 500kW capacity operates at 500 to 800 Volts. The 900kW charger that China and Japan are co-developing will need 600 Ampere at 1500 Volts to deliver

⁸ Mahindra Electric cars come with 13kWh (for the hatchback) and 19kWh (for the sedan) batteries. The maximum depth of discharge of the batteries allowed being 80%, when an EV comes for charging there will be 20% charge left in the battery and the maximum electricity that can be sold to the EV is 80% of battery capacity. So about 10kWh in the hatchback and 15kWh in the sedan can be sold in $2\frac{1}{2}$ hours. While the EV tariff in Delhi is INR 5.50/kWh, the charging station Operator (the fuel station) may charge three times that rate, say INR 15/kWh. In this scenario, the fuel station will charge INR 150 from a hatchback or INR 225 from a sedan in $2\frac{1}{2}$ hours of charging. In case of the recently announced Hyundai Kona electric SUV with 39 kWh battery that can be charged in 1 hour (1C-Rate), the revenue may be INR 468. For charging the 39kWh battery in one hour the charger capacity should be 40-50 kW and such chargers cost above INR 2 million presently.



900kW capacity. Existing fuel stations are certainly not the ideal places for these range of fast chargers expected to be popular in the immediate future.

4.4 Vehicle-Grid-Integration Services Mandatory for All EVs Sold in India

Vehicle-Grid-Integration (VGI) technologies have been successfully tested in several research labs and universities and are commercially deployed in few places. But most EV manufacturers are apprehensive of the effect of specific VGI methodologies on battery life and battery warranties. The life of a battery is based on the number of charge-discharge cycles and in certain VGI methods such as vehicle-to-grid (V2G) operations, where battery is discharged to feed electricity to the grid, it can cause issue with battery warranties and degradation in lifetime. So theoretically for V2G services, the life of the battery can reduce in terms of years of service. Many V2G trials have shown that if the DOD is kept above 50% of the battery capacity, the effect of V2G operations on battery life will be minimal. However, other alternatives such as V1G, where battery is managed smartly to charge based on the grid conditions or real-time prices has no adverse impacts on the batteries and can immediately be considered for EVs and charging infrastructure. A 2017 report by University of Warwick “On the possibility of extending the lifetime of lithium-ion batteries through optimal V2G facilitated by an integrated vehicle and smart-grid system” describes the “massaging effect” on the EV batteries through partial charge-discharge cycles that could extend the life of lithium-ion batteries. From the future proofing context, it is recommended that by regulation VGI services should be enabled in all EVs sold in the country. This will be a great support for the grid with increasing share of renewable energy, though location specific constraints may be considered. The EV charging stations can also offer grid balancing and ancillary services to electric utilities which can be compensated to the charging stations owners/operators. EV charging stations may opt on subscription basis to facilitate: (a) Load Balancing; (b) Ancillary Services; (c) Demand Response; and (d) Other Load Time Shifting Requirements that the utilities would prefer.

4.5 Policies on Reuse of EV Batteries

When the capacity of an EV battery drops below 70% (typically after 3-4 years of use in cars and auto-rickshaws), it is replaced with a new battery. The retired battery from an EV can be reused for several years for stationery applications such as storage for solar PV systems, solar PV based street lighting, UPS, energy storage for microgrids, ancillary services and other grid support applications. Third party agencies may be encouraged to setup facilities for providing grid support services to both distribution and transmission grid operators. Such third parties can underwrite the cost of used EV batteries to be given to them after retirement from EVs at mutually agreed terms. This could significantly reduce the entry cost for an EV owner and will drive faster EV adoption. Deploying millions of EV batteries retired every year for grid applications would be the most cost-effective route to build GW scale energy storage systems for grid support services in India. Appropriate norms may also be prescribed in the policy for final disposal of the batteries at end of life.

4.6 EV Charging Stations under Corporate Social Responsibility Initiatives

Large companies may be advised to set up charging stations at strategic locations on fast track under their Corporate Social Responsibility (CSR) budget so that the e-mobility plan can be kick started immediately. Visibility of EV charging stations in parking lots, malls, railway stations, office complexes, hospitals, metro stations, government offices, highways etc., gives people comfort to buy EVs.



4.7 Optimization of Bus Routes and Building Bus Transit Stations

With introduction of electric buses, route optimization may be undertaken in cities so that route length is adjusted to the battery capacity of the buses which the bus operators may choose. This can be achieved through creation of interchange points or transit stations very much like the metro rail stations where passengers change from one line to another. Such interchange bus stations can be made either on the roadside itself or underground or over ground depending on the space availability in cities. These stations should have EV charging stations, toilets, cafes, and other convenience stores as well as charging facilities for electric buses.

4.8 Setting up Facilities for Testing and Certification

New EVs, batteries and charging stations need to be tested and certified which requires creation of facilities to be created in the country on fast track.

4.9 Electricity Tariff for EV Charging

Twelve states and one uniform territory have issued separate tariff for EV charging. While few states have waived off capacity charges, others have imposed capacity charges from INR 40/connection/month to 190/kVA/month. The energy charges vary from INR 4/kWh to INR 7.7/kWh. We suggest that there should not be any capacity (fixed monthly) charges based on connection capacity (kVA or kW) in the initial 3 to 5 years as volumes will be very low and the capacity will be barely utilized. The energy charges may be made to follow the principle of time of day charges to discourage charging during peak hours; and incentivise charging during off-peak hours.

4.10 Other Policy Measures

- For busy districts in the city, a congestion fee may be levied on non-electric vehicles (could have implementation challenges) during peak hours from 2022
- Electric utilities may be mandated to setup charging station network in strategic locations in their service area under capex for grid upgrades (regulated asset)
- City Governments/Municipalities and Highway Authorities may be mandated to allot space for charging station networks on long lease at concessional (or free) rates through transparent selection route avoiding creation of monopolies
- EV manufacturers to contribute a certain percentage of the vehicle cost towards Charging Station Fund which will be utilized to build charging station network in respective cities/states
- Charging station may be clubbed with Highway construction cost – again it will have negligible impact on per kilometre cost of highways
- In commercial centres, tourist places, religious places etc the shop owners may be encouraged to invest in charging stations and entry of petrol and diesel vehicles may be banned
- Allot land and licences to setup large charging stations at strategic locations which will also have following facilities:
 - Café/ATMs
 - Convenient Store/ Grocery/Vegetables Shops
 - Health Club (Gym)
 - Gaming Stations/Barbershops/Beauty Parlours/Massage Centres
 - Air and Tyre changing services



- EV manufacturers consortiums may promote charging station networks and collect monthly subscription from EV owners and pay to the charging station owners and operators (Japanese model)
- Fleet operators and car rental companies may be mandated to setup EVSE networks
- Other incentives for charging stations could include:
 - Tax concessions
 - Free or concessional land on long term lease
 - Transparent allocation of land preventing formation of monopolies



