



# ITES

Part of the **UK-India** Net Zero  
Innovation Virtual Centre

# India Site EV Infrastructure and Demand Calculator

Case study



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Department for  
Science, Innovation  
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Innovate  
UK



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# 1 Introduction



India is the 2nd largest urban system with 377 million urban population. It is suggested that by 2030, the number of cities with populations of more than 1 million will grow from 42 to 68. To keep India on the move, despite high levels of congestion there is an ever-increasing need for personal transport solutions. As the journey towards electrification increases pace in India, the provisions of charging infrastructure where vehicles park is becoming increasingly critical.

Recent statistics show that electric 2-wheelers dominate new vehicles registrations in 2023-24 with 96.51% of new motorcycles running on electric motors or defined as e-scooters. There are significant incentives for 2 & 3 wheelers, such as a waiver on road tax and registration charges.<sup>i</sup> As India progresses on their decarbonisation pledges, the increase in the electrification raises questions around necessary infrastructure and energy consumption<sup>ii</sup>.

Not only is there national policy supporting the transition to EV's, but state governments are also taking action with the space available for parking. The Telangana government are creating preferential parking slots with required infrastructure to accommodate the uptake of electric vehicles.<sup>iii</sup> By supporting electric vehicle charging requirements, the state can ensure that there is adequate charging infrastructure to properly support the shift towards a greater proportion of electric mobility.

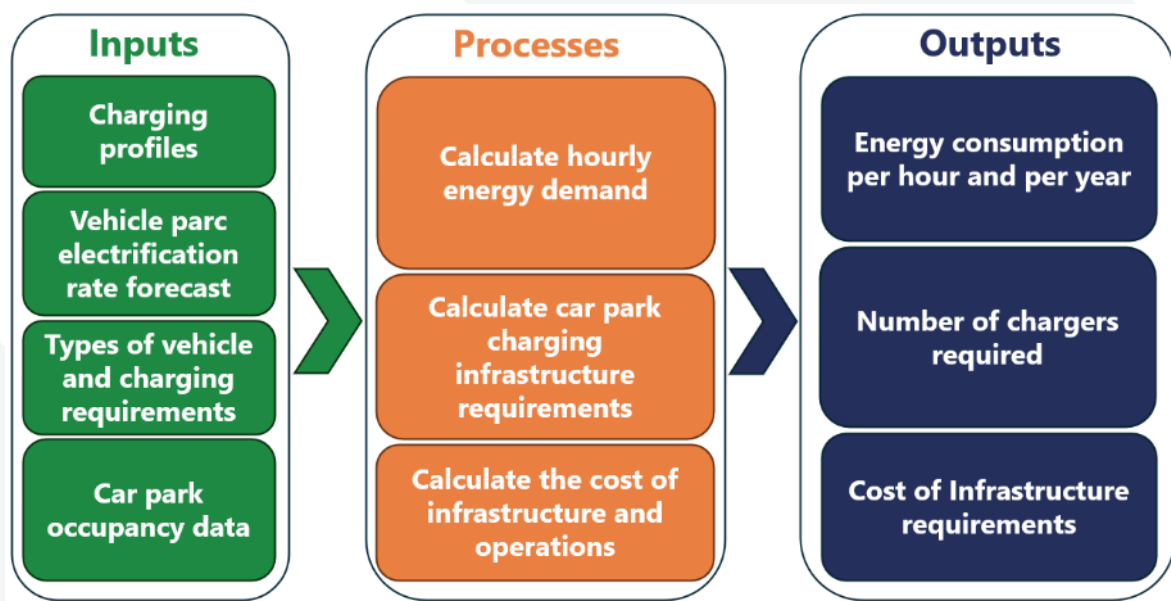
Car parking facilities will play a key role in the future of EV infrastructure across the globe. The ITES program has developed an India Site EV Infrastructure and Demand Calculator to support EV car park operators and plans for the provision of charging infrastructure to ensure it meets the needs of their users. This case study will explore its use through an illustrative example of a Hyderabad, Telangana airport parking operation.

