ENERGY EFFICIENCY AND CONSERVATION BLOCK GRANT (EECBG) PROGRAM

Key Activities Summary

Blueprint 4A: Electric Vehicles and Fleet Electrification

This Key Activities Summary provides a concise overview of the **Electric Vehicles and Fleet Electrification**. DOE plans to provide technical assistance support to all entities who select this Blueprint, which may include one-on-one attention from DOE or national lab experts, webinars, and peer learning opportunities.

blueprints
Energy Efficiency & Conservation Block Grant Program

SCEP
STATE & COMMUNITY ENERGY PROGRAMS

What

This Blueprint includes a high-level overview of the process and benefits of fleet electrification. It includes a focus on planning for and purchasing electric vehicles (EVs) for government fleets, as well as the associated charging infrastructure, such as charging stations and site upgrades.

Many heavy-duty government vehicles have traditionally run on conventional diesel fuel, including transit buses, school buses, garbage trucks, and other service vehicles. When these vehicles run through environmental justice communities, the diesel exhaust may exacerbate the effects of already higher-than-average air pollution. Thus, when replacing conventional fleet vehicles with EVs, governments may wish to consider placing a priority on heavy-duty vehicles that run service routes through lower-income communities.

Governments can also consider including preferences for local and women- and minority-owned small businesses in RFPs related to EVs and charging equipment procurement.

Why

Every government, whether state, local, or tribal owns and operates a variety of vehicles, such as passenger cars, school buses, shuttle buses, heavy duty garbage trucks, and snowplows. Electrifying the fleet, by replacing vehicles with gasoline or diesel engines with electric vehicles, will reduce transportation sector emissions, improve air quality, and, if done right, reduce your government's operational expenses and maintenance needs. Planning is a key component to electrification of the transportation sector. To ensure new electric vehicles can be operated successfully, governments need to consider many important details, such as parking and charging options, fleet routes, frequency of use, and specific issues like turning radius limitations on city streets and continuous operating time.

1
2
3
4
5
6

Key Activities

These selected Key Activities are suggestions of important steps a government could take to begin or make progress on their fleet electrification journey. EECBG Program awardees that utilize a Blueprint will receive expedited application review from DOE. Applicants must execute at least one of the key activities listed under each selected Blueprint but should avoid going beyond the recommended activities. Going beyond these key activities may trigger additional reviews of your EECBG Program project to ensure you're meeting National Environmental Policy Act (NEPA), historic preservation, and/or other federal regulations. While each step is important, they should be seen as a guide. Awardees should determine their own priority activities based on their local context.

1. **Develop Fleet Replacement Plan, Including Stakeholder Engagement and Input**
2. **Siting Planning and Preliminary Assessments**
3. **Develop Utility Data Sharing Agreement**
4. **Develop Charging Plan Including Cost Assessment of Electric Bill**
5. **Procurement, Legal, and Technical Support to Purchase EVs and EVSE**
6. **Installation of Charging Infrastructure**

Develop Fleet Replacement Plan, Including Stakeholder Engagement and Input

Begin by performing a fleet assessment: Gather as much information as you can about the vehicles in your fleet. This may include: total number of fleet vehicles; vehicle types; frequency of use per vehicle; engine fuel type; fuel economy; annual vehicle mileage; service route length and location; daily service hours; communities or constituency served; anticipated replacement date – noting any vehicles at or near retirement age, making them strong near-term candidates for EV conversion; maintenance and repair costs; vehicle use case; whether vehicles need to be four-wheel drive or snowplow capable; overnight vehicle parking locations; number of domiciled vehicles; and vehicle charging requirements, including whether or not charging stations can be made available during the vehicle's daily use. Evaluate which vehicles in your fleet are the best candidates for electrification.

Engage Stakeholders: Fleet manager(s), fleet mechanics, drivers, etc. – as part of this process to understand any questions, concerns, or unique vehicle specifications such as turning radius, maximum vehicle height, use case, or additional electrical equipment needs. Understanding and addressing these needs and concerns and applying it to purchasing decisions and training resources can build confidence in EVs.

» Fleet assessment cost estimate: $10,000 to $100,000

» Detailed vehicle replacement plan, including a full fleet assessment, identification of vehicles for EV conversion, and prioritization of vehicles for replacement.