Appendix – A: Comparison of Electric Vehicle Policies in Various States in India

State	Objectives	Targets	Incentives	Other Significant Features
Karnataka (25.09.2017) EV Policy Document Link: https://indianstate.scsis.org/uploads/KarnatakaStateElectricVehicleEnergyStoragePolicy2017.pdf	<ul style="list-style-type: none"> To maintain Karnataka as preferred destination for attracting investments in EV manufacturing To attract investments of Rs. 31000 crore and create employment opportunities to 55000 persons both from supply and demand side Create conducive environment for EV transition Create opportunity for R&D in E-mobility 	<p>1. Electric Vehicles:</p> <p>1.1 Public Transport: Bangalore Metropolitan Transport Corporation (BMTCL), Karnataka State Road Transport Corporation (KSRTC), North Western Karnataka Road Transport Corporation (NWKSRTC) and North Eastern Karnataka Road Transport Corporation (NEKRTC) to introduce 1000 EV buses in policy period of Karnataka.</p> <p>1.2 Private Transport: In Bengaluru: To achieve 100% electric mobility by 2030 in the segments: autorickshaws, cab aggregators, corporate fleets, school buses/vans</p> <p>1.3 Goods Transport: in Bengaluru: 3Ws and 4Ws mini goods vehicles to move to 100% electric mobility by 2030 in phased manner. E-commerce and delivery companies to replace their fleet of 2Ws/3Ws to 100% EV by 2030</p>	<p>1. Demand Incentives:</p> <ul style="list-style-type: none"> Capital subsidy of 25% on the equipment/machinery subject to maximum of 10 lakh/station for first 100 fast charging stations for electric 2Ws, 3Ws, cars and buses Capital subsidy of 25% on the charging equipment/machinery subject to maximum of 3 lakh/station for first 100 battery switching/swapping stations for electric 2Ws and 3Ws Capital subsidy of 25% on the charging equipment/machinery subject to maximum of 5 lakh/station for first 50 battery switching/swapping stations for electric cars Capital subsidy of 25% on the charging equipment/machinery subject to maximum of 10 lakh/station for first 50 battery switching/swapping stations for electric buses Incentive subsidy for setting up first lot of 100 fast charging stations 	<ul style="list-style-type: none"> Karnataka Govt will constitute working groups for development of necessary technologies Karnataka Govt will commission 'Karnataka Electric Mobility Research and Innovation Centre' Make incubation centre for facilitating EV mobility developments Research programs in collaboration with EV industry and colleges/universities with focus on battery innovation Venture Capital fund for research in e-mobility EV skill development centre to be setup Technical committee setup to define/certify EV enterprise High Level Inter Departmental Review Committee constituted for



State	Objectives	Targets	Incentives	Other Significant Features
		<p>2. Charging Station:</p> <ul style="list-style-type: none"> - Fast charging station/battery swapping infra to be provided at every 50 kms on highways between prominent cities - Charging infra for 2Ws at parking stations by Bangalore Metro Railway Corporation Limited (BMRC)/BMTCL/KSRTC/Bruhat Bengaluru Mahanagara Palike (BBMP) and charging infra at Vikas Soudha Basement/Multistoried Building parking area and covered parking areas in all government buildings <p>3. Manufacturing: Target of inviting investment in setting up to 5 GWh of EV battery manufacturing capacity, 5000 direct jobs and 7500 overall jobs</p> <p>4. Pilots: As a pilot project, BMTCL to introduce 'EV Vaayu Vajra' services in select routes to Kempegowda International Airport by end of 2018</p>	<p>2. Supply Incentives:</p> <ul style="list-style-type: none"> - EV and component manufacturing and EV battery/cell manufacturing/assembly enterprises: Investment promotion subsidy of 25% of Value of Fixed Assets (VFA) up to 15 lakhs, 20% of VFA up to 40 lakh and 50 lakhs for micro, small and medium enterprises respectively. Apart from this, these enterprises, along with Large, Mega, Ultra Mega and Super Mega Enterprises will get 100% stamp duty exemption, concessional registration charges, 100% reimbursement of land conversion fee, one-time capital subsidy up to 50% (max 50 lakh and max 200 lakh respectively) for setting up Effluent Treatment Plants. Large, Mega, Ultra Mega and Super Mega Enterprises will also be eligible for interest free loan on Net SGST. Large, Mega, Ultra Mega and Super Mega EV Cell/Battery Manufacturing Enterprises will also avail investment subsidy of 20% of VFA up to 20 crore per project, for first two units in the state. - EV Charging/Swapping Infrastructure Manufacturing Enterprises will avail similar incentives and subsidies as above. Certain deviations include: 100% exemption of electricity duty on tariff for 	<p>review, monitoring and course correction mechanism</p>



State	Objectives	Targets	Incentives	Other Significant Features
Telangana (27.09.2017) EV Policy Document Link: http://evpedia.in/wp-content/uploads/2017/11/Telangana-Draft-Electric-Vehicle-Policy-16_10_2017.pdf	<ul style="list-style-type: none"> To attract investments worth US\$ 3 billion and create employment for 50,000 persons by 2022 through EV manufacturing and charging infrastructure development Make Telangana EV hub of India and also preferred destination for EV manufacturing 	<p>1. Electric Vehicles: 100% migration to Electric Vehicles by 2030 supported by an enabling infrastructure and local manufacturing base for Electric Vehicles and related components</p> <p>1.1 Public Transport: Tourist places (national parks, ecological sites) in the state to switch to all EVs by 2025 for transportation in and around their premises</p> <p>Buses:</p>	<p>initial 5 years for Micro, Small and Medium Enterprises (MSMEs).</p> <ul style="list-style-type: none"> Incentive for manufacturing modular design lithium ion batteries with higher mileage per charge <p>3. Other Taxes and Tolls:</p> <ul style="list-style-type: none"> Tax payment exemption on all electric non-transport and transport vehicles <p>4. Non-fiscal incentives:</p> <ul style="list-style-type: none"> Karnataka Udyoga Mitra to expedite clearances process <p>5. R&D Incentives: Encourage in-plant training provided by EV manufacturers in the state by offering a stipend up to 50% of the cost of training subject to a limit of Rs 10000/month/trainee. This incentive shall be available for 1000 candidates per annum</p>	
			<p>1. Demand Incentives:</p> <ul style="list-style-type: none"> Exemption of registration charges on personal vehicles purchased till 2025 Interest Free loans up to 50% of the cost to all state government employees for purchase of EVs All existing apartment associations with 200+ families will be encouraged to provide charging points in parking lots and will be supported by capital subsidy of up to 25%, capped at 5 lakhs Existing Residential Townships with 1000+ families will be encouraged to 	<ul style="list-style-type: none"> EV Cluster: A mega Automotive Park with global standard infrastructure is currently at planning stage and the development work is expected to commence by mid-2018. A designated EV cluster spread over 1500-2000 acres catering to EV/EV component manufacturing for two wheelers, Cars, Buses and



State	Objectives	Targets	Incentives	Other Significant Features
	<ul style="list-style-type: none"> Develop a proving ground for viable Business models through accelerated demand for EVs Create conducive environment for promoting R&D in EV and Autonomous/Connected Mobility Create skilled workforce for EV industry 	<ul style="list-style-type: none"> Telangana State Transport Corporation to set a target of 100% electric buses by 2030 for intra-city, intercity and interstate transport (key milestones – 25% by 2022, 50% by 2025 and 100% by 2030) Battery operated shuttle services at all Hyderabad Metro Stations for last mile connectivity Airport flight shuttles and PUSHPAK buses to be transitioned to EV on priority <p>3Ws:</p> <ul style="list-style-type: none"> Time bound mandate for all auto rickshaws within Greater Hyderabad Municipal Corporation (GHMC) to switch to EV, followed by other cities <p>Government Vehicles: Government vehicles (owned and contractual) to switch to all electric by 2025, in phased manner</p> <p>1.2 Private Transport:</p> <p>Educational Institutions Buses and Hospital Fleets: Educational institutions and hospitals for a 25% switch by 2022 (100% by 2030) of their Buses/ Derivatives/Passenger vehicles fleet to Electric Vehicles</p>	<p>develop charging stations, supported by capital subsidy of up to 25%, capped at 10 lakhs for each station with 4 fast chargers</p> <p>2. Supply Incentives:</p> <ul style="list-style-type: none"> Local manufacturing and R&D are key to reaching price/performance parity between Electric and ICE Vehicles. In cognizance of this fact, support will be extended to the EV industry through policy interventions and incentives with focus on research, innovation and skilling. The Government will provide benefits/incentives, depending upon the scale of investment as per the categories defined in MSMED Act 2006 and Telangana Industrial Policy framework 2014. Investments beyond 200 Crores will be treated as Mega Projects and will be offered tailor made benefits Land belonging to Government Agencies within Hyderabad and other cities will be offered to private players on long term lease at subsidized rates and 2-year moratorium period on rental payment for setting up charging/swapping stations, through a transparent bidding process. 75% of SGST paid on the fast charging equipment / machinery procured by 	<p>Trucks will be integrated with the Automotive Park plan.</p> <ul style="list-style-type: none"> Research and Development: Smart Mobility Technologies Cluster, Mobility Engineering Cluster, Centre of Excellences, EV Research Hub, Telangana EV Innovation Fund, EV Testing Facility, T-Works Automotive Prototyping centre Skilling: TASK (Telangana Academy of Skill and Knowledge), Short term (4-6 months) finishing course post completion of graduate Engineering courses, PG Courses on EVs Single-Window System: Telangana implemented TSi-PASS in 2015, an Industrial Project approval system based on self-certification. It also protects Investors interest with Right to Single Window Clearance and provision for