## 2 The India Site EV Infrastructure and Demand Calculator

The India Site EV Infrastructure and Demand Calculator is an Excel-based tool designed to assess the potential future energy consumption, charging infrastructure requirements and associated costs for parking for electrified vehicles in India.

Figure 1 shows a high-level summary of the tool's inputs, processes and outputs. The tool uses pre-existing data which is gathered from public resources with additional information that can be provided and configured by the user. These datasets include:

- Hourly car park occupancy rate
- Electrification rate forecast
- Vehicle performance & specifications
- Vehicle charge point performance
- Charging infrastructure costs



• Figure 1 India Site EV Infrastructure and Demand Calculator – Proposed Methodology

Based on the inputs selected and the scenario configured the calculator is then able to answer questions the user may have like:

- What is the impact of vehicle electrification on car park sites and charging infrastructure?
- What does the peak hourly demand for electrified spaces look like during weekdays and weekends?
- 1. What are the costs of the charging infrastructure which is needed to support on-site charging whilst EVs are parked?

## 3 A Telangana Airport Parking Case Study

### 3.1 The site

This case study is built around an illustrative car park based at a commercial airport in Telangana, Hyderabad and will highlight how the India Site EV Infrastructure and Demand Calculator can be used to explore how to accommodate the changes that come with increased rate of electric mobility. There are ambitions within Telangana government to build the state into a major base for electric vehicles (EVs) and energy storage systems. The Telangana government hopes to do this by securing investments worth \$4.0 Billion and creating employment opportunities for 120,000 people by the year 2030, utilising EVs in shared mobility and charging infrastructure development.<sup>iv</sup>

This example of the India Site EV Infrastructure and Demand Calculator will explore how staff in Hyderabad would typically use the car park for work purposes and assess how many chargers are required to support the incoming electric mobility future. Hyderabad was selected based on the increased number of car parks that the city is investing in and how it's incorporating advanced technology.<sup>v</sup>

To configure the calculator several assumptions were made as outlined below in Table 1, to build a picture of a representative commercial airport vehicle parc based in Hyderabad, Telangana.

Site Attribute	Assumption
Site type	Commercial airport parking
Number of car spaces	2500 <sup>vi</sup>
Number of 2-wheeler spaces	500
Vehicle types	<ul style="list-style-type: none"> <li>• Ultra-compact (&lt;3.4m)</li> <li>• Sub-Four Meter</li> <li>• Entry-Level Mid-Size Sedan</li> <li>• Small Family (&lt;4.7m)</li> <li>• Small Van (&lt;4m)</li> <li>• Mid-Size Van (&gt;4m)</li> <li>• SUV</li> </ul>
Operations	Both weekday and weekend access to the vehicle parc. The site is used by staff who commute to the site via cars or 2-wheeled vehicles.
Average manufacture year	2022

