FLEET TRANSITION PLAN COMPONENT COMPENDIUM

ELECTRIC SCHOOL BUS NETWORK

CALSTART

Common Fleet Transition Plan Components

Fleet transition plans (FTPs) are strategic documents that outline how a school district or third-party operator can electrify their school bus fleet. FTPs can be a key asset in meeting state-level electrification goals and when applying for incentive funding because they can identify potential issues, answer key questions, and lay out a schedule of actionable steps. This foundational resource is designed to help fleets, funding agencies, and other stakeholders understand the components that could be included in a successful FTP. By laying out the key elements of an FTP, this primer provides the knowledge and vocabulary needed to navigate the FTP process and identifies the most-common components to include for a comprehensive and actionable plan.

Reviewing internal and external fleet transition plan (FTP) reports, CALSTART identified the top 10 most-common components included in FTPs for school bus fleets. These components are listed below in order of frequency of occurrence.

1. Fleet overview
2. Duty cycle analysis
3. Charging plan
4. Funding and incentive opportunities
5. Utility capacity estimates
6. Environmental impact
7. Site assessment (virtual)
8. Phasing plan/recommended replacement timeline
9. Total cost of ownership (vehicle, chargers, infrastructure, and other project costs)
10. Policy and legislation considerations

Component Definitions

CALSTART developed and used the following definitions to categorize the FTP components assessed. This includes definitions for components that were identified as common but did not make the top 10.

Charging Plan

A breakdown of the quantity and speed of chargers at each domicile location required to fulfill the fleet's needs for their electrification transition.

Duty Cycle Analysis

How many vehicles the fleet owns and classifications that describe the vehicle by type and class and how it is operated, such as typical miles traveled, number of stops, type of use (local versus highway), and fuel consumption.

Environmental Impact

Emissions calculations, such as percentage of greenhouse gas emissions reduced, gallons of gas or diesel reduction, and/or the reduction of specific pollutants through the fleet transition.

Executive Summary

One-page summary providing a high-level overview of the analysis results and recommended actions.

Fleet Overview

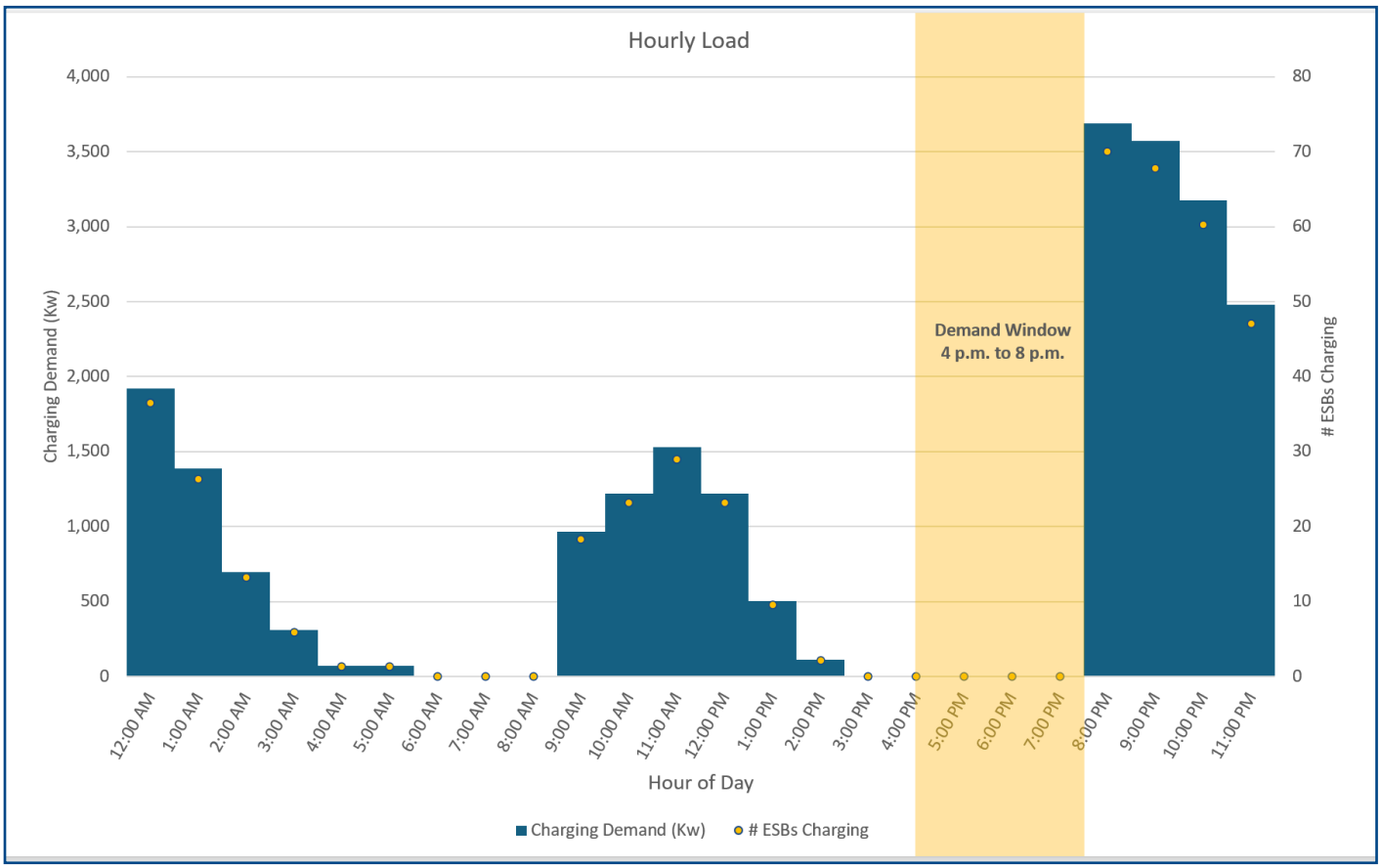
An overview of the fleet, including information like fleet type, fleet size, ownership structure, ridership, goals, and vehicle inventory summary.

