PROTERRA

Response to Request for Information (RFI) from the Florida Dept. of Transportation

Information Requested:

General

1. Please describe your organization's involvement and experience with DCFC infrastructure. What are your long-term EV plans? How many chargers and/or charging stations are you able to build, install, and/or maintain on an annual basis?

Proterra, a U.S. company, offers a full suite of options that enable turnkey delivery of a complete energy ecosystem for heavy-duty electric fleets, including design, build, financing, operations, maintenance and energy optimization. With this comprehensive solution, operators of medium- and heavy-duty vehicle fleets such as transit bus, school bus, truck and others can lower upfront cost, reduce risk, and simplify the transition to electric vehicles.

Proterra has been providing electric bus charging systems beginning with the delivery of the first buses produced. Proterra was the first transit bus OEM to develop, patent and install overhead on-route high powered chargers for battery electric buses. Recognizing a need for industry standards, Proterra collaborated with other electric bus OEMs and national standards organizations to prioritize commonality of certain components such as plug-in charger connections (J1772 CCS) and design of overhead pantograph charging apparatus (SAEJ3105).

Proterra has partnered with Power Electronics to finalize design for a suite of chargers specifically for commercial applications. These Power Electronic chargers are certified by third parties to meet NEC 511, IEEE 1547-2018, ISO 1518, and are pending UL certifications 2202, 2231, 1741 SA. Recognizing that public transit agencies often need a robust solution for space constrained depots, Proterra and Power Electronics have collaborated to design an industrial charging system which separates the dispenser from the power control system allowing for flexible options for charging with either a plug-in connector or using overhead charger.

As more fleet operators transition to battery electric vehicles, implementing and maintaining a complex energy ecosystem introduces a new set of challenges and upfront costs. Proterra designs, builds, deploys and maintains proprietary electric buses, batteries, chargers and charging infrastructure that are purpose-built for heavy-duty electric vehicle application and can deliver a comprehensive solution with a single point of contact for a streamlined transition to an electric fleet.

2. Where does your organization see the biggest opportunities for the utilization of NEVI funds? This could be in terms of innovative technology solutions, partnerships, and/or targeting geographic locations.

Proterra strongly urges FDOT to consider medium- and heavy-duty EVs in its State Plan. FHWA recently provided clarity in a NEVI Questions and Answers document[1] that, "NEVI formula program funds can be used for light, medium, and heavy-duty electric vehicle charging infrastructure projects that meet NEVI program requirements." Moreover, FHWA also stated that, "All EV infrastructure projects under NEVI must be open to

the general public or to authorized commercial motor vehicle operators from more than one company."

Proterra sees NEVI as an opportunity to provide charging infrastructure to serve electric trucks and other heavy-duty vehicles that serve Florida's many ports. Electrifying Florida's ports will be critical for reducing air pollution and greenhouse gas emissions.

[1] https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/resources/nevi_program_faqs.pdf

3. What are the biggest challenges or barriers that should be addressed to expedite reaching the goals of the NEVI program?

The NEVI program represents a historic federal investment in EV charging infrastructure, including an estimated $198 million to the state of Florida over the next five years. As mentioned above, Proterra strongly urges FDOT to consider charging that meets the ends of medium- and heavy-duty EVs, not only light-duty, in its State Plan.

Site Location

4. Please describe what you believe makes an ideal DCFC location including amenities as well as any risk factors that should be considered. How would you rank the relative importance of these factors?

Appropriate distances between publicly available electric vehicle service equipment (EVSE) can be calculated based on local EV sales trends and per-capita EV adoption; however, publicly available infrastructure should be designed and deployed consciously to support multiple forms of transportation electrification and not solely light-duty EVs.

Just as public truck stop gas stations can be used by the general public, so too should public EV charging accommodate larger vehicles in some instances. Such consideration can be accomplished by ensuring that grant dollars are allocated towards properties and locales which can fit larger vehicles and accommodate "pull through" charging, similar to a gas station style configuration, as opposed to a more conventional "pull in" parking spot configuration. This is especially important for being able to service EVs that are towing trailers, boats, and other loads.

Florida guidelines should consider high-power, commercial fleet charging to encourage the deployment of chargers which are more powerful, flexible, and durable than some "retail" charging hardware solutions. Additionally, federal guidance should encourage states to incorporate medium- and heavy-duty depots as well as dual-use in their charging infrastructure plans.

Charging providers that have experience deploying EVSEs with power levels in excess of 300kW per connector and remote dispenser configurations (i.e., the ability to host power modules and electronics separately from the dispenser/connector) can apply the commercial fueling lessons learned to public charging deployments if given the opportunity to do so. These lessons learned will ensure infrastructure is deployed at the lowest cost per kW deployed at optimum spacing, and in a flexible fashion that can enable fueling large batteries quickly and/or meet physical site constraints.

5. Please describe your process, including market research, land use requirements, and business development opportunities for determining a DCFC site location.

Each site will have specific constraints and working with EV charging providers who can flexibly design a project to "solve" for each constraint is key.

Sample constraints include, but are not limited to distribution grid capacity, utility transformer capacity, trenching distance from utility to meter panel and EV charger, parking spaces available, charging use case (e.g., is it preferred to charge many vehicles reasonably quickly, or a few vehicles very quickly?), fuel costs (e.g., what utility tariffs exist to either incentivize or penalize certain types of charging and/or specific times of day?), property owner timelines and construction constraints, and ancillary grid services via special programs or compensation mechanisms.

Once a site establishes which constraints are priorities, a savvy charging provider can design a custom solution which addresses the constraints in order of priority. For example, if it is known that a public charging station will be primarily used by ridesharing drivers, it has been demonstrated that they are more likely to charge in the mornings, and mid-day, and at night rather than during the late afternoon. With this knowledge, a site can feel comfortable deploying the highest-power fast chargers because they are less likely to be used when the grid is the most constrained and the energy is the most expensive (e.g., from