Table 1 Site Attributes and Assumptions

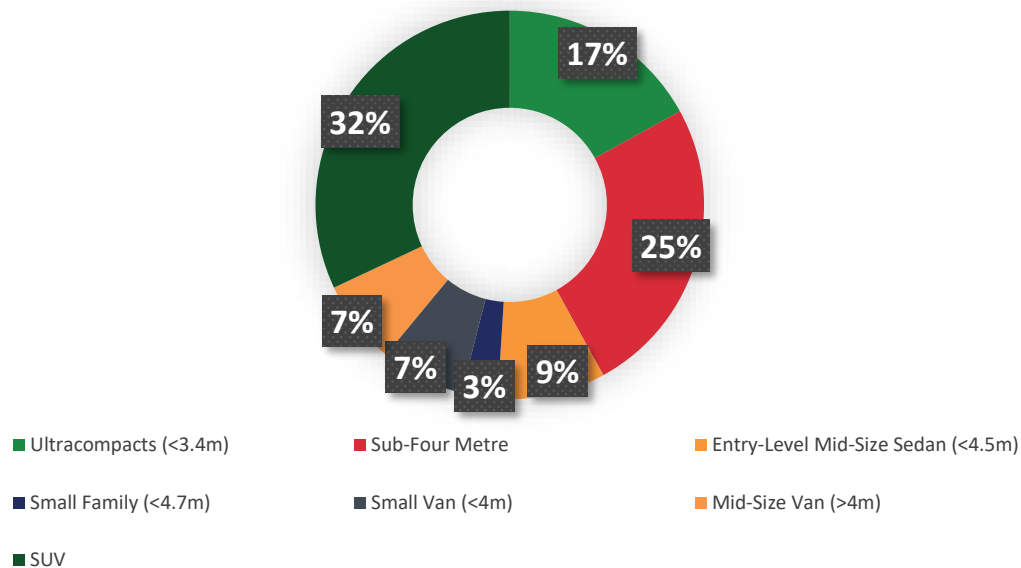


Figure 2 Percentage of vehicles arriving at the car park considered for this case study

The calculator can be configured to assign the required powered chargers for the vehicle type depending on the size of its battery. In this example, the cars will charge using a 7kW charger and for the 2-wheelers, a 3kW charger is used. The calculator also considers real-world energy consumption factors so that the tool can represent more accurate use cases for electric mobility.

The India Site EV Infrastructure and Demand Calculator combines all the information provided by the user with the background embedded input data, as laid out above. From this, the tool can model and build a picture of the likely energy consumption, and the number of chargers required over the next 10 years.

### 3.2 Scenarios

As the electrification of transport progresses in India, the rate of adoption will vary depending on user requirements, incentives and government schemes. The variable changed for this illustrative site example is the vehicle parc electrification forecast rate which is adapted for both cars and 2-wheeler vehicle types shown in **Error! Reference source not found.** Both the Bloomberg and Ramp Up scenarios will use the same charging profiles for the vehicles parked on-site at a given hour as well as the same hourly car park occupancy rate. The hourly car park occupancy rate is based on an average workday, used by staff and necessary vehicles parked at an airport carpark in Hyderabad, Telangana.

Figure 3 Proportion of spaces occupied by vehicles parked during the day. below, shows the theoretical proportion of spaces used by staff during the working day.

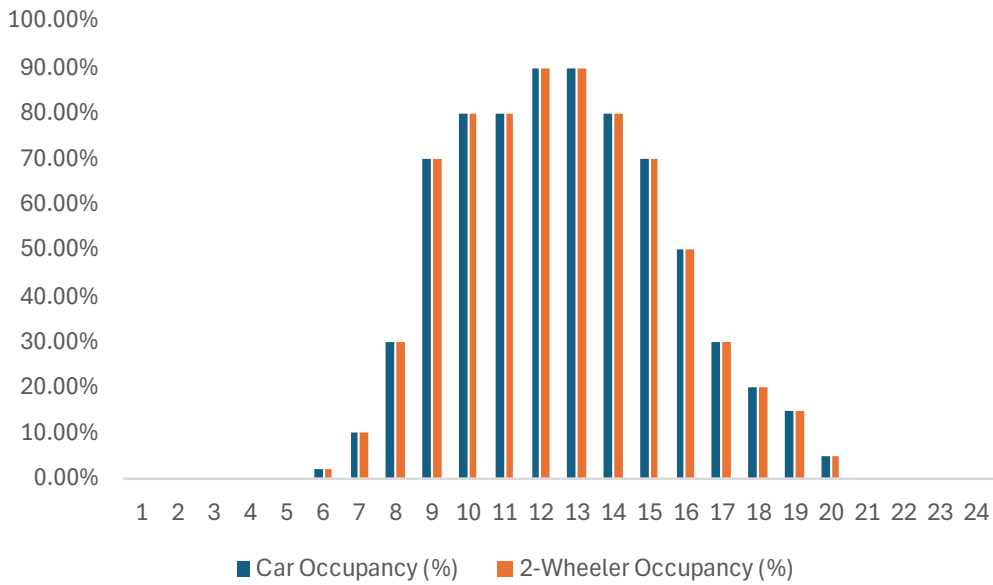


Figure 3 Proportion of spaces occupied by vehicles parked during the day.

