

# Getting the Most From EV Infrastructure Investments: A Programmatic Design-Build Approach

By Michael Hollingshead

For most transit agencies and fleet operators, the biggest impediment to fleet electrification is a lack of available charging infrastructure. But making informed decisions is challenging in the ever-changing electrification market. The programmatic approach to project delivery clarifies the path, allowing you to scale your infrastructure cost-effectively with speed and quality.



Vehicle electrification is immersing the transportation sector in one of the most significant powertrain transformations in a century. Turnkey development of charging infrastructure is offered by vehicle original equipment manufacturers (OEMs), charger manufacturers and resellers, charging network operators, and electric vehicle (EV) consultancies. But beware: While turnkey offerings can be beneficial, customers can be subject to one-size-fits-all biases and knowledge gaps that lead to unplanned scope, stranded assets, additional costs and a lack of end-to-end accountability that could leave them without reliable infrastructure when they need it most.

The objectivity of programmatic design-build approaches, agnostic to hardware, software and vehicle brands, provides lasting, quality solutions that operators can depend on. Most importantly, design-build starts with your vision and operational data in mind. Upon initiation, the design phase prioritizes the customer's operational requirements above

the capabilities of any singular software solution, vehicle or charger. Transit agencies and fleet operators, by starting with a criteria-based assessment, can navigate the complicated electrification environment and make decisions that will cost less and serve their companies well over the long-term.

## COVID-19 Impacts

It is almost impossible to discuss infrastructure without first discussing how the COVID-19 pandemic has affected global transport and related zero-emission transition timing. Though the current economic situation is dire in many respects, our view remains positive and optimistic. Zero-emission planning must take into consideration that while the market pauses, expectations for meeting pre-pandemic goals remain. This is due mainly to the pre-pandemic commitments at the policy level by OEMs and private industries that have created powerful and unmistakable momentum.

While the ebb of governmental incentives continues, zero-emission mandates are on the rise in the U.S. with developing regulations that go well beyond light vehicles and transit. For example, new California mandates that are projected to take effect in 2023 will help improve the electrification of transportation refrigeration units (TRUs) for trucks, goods movement facilities in industrial zones, ports and railheads.

Powerful forces — in terms of private industry, political will and governmental policy — continue to drive the long-term prospects of the transportation electrification market. The California Air Resources Board is often regarded as the most influential regulatory body in the nation for emissions, with 13 states plus the District of Columbia choosing to adopt its strict standards.

The economics of low gas prices notwithstanding, technological advancements make it possible to produce batteries with longer ranges at lower prices. According to Bloomberg New Energy Finance, EVs are coming closer to cost parity with internal combustion vehicles, which is forecast to occur in 2024.

### **Jumping In (Vehicle or Charger First)**

In many cases, customers begin the EV transition with the selection of new or replacement EVs — with or without a “turnkey” charger equipment offering from the vehicle manufacturer. That choice, assuming it considers the performance required for the vehicle’s planned uses (i.e., duty cycle), determines the required charging infrastructure and potential utility upgrades. Furthermore, all of these closely related decisions are subject to technology advancements and obsolescence cycles that should be carefully considered to avoid future stranded assets.

Similarly, starting with an electric charger product selection may commit owners and operators to products that are misaligned with their vehicle and duty-cycle requirements, long-term operational goals and customer commitments. Conversely, if the decision is to purchase EV fleet vehicles first and figure out how to charge them later, service interruptions, unanticipated costs, lengthy implementation time, lack of available space and other constructability problems may appear. Understandably, many operators feel pressure to jump on the electrification bandwagon. But selecting the right partner with an objective point of view will accelerate the realization of electrification’s many long-term benefits.

### **Avoid Turnkey Risks**

During construction, customers are exposed to the greatest potential for unanticipated costs and operational delays. The role of a design-builder is to minimize those risks through holistic planning. Specifically, the design-builder is responsible for linking operator strategy, such as operation and financial targets, with the right equipment, the right design and expedited execution. Common pitfalls and risks are detailed below.

### **Unplanned Project Dependencies**

Determination of an operator’s load profiles is critical to forecast both expected energy costs and any utility upgrades necessary for the required charging infrastructure. The latter will vary greatly site to site depending on facility operations, dwell times, vehicle performance, charger power, and available electrical capacity and condition of the local power grid. Site location is consequential; for example, the electric capacity of the grid near a bus yard in a remote area is typically lower than the grid capacity near an urban bus yard. Engaging with a local utility early in the project is critical in understanding the process, timeline and requirements for service upgrades and interconnection.

