Drive Electric TENNESSEE

Executive Summary: Tennessee Statewide Electric Vehicle (EV) Charging Infrastructure Needs Assessment

Background

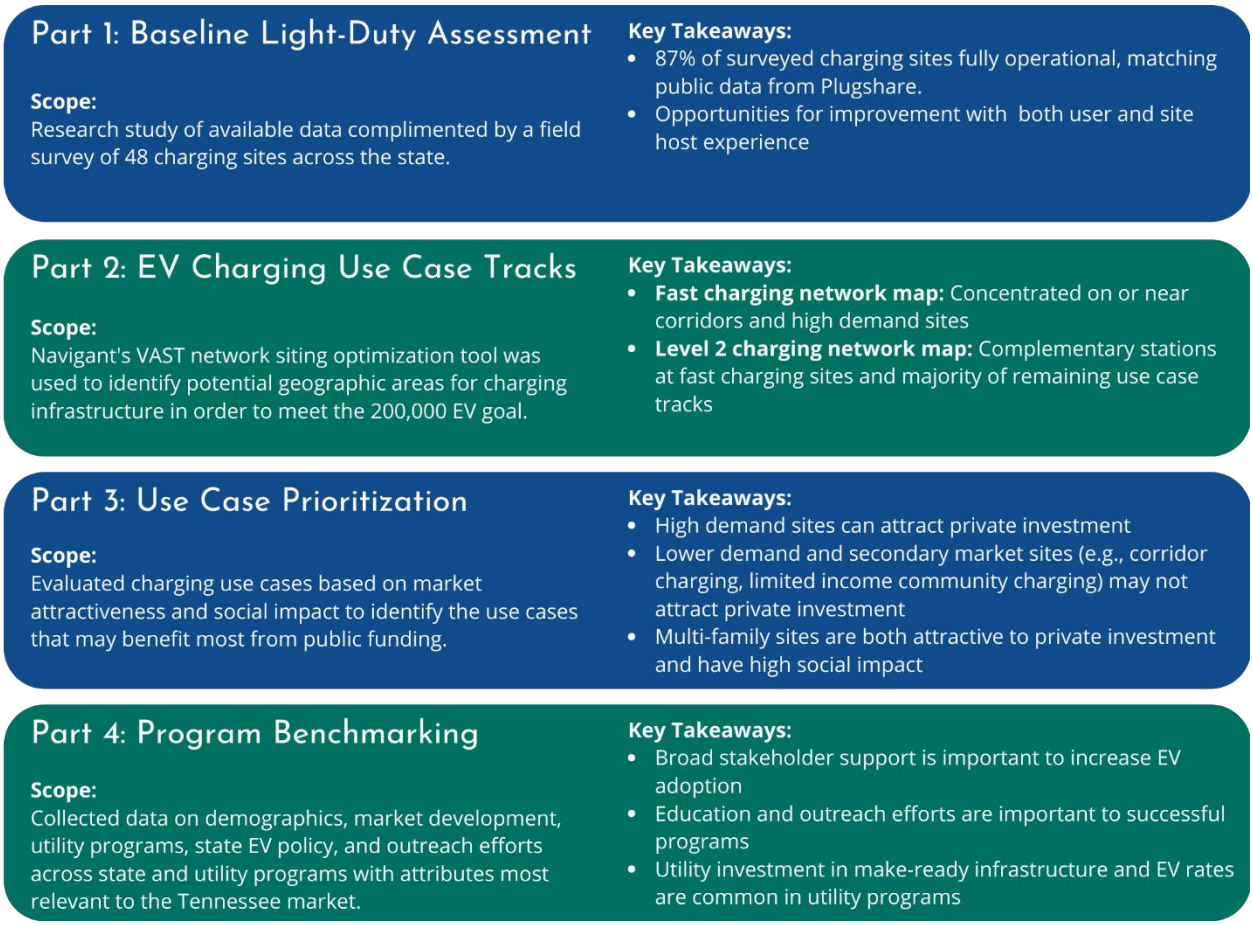
Throughout 2018, a core team of stakeholders—including State agencies, electric utilities, local governments, universities, electric vehicle manufacturers, businesses, and advocacy groups—worked together to develop a shared vision for electric transportation in the state, which includes goals and guiding principles for increased electric vehicle adoption over the next 5-10 years. Together, these stakeholders comprise Drive Electric Tennessee, a statewide electric vehicle consortium.