The two different assumed scenarios explored in this case study are explained here:

- Bloomberg electrification** – This example reflects the projected electrification adoption published by the Bloomberg New Energy Finance (2022) research<sup>vii</sup>. For this scenario by 2030, vehicle parc electrification rate forecast is at 5% for cars and 10% for 2-wheelers. As we near 2030 targets there will still be traditional transport options that will need to park at sites.

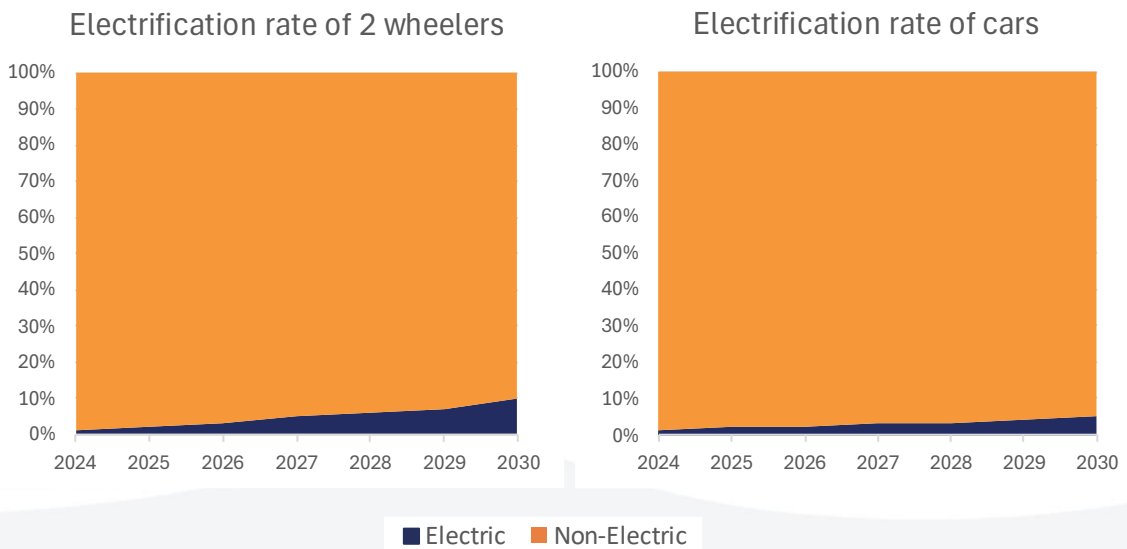


Figure 4 Bloomberg scenario Vehicle Parc Electrification Rate Forecast for cars & 2-wheelers

- Ramp Up electrification** – This is an accelerated electrification rate example. Theorising rapid adoption therefore the imminent need for the car park to cater for more electric mobility options. This electrification scenario projects that

India has accelerated its shift to electric mobility for both cars and 2-wheelers by 2030. Therefore, the vehicle electrification rate forecast for this scenario will be set to 70% for all vehicles by 2030.