State	Objectives	Targets	Incentives	Other Significant Features
		<p>Corporate Buses: Corporates with annual turnover of Rs 100+ Crore operating within GHMC limits to compulsorily migrate 25% of their employee commuting fleet to EVs by 2022 and 100% by 2030. The same rule will be extended to corporate entities operating in other cities in the state.</p> <p>Taxis:</p> <ul style="list-style-type: none"> • Cab operators/ aggregators to switch to full EV fleet in phased manner <p>1.3 Goods Transport:</p> <ul style="list-style-type: none"> • Freight and logistics firms to use Electric Vehicles in a phased manner • Intra-city goods delivery services (sub 2T category) to switch to EVs only by 2030 in a phased manner • All app based and e-commerce delivery services to migrate 25% of their vehicles fleet to EVs by 2022 and 100% by 2030 • Battery operated application vehicles will be encouraged in government departments such as Municipal Corporations, Postal Services etc. across Telangana State 	<p>any entity for setting up private/public/institutional charging stations will be reimbursed.</p> <ul style="list-style-type: none"> • All benefits, incentives and subsidies offered to industries in Telangana through various policies, schemes, etc. will also apply to EV Automotive Industries in Telangana <p>3. Other Taxes and Tolls:</p> <ul style="list-style-type: none"> • Road tax exemption for all electric vehicles till 2025, expected year of price parity with ICE vehicles <p>4. Non-fiscal incentives:</p> <ul style="list-style-type: none"> • Preferential Allotment to be made to Make in Telangana Vehicles for Government Orders • Extension of transport department retro fitment rule for existing vehicles to cover Electric kits for passenger vehicles, Auto Rickshaws and e-Rickshaws • Permission for Automotive Research Association of India (ARAI) certified E-rickshaws in fringe areas at the periphery of GHMC limits in predefined zones and routes. Similar permission will be granted in other cities across the state • Contract carriage permits for private operators with EV fleet operations 	<p>penal action on the officers who delay the applications</p> <ul style="list-style-type: none"> • Exit Mechanism: Considering the high volatility and the risk associated with maturing of EV Technologies, Government of Telangana in consultation with Government of India will put in place a mechanism for reasonable exit strategy for the EV enterprises • Labour Environment: The EV industry will be declared a 'Public Utility' under the Industrial Disputes Act, 1947 in order to prevent flash strikes • Telangana State EV Advisory Council



State	Objectives	Targets	Incentives	Other Significant Features
		2. Charging Station: <ul style="list-style-type: none"> Charging/ swapping station will be provided at every 50 kms within state boundaries on highway to cities like Bengaluru, Mumbai and Chennai, followed by other national/state highways Hyderabad Metro Rail (HMR) stations and Telangana State Road Transport Corporation (TSRTC) Bus depots (across state) will provide reserved parking and free charging stations for 2Ws in their parking zones to encourage EVs for last mile commute. Charging points for personal vehicles of Government employees would be provided at Government office parking lots, starting with Hyderabad, followed by other cities in the state <p>Provision for charging spots will be made mandatory in all commercial buildings such as hotels, shopping malls and technology parks</p>	<ul style="list-style-type: none"> Allow use of CSR funds for electrification of employee commuting fleets Only Electric Vehicles will be allowed in high traffic density areas, Heritage zones, IT SEZs and similar EV Zones in Hyderabad by 2025. Same will be applied to other cities in Telangana State. Free Parking in public parking places and Toll exemption on State Highways for EVs till 2025 	
Maharashtra (14.02.2018) EV Policy Document Link: https://www.maharashtra.gov.in/Site/Upload/Government	<ul style="list-style-type: none"> Make Maharashtra leader in EV manufacturing and use Create newer employment opportunities 	1. Electric Vehicles: Increase number of EV registered in Maharashtra to 5,00,000 during the policy period. Initially Government of Maharashtra to promote EV in public transport in six cities i.e. Mumbai, Pune,	1. Demand Incentives: <ul style="list-style-type: none"> Commercial public EV charging stations for 2Ws, 3Ws, cars and buses will be eligible for 25% capital subsidy on equipment/machinery (limited up to 	<ul style="list-style-type: none"> Promotion of R&D, Innovation and Skill Development in EV Sector: a) Based on an assessment of feasibility and other details by the High-Power



State	Objectives	Targets	Incentives	Other Significant Features
Resolutions/English/201802141807189810.pdf	<ul style="list-style-type: none"> Promote export of EV, EV components, and charging equipment Promote R&D, innovation and skill development in EV Sector Promote sustainable transport system 	<p>Aurangabad, Thane, Nagpur and Nashik</p> <p>2. Manufacturing: To generate an investment of Rs.25,000 crores in EV, EV manufacturing and component manufacturing, battery manufacturing/assembly enterprises and charging infrastructure equipment manufacturing in the state.</p> <p>3. Other: To create 1,00,000 jobs in the state</p>	<p>Rs. 10 lacs per station) for first 250 commercial public EV charging stations.</p> <ul style="list-style-type: none"> First 1,000 EV private/public passenger bus buyer whose vehicles are registered in the state will be eligible for user subsidy over policy period of 5 years. 10% subsidy for passenger buses registered in the State to private/public bus transport buyer, on base price (maximum limit of Rs. 20 lacs per vehicle) will be eligible to buyer. First 1,00,000 EV (2-wheeler-70,000, 3-wheeler-20,000 and 4-wheeler-10,000 all categories combined) registered in the State, private transporter and individual buyer to get end user subsidy over policy period of 5 years. 15% subsidy (maximum limit of Rs.5,000 for 2-wheeler, Rs. 12,000 for 3-wheeler, and Rs 1 lac for 4-wheeler) per vehicle to private transport and individual buyer for Electrical Vehicles registered in the State, on base price will be paid to buyer. Subsidy will be transferred to buyer's bank account within 3 months of purchase date. <p>2. Supply Incentives:</p> <ul style="list-style-type: none"> The package of incentives to Pioneer Units, Mega Units and Ultra Mega 	<p>committee, proposal will be prepared for the establishment of centre of excellence and research and development centres, finishing schools and other employment-oriented centres.</p> <p>b) The Maharashtra State Board of Technical Education (MSBTE), Maharashtra State Skill Development Society (MSSDS) and other agencies will institute training-based certification and placement programmes. They would collaborate with National Automotive Board (NAB) and other associations to understand their human resource requirements. Based on these requirements, a merit based, defined certification and placement procedure shall be instituted so that appropriate manpower is created for the EV industry.</p>