On January 18, 2019, Drive Electric Tennessee released the first edition of its Electric Vehicle Roadmap. The Roadmap establishes a goal to increase EV adoption to 200,000 EVs by 2028 and identifies projects and initiatives for local stakeholder implementation that will increase EV adoption across multiple Tennessee use cases and sectors. The various initiatives fall under four broad opportunity areas: Charging Infrastructure, Consumer Awareness, Vehicle Availability and Supportive Programs and Policies.

Following the release of the Roadmap, a Drive Electric Tennessee working group conducted a Statewide EV Charging Infrastructure Needs Assessment. The purpose of the assessment was to evaluate the condition of Tennessee's current electric vehicle charging infrastructure and to identify charging needs and potential geographic locations to support the adoption of 200,000 EVs in Tennessee. The scope and takeaways from each of the four parts of the Assessment are discussed below.

For further detail, a companion slide deck to this executive summary is available at https://www.tn.gov/environment/program-areas/energy/state-energy-office--seo-/programs-projects/programs-and-projects/sustainable-transportation-and-alternative-fuels/sustainable-transportation-and-alternative-fuels/drive-electric-tennessee.html.

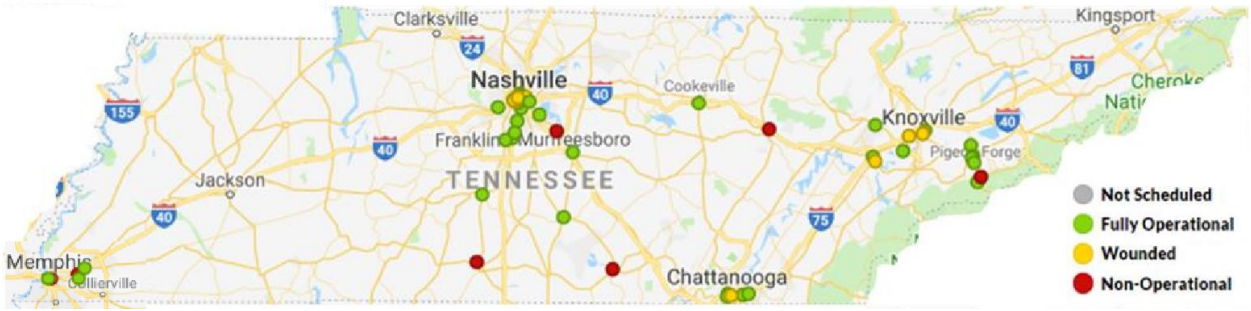
FIGURE 1: FOUR-PART STATEWIDE EV CHARGING INFRASTRUCTURE NEEDS ASSESSMENT



Baseline Light-Duty Assessment

The Baseline Light-Duty Assessment combined results from a desktop study, which utilized tools such as the Alternative Fuels Data Center and PlugShare, as well as a field survey of 48 charging stations across Tennessee, to conclude that 87 percent of Tennessee's existing public charging infrastructure is operational and can deliver a reliable charge. Figure 2 shows the location and status of the charging stations included in the study. While most infrastructure is operational, data collected during the field survey revealed that important opportunities exist to improve both user and site host experiences. The most common issues found at charging sites included damaged/sun-faded display screens, insufficient directional signage to help people locate charging stations in parking lots, and insufficient power output (the average maximum output among 50 kilowatt-rated stations was only 31.1 kilowatts). The assessment found that expired service agreements with site hosts were the primary reason that damaged and non-operational stations were not fixed. To improve site host experiences going forward, the assessment recommended following up with site hosts whose service contracts have expired to identify best practices and lessons learned.