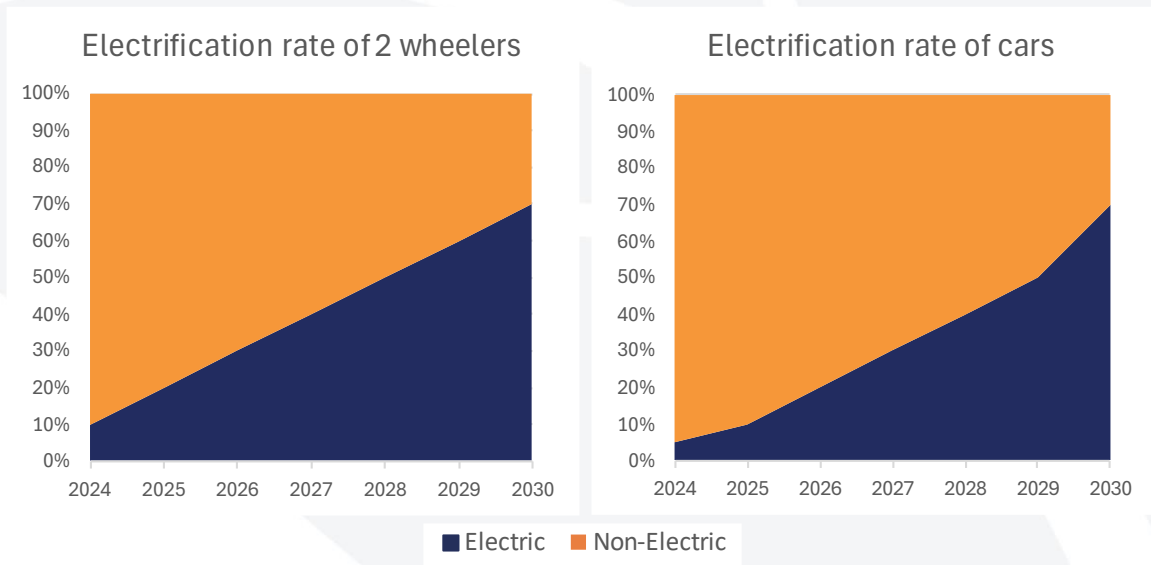


Figure 5 Ramp Up scenario Vehicle Parc Electrification Rate Forecast for cars & 2-wheelers using the car park

### 3.3 Analysis

Once the calculator is configured there are a variety of outputs calculated. These include:

- Number of car park chargers required
- Peak energy consumption in each hour (kWh)
- Car park charger infrastructure and operational costs
- Total 5 year spend

The user of the India Site EV Infrastructure and Demand Calculator will have the ability to evaluate the effects of their scenarios. Here we discuss the results from the scenarios outlined above.

#### 3.3.1 Electrification rate by 2030

Reviewing the Bloomberg electrification scenario, by 2030, 10% of motorcycles and 5% of the car spaces at the car park have been adapted for charging. In comparison the Ramp Up electrification rate has been set to 70% of both motorcycles and car spaces are expected to be electrified.

In the Bloomberg scenario the electrification of the infrastructure alongside the increase in electric mobility usage, will lead to increased energy consumption which we can see in the graph below, Figure 6 Bloomberg scenario energy consumption 2024, 2030 and Ramp Up energy consumption 2030 (kWh).



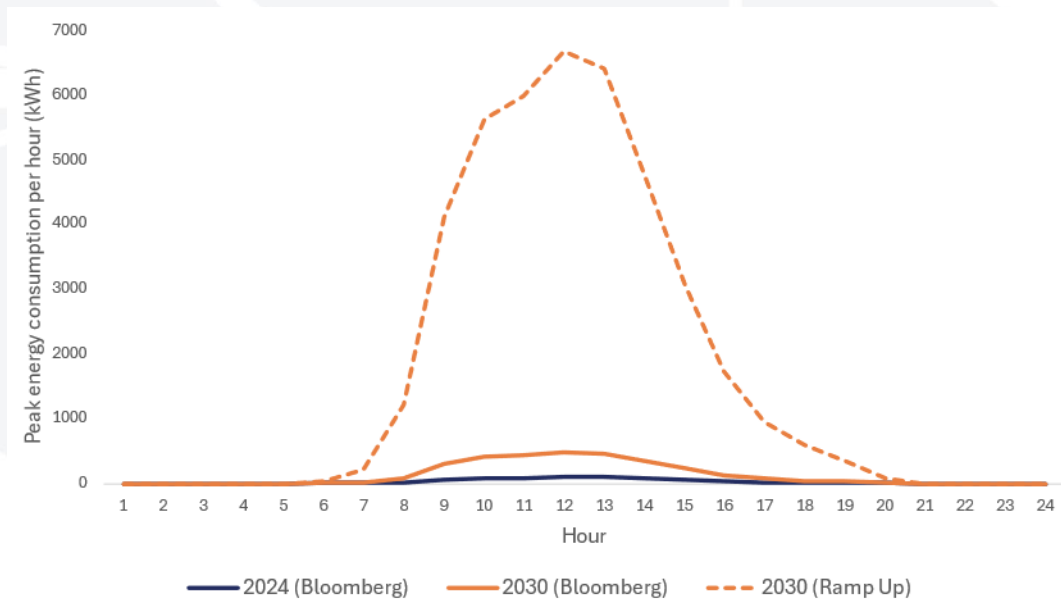


Figure 6 Bloomberg scenario energy consumption 2024, 2030 and Ramp Up energy consumption 2030 (kWh)