Funding and Incentive Opportunities

Summary of and links to relevant funding opportunities for fleet vehicles, infrastructure, and other associated costs, including federal, state, local, philanthropic, and utility funding and incentives.

Hourly Load Analysis

A graph or table projecting the fleet's hourly peak demand over 24 hours. It also shows demand hours (identified by the utility) and demonstrates when and how many vehicles would be charged at certain times of day.



Managed vs. Unmanaged Charging Analysis

A scenario comparison of managed and unmanaged charging. This analysis provides a kWh overview, charging schedule, and financial comparison for the fleet.

Operation/Workforce Training

Information on specific operations and workforce development beyond simple descriptions. Examples include training recommended to the fleet, driver and maintenance checklists for operators, and maintenance that the fleet will need to perform based on their specific vehicles.

Phasing Plan/Recommended Replacement Timeline

An outline of vehicle procurement or deployment year to guide the fleet transition. This can be based on preexisting retirement schedules or be adapted to accommodate pilots, electrification mandates, or project barriers such as utility upgrade timelines.

Policy and Legislation Considerations

Summary of policies, laws, regulations, mandates, or memoranda of understanding that are relevant to the fleet's electrification goals at the federal, state, and local levels.

Resiliency Considerations

Explanation of resiliency and redundancy planning beyond simple overviews of distributed energy resources. This can include, but is not limited to, information on local vehicle-to-grid interconnection rules and rates; specific sizing for solar, battery storage, or backup energy generation; and specific information on flood mitigation.

Route Analysis: Regular Routes

An analysis of the vehicles' regularly scheduled routes, including trip distance, drive time, idling, and dwell time (i.e., overnight or periods in between trips for opportunity charging).

Route Energy Modeling

Estimates of vehicle energy consumption for their specific operations and geography, beyond the vehicle efficiency estimates provided by original equipment manufacturers. Route energy modeling tools or calculations typically use location and geospatial data from fleet routes to simulate vehicle performance under real-world operational conditions. Models evaluate parameters that impact vehicle range and efficiency, such as elevation changes, stops, seasonal temperature changes, vehicle load variability, and auxiliary loads.

Single-Line Diagram

An electrical single-line of the depot(s) assessed. A single-line diagram is a simplified representation of the site's electrical power system components and their connections, showing the path of power flow from the source to the loads. These diagrams are traditionally prepared by an electrical engineer.

Site Assessment (on-ground)

Site assessment performed in-person at the depot location by the report author, a project partner, or the client's utility. Includes the information provided in a virtual site assessment, plus additional information such as existing electrical equipment (transformers, switchgears, etc.), estimation of the current load, and projection of additional equipment that will be required to support the transition. Includes a description of site constraints that may limit electrification.

Site Assessment (virtual)

Virtual assessment of the depot location, including an aerial image (i.e., one sourced from Google Images) or site drawing (provided by the fleet), and an overview of the utility capacity map for that location (if available). Usually paired with utility capacity estimates based on current site load and information from the utility capacity map or relayed by the utility without an official site visit or load study.