FIGURE 2: CHARGING SITES FOR FIELD SURVEY



EV Charging Use Case Tracks

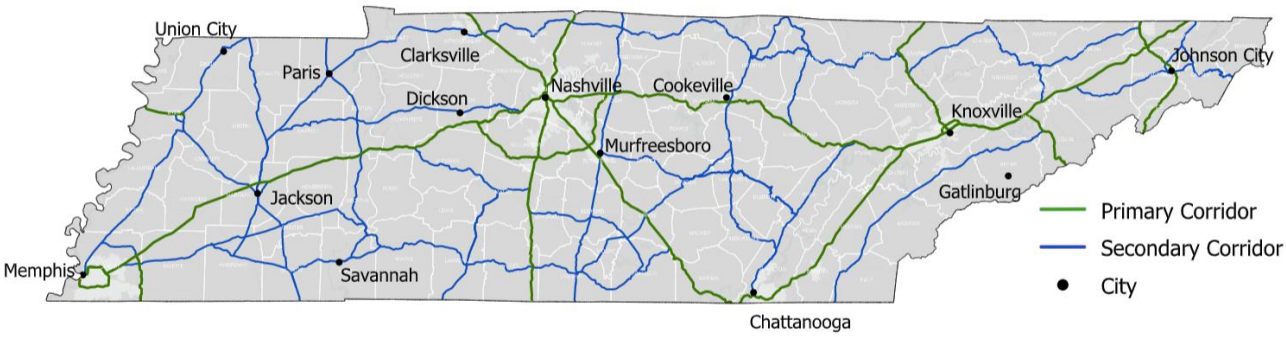
The Charging Use Case Tracks Assessment produced two maps of potential geographic areas for EV charging infrastructure to support the 200,000 EV deployment goal: one for DC fast charging and another for Level 2 charging. The assessment concluded that in the near term, most sites will likely be located along highway corridors and in urban areas of high demand close to Memphis, Knoxville, Chattanooga, and Nashville. Later phases of deployment anticipate more stations being added in suburban areas around these major cities. To define six types of sites, called "use cases," the maps were generated using Navigant's VAST™ network siting optimization tool, which used Average Annual Daily Traffic (AADT) data, vehicle miles traveled, EV adoption forecasts, and U.S. Census Bureau data. In some cases, results from the tool were supplemented with on-the-ground knowledge of known gaps along corridors. The tool then determined approximate geographic areas for each of these use case tracks and the level of charging infrastructure necessary to support expected demand at each location. The six use case tracks were defined by either the type of site location or the expected level of demand at the site, based on traffic data and EV adoption forecasts.[1] The six use case tracks are: 1) Existing, 2) Corridor, 3) Primary Market, 4) Limited Income, 5) Multi-Family, and 6) Secondary Market.

The assessment found that an optimized DC fast charging network would be concentrated along highway corridors in the "Corridor" use case track and at locations identified under the "Primary Market" use case track. An optimized Level 2 charging network would make up the majority of the required charging infrastructure at the remaining use case locations, such as in limited income areas, multi-family dwellings, and at other, secondary market sites that the tool predicted will be necessary in order to support 200,000 EVs. In certain cases, complementary L2 stations would be installed at DC fast charging locations.

A map of the "Corridor" use case track is shown in Figure 3. This map shows primary and secondary DC Fast Charging corridors to be designated as "FAST 50," meaning at least two chargers capable of 50 kW or more would be located at least every 50 miles (including CHAdeMO and CCS plugs).

[1] While some potential sites may meet the definition of more than one use-case track (e.g., a multi-family site may also be in a limited income area), for this optimization analysis, each is classified under only one use-case track.