### **Cost Overruns**

The bulk of charging infrastructure installation costs fall within the construction phase but can be estimated much earlier in the project initiation and design phases. Well-supported cost estimates are critical so that project funding and finance mechanisms can be determined as early and accurately as possible. Otherwise, cost overruns may result, and federal, state and utility funding may become oversubscribed, leading to budget gaps or requiring additional delays until funds are replenished.

### **Charger Unknowns**

While the EV charging market has matured significantly over the last several years, product performance, longevity and reliability estimates are still difficult to verify. Post-installation warranties and service plans may be unavailable or very costly, requiring customers to determine early in the purchase cycle what uptime service levels, on-site labor, parts inventory and other support they will need.

### **The ‘Plug-and-Play’ Fallacy**

A charger may look like an appliance, but proper operation depends on a number of factors, including network connectivity, firmware/software compatibility and scheduled maintenance. Furthermore, most medium- and heavy-duty

electrification initiatives should consider the benefits of integrating chargers with fleet management systems and load mitigation technologies (e.g., site controllers, dynamic load sharing and other features) to lessen demand charges. This can be challenging because information on equipment capabilities, compatibility with software protocols, constructability and interoperability with vehicles and other infrastructure is often not available or requires extensive knowledge to implement.

## Advantages of Design-Build

Programmatic design-build is advantageous in many industries, but it is particularly valuable for fleets where the energy requirements and constructability of new charging technology require deep knowledge and experience. During the initial concept phase, the design-build team will explore important factors regarding your operations and facility needs, including:

- Battery storage as a part of a more comprehensive resiliency plan.
- Charger location selection, technology options and automation requirements.
- Existing on-site power and available utility service capacity upgrade costs.
- Load growth over time with scaling of electric vehicles (future-proofing).
- Site feasibility and layout.
- Vehicle performance data and compatibility with service requirements.

As EV technology evolves in range and capability, and as energy requirements grow, design-build may provide many additional benefits.

## Flexibility and Continuity

In the developing EV market, project requirements can change in response to new technology, building code requirements, product availability and other unforeseen factors. For example, site selection depends in part on the constructability of a particular charging solution, available electric capacity from the local utility and other considerations. An experienced design-build team can anticipate and mitigate many of these challenges.

## The Ability to Work Further Upstream in the Project Development Cycle

Because the same design-build team works together from initial concept through completion, owners can benefit from the knowledge and experience of electrification professionals in planning, engineering, procurement and construction throughout the project. This keeps the concept and reality of the project in sync. For example, early decisions on charger socket locations in a freight or bus yard can be evaluated holistically to meet connectivity requirements for smart charging, code requirements for constructability and operational requirements for interoperability among different vehicle makes and models.

Working upstream in the project development cycle also improves the likelihood of securing available funding, since EV programs can quickly become oversubscribed. The earlier you can determine vehicle and infrastructure requirements, the more prepared you will be to apply for and receive available federal, state, utility and municipal funding.

## Greater Insight Into Costs

A programmatic approach applies rigorous cost and schedule management to monitor project progress, providing owners and operators a high level of transparency to project health that is not typically part of other turnkey providers' skill sets. That transparency will in turn provide more timely and robust decision support to control costs.

Additionally, an experienced design-build team can help owners mitigate costs through value engineering during upfront planning. This includes helping owners know what to expect in terms of construction, reducing risks, ongoing operations and maintenance costs. How companies pay for electrification construction will depend on what funding is available, as well as what mechanisms are in place to finance the difference.

## Vendor-Agnostic Approach

When operators turn to a design-builder to begin their electrification transition, they avoid the inevitable conflict of interest when relying on a single vehicle or charger OEM to provide objective advice on other available solutions. In addition, once options are fully considered, planning any project does not pivot solely on accommodating charger equipment or vehicle requirements, but on the operator's needs. Owners may be better served by designing holistic electrification requirements first and then seeking the product solutions and components that are the right functional and economic fit.

## The Time is Right

Working in the developing electrification market is exciting. Technology is continually evolving and presenting new opportunities for energy and operational efficiency. At the same time, it's hard to anticipate changes and gather the detailed and accurate information needed to make decisions that will serve your company well in the long term.

The design-build approach addresses these challenges by integrating electrification planning from initial concept through completion. An experienced team will work far upstream of the construction process to study developing vehicle and charger technologies; analyze the existing electric infrastructure and identify required modifications; and evaluate logistics, such as making charging stations effective in busy airport parking lots.

It's never too early to talk to an experienced design-build team about your electrification goals. The sooner you begin the design-build process, the more the team will be able to help in putting together an effective plan.

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