Site Design

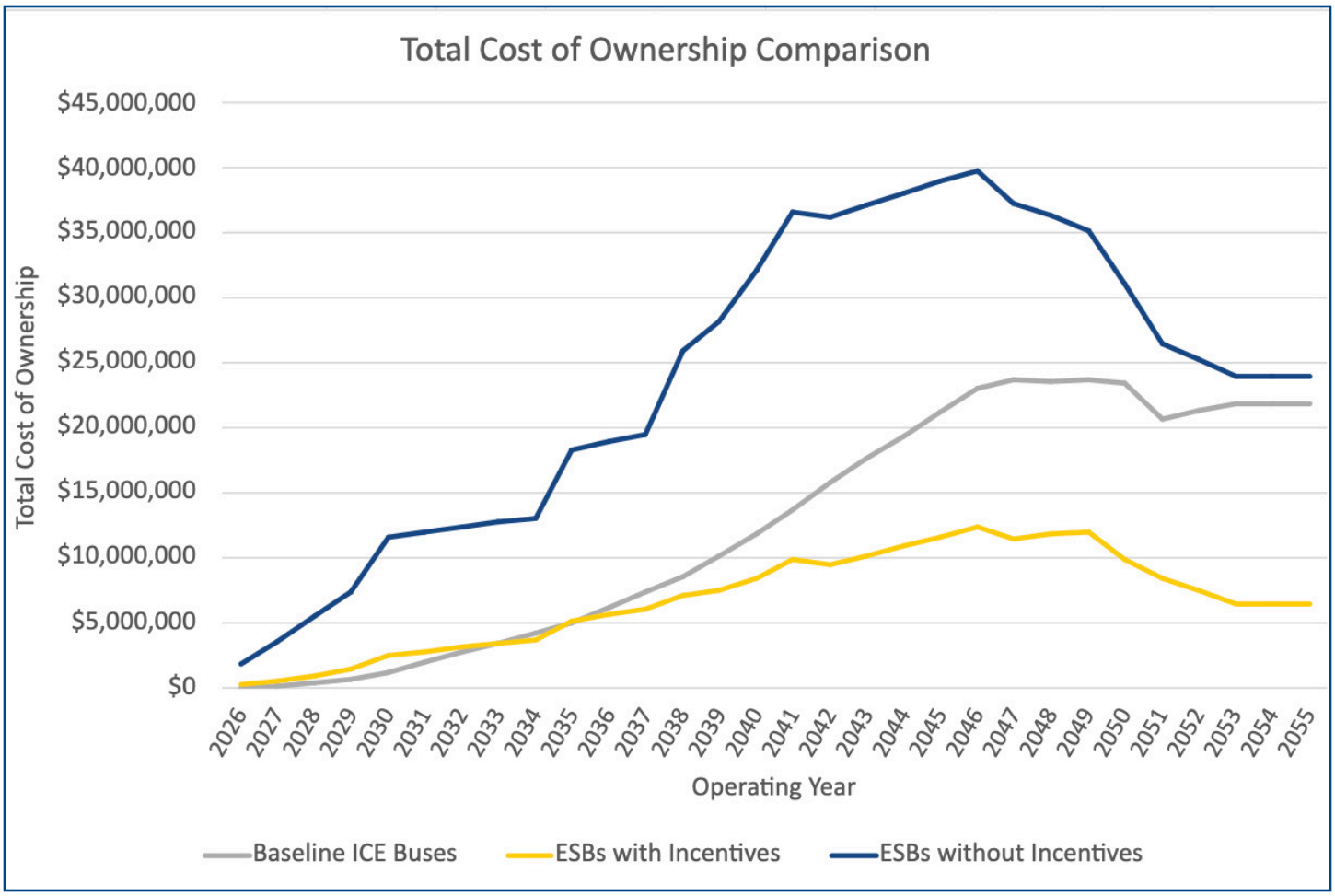
A site design schematic or drawing showing electrical equipment (such as transformers); suggested charger siting; parking orientation; and other spatial factors that need to be considered, such as bollards and walkways.

Total Cost of Ownership Analysis

Total cost of ownership calculations for the proposed electric vehicles as compared to baseline operations, including the vehicles, chargers, and infrastructure. Typically includes capital costs of the vehicles, charging infrastructure, and any customer-side electrical make-ready work, in addition to maintenance costs for the vehicles and chargers, operating costs such as fuel, and other costs such as insurance and taxes.

Total Cost of Ownership Analysis: Vehicle Only

Total cost of ownership calculations for the proposed electric vehicles compared to baseline operations. This often includes vehicle capital, maintenance, and operations costs.



Utility Capacity Estimates

Approximations of the maximum electrical capacity available at the site provided by a load study from the utility or an in-person site review based on the equipment present.

Vehicle Replacement Options

Available vehicle models that can serve the fleet's electrification needs.

Vehicle-by-Vehicle Operations-to-Charger Schedule

A breakdown of which specific vehicle or route will need to be charged at which charger speeds and at what times. Example: bus001 on a 50 kW DC charger overnight 11 p.m.-5 a.m. and midday 9:30 a.m.-1 p.m.

Get Expert Guidance, Connect With Peers

Join the **ESB Network** to access the latest industry trends, best practices, and valuable insights from peers facing similar challenges.

Contact Us

electricschoolbusnetwork.org
schoolbusteam@calstart.org

ELECTRIC SCHOOL BUS NETWORK

CALSTART