FIGURE 3: MAP OF THE "CORRIDOR" USE CASE TRACK

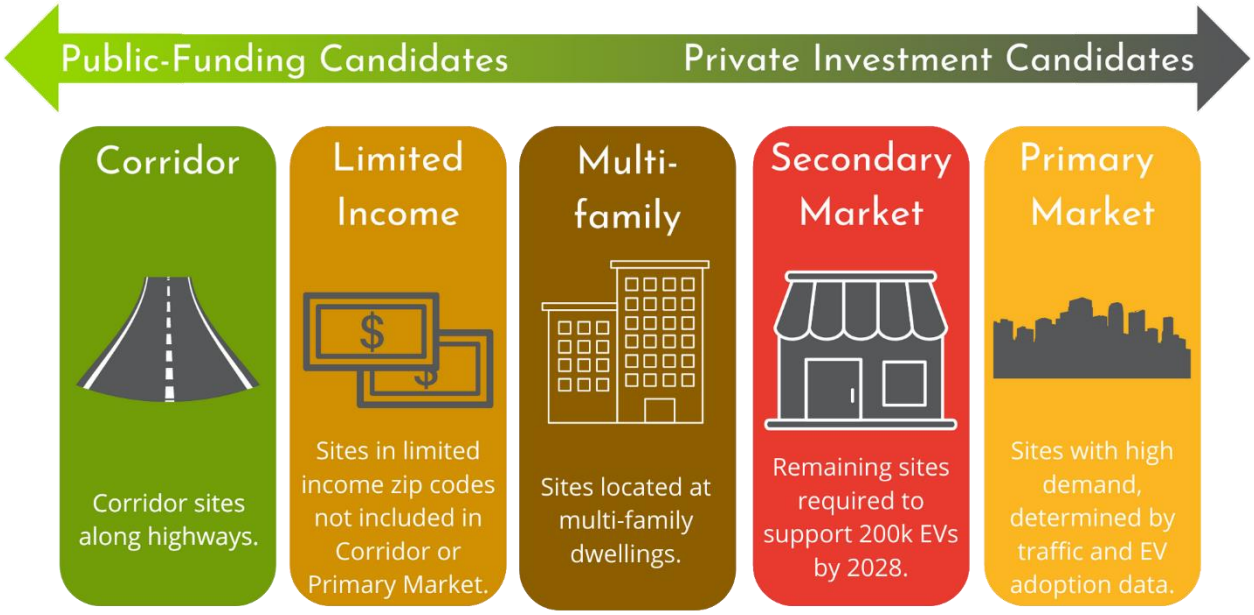


Use Case Prioritization

Through an evaluation of charging use cases based on market attractiveness and social impact, the Use Case Prioritization Assessment concluded that primary market charging sites are more likely to attract private investment, whereas corridor and secondary market sites (e.g., limited income community charging, additional corridor charging, etc.) may not attract private investment and are therefore good candidates for public funding.

The charging sites in the Primary Market use case track were determined by traffic data (AADT) and EV adoption data. Due to anticipated high utilization rates, these are the most attractive for private investment as site hosts could earn revenue by charging fees for utilization of the infrastructure.

FIGURE 4: CHARGING NEEDS USE CASES



These Primary Market use case tracks make up approximately 80 percent of the fast charging sites and 87 percent of the Level 2 charging sites identified by the VAST site optimization tool, with Primary Market use case tracks clustered around major urban centers such as Memphis, Knoxville, Chattanooga, and Nashville.

The sites identified as good candidates for public funding are sites located along highway corridors, which are necessary in order to relieve range anxiety, and sites located in limited-income areas, which ensure equity of access. In addition, the assessment found that charging sites at multi-unit dwellings have both high market attractiveness and high social impact, making them particularly good candidates for public-private partnerships.

State and Utility Program Benchmarking

The Needs Assessment also included a benchmarking of government and utility programs in other states to identify best practices for increasing EV adoption. Specifically, data was collected on demographics, market development, utility programs, state EV policies, and outreach efforts, noting attributes most relevant to the Tennessee market. The assessment found that investment in make-ready charging infrastructure, equipment rebates, and time of use rates were common components of leading utility programs such as those adopted by the New York Power Authority, Consolidated Edison, and Southern California Edison. The assessment also found that strong legislative support in states such as New York and Colorado was linked to high EV adoption rates in those states.