Key Resource

AFLEET Tool - Argonne National Laboratory (ANL)

Clean Cities Coalition Network: Technical Assistance (DOE)

Dashboard for Rapid Vehicle Electrification: DRVE Tool (Electrification Coalition)

Alternative Fuels Data Center: Electric Vehicles for Fleets (DOE)

Plan for Driver and Technician Training: Consider whether the staff who will routinely drive the vehicle have any prior experience with EVs and how to set up standard training for current and future staff. Energy efficient driving behaviors will help extend the EV's time of use and will save fuel when driving non-EVs. For complex and/or heavy-duty vehicles, additional training may be required due to operational differences in EVs versus conventional diesel vehicles. Consider also whether the technicians in your staff are experienced or knowledgeable about EV repair and maintenance, or whether additional training will be required. Similarly, examine your fleet's maintenance facilities to determine if any bays will need upgrades to support EVs (e.g., heavy-duty EVs will require stronger lifts).

Key Resource

Emergency Response Guides for Alternative Fuel Vehicles (NFPA)

Electric Drive Vehicle Automotive Technician Training (WVU)

Electric Vehicle Infrastructure Training Program (EVITP)

EV Training (DOE)

Siting Planning and Preliminary Assessments

Once the fleet has been evaluated for electrification opportunities and vehicle parking locations are identified, you will need to identify locations for electric vehicle supply equipment (EVSE) installations, another term for charging stations and evaluate the site's existing infrastructure and the infrastructure fleet EVs will require.

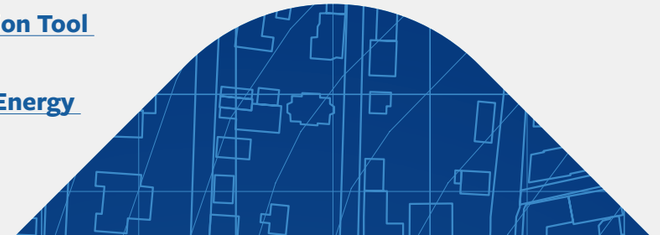
Identify Charging Locations: Determine what location(s) are best suited to provide charging for vehicles selected for electrification. This will likely be a location where a large number of vehicles recommended for electrification park overnight and will be able to charge for an extended period. Special considerations and charging practices may be needed for vehicles that are domiciled at employee homes.

Evaluate Charging Infrastructure Options: Determine what charging equipment is compatible with your new EVs, how and when charging will be conducted, and where charging equipment will be located within your facility.

Key Resource

Electric Vehicle Infrastructure Projection Tool (EVI-Pro) Lite (DOE)

EV Planning Resources: Charging and Energy Needs (USDOT)



Key Resource

Alternative Fuels Data Center: Electric School Bus Education (DOE)

Contact your Electric Utility: Once you have identified which vehicles to target for EV conversion and locations for charging infrastructure, reach out to your electric utility. Your utility is essential to helping you understand your plan's power requirements and may even have rebated and incentives available. Share as much information as possible about your proposed fleet electrification charging requirements with your electric utility, including the estimated power requirements and location of any new charging equipment. Your utility can work with you to determine available incentives (if applicable) and if any grid or facility upgrades are needed to meet the additional electric load. If so, electrical upgrade projects often have long lead times, so it will be important to complete this step early in the process. It will be important for your utility to understand your long-term plans so that they can incorporate that into their planning while also allowing you to futureproof your buildings and parking facilities for future EV adoption.

Siting Cost Estimate: $10,000 to $100,000

» Detailed charging plan, including parking locations, siting for charging equipment, and cost assessment of electricity bill based on electricity rates, power needed, and planned charging times.

Develop Utility Data Sharing Agreement

Sharing data with your utility can help utilities mitigate grid impacts through managed charging programs, which allow the utility to remotely control EV charging to respond to real-time grid needs. Types of data to share with your utility may include EVSE utilization rates, expected versus actual power demand, charging times, number of vehicles charging at each station, and projected changes to your fleet. Data sharing with your utility can help your fleet avoid excess demand charges, learn about your fleet's vehicle charging behavior, and plan for future infrastructure needs.

Case Study

Clean Fuels Technical Assistance Program Reports

The Maryland Energy Administration offers technical assistance to local governments as they consider alternative transportation fuel options for their fleets. The **Clean Fuels Technical Assistance Program Reports** include analyses for multiple localities.