State	Objectives	Targets	Incentives	Other Significant Features
			<p>Units, Large Units and MSMEs manufacturing Electric vehicles shall be as per the 'Template of Incentives'.</p> <ul style="list-style-type: none"> Under the Electric Vehicle Policy-2018, throughout the state, manufacturing MSMEs and Large units will be eligible for incentives as per Package Scheme of Incentives (PSI) <p>3. Other Taxes and Tolls:</p> <ul style="list-style-type: none"> Exemption from road tax and registration fees for Electric Vehicles. <p>4. Non-fiscal incentives:</p> <ul style="list-style-type: none"> Petrol pumps will be allowed to setup charging station freely subject to charging station areas qualifying fire and safety standard norms of relevant authorities under relevant acts/rules Development Control Rules (DCR) of all local self-Government and Special Planning Authorities will be suitably modified to allow for setting up of common public charging facilities in parking areas of malls, residential properties and parking areas etc. As per requirement facility of Robotic Battery Swapping Arm will be created at public bus stations. 	
Uttar Pradesh (15.3.2018) EV Policy Document Link: https://niveshmitra	<ul style="list-style-type: none"> Make Uttar Pradesh preferred destination for attracting investments in EV manufacturing 	<p>1. Electric Vehicles: Use of HEVs during the transition phase in the state so as to overcome the barriers in migrating to EVs from Internal</p>	<p>1. Demand Incentives:</p> <ul style="list-style-type: none"> Tax exemptions to buyers – 100% exemption of road tax on EVs purchased within Uttar Pradesh, 	<ul style="list-style-type: none"> Service Providers for Electric Vehicles in the State will be encouraged through variable tariff rates



State	Objectives	Targets	Incentives	Other Significant Features
up.nic.in/Documents/DraftPolicies/Uttarakhand/Pradesh_Electric_Vehicles.pdf	<ul style="list-style-type: none"> Create employment opportunities both from supply side and demand side Create conducive environment for EV transition. Encourage Hybrid Electric Vehicles (HEVs) usage during transition period develop human capital and augment the power capacity for e-mobility promotion 	<p>Combustion Engine (ICE) Vehicles up to 2022</p> <p>1.1 Public Transport:</p> <p>Buses: In order to promote EV vehicles in Public Transportation, 1000 EV buses will be introduced by the State by 2030, in phases. 25% in phase I by 2020, remaining 35% in phase II by 2022, and rest 40% in phase III by 2030.</p> <p>1.2 Private Transport: State Govt will encourage electric 2W taxis for short distance mobility, and existing auto rickshaws will be encouraged to resort to EV technology. Further in this context, Auto rickshaws, Cabs, School buses/vans, etc will be targeted to achieve 100% electric mobility by 2030 in five cities - GB Nagar, Ghaziabad, Lucknow, Kanpur, Varanasi</p> <p>1.3 Goods Transport: Further, to promote adaptability of EV in Goods transportation, EV-3Ws, 4Ws mini Goods vehicles will be encouraged in GB Nagar, Ghaziabad, Agra, Lucknow, Kanpur, Varanasi and Jhansi.</p> <p>2. Charging Station: In addition to public and private charging infra, to promote EV mobility on prominent</p>	<p>applicable over the period of this policy. Other buyers will be fully exempted from paying Vehicle registration fees of EVs manufactured within the State. Further in this context, state will exempt SGST on purchase of electric vehicles manufactured within the state.</p> <ul style="list-style-type: none"> 100% Interest free loans to State Government employees for purchase of EVs in the state. 30% subsidy on road price of EV in form of reimbursement to Individual families with Single-girl child in the State on purchase of EVs, applicable over the period of this policy. Incentives to service providers – The Service units as defined under this policy will be provided following incentives - <ul style="list-style-type: none"> -Service units setting up charging stations with capital investment of more than INR 25 lakh but less than INR 5 crore, will be provided Capital Interest Subsidy @5% per annum for 5 years in the form of reimbursement on loan for procurement of plant and machinery and setting up charging infrastructure (excluding land cost) subject to maximum ceiling of INR 10 lakh per annum per unit. 	<p>to use electricity supply from solar grid.</p> <ul style="list-style-type: none"> Electric Vehicle Incubation centres will be set up at IIT-Kanpur, and other leading engineering institutions Ease of business: Taking forward the vision and mission of State's Industrial Investment and Employment Promotion (IIEP) Policy, 2017: <ul style="list-style-type: none"> a) Single Window: All required approvals to EV manufacturing/ EV battery manufacturing units and service providers shall be provided under one roof through single window system by NIVESH MITRA. For this, a dedicated Nodal officer shall be provided to each unit. Policy Implementation Unit (PIU) will be set up under the Infrastructure and Industrial Development Commissioner and Principal Secretary, Department of Infrastructure and Industrial Development.



State	Objectives	Targets	Incentives	Other Significant Features
		<p>highways, such as Yamuna Expressway, Agra-Lucknow Expressway with heavy density of vehicles, will be provided fast charging stations, battery swapping infrastructure, at every 50 km</p> <p>3. Manufacturing: The State Govt will promote EV battery and charging equipment manufacturing in Uttar Pradesh. Govt of UP will incentivise manufacturing of lithium batteries with higher mileage per charge in Uttar Pradesh. Also, the state will incentivise manufacturing of Hydrogen-powered fuel cells and Sower powered cells, as an alternative clean energy source</p> <p>4. Battery: Govt of Uttar Pradesh targets to create a capacity of 2000 MWh for manufacturing or assembling of EV battery in the state, thereby creating 10,000 job opportunities over time</p>	<p>-Service units setting up charging stations with capital investment of less than INR 25 lakh, will be provided Capital Interest Subsidy @5% per annum for 5 years in the form of reimbursement on loan for procurement of plant and machinery and setting up charging infrastructure (excluding land cost) subject to maximum ceiling of INR 2 lakh per annum per unit.</p> <p>-All the defined service units will be eligible for 100% exemption from paying electricity duty for 10 years.</p> <p>2. Supply Incentives:</p> <ul style="list-style-type: none"> • Private EV Parks (PEV Parks) – Both Manufacturing and Assembling units: Govt of Uttar Pradesh incentivises PEV Parks developed on at least 100 acres of land area in National Capital Region (NCR) districts and Kanpur, and minimum 150 acres in other districts, by private developers. These parks will be given incentives as under UP Industrial Investment and Employment Promotion Policy 2017. • The Electric Vehicle and its components manufacturing units (EVMUs) and/or EV Battery Manufacturing or Assembly Units (EBUs) or MSME units as defined in this policy shall be eligible for 	<p>The PIU shall take decisions on matters pertaining to effective and successful implementation of UP Electric Vehicles Manufacturing Policy 2018</p> <ul style="list-style-type: none"> • Empowered Committee under the chairmanship of Chief Secretary/an officer delegated by him, shall oversee the development of UP Electric Vehicles Manufacturing Policy 2018 and monitor the implementation of the same. The Principal Secretaries/Secretaries of different departments will be its member. Secretary of Infrastructure and Industrial Development Department will be the Coordinating Secretary of the Committee. Representatives of the Industry Associations will be invitee member.



