Planning Tool for Electric Bus Deployment

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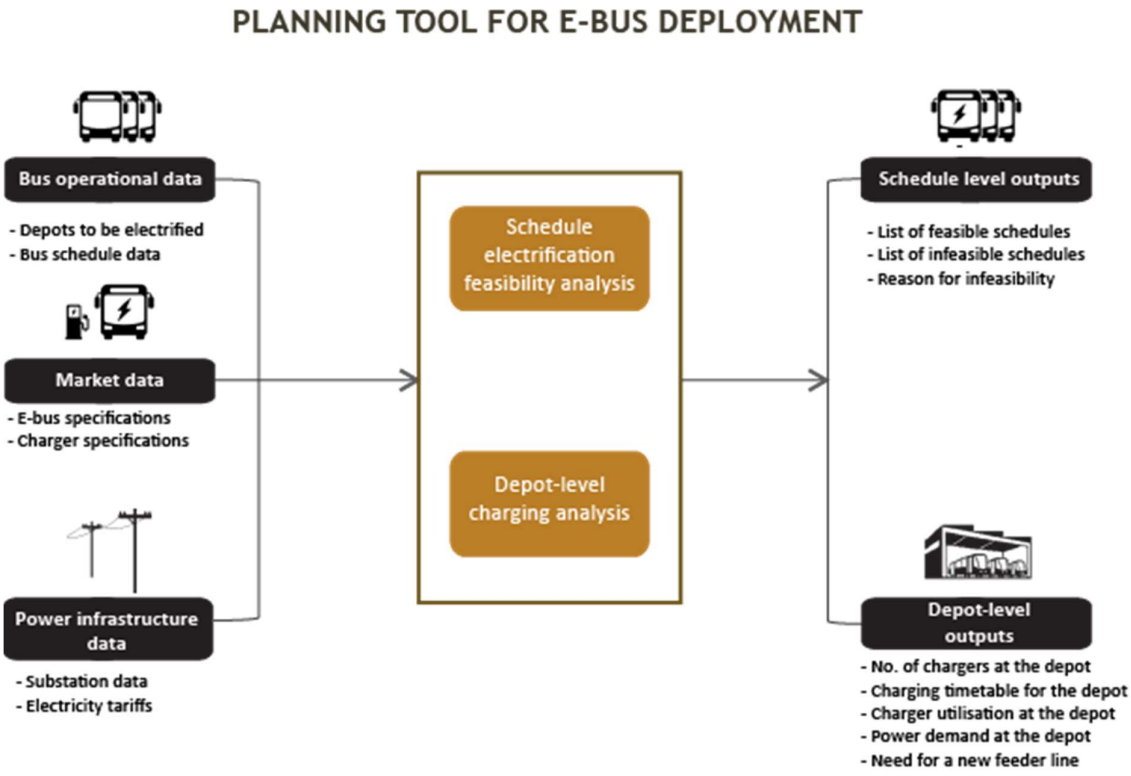
Under phase II of the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles (FAME) India policy, it has been envisioned to introduce 7,000 e-buses across the country by 2025. This initiative has increased e-bus deployment at a rapid rate. However, traditional bus operators are not yet familiar with the planning process and operational needs of e-buses. Unlike traditional buses that require liquid fuels, e-buses depend on the electrical grid for their energy needs. This key difference calls for setting up of the necessary electrical infrastructure to meet the resulting charging demand of the entire fleet.

A preliminary assessment is needed to understand the demand that may arise due to charging a fleet of vehicles such as e-buses at a depot. The planning process will necessitate a study of suitability of different technology options for vehicle charging. These options include opportunity charging wherein e-buses are charged intermittently for short periods during their operation, trolley buses that draw power from overhead cables, depot charging wherein the buses are charged during their halting times at the depots, and battery swapping wherein the spent batteries are quickly swapped for charged ones. Irrespective of the charging technology employed, the resulting demand is expected to significantly impact the electrical grid. Estimating this power demand is therefore crucial for electricity distribution companies (DISCOMs) to plan the necessary infrastructure. In addition, owing to the limited travel range of e-buses, only a subset of routes may qualify for their deployment. Hence, for inducting new e-buses, it becomes critical to study operational requirements and the grid infrastructure.

To address the aforementioned challenge in the decision-making process for State Transport Undertakings (STUs) and city transport authorities, the Center for Study of Science Technology and Policy (CSTEP) is building a web-based tool. The depots and bus schedules selected for operating e-buses are the key inputs to the tool. The specifications of the e-bus and charger models chosen, and electric grid details are other inputs. Using this data, the

current version of the tool provides a list of schedules that can be operated with e-buses, number of required chargers and their utilisation profile, charging timetable and the resulting demand profile, total charging energy consumed, and cost of charging per day at each depot. The schematic below shows the process flow within the tool (additional features are planned in the future versions).



This tool helps STUs and city transport authorities to plan depot-based charging requirements, identify schedules which can be used for operating e-buses, and estimates the resulting power/energy consumed in charging these e-buses at the selected depots. Given the generic nature of the tool and the inputs required, it can generate charging plans for different Indian cities where city-specific bus information. Apart from the transport authorities, the tool will also benefit electricity distribution companies (DISCOMs) to plan the related electrical infrastructure. Planning tools like this can help further large scale deployment of e-buses in India, thus furthering India's electric mobility ambitions. To know more about the tool or request a demonstration, the CSTEP team can be contacted at cpe@cstep.in.