As we see a gradual increase in electrified spaces, the peak hourly energy demand increases by 2030. The increase in energy consumption is in parallel to the percentage increase of vehicles being parked. The peak energy demand is during peak car park usage, which reflects the increase in number of vehicles over the years.

The same relationship is observed with the Ramp Up scenario. By 2030 we see a much greater increase in electrified spaces in use, therefore the peak hourly energy demand increases. This clearly demonstrates the impact of accelerated uptake of electric mobility and how numerous vehicles on charge lead to a large increase in energy consumption and requirements.

### 3.3.2 Number of chargers required

The increased number of cars ultimately results in an increase in the number of chargers required to provide adequate infrastructure. As the electrification forecast increases, so does the number of chargers which is observed from the graph below in Figure 7.

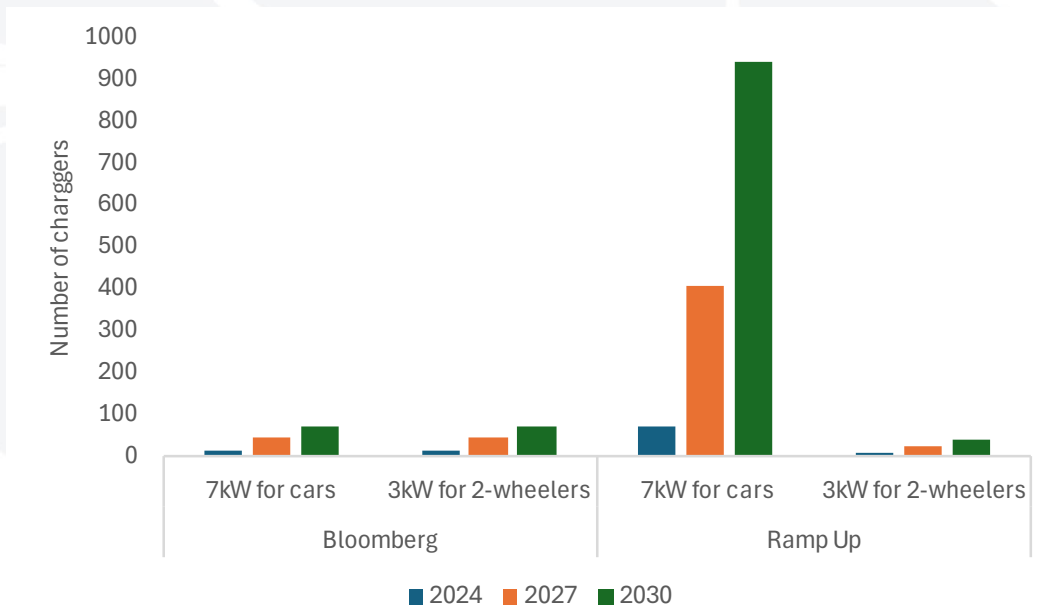


Figure 7 Number of chargers required for the vehicle parc for both the Bloomberg and Ramp Up scenarios

Where electrification forecast rate has been the same rate from 2025 to 2026 the number of chargers has also remained the same.

Figure 8 Comparison of compares the number of chargers required for each car park scenario, highlighting the impacts that electric mobility has on infrastructure.

Scenario	Number of car chargers	Number of 2-wheeler chargers	Proportion of car park space with chargepoints
Bloomberg	68	6	3%
Ramp Up	945	40	70%

Figure 8 Comparison of charging infrastructure by scenario in 2030

The number of chargers show an increase by 2030. The Ramp Up scenario is an accelerated case which helps justify the need to install a lot more infrastructure to appropriately support electric mobility and pre-empt infrastructure costs.