State	Objectives	Targets	Incentives	Other Significant Features
			<p>incentives on case to case basis as under UP Industrial Investment and Employment Promotion Policy 2017. These incentives include –</p> <p>a) Capital Interest Subsidy to the extent of 5% per annum for 5 years in the form of reimbursement on loan taken for procurement of plant and machinery, subject to an annual ceiling of INR 50 lakh.</p> <p>b) Infrastructure Interest Subsidy - Both EVMUs and EBUs setup in the state, will for a maximum period of 5 years be reimbursed the amount of interest at the rate of 5% per annum payable on loan taken by them for developing supporting infrastructure such as self-use roads, drainage, powerlines, etc. The overall ceiling limit of the same will be INR 1 Crore.</p> <p>c) Industrial Research subsidy for procurement of plant and machinery for industrial research, quality improvement and setting up testing labs, quality certification labs, tool rooms, etc. 5% per annum subsidy in form of reimbursement on interest on loan taken for the mentioned purpose, subject to maximum ceiling of INR 1 crore per unit.</p>	



State	Objectives	Targets	Incentives	Other Significant Features
			<p>d) Electricity duty exemption: All new EVMUs and EBUS as defined under the policy will be exempted from paying electricity duty for first 10 years.</p> <p>e) Stamp duty reimbursement - 100% Stamp duty will be reimbursed to all new units in EV sector as defined under this policy for purchase of land in Bundelkhand and Poorvanchal, 75% in Madhyanchal and Paschimanchal region of the state (except Gautambuddhnagar and Ghaziabad districts) 50% in Gautambuddhnagar and Ghaziabad districts.</p> <p>f) Employees' Provident Fund (EPF) reimbursement facility to the extent of 50% of employer's contribution to all such new units in EV sector providing direct employment to 100 or more unskilled workers, and additional 10% of employer's contribution on direct employment to 200 skilled and unskilled workers.</p> <p>g) SGST reimbursement – 90% for SGST reimbursement for MSME and Large Units for 5years in EV sector, 70% reimbursement to Mega EVMU and EBUS for 10 years.</p> <p>• Environment Protection Incentives:</p> <p>a) Common Effluent Treatment Plant – The developers will be provided</p>	



State	Objectives	Targets	Incentives	Other Significant Features
			<p>incentives for setting common Effluent Treatment Plant (ETP) at Private Electric Vehicle (PEV) Manufacturing/Assembling Parks. They will be eligible for 50% reimbursement of interest on loan taken to set-up such common purpose ETP, for 7 years subject to a maximum ceiling of INR 5 crore per project.</p> <p>b) Setting up ETPs – Units setting up ETPs will be reimbursed – 50% interest on loan taken for 7 years to set-up ETP to EVMUs up to maximum INR 1 crore per unit; 50% interest on loan taken for 7 years to set-up ETP to EBUs up to maximum INR 75 lakh per unit.</p> <p>3. Non-fiscal incentives:</p> <ul style="list-style-type: none"> Green routes will be identified by 2020 in GB Nagar, Ghaziabad, Lucknow, Kanpur, Varanasi for 100% EV public transportation. <p>4. R&D Incentives:</p> <ul style="list-style-type: none"> Capacity building: Skill Development Institutes giving skill training in EV and battery repair, maintenance, etc. will be reimbursed 20% of expenditure incurred in imparting such training over the period of this policy. Also, stipend at the rate of INR 1000 per trainee per month over 6 months will be provided to the trainees undertaking such skill 	



State	Objectives	Targets	Incentives	Other Significant Features
			<p>development courses over the period of this policy.</p> <ul style="list-style-type: none"> Green Innovation Incentives – R&D in EV sector to adopt sustainable practices, particularly, renewable energy-based fuel-cells such as solar powered batteries, hydrogen powered batteries will be incentivised. 5% subsidy in form of reimbursement on interest on loan taken for setting up such technologies or innovation centres at Electric Vehicles manufacturing parks and zones in the state, subject to maximum ceiling of INR 1 crore per project. 	
<p>Andhra Pradesh Amendment: (8.06.2018)</p> <p>Amendment: (24.08.2018)</p> <p>EV Policy Document Link: https://www.acma.in/uploads/doc/AP_Policy_Final.pdf</p>	<ul style="list-style-type: none"> Make AP global hub for EV development and manufacturing Attract EV manufacturers and promote EV innovation and R&D through grants and venture funds, industrial park development, skilled workforce Promote EV usage in cities Enable investment in charging/battery swapping infrastructure and hydrogen generation 	<p>1. Electric Vehicles: Attract combined investments of over INR 30,000 Crore in the next 5 years across the electric mobility ecosystem with an employment potential for 60,000 people. Target to have 10 lakh EVs, combined across all segment of vehicles, by 2024.</p> <p>1.1 Public Transport: All forms of government vehicles, including vehicles under government corporations, boards and government ambulances etc. will be converted to electric vehicles by 2024.</p>	<p>1. Demand Incentives:</p> <ul style="list-style-type: none"> Exemption of registration charges and road tax on sale/lease of Electric Vehicles until 2024. Reimbursement of the Net State Goods and Services Tax (SGST) for services rendered, accrued to the State, for firms involved in services such as leasing of fleet of Electric Vehicles, owning or operating EV fleets and providing charging/battery swapping/Hydrogen Stations for recharging/refuelling Electric Vehicles, until 2024. Financial Incentives for Private/ Government including Undertakings, 	<ul style="list-style-type: none"> Smart Mobility Corporation: A Corporation will be setup to coordinate all necessary activities for promoting futuristic needs of transportation A separate EV tariff category will be created. Time of day sale of power to Battery Electric Vehicles will be considered to provide cheaper power during non-peak hours. Andhra Pradesh Electricity Regulatory Commission (APERC) will issue



State	Objectives	Targets	Incentives	Other Significant Features
	and fuelling station development <ul style="list-style-type: none"> Build next generation transportation infrastructure using Vehicle to Everything (V2X) platforms 	<p>Buses: Target to convert 100% of Andhra Pradesh State Road Transport Corporation (APSRTC) bus fleet of over 11,000 buses into electric buses (BEVs/FCEVs) by 2029, with the first phase of 100% conversion of bus fleet in top 4 cities (Vijayawada, Vishakhapatnam, Amaravati and Tirupati - declared as Model Electric Mobility (EM) cities with phase-wise goals to adopt Electric Vehicles, charging and hydrogen refuelling infrastructure and new EV enabling building codes by 2024</p> <p>1.2 Private Transport: Phase out all fossil fuel based commercial fleets and logistics vehicles in top 4 cities by 2024 and all cities by 2030</p> <p>2. Charging Station: Target to have 1,00,000 slow and fast charging stations by 2024</p>	<p>Corporations, Organizations, Urban and Rural Bodies for Charging Stations and Hydrogen generation and refuelling infrastructure:</p> <p>(i) Direct-Current (DC) Chargers (100V and above): Capital Subsidy of 25% of the value of the charging station equipment/machinery for first 100 stations up to a maximum subsidy of INR 10,00,000.</p> <p>(ii) Direct-Current (DC) Chargers (Below 100V): Capital Subsidy of 25% of the value of the charging station equipment/machinery for first 300 charging stations up to a maximum subsidy of INR 30,000.</p> <p>(iii) Capital subsidy of 25% of Fixed Capital Investment (for eligible assets excluding cost of battery inventory) up to a maximum subsidy of INR 10 lakhs for swapping stations for the first 50 stations.</p> <p>(iv) 100% net State Goods and Services Tax (SGST), accrued to the State, as reimbursement for purchase of fast chargers (DC chargers of capacity 100V and above).</p> <p>(v) 100% net State Goods and Services Tax (SGST), accrued to the State, as reimbursement for purchase of</p>	<p>regulations, defining tariff and related terms and conditions, for vehicle to grid (V2G) sale of power to meet the requirements of real time and ancillary services for DISCOM. Sale of power from battery swapping stations to the grid will also be considered as V2G sale of power.</p> <ul style="list-style-type: none"> Third party EV charging infrastructure providers will be allowed to procure power from DISCOM at regulator determined tariff and will be allowed to provide the charging service to Electric Vehicles. Third party EV charging service providers will be allowed to procure power through open access route from renewable energy sources irrespective of the size of the demand. APERC will determine the appropriate process and charges related to open access.



