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December 26, 2018

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SUB: Comments and suggestions on draft Delhi Electric Vehicle Policy

I am writing to express the strong support of the International Council on Clean Transportation (ICCT) for the draft electric vehicle policy proposed by the Government of National Capital Territory of Delhi (GNCTD). We commend GNCTD for its efforts to promote a cleaner, lower-carbon transportation sector, while improving energy security. ICCT particularly commends GNCTD for its focus on using effective fiscal instruments to stimulate demand for electric vehicles (EV) in Delhi. The comments below offer a number of technical observations and recommendations for the GNCTD to consider in its efforts to drive rapid adoption of electric vehicles.

The ICCT is an independent research organization that provides unbiased technical research and analysis to regulators focused on improving the environmental performance and energy efficiency of the transportation sector. The ICCT promotes best practices and comprehensive solutions to improve vehicle emissions and efficiency, increase fuel quality and sustainability of alternative fuels, reduce pollution from the in-use fleet, and curtail emissions of local air pollutants and greenhouse gases (GHG) from international goods movement. The ICCT also serves as the secretariat of the International Zero Emission Vehicle Alliance (http://www.zevalliance.org).

Thank you for your attention to this important policy area. The ICCT will be glad to be of any assistance during further refinement and implementation of the Delhi EV policy. If there are any questions or comments, please feel free to contact us.

Sincerely,

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Comments on the draft Delhi electric vehicle policy 2018

The draft Delhi Electric Vehicle Policy released on November 27th, 2018 presents a strong and progressive vision for promoting the transition to a sustainable, low-carbon transportation sector in Delhi. The following comments offer specific suggestions for improving the draft policy.

Two Wheelers:

i) Since the goal of the policy is to provide incentives to electric two wheelers that are comparable to >90cc ICE two wheelers, the policy should clarify that the incentive will not be available to low-speed vehicles with a maximum speed not exceeding 25 kmph. The eligibility criteria defined in section 3.1 of the draft policy should therefore clarify that incentive will only be available to vehicles defined as "Battery operated Vehicle (Two Wheeler)" in the Automotive Industry Standard (AIS)-053 on 'Automotive Vehicles -Types –Terminology'.

ii) The policy should consider separating the level of incentive for L1 category vehicles (maximum speed not exceeding 45 km/h and motor power not exceeding 0.5 kW), from the L2 category vehicles, which are closer to the performance of the target market. L1 and L2 category vehicles are also defined in AIS-053.

iii) Section 3.1.2 of the draft policy proposes a 'Top-up Incentive' for vehicles with swappable batteries. However, it is not clear if the Delhi policy will provide this incentive for vehicle models already available in the market with a removable battery pack that can easily be charged at home at a time convenient to the user, without the need of a battery swapping operator. The transport department of GNCTD should therefore clearly identify such models as being eligible for the top-up incentive.

iv) The scrapping provision in section 3.1.5 (as well as section 3.2.7) appears to require only a certificate of de-registration. However, it is possible for those deregistered vehicle to be sold to other users either in Delhi or in another city. Therefore, we suggest that the RTO should only provide a certificate of completion upon a scrappage process which documents that the engine has been rendered inoperable completely.

v) We commend the bold fiscal incentives proposed by Delhi for electric 2-W which will be the cornerstone in driving adoption across this segment. Electric vehicles are associated with high up-front costs while significantly lower operating costs in comparison to conventional ICE. Thus, a total cost of ownership (TCO) over the vehicle's lifecycle is perhaps the true metric of cost burden on the consumer. However, consumer adoption is also significantly influenced by up-front costs and not always driven by structured TCO data. Thus, we have conducted an analysis to understand the impact of the proposed subsidy levels by Delhi in context of both up-front costs as well as TCO over a 10-year vehicle life.

In order to analyze impacts due to subsidies, it is also important to understand the current market offering of the target high-power/high-speed 2-W. This target

segment is still developing in India and currently available models broadly fall into the performance categories presented in Table 1 below.

Table 1. Summary of specifications of eligible electric 2-W available in the market

Peak power (W)	Top speed (kmph)	Claimed range* (km)	Test range (km)	Battery capacity (kWh)	Removable battery pack	Models
~ 1200	40	~ 60	No data	1.2	Yes	Hero NYX e5, Hero Flash e5, Hero Optima
~ 1500	45 - 55	~ 80	No data	1.9 – 2.3	Yes	Hero Photon Li, Avan Xero+, NDS Lio
~ 5000	70 – 80	~ 60	107	2.4	No	Ather 340, Ather 450

* claimed range in power mode when vehicle operates closer to maximum rated speeds.

