**General note:** This checklist can be used for bus contractors as well. Any reference to school district can be assumed to apply for the bus contractor in this case.

**Things to Look For**

* Proper grammar
* Ensure the correct district is being referenced throughout the document
* Numbers in executive summary match numbers within each specific section
* Numbers represented in tables/graphics match numbers within the text
* Referenced sections are actually referencing the correct section
* Tables, graphs, and images are all labeled and referenced correctly in the text
* Confusing, misleading, or undefined technical language should be clarified
* Technical Accuracy

**Executive Project Summary**

* Clear description of the assessment process
* Table with information about planned electric fleet
  + Total # of ESBs planned for purchase (broken down by battery size)
  + Total # of chargers (specify # per power rating)
  + Total Number of routes
    - Total # of routes that can be electrified with today’s technology
    - % of routes that can be electrified with today’s technology
  + Depot Address that was assessed for electrification (including street address, city, state, and zip)
    - # of buses and chargers at each depot location
    - Indicate ownership of the depot (district owned or leased property)
  + Vehicle ownership (district/contractor/lease)
* Table with information about utility requirements and impacts
  + Peak demand/load without charge management
  + Peak demand/load with charge management
  + % reduction in peak demand with charge management
  + List key items needed on the district side
  + List key items needed on the utility side
  + Include a timeline for improvements (if available)
* Table with information about the cost summary
  + Unit cost of each recommended bus type along with total available incentives per bus, unit cost of each recommended bus type after incentives are applied, and unit cost of comparable diesel or gasoline bus. Note that unit prices are provided due to current volatility of zero-emission bus costs and incentive amounts.
  + Unit cost of each recommended charger type along with total available incentives per charger, and unit cost per charger after incentives are applied
  + Total cost of infrastructure
    - Cost of district-side infrastructure
    - Cost of utility-side infrastructure
    - Potential incentive amount for infrastructure (including excess NYSBIP charging voucher amounts, make-ready funding, etc.).
  + Include a brief description of the impacts of state aid on costs over time
* Table Summarizing the Proposed Phasing Plan
  + Broken down into actions for each year (bus purchases, charger purchases/installations, major infrastructure upgrades)
  + OPTIONAL: Total cost of ownership (TCO) comparison to business-as-usual bus purchasing and operations

**Introduction and Overview**

* Clear and accurate statement of the current legislation, transition timelines, and NYSERDA’s role in this project
* Summary of the study’s scope, tasks, process, stakeholders, and report sections
* Acknowledgement that technology will continue to change over time

**Data Collection/Existing Conditions (Task 2 from SOW)**

* Clear statement of # of buses in current fleet
  + State if buses are district owned/leased/contracted
* Summary table of the current fleet
  + # of buses broken down by bus capacity and class (Type A,B,C,D)
  + Who owns the buses (# and/or % of fleet that is contracted or leased) Please include this even if the entire fleet is district owned/contracted out
  + Age of buses
* Information about existing routes and schedule
  + Clear statement of the current # of active routes
  + # of spare buses (% spare ratio)
  + Average route length
  + Specific information on each route (bus type, route length, etc.)
* Description of current depot location
  + Is the depot or lot district owned? If not, who owns it?
  + Depot Address
  + Bus parking/storage arrangements (are the buses parked outside or inside? Is there a bus garage used for maintenance?)
* Summary table of the existing service capacity at each depot location
  + Depot address
  + Fleet size at this location
  + Existing service capacity
  + Existing voltage
  + Available breaker space
  + Recommendations for immediate electrification
* Description of geography and climate of the district

**Routing Analysis and Bus Technology Assessment (Task 3 from SOW)**

* Summary of data inputs (routes, climate, efficiency, topography, climate, etc.)
* A table outlining the route analysis charging variables/assumptions. This table should include, but is not limited to, the following:
  + Battery Efficiency for at least 2 Temperature Scenarios
    - Cold: Average Winter low for the past 5 years
    - Temperate: Average temp Post March 1 and Pre November 1
    - OPTIONAL Extreme Cold: Lowest temp in past 5 years
  + The frequency, or % of days, in a year that fall within each temperature scenario
  + Battery efficiency/efficiencies at each temperature
  + Any relevant safety factors
  + Battery degradation %
  + Deadhead Mileage (if not available from routing data)
  + Minimum/Maximum SOC
* Analysis of at least 2 bus manufacturers
* Include information on spare buses
  + # of spare buses
  + % of spares in the total fleet
* Route feasibility table under at least 2 different temperature scenarios
  + Include feasibility, minimum battery size required, and battery efficiency for both temperature scenarios
    - Cold: Average Winter low for the past 5 years
    - Temperate: Average temp Post March 1 and Pre November 1
    - OPTIONAL Extreme Cold: Lowest temp in past 5 years
* Table of minimum battery size per route, and recommended battery size per route based on current technology on the market (based on the Cold temperature scenario)
  + Show route feasibility over time as battery degrades
* Qualitative explanation of how routes that may not be feasible with today’s technology may be feasible by 2035 as technology improves