State	Objectives	Targets	Incentives	Other Significant Features
			<p>advanced batteries for Battery Electric Vehicles swapping.</p> <p>(vi) Capital subsidy of 25% of the Fixed Capital Investment (FCI), for hydrogen generation and fuelling plants, with a maximum subsidy of INR 10 Crore/unit for the first 10 units.</p> <p>2. Supply Incentives:</p> <ul style="list-style-type: none"> Capital subsidy: <ul style="list-style-type: none"> (i) 25% of Fixed Capital Investment (FCI) up to a maximum of INR 15 lakhs for Micro industries. (ii) 20% of Fixed Capital Investment (FCI) up to a maximum of INR 40 lakhs for Small and INR 50 lakhs for Medium Industries. (iii) 10% of Fixed Capital Investment (FCI) up to a maximum of INR 10 Crores for first two units, under Large industries, in each segment of Electric Vehicle (2 wheelers, 3 wheelers, 4 wheelers, buses), battery and charging equipment, hydrogen storage and fuelling equipment manufacturing. (iv) 10% of Fixed Capital Investment (FCI) up to a maximum of INR 20 Crores for first two units, under Mega category, in each segment of Electric Vehicle (2 wheelers, 3 wheelers, 4 wheelers, buses), battery and charging 	<ul style="list-style-type: none"> Third party EV charging service providers can also setup their own renewable energy generating stations at their premises for charging Electric Vehicles only. Cloud charging features will be encouraged in order to have all metering and transactions done digitally with payment apps, Near Field Communication (NFC) enabled devices, Radio Frequency Identification (RFID) tags etc. while keeping it flexible and customer friendly. Battery Recycling: Battery recycling plants will be incentivized to mine for compounds from used batteries.



State	Objectives	Targets	Incentives	Other Significant Features
			<p>equipment, hydrogen storage and fuelling equipment manufacturing.</p> <p>(v) For specific clean production measures, as certified by Andhra Pradesh Pollution Control Board (APPCB), 35% subsidy on cost of plant and machinery for Micro, Small and Medium Enterprises (MSME) up to a maximum of INR 35 lakhs and 10% subsidy on cost of plant and machinery for Large projects up to a maximum of INR 35 lakhs.</p> <p>(vi) 25% subsidy, for Micro Small and Medium Enterprises (MSMEs) and Large projects, for sustainable green measures on total Fixed Capital Investment (FCI) of the project (excluding cost of land, land development, preliminary and pre-operative expenses and consultancy fees) with a ceiling of INR 50 crore.</p> <p>(vii) Special incentives will be given according to their need for Mega, Mega Integrated Automobile Projects and Ultra-Mega Battery Manufacturing Plants on a case to case basis.</p> <p>• Stamp Duty:</p> <p>(i) 100% of stamp duty and transfer duty paid by the industry on purchase or lease of land meant for industrial use will be reimbursed.</p>	



State	Objectives	Targets	Incentives	Other Significant Features
			<p>(ii) 100% of stamp duty for lease of land/shed/buildings, mortgages and hypothecations will be reimbursed.</p> <ul style="list-style-type: none"> • External Infrastructure Subsidy: All external infrastructure such as power supply, water supply, roads will be provided at the doorstep of the industrial unit, charging and battery swapping stations at 50% of the cost of the infrastructure with an overall limit of INR 2 crores per project. • Land: In case of Mega Integrated Projects, Government will offer land to dependent ancillary units at the same rates as offered to respective Original Equipment Manufacturer (OEM) (wherever Government allocates land to OEM) up to a maximum of 50% of the land allocated to OEM. • Power: <ul style="list-style-type: none"> (i) Government of Andhra Pradesh will provide fixed power cost reimbursement @ Rs. 1.00 per unit for a period of five (5) years from the date of commencement of commercial production. (ii) The electricity duty will be reimbursed for a period of five (5) years. (iii) A dedicated line along with special discount for night time/non-peak time 	



State	Objectives	Targets	Incentives	Other Significant Features
			<p>usage will be offered for testing of BEV batteries based on requirements.</p> <ul style="list-style-type: none"> • Water: <ul style="list-style-type: none"> (i) Water Supply will be made at 50% of the price of existing industrial supply tariff for the initial 3 years from the date of commencement of commercial production. (ii) The Government of Andhra Pradesh will provide water supply and also facilitate/support setup of water treatment plants in/around major auto hubs in order to meet this requirement wherever necessary. (iii) In order to provide quality water, the Government of Andhra Pradesh will reimburse 25% of the cost of water treatment plant wherever necessary, with a limit of INR 2 crores on this subsidy. • Tax Incentives: <ul style="list-style-type: none"> 100% net SGST accrued to the State will be reimbursed for a period of five (5) years for micro and small, seven (7) years for medium, ten (10) years for large industries. This reimbursement will be limited to 100% of capex or for the period Stated, whichever is earlier. • Skill Development Incentives: <ul style="list-style-type: none"> Stipend of INR 10,000 per employee per year to a maximum of first 50 	



State	Objectives	Targets	Incentives	Other Significant Features
			<p>employees for a single company for Micro, Small, Medium and Large firms.</p> <ul style="list-style-type: none"> • Marketing Incentives: 50% of cost of participation with a maximum amount of INR 5 lakhs to be reimbursed to a maximum of 10 MSME units per year for participating in International Trade Fairs. • Industrial Parks and Clusters: (i) The Government of Andhra Pradesh will allocate 500 to 1,000 acres of land for developing EV Parks with plug and play internal infrastructure, common facilities and necessary external infrastructure. (ii) Developers of Auto Clusters and Automotive Suppliers Manufacturing Centres (ASMC) specific to Electric Vehicles shall be provided financial assistance of 50% of fixed capital investments in building and common infrastructure, up to a maximum of INR 20 crore. <p>3. R&D Incentives:</p> <ul style="list-style-type: none"> • A research grant of INR 500 Cr will fund the most innovative solutions in the mobility space. This fund will support Centre for Advanced Automotive Research (Research Labs working on battery, EV, EV component research etc), Centre for Advancement of Smart 	