We have compared the costs of a representative 2-W from each of the above performance categories against the top-selling conventional ICE 2-W, the Honda Activa 5G. Our analysis indicates the following (see Table 2 and Table 3 below for reference):

1. Other than models from Ather Energy, all vehicles currently on the market come with removable battery packs. It should be noted that not all models with a removable battery pack have been designed for regular removal and insertion. At the same time, a few models come with dual battery packs with the total battery capacity and range split across two batteries. Such vehicles can operate on one battery pack while the other re-charges thus cutting down net charging time. As mentioned in comment (iii) above, the draft EV policy is not clear on whether these vehicles are eligible for top-up incentive.

2. <u>For vehicles in the ~1200 W/40 kmph bracket</u>:
    a. the combined road tax waiver, one-time MCD parking fee waiver, purchase incentive, and scrapping incentive lower the up-front costs significantly in comparison to the top-selling ICE 2-W. For example, up-front costs for the Hero NYX e5 are lowered by about INR 23,000 in comparison to the Honda Activa 5G due to the above-mentioned subsidies. Since all consumers may not be availing of the scrapping incentive, the up-front price differential could be effectively lower by about INR 8000.
    b. **Additional top-up incentives for battery swapping may not be warranted for this segment as other subsidies suffice in lowering the up-front costs**. Further, all such models come with removable battery packs that can be conveniently charged at home/work-place without the added costs and complexity involved in swapping through third party operators.
    c. The adequacy of the combined road tax waiver, parking fee waiver, and purchase inventive is also reflected in the TCO analysis. For example, the 10-year TCO for the NYX e5 is lower by about INR 68,000 in comparison to the Activa 5G with these subsidies.

3. For vehicles in the ~1500 W/45 – 55 kmph bracket:
    a. the combined road tax waiver, one-time MCD parking fee waiver, purchase incentive, and scrapping incentive bring the up-front costs in a comparable range to the top-selling ICE 2-W. For example, up-front costs for the Hero Photon Li are higher by about INR 4,000 in comparison to the Honda Active 5G due to the above-mentioned subsidies. Since all consumers may not be availing of a scrapping incentive, the up-front price differential could be as high as INR 19,000 for the Photon Li compared to the Activa 5G.
    b. While an additional swapping incentive could bring down the overall up-front costs further, all 2-W in this category are also equipped with removable battery packs. The Delhi policy could explore the possibility of incentivizing consumers to invest in a spare battery for added convenience through the top-up incentive, instead of narrowing the focus on battery swapping through third party operators.
    c. In terms of TCO, the fuel-savings from such models outweigh the difference in up-front costs significantly. For example, the 10-yr TCO of the Photon Li is about INR 3,000 lower than the Activa 5G without any incentives from the Delhi government. The combined road tax waiver, parking fee waiver, purchase incentive, and scrapping incentives could lower the TCO by about INR 40,000. Thus, the key role of subsidies from Delhi here is in bringing up-front cost parity. With increasing awareness levels amongst consumers on basing purchase decisions based on TCO data, the level of subsidy can be adjusted accordingly in the future.

4. Currently, there is only one manufacturer (Ather) offering models that are comparable to speed/power ratings of 2-W such as the Honda Activa 5G. Further, these models come with on-board non-detachable battery systems and are not compatible with battery swapping. The combined road tax waiver, parking fee waiver, purchase incentive, and scrapping incentive, falls short by about INR 36,000 in lowering the up-front costs of the Ather 450 in comparison to the Activa 5G. Likewise the TCO over 10 years for the Ather 450 is higher by INR 22,000 in comparison to the Activa 5G. Thus, based on the current market offering of high performance 2-W which have a comparatively lower range, it is indicated that even higher levels of subsidy may be required to bring both up-front cost-parity and TCO equivalence.

5. It is important to note that in addition to performance, fuel-efficiency (kWh/km) is also an important consideration in the design of a subsidy structure. FAME guidelines require all eligible battery operated 2-W to have a range of at least 55 km on the Indian Drive Cycle (IDC). Further, the maximum electrical energy consumption for eligible models is restricted to 0.08 kWh/km. All models that are currently eligible under FAME and the proposed Delhi policy claim a range higher than 60 km with a wide variation in the claimed values. However, these values are manufacturer claimed values under “power-mode” (vehicle operates closer to its rated performance limits) and “economy-mode” (vehicle operating at lower performance levels than rated). Our experience indicates that there can be a significant difference in test values and actual on-road range. Thus, while there is a definite possibility of linking the level of subsidy to IDC range values within performance bands, it is difficult to evaluate such a stratification in the absence of reliable on-road data.