Develop Charging Plan Including Cost Assessment of Electric Bill

A charging plan will set a schedule for your fleet's charging needs to ensure all vehicles have enough power to complete their required tasks. To develop this charging plan, you will need to have an understanding of the number of EVs charging at each location, their range, the total time they are able to charge overnight or during the day, and the frequency at which they will need to be charged. Vehicles with different use cases will require different charging considerations. For example, transit buses will need to charge quickly and multiple times throughout the day and can slow charge overnight. Other vehicles that have lower daily mileage can go a few days without charging and then charge for several hours overnight. Your charging schedule will want to take advantage of cheaper charging times, which typically occur at night, and avoid demand charges when possible.

As you determine the amount of energy it will require to keep your fleet operational, you can estimate your electricity bill. For this cost assessment, you should work with your utility to understand your electricity rate at different times of the day and how to build in considerations for demand charges. Your utility can help you assess multiple charging schedule scenarios.

Case Study

Philadelphia Municipal Clean Fleet Plan

The **City of Philadelphia's Municipal Clean Fleet Plan** lays out a strategy for the City to transition its fleet to clean and electric vehicles. Includes data from the City's fleet assessment and analyses.

KEY ACTIVITIES

Procurement, Legal, and Technical Support to Purchase EVs and EVSE

Once you are ready to begin purchasing EVs and EVSE, you may need support during the procurement and installation phase of electrification. Depending on your fleet's size, a formal solicitation process may help streamline the purchase and installation of charging infrastructure.

Key Resource

Alternative Fuels Data Center: Charging Infrastructure Procurement and Installation (energy.gov)
WPCC_sampleRFP_1114.pdf (energy.gov)

Compare EVs on the Market to Your Fleet's Needs: Identify which EVs on the market are the best fit with your fleet's procurement requirements, based on the factors you've considered during the fleet assessment. Many EVs of the same vehicle type will offer similar operations, fuel, and maintenance savings, but your fleet may prefer certain makes, models, or purchase prices.

Key Resource

Find and Compare Cars (DOE) (for light-duty vehicles)
Alternative Fuels Data Center: Vehicle Search (DOE) (includes heavy-duty vehicle models)
ZETI (Zero-Emission Technology Inventory) (Drive to ZeroTM)
Truck and Bus Voucher Incentive Project (California HVIP)

Vehicle cost estimates (data as of March 2023):

» Light duty vehicles: multiple models available, starting at roughly $25,000

» Light duty pickup trucks: multiple models available, starting at roughly $40,000

» Heavy-duty vehicles: estimated cost $100,000-200,000+
  » Transit van/shuttle van: multiple models available
  » Transit buses: 44 models available
  » School buses: 32 models available
  » Garbage trucks: 8 models available
  » Street sweepers: 2 models available

Examine Financials: Determine any funding, incentives, or programs that are available for EVs or EV charging infrastructure in your area, including utility, state, or federal funding sources. Estimate future operations and maintenance costs and how they will compare with current costs. Work with your budget office, fleet manager(s), and energy manager to incorporate these adjustments into future budget requests and planning.

Procure EVSE, including charging stations and related infrastructure. Cost estimates:

» Level 2 charger: $3,000 - $6,300 per charger, including hardware and installation costs

» DC fast charger: $55,000 - $120,000 per charger, including hardware and installation costs

Key Resource

Alternative Fuels Data Center: State Laws and Incentives
(DOE) EV Utility Finder (EV U-Finder) (DOE)
Charging Infrastructure Procurement and Installation (DOE)

KEY ACTIVITIES

Installation of Charging Infrastructure

Once you have identified vehicles for electrification and determined the type and location of supporting EVSE, you may begin the installation process. When installing EVSE, you must consider building code requirements, zoning requirements, compliance with other relevant local or state laws, permitting, and design specifications (e.g., signage, markings, etc.).

Key Resource

Alternative Fuels Data Center: Charging Infrastructure Procurement and Installation (energy.gov)

Alternative Fuels Data Center: Installing Electric Vehicle Charging in Compliance with the Americans with Disabilities Act Requirements (energy.gov)

Alternative Fuels Data Center: Signage for Electric Vehicle Charging Stations (energy.gov)

NOTE: Further restrictions are listed on page 39 of the Energy Efficiency and Conservation Block Grant (EECBG) Program Formula Grant Application Instructions.