State	Objectives	Targets	Incentives	Other Significant Features
Kerala (29.09.2018) EV Policy Document Link: https://icfoss.in/docs/Draft-EV-policy.pdf	<ul style="list-style-type: none"> Use e-mobility to promote shared mobility and clean transportation and ensure environmental sustainability, pollution reduction, energy efficiency and conservation and to create an ecosystem for EV component manufacturing Attract investment and create employment in EV component manufacturing Create enabling ecosystem – skilled manpower, infra, R&D, regulations and initial volumes through govt. programs 	<p>1. Electric Vehicles:</p> <ul style="list-style-type: none"> To reach 1 million EVs on road by 2022 To introduce pilot fleet of 200,000 2Ws, 50,000 3Ws, 1000 goods carriers, 3000 buses and 100 ferry boats Creation of e-mobility zones <p>1.1 Public Transport:</p> <p>Buses:</p> <p>Kerala State Road Transport Corporation (KSRTC) should transition part of its 6000+ bus fleet to EVs by 2025</p> <p>2. Charging Station:</p> <ul style="list-style-type: none"> Kerala State Electricity Board Ltd (KSEBL) to setup initial charging and swapping stations across vehicle segments (20 charging stations each in initial pilot districts of Trivandrum, Ernakulam and Kozhikode and swapping stations across the 3 districts for 	<p>Mobility (incubators, start-ups, prototyping centres etc are covered under this), Research Scholars and testing and quality labs as needed.</p> <ul style="list-style-type: none"> Recycling: Battery recycling plants will be incentivized to mine for compounds from used batteries. <p>1. Demand Incentives:</p> <ul style="list-style-type: none"> Demand aggregation of home and workplace AC chargers Subsidized rate of charging Energy companies to invest in charging networks Support schemes for early adoption in pilot project areas: Incentives of Rs 30000 or 25% of EV cost whichever is lower for 3Ws that are procured by the public, for initial one-year period. In Thiruvananthapuram, Kochi and Kozhikode Corporation, permit to be given only to EV autorickshaw. Other fiscal incentives on EVs such as state tax breaks, road tax exemptions and free permits to fleet drivers. Non-fiscal incentives such as exemption for free parking, etc. Subsidized electricity tariff between Rs. 5-5.5 per unit for EV charging stations <p>2. Supply Incentives:</p> <ul style="list-style-type: none"> Incentives under the ESDM and IT Policy for Manufacturing of: Drive 	<ul style="list-style-type: none"> E-mobility State Level Task Force (e-MobSLTF) setup as a technical advisory committee Human Capacity Building Initiatives: Setting up of Centre of Excellence for Electric and Autonomous Vehicles, Curriculum updates for EVs and AVs, Skilling Programs for EV and AV industry, Connected and Autonomous vehicle testing corridor.



State	Objectives	Targets	Incentives	Other Significant Features
	<ul style="list-style-type: none"> Create Centres of Excellence (CoE) in EV value chain 	<p>2W/3W/4W and bus charging stations in depots</p> <ul style="list-style-type: none"> Fast charging and swapping stations will be established all over cities and on highways to create the infrastructure for EVs 	<p>Technology (Complete Vehicle), Electric Drive Train and Power Electronics, Energy Systems and Storage and Charging Technology/Mode</p> <p>3. Other Taxes and Tolls:</p> <p>Road tax on EVs to be fully exempted for initial 3 years for new registration</p>	
Uttarakhand (5.10.2018) EV Policy Document Link: https://www.sildcu.com/upload/industrialPolicy/ElectricVehiclePolicyofUttarakhand-20181549520506.pdf	<ul style="list-style-type: none"> To create a conducive atmosphere to support manufacturers, and reduce vehicular pollution To create jobs in the state 	<p>1. Electric Vehicles:</p> <p>1.1 Public Transport:</p> <p>Buses: Initial target of 500 e-buses</p>	<p>1. Demand Incentives:</p> <ul style="list-style-type: none"> First 100,000 customers purchasing EVs in the state will not have to pay motor vehicle tax for a period of 5 years. First 100,000 customers purchasing commercial EVs or electric stage carriages will also be able to avail exemption from tax. <p>2. Supply Incentives:</p> <ul style="list-style-type: none"> Land provided to EV manufacturing sector will not be utilised for other purposes till 15 years. Entrepreneurs will be entitled to 100% electricity duty exemption Government will offer term loans of Rs.100-500 million to micro, small and medium enterprises (MSMEs) to manufacture EVs. Manufacturing plants that have a minimum of 100 employees will benefit from government's employee provident fund per company of Rs. 20 million. 	



State	Objectives	Targets	Incentives	Other Significant Features
Delhi (27.11.2018) EV Policy Document Link: http://transport.delhi.gov.in/sites/default/files/All-PDF/Electric Policy 2018.pdf	<ul style="list-style-type: none"> To improve Delhi's air quality through transport emission reduction such that BEVs will contribute to 25% of all new vehicle registrations by 2023 Introduce measures to support job creation in driving, selling, financing, servicing and charging of EVs 	<p>1. Electric Vehicles: 25 percent of all new vehicle registrations by 2023 will be Battery Electric Vehicles (BEVs)</p> <p>1.1 Public Transport: BEVs to make up at least 50% of the entire public transport system in Delhi by 2023</p> <p>Buses:</p> <ul style="list-style-type: none"> Induction of 1000 pure electric buses in 2019 50% of the public transport bus fleet zero emission by 2023 <p>2. Charging Station:</p> <ul style="list-style-type: none"> Providing accessible public charging facilities within 3 km travel from anywhere in Delhi All existing residential building owners, Resident Welfare Associations (RWAs), Co-op Group Housing Societies, non-residential building owners and Market Associations with parking demarcated for more than 10 ECS 	<ul style="list-style-type: none"> The state government has also planned to contribute around 30-50 per cent of overall Goods and services tax (GST) paid by the MSMEs for 5 years since their first day of production. The firms must also employ around 70 per cent of its staff from the state itself to avail the incentives. <p>1. Demand Incentives:</p> <ul style="list-style-type: none"> For 2Ws, purchase incentive of 50 per cent of Faster Adoption and Manufacturing of (Hybrid and) Electric Vehicles in India (FAME) incentive to be supplemented by top-up incentive of 50 per cent of FAME incentive for 2Ws with swappable batteries. Maximum subsidy of up to Rs 29,000 per 2Ws. Existing non-electric 2W owners to get a scrapping and de-registration incentive of up to Rs 15,000 per vehicle for non BSIV vehicles, up to two years of the policy term. For e-autos, a purchase incentive of 5 per cent and increase in credit availability. And, existing non-electric rickshaws and autos to get a scrapping and de-registration incentive of up to Rs 15,000. When it comes to e-rickshaws, drivers and operators to get access to loans at 	<ul style="list-style-type: none"> Recycling Ecosystem – Battery and EVs: Encourage the re-use of EV batteries that have reached the end of their life and setting up of recycling businesses in collaboration with battery and EV manufacturers that focus on 'urban mining' of rare materials within the battery for re-use by battery manufacturers. Reuse of EV batteries: <ul style="list-style-type: none"> a) Energy Operators (EOs) and Battery Swapping Operators (BSOs) will be operate as end of life battery recycling agencies. EV owners can deposit vehicle batteries that have reached their end of life at any charging point or swapping station operated



State	Objectives	Targets	Incentives	Other Significant Features
		will be encouraged to install one Bharat EV AC charger for every three ECS	<p>5 per cent interest and a purchase incentive of 10 per cent</p> <ul style="list-style-type: none"> For e-goods carriers, a purchase incentive of 50 per cent of FAME incentive for first 5,000 registrations with advanced swappable batteries. Also, an exemption from prohibition on plying and idle parking of light goods vehicles during specified timings within the city. <p>Public sector e-bus procurement has a target of 50 per cent of the fleet by 2023 and there will be incentives for operators of private stage-carriage vehicles</p> <ul style="list-style-type: none"> Only high-powered vehicles (>250W) with lithium ion (and other advanced) batteries eligible for subsidy For the first 10,000 charging points, a 100 per cent grant for purchase and installation of up to Rs 30,000 Tariff for private charging infrastructure: Rs 5.50 per kWh with time of day rebates <p>For swapping, the BSOs will be reimbursed 100 per cent of net state GST for purchase of advanced batteries</p> <p>2. Other Taxes and Tolls: Waiver on road tax, registration fees, Municipal Corporation of Delhi (MCD)</p>	<p>by an EO or BSO and in return get a remunerative price for this battery.</p> <p>Disposal of EV batteries in any other manner – e.g., in landfills or as scrap, will not be allowed.</p> <p>b) A nodal agency shall be appointed by GNCTD to act as an aggregator to purchase EV batteries that are at least 70% of rated capacity. These batteries will be purchased from EOs and BSOs and will then be re-used as 'power banks' to store renewable energy.</p> <p>Batteries procured in such manner will be auctioned to renewable generators within and outside Delhi.</p> <p>The nodal agency shall publish purchase price of end of life batteries every month based on auction prices achieved and a margin for itself and the EO/BSO.</p> <ul style="list-style-type: none"> End-of-life battery and EV recycling: EV batteries that cannot be re-used, either