Table 2. Up-front cost comparison of eligible electric 2-W with top-selling conventional 2-W

Up-front cost* (INR)	Hero NyX e5 40kmph @ 1300W	Hero Photon Li 45 kmph @ 1500W	Ather 450 80kmph @ 5399W	Honda Activa 5G 83kmph @ 5965W
Without any proposed Delhi incentives	72,068	1,03,546	1,33,420	62,690
With road tax waiver	66,490	94,180	1,24,300	
With road tax waiver, parking fee waiver	65,490	92,490	1,22,000	
With road tax waiver, parking fee waiver, purchase incentive	54,490	81,490	1,11,000	
With road tax waiver, parking fee waiver, purchase incentive, scrapping incentive	39,490	66,490	96,000	
With road tax waiver, parking fee waiver, purchase incentive, scrapping incentive, top-up incentive	28,490	55,490	96,000	

*Up-front costs include a FAME subsidy of INR 22,000 for electric two wheelers, GST, road tax, one-time MCD parking charge, and a 5-year comprehensive insurance cover.

Table 3. 10-year TCO of eligible electric 2-W in comparison to top-selling conventional 2-W

Total Cost of Ownership – 10 yrs* (INR)	Hero NyX e5 40kmph @ 1300W	Hero Photon Li 45 kmph @ 1500W	Ather 450 80kmph @ 5399W	Honda Activa 5G 83kmph @ 5965W
Without any proposed Delhi incentives	1,53,411	2,00,266	2,60,822	203,505
With road tax waiver	1,47,833	1,90,900	2,51,702	
With road tax waiver, parking fee waiver	1,46,833	1,89,210	2,49,402	
With road tax waiver, parking fee waiver, purchase incentive	1,35,833	1,78,210	2,38,402	
With road tax waiver, parking fee waiver, purchase incentive, scrapping incentive	1,20,833	1,63,210	2,23,402	
With road tax waiver, parking fee waiver, purchase incentive, scrapping incentive, top-up incentive	1,09,833	1,52,210	2,12,402	

*TCO is estimated based on a 10-year life-span at 10,000 km/year. Costs include GST, FAME subsidy of INR 22,000 for electric 2-W, road-tax, one-time MCD parking charge, insurance premiums, finance costs, fuel costs, maintenance costs, battery replacement costs (1 replacement after 1500 charge cycles/60,000 km), and loss in value due to depreciation.

Three-Seater Auto-Rickshaws (TSRs):

vi) While there are several reasons to encourage deployment of TSRs as well as E-rickshaws with a swappable battery, GNCTD should avoid restricting the benefits provided under the policy only to vehicles with a swappable battery. The EV market for such vehicles is at a nascent stage, and it would be premature for GNCTD to commit only to one technology pathway for electrification of this sector.

vii) The number of individual e-auto owners who will not require financing for their vehicles is likely very small. Regardless, the purchase incentive described in section 3.2.6.i should also be made available to individual e-auto owners and fleet owners looking to purchase without the finance provider. The interest subvention in section 3.2.6.ii on the other hand may only be made available to individual e-auto owners.

viii) Scrappage incentive described in section 3.2.7 should be made available to all TSRs regardless of the age. It should be noted that even BS IV CNG TSRs are certified with an emission limit of 940mg/km of HC+NOx emissions. BS III CNG TSRs were certified with an emission limit of 1200mg/km HC+NOx emissions, and their real-world emissions performance is likely significantly worse than BS III motorcycles certified to an emission limit of 920mg/km.

ix) Similar to the eligibility criteria listed in section 3.1, eligibility criteria for section 3.2 and 3.3 should clearly require use of 'advanced batteries', as well as driving range and energy consumption criteria consistent with the FAME India provisions.

Promoting usage of App based e-autos and e-cabs

x) All app based aggregators of autos and cabs should be required to undertake a time-bound electrification program[1]. In California, the California Clean Miles Standard and Incentive Program (SB 1014) explicitly requires setting of targets for app based aggregators that include increasing the number of zero-emission vehicles[2]. In London, Uber's clean air plan includes a commitment to electrify all vehicles on its app to be electric by 2025[3]. Without explicit target setting by GNCTD, voluntary programs announced by the aggregators, however well intentioned, are likely to fall short of substantial volumes.