**Optional:**

* Information on rerouting if it could reduce the number of buses/energy needed for routes (some districts are not interested in rerouting, but worth including if it would drastically increase the efficiency of the fleet)
  + If rerouting was not considered a valid option, please explain why
* For cold climates, assess the need for auxiliary heating (short-term fuel-fired heaters, long-term heat pumps, or fuel-cell heaters)
* Additional tasks as discussed with the client

**Conceptual Charging Strategy (Task 4 from SOW)**

* Summary of data inputs and assumptions. May include, but not limited to, the following:
  + Charger efficiencies
  + Peak demand windows
  + Rate of charge limits
  + Pre-conditioning assumptions
  + Charge management strategies or limits
* Identify peak demand using 2 potential charging scenarios
  + Max charging (includes pre-conditioning and maximum SOC at departure)
  + Managed charging (includes reduced pre-conditioning, and matches SOC to route needs)
* Consult with school district or bus contractor to choose a charging scenario to carry through to Electric Utility Analysis and Concept Development and Phasing Plan
* Indication of chosen charging scenario to carry through for Electric Utility Analysis and why
* Table of recommended charger size and charging times per route
* Summary of managed charging or demand reduction analysis
  + Peak demand
  + Percent reduction from non-managed charging
  + Is a charge management system/service being recommended
* Identify routes that are able to complete their afternoon runs without midday charging, and routes that have additional charge remaining after all of their scheduled runs
  + This will inform a discussion and high-level analysis of which buses/routes could support early dismissal and extracurricular activities
* Submit the necessary inputs for a rate analysis to the utility provider, or use their online tool to complete a rate analysis (as available)
  + Number of buses
  + Number of ports
  + kW rating of ports
  + 24hr load profile in kW

**Electric Utility Analysis (Task 5 from SOW)**

* Table showing Electricity usage at depot location(s)
  + Demand (kW)
  + Usage (kWh)
  + Total cost
  + $/kWh
  + Average yearly data
  + Remaining capacity on existing service
* Estimate of the number of chargers/buses that could be supported on the existing service equipment (i.e. Could a bus pilot be supported without making utility upgrades)
* Summary of utility capacity analysis
* Utility side requirements
  + Any upgrades needed to the utility-side infrastructure to electrify the whole fleet
  + Reference to CMS analysis (if applicable)
  + Document outreach and coordination with utility
* Customer side requirements
  + Any upgrades needed to the customer-side infrastructure necessary to electrify the whole fleet
  + Reference to cost analysis section
* Summarize the findings of the utility rate analysis (as available)
  + Include each adoption milestone as defined by the Joint Utilities (25%, 50%, 100%)
* Discuss possible mitigation measures if power cannot be supplied to the site, and possible obstacles for the district meeting the timelines required by New York State law (i.e. Alternative connection options, battery storage, mobile chargers, easements, component lead times, etc.)

**Optional:**

* Description of how multiple sites will be handled, if applicable
* Vehicle-to-Grid (V2G) charging analysis
* Backup power analysis
* Microgrid analysis
* Distributed Energy Resources (DER) analysis

**Concept Development and Phasing Plan (Task 6 from SOW)**

* Summary table of minimum and recommended bus and charger sizes/models from the Route Analysis and Conceptual Charging Strategy
* Provide a consolidated timeline for how the school district could meet the 2035 transition schedule either in phases, or year-by-year, which includes:
  + Procurement schedule for buses
  + Procurement/installation schedule for chargers
  + Timeline for infrastructure upgrades
* Align timeline with any planned capital projects that may be relevant
* Concept-level site plan and one-line diagram including locations of utility interconnections, conduit, chargers, bus parking, and other necessary site changes or infrastructure elements to support a zero-emission bus fleet

**Transition Plan Cost Estimates and Cost Comparisons (Task 7 from SOW)**

* Total anticipated infrastructure costs
  + Specify what are district costs, and if available, what are utility costs
  + Identify potential mark-downs from utility make-ready funds and charger incentives
* Bus and charger costs
  + Provide per-unit costs, along with incentive amounts per unit, unit-costs once incentives are applied, and in the case of buses a comparison to business-as-usual diesel bus costs
  + Separate these costs from infrastructure upgrade costs and bus and charger prices are most likely to change as the market matures
* Summarize how state aid will be applied to buses, chargers, and infrastructure/building costs as applicable
* Summarize the cost implications of the utility-provided rate analysis and cost impacts of midday charging or other charge management strategies
* Identify and summarize currently available incentives, rebates, vouchers, tax credits, and other forms of funding
* If any assumptions or exclusions were made in this cost estimate, please state them clearly in this section