State	Objectives	Targets	Incentives	Other Significant Features
			<p>one-time parking fee and auto rickshaw permit fees for e-vehicles</p> <p>3. Non-fiscal incentives:</p> <ul style="list-style-type: none"> • Electric 2Ws can be used for rentals and taxi services • Open permit system for approved e-autos, with no limits on the number of permits to be issued • App-based aggregators and taxi service providers to get cash back rebates for short first and last mile connectivity trips • Private charging infrastructure • Changes in building bye-laws to enable new charging infrastructure: All new non-residential buildings with parking space for more than 10 cars will need to have at least 20 per cent parking accessible to chargers and a 100 per cent access in such residential buildings, co-op, group housing societies and colonies managed by Residents Welfare Associations (RWAs) • For existing residential building owners, RWAs and co-op group housing societies, as well as non-residential building owners and market associations with similar parking space, subsidy to install one charger for every three cars. 	<p>because of poor condition of the battery or lack of demand for reuse, will be sent to recycling facilities. At these recycling facilities, high value battery materials (e.g., Nickel and Cobalt) will be recovered and then sold to battery manufacturers for re-use.</p> <ul style="list-style-type: none"> • The Government of National Capital Territory of Delhi (GNCTD) will invite battery recycling businesses to establish a presence in Delhi. Appropriate protocols and investment subsidies for setting up such a business shall be notified by the GNCTD after consultation with stakeholders, especially battery and EV manufacturers. Battery recycling businesses will purchase end of life batteries from EOs and BSOs as per mutually agreed prices.



Appendix – B: Comparison of Electricity Tariffs for Electric Vehicle Charging in Various States in India

Sr. No.	State	Category	Energy Charges	Fixed Charges	TOD/Surcharge/Rebate
1	Delhi (16.3.2018) Tariff Order Link: http://www.derc.gov.in/orders/petitions/orders/Tariff/Tariff Order for FY 2018-19/Tariff Order/NDMC Tariff Order FY 2018-19.pdf	Separate Category	Supply at LT – Rs. 5.50/kWh Supply at HT – Rs. 5.00/kVAh	No fixed charges	May-September Peak Hours: 1400 Hrs – 1700 Hrs and 2200 Hrs – 0100 Hrs Surcharge-20% Off Peak Hours: 0400 Hrs – 1000 Hrs Rebate-20%
2	Punjab (27.5.2019) Tariff Order Link: https://www.pserc.gov.in/pages/PSPCL-Tariff-Order-2019-20.pdf	Separate Category	Rs. 6.00/kVAh	No fixed charges	
3	Maharashtra (12.9.2018) Tariff Order Link: http://www.mercindia.org.in/pdf/Order5842/Order-195 of 2017-12092018.pdf	Separate category at LT and HT level	Rs. 6.00/kWh	Rs. 70/kVA/Month	2200 Hrs-0600 Hrs: Rs. (-) 1.5/kWh 0900 Hrs-1200 Hrs: Rs. 0.8/kWh 1800 Hrs-2200 Hrs: Rs. 1.1/kWh
4	Jharkhand (28.2.2019) Tariff Order Link: http://jserc.org/pdf/tariff_order/lbvn2019.pdf	Commercial	Rural - Rs. 6/kWh Urban - Rs. 6.25/kWh	Rural - Rs. 40/Conn/Month Urban – Rs. 150/Conn/Month	
5	Andhra Pradesh (22.2.2019)	LT: II (C) Non-domestic	Rs. 5 /kWh	No fixed charges	



Sr. No.	State	Category	Energy Charges	Fixed Charges	TOD/Surcharge/Rebate
	Tariff Order Link: http://aperc.gov.in/admin/upload/TOforFY201920.pdf	HT Category-II(E): Electric Vehicles (EVs) / Charging Stations			
6	Harviana (1.11.2018) Tariff Order Link: https://herc.gov.in/WriteReadData/Orders/O20181115a.pdf	LT HT	Rs. 6.50/kWh Rs. 6.40/kWh	Rs. 160/kVA/Month	
7	Karnataka (30.5.2019) Tariff Order Link: https://www.karnataka.gov.in/keerc/Tarifforders2019/TariffOrder2019/BESCOM/8-BESCOM-CHAPTER-6.pdf	LT and HT	Rs. 5/kWh	LT – Rs. 60/kW/Month HT – Rs. 190/kVA/Month	
8	Uttar Pradesh (7.3.2019) Tariff Order Link: http://www.uperc.org/App_File/SM182019Suom/oto/proceedingfordeterminationofTariffforElectricVehicleCharging.pdf38201915052PM.pdf	LMV-1b and HV-1b LT and HT (metered consumers of LMV-1, LMV-2(a), LMV-2(c), LMV-4, LMV-6, LMV-7, LMV-8 (Metered), LMV-9 (Metered), HV-1, HV-2, HV-3 and HV-4 to be charged as per respective category tariff)	LMV-1b - Rs. 6.20 / kWh HV-1b - Rs. 5.90 / kWh LT - Rs. 7.70 / kWh HT - Rs. 7.30 / kWh	No fixed charges	Summer Months (April to September): 05:00 hrs – 11:00 hrs: (-)15% 17:00 hrs – 23:00 hrs: (+)15% Winter Months (October to March): 17:00 hrs – 23:00 hrs: (+)15% 23:00 hrs – 05:00 hrs: (-)15%
9	Gujarat (24.4.2019) Tariff Order Link: http://www.fercin.org/uploaded/document/d1c2e662-58f1-4e36-a87d-70d21b603b0e.pdf	LT and HT	LT – Rs. 4.1/kWh HT – Rs. 4/kWh	LT - Rs. 25 per installation HT - For billing demand up to contract demand Rs. 25/- per kVA per Month HT - For billing demand in excess of contract demand Rs. 50/- per kVA per Month	



Sr. No.	State	Category	Energy Charges	Fixed Charges	TOD/Surcharge/Rebate
10	Telangana (15.11.2018) Tariff Order Link: http://www.tserc.gov.in/file_upload/uploads/Orders/Commission Orders/2018/Tariff amendment order for EV tariff.pdf	LT and HT	LT – Rs. 6/kWh HT – Rs. 6 + TOD Charges	No fixed charges	6 AM to 10 AM and 6 PM to 10 PM: Rs. (+)1/kWh 10 PM to 6 AM: Rs. (-)1/kWh
11	Chhattisgarh (28.2.2019) Tariff Order Link: https://www.cspdd.co.in/cseb/(S(mrcvxe3d4pd31xwn2lwbv55))/Files/Tariff Schedule 11032019/Final Tariff Schedule FY 2019-20.pdf	LV-2.1: Non-Domestic LV-2.2: Non-Domestic Demand Based Tariff (for Contract Demand of 15 to 112.5 kW) Supply Voltage HV- 3 LV – 5 and HV – 4: Electric Vehicle/ Rickshaw charging installations	Rs. 5/kWh	No fixed charges	
12	Madhya Pradesh (3.5.2018) Tariff Order Link: http://www.mperc.nic.in/030518-PNo-03-2018-Tariff.pdf	LV – 5 and HV – 4: Electric Vehicle/ Rickshaw charging installations	Rs. 4.08/kWh	No fixed charges	
13.	Chandigarh (20.5.2019) Tariff Order Link: http://ercuts.gov.in/writerreaddata/UploadFile/FINALCHD_1972.pdf	Electric Vehicle Charging Station	Rs. 4/kWh	Rs. 100/kW/month	



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