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[1] https://sustainabledevelopment.in/uploads/pdf/1520238209Clean%20Transport.pdf Section 3.5.b
[2] https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB1014
[3] https://www.uber.com/en-GB/newsroom/uber-helps-london-go-electric/

Buses

xi) We commend GNCTD's plan to induct 1000 electric buses in 2019 and commitment to procure at least 50% of all new state-carriage buses procured for city fleet to be electric. In order to ensure the success of this objective, Delhi needs a fleet-wide technology transition strategy. A fleet-wide strategy should include the following:

- *Deadlines to achieve 50% as well as100% zero emissions in all new buses and in the fleet as a whole.*
- *A schedule for construction of facilities and infrastructure modifications or upgrades, including charging, fueling and maintenance facilities, to deploy and maintain zero emission buses. The schedule should specify the general location of each facility, type of infrastructure, service capacity of infrastructure, and timeline of construction.*
- *A schedule for zero emission bus purchases, lease and gross cost contract options. The schedule must identify the bus types, infrastructure needs for recharging and maintenance, and number of buses.*
- *A schedule for retirement of buses, if any, including the number of buses, bus types, fuel type, and emission standard.*
- *A schedule for deployment of zero emission buses by route and depot, as well as retirement or re-assignment of buses by route and depot.*
- *A training plan and schedule for bus operators and maintenance staff*
- *Identification of potential funding sources and their application.*

xii) A fixed percentage of State EV fund should be set aside for Delhi bus electrification program.

xiii) GNCTD should further support innovation in tendering, including for example tendering that awards bids based on lowest total cost of ownership for all procurements of buses going forward. Such an approach will be sensitive to the operational savings of electric drive technology, including lower maintenance costs, lower cost of consumables, greater energy efficiency, and differences in energy costs.

Goods carriers (3 wheelers)

xiv) As described in comments (v) and (vii) above, not only should the incentive for 3 wheeler goods carriers be available regardless of charging strategy, but the policy should provide a de-registration and scrappage incentive for these vehicles as well. Further, there are as many as 70,000 three-wheeler goods carriers in Delhi[4]. Therefore, the EV policy should remove the cap on incentive for three-wheeler goods carrier segment, in addition to granting the scrappage incentive.

Light-commercial vehicles and retrofit solutions

xv) While the draft EV policy focuses on two and three wheelers, we recommend that direct fiscal incentive beyond waiver for road tax, registration fees and one time parking fees should be granted to light-commercial vehicles.

xvi) While it may not be necessary for GNCTD to grant additional fiscal incentive for retrofits of existing vehicles, the Delhi EV policy should consider a pro-rated rebate of road tax, registration fees and on-time parking fees for ICE vehicles that are retrofitted to become electric drive.

Charging Infrastructure

xvii) In section 4.1.1.b, further clarity may be provided in terms what an EV ready parking space means. We suggest the following language, based on San Francisco Green Building Code as an example: “A branch circuit panelboard shall be provided at each parking level, and the panelboard shall have capacity to deliver a minimum …. amperes at ….-volts multiplied by the total number of EV Spaces and shall provide sufficient space in the panelboard to install one ….ampere minimum dedicated branch circuit and overcurrent protective device for each EV Space. The circuits and overcurrent protective devices shall remain reserved for exclusive use by electric vehicle charging.”[5]

xviii) In section 4.1.3, the policy may grant an equivalence of 3:2 or other suitable ration to provide incentive to set up DC fast chargers i.e. instead of three AC charger per nine ECS, two DC charger per nine ECS may be considered as an equivalent charging arrangement. The incentive in section 4.1.3 should be extended to BEVC-DC001 chargers accordingly.

xix) The draft policy proposes favourable electricity tariff for energy operators (EOs), and also proposes a capital subsidy for setting up chargers in section 4.2.4. Yet, the draft policy allows EOs to price their service as they want. We suggest that the Delhi policy cap the price for service provided by EOs at the average cost of supply plus 15 percent as suggested by the Power Ministry guidelines[6].