### 3.3.3 Infrastructure and operational costs

The additional chargers lead to a result in an increased cost which can be observed in Table 2 Scenario Infrastructure Costs.

Year	2024	2025	2027	2030
Bloomberg Infrastructure Cost	₹463500	₹669500	₹721000	₹721000
Ramp Up Infrastructure Cost	₹3244500	₹3450500	₹6952500	₹13905000

## Table 2 Scenario Infrastructure Costs

In Table 2 Scenario Infrastructure Costs the Bloomberg scenario shows an increase in initial investment to install the infrastructure. Once the infrastructure is installed the costs steady at similar rates per year from 2025.

This is due to the electrification forecast rate also being steady, so that installed chargers can continue to be used and are added based on demand over the years.

The Bloomberg scenario vehicle park electrification rate by 2030 is 3%. The Bloomberg scenario represents a moderate increase in vehicle park electrification. This results in a steady increase in infrastructure needs, costs and number of chargers.

Whereas the Ramp Up scenario vehicle park electrification by 2030 is 70% which a large proportional increase that has returned expected increased values in the number of car and 2-wheeler chargers required to provide adequate infrastructure. This leads to a significant increase in energy consumption, a much higher number of chargers required and higher costs.

The results from both scenarios amplify the need to have a strategy in place for electric infrastructure and anticipated usage of electric mobility to accommodate future users. Using the India Site EV Infrastructure and Demand Calculator increases awareness around the impacts of electrification rate, help users understand electric vehicle parking requirements, as well as the costs of operations and infrastructure requirements.

## 4 How can you use it?



This case study serves to demonstrate the use of the India Site EV Infrastructure and Demand Calculator for the scenarios explored here. However, the potential use cases that can be explored through this calculator are wider ranging.

The calculator is a tool to help stakeholders make key decisions as we approach target years for emissions reductions and for car park operators to have a better vision of how to operate more sustainably. Beyond what has been demonstrated here this tool could be used to explore:

- Varying chargepoint costs,
- Chargepoints with other power specifications
- Different vehicle performance data
- Different number of car park spaces
- Different car park operation profiles
- Changes in electrification profiles and targets

The calculator offers a canvas which can be configured by a variety of car park owners or operators to reflect their operations and future strategies and support their decision making and planning.

If you are interested in understanding more, please do get in touch with the Innovating for Transport and Energy Systems programme.

## 5 Annex



### 5.1 Assumptions

There are several underlying assumptions that support the operation of the India Site EV Infrastructure and Demand Calculator. They include:

- The calculator is currently only set up to take in account staff and visitor car parks
- The CAPEX values are for the purchase and installation of the charge posts, it does not include connection to network charges.
- The reference data used in this calculator is specific to consumer vehicles (ie. staff and visitor) and only cars, vans have not been included.
- Vehicles begin their charge after having depleted their entire usable battery capacity and continue to occupy the space until the battery is fully charged.

For further detail get in touch with the ITES programme.

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<sup>i</sup> Market Research Report\_ITES\_EV Fleet Operators

<sup>ii</sup> [Executive summary – Transitioning India’s Road Transport Sector – Analysis - IEA](#)

<sup>iii</sup> [Telangana Electric Vehicle and Energy Storage Policy 2020-2030 chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.nsws.gov.in/s3fs/2021-08/Telangana%20EV%20policy.pdf](#)

<sup>iv</sup> [Telangana Electric Vehicle and Energy Storage Policy 2020-2030 https://tscost.telangana.gov.in/sti\\_policies.aspx](#)

<sup>v</sup> [HMR’s first automated 15 floor multi-level parking complex in Hyderabad getting ready https://www.thehindu.com/news/cities/Hyderabad/hmrs-first-automated-15-floor-multi-level-parking-complex-getting-ready/article68090676.ece](#)

<sup>vi</sup> [Hyderabad Rajiv Gandhi International Airport Guide \(tripsavvy.com\)](#)

<sup>vii</sup> Bloomberg New Energy Finance (2022)

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