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[4] http://transport.delhi.gov.in/sites/default/files/All-PDF/Total%2BVehicles%2BRegistered%2Bupto%2B31.03.2018.pdf

[5] https://sfdbi.org/sites/default/files/EV%20Ready%20draft%20ordinance%2002%203%202017%20changes%20colored%20for%20DBI%20CAC.docx

xx) The policy suggestion to create an open, publicly owned database of public charging infrastructure is a welcome, but narrowly defined move. Instead of only specifying a real-time database, the EV policy should ask for a historical database as well, and track at least the following parameters: kWh, session length, vehicle type if available from the customer key card, number of events, location of charger (latitude, longitude), number of chargers at site, site classification, payment amount, pay structure (by hour, or by kWh, or by session), as well as payment rate.

xxi) The Delhi EV policy should push for use of global open standards and open protocols to ensure interoperability between different types of electric vehicles, charging spots, and energy providers.[7]

Recycling

xxii) The introductory statement of the section 5 is not accurate, and we suggest striking out the language after '…one they have degraded'.

xxiii) Section 5.1.2 suggests a price discovery mechanism for used batteries. However, in order to create an incentive for EV users to return the batteries to the appropriate recycling stream regardless of the second and third use considerations, GNCTD should consider establishment of a small battery deposit fee that is refunded upon depositing used batteries with the designated battery recycling agencies.

Funding

xxiv) We appreciate Delhi's commitment to provide stable incentives by seeking reliable funding sources. Committing to durable incentives is one of the four principles identified by the ICCT for an effective EV incentive design[8]. Securing incentive programs for several years is best suited to assist the larger market transition. Industry gains from the ability to plan their product placement and strategically market their incentives, and consumers need certainty to weigh their investment. Within such a framework, governments can still regularly review the incentive policies and, if needed, make adjustments.

xxv) The additional road proposed in section 6.3 should explicitly take into consideration higher pollution load from passenger vehicles with gross vehicle weight greater than 2500 or with more than six seats. Such vehicles, particularly those running on diesel with a reference mass greater than 1305 kg and certified to BS IV emission standards, emit 35% to 50% greater NOx and PM emissions than BS IV vehicles with gross vehicle weight less than 2500.

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[6] https://powermin.nic.in/sites/default/files/webform/notices/scan0016%20%281%29.pdf
[7] https://www.elaad.nl/research/interoperability/
[8] https://www.theicct.org/publications/principles-effective-electric-vehicle-incentive-design

Non-financial incentives

xxvi) Nonfinancial incentives and driver perks make electric vehicles more attractive to potential buyers, supplementing financial incentives. As noted in ICCT's EV capitals briefing[9]:

> *These policies are carefully tailored to fit local contexts…. Major cities in China, suffering from heavy congestion and pollution, have implemented strict vehicle registration quotas; exempting electric vehicles from this quota makes them very attractive to residents. Additionally, some of these cities in China allow electric cars to drive even on days when internal combustion engine vehicles are banned to reduce pollution. The congestion in major cities in California makes access to high-occupancy vehicle lanes on freeways a valuable perk. In Amsterdam, electric vehicle drivers have priority for parking permits, while the waiting list for other vehicles can last years.*

We encourage GNCTD to explicitly document and publicize non-financial incentives currently being offered for EVs in Delhi (e.g. exemption from odd-even scheme) in addition to the fiscal incentives.

Consumer awareness programs

xxvii) The draft EV policy seeks to 'develop a communication plan focused on driving awareness regarding the benefits of adopting electric vehicles and the key elements of this policy.' Our review of various consumer awareness programs leads us to the conclusion that 'actions to increase consumer awareness are a key part of supporting the growth in the early electric vehicle market'.[10] We encourage GNCTD to elevate consumer awareness as one of the key pillars of the Delhi EV policy. Ideally, such an effort should be a brand-neutral joint public-private partnership along the lines of Go Ultra Low in UK and PEV Collaborative (now Veloz) in California. A portion of state EV fund should be set aside for such a consumer awareness program, and leveraged with private sector contribution.

xxviii) Walking the talk: Public procurement remains one early element of an EV strategy that demonstrates to the broader public the commitment of state government. Delhi EV policy should include 'electric first' guidelines directing all GNCTD departments to purchase/lease all-electric vehicles when the vehicle usage is compatible with available electric vehicles.

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[9] https://www.theicct.org/sites/default/files/publications/World-EV-capitals_ICCT-Briefing_08112017_vF.pdf
[10] https://www.theicct.org/sites/default/files/publications/Consumer-EV-Awareness_ICCT_Working-Paper_23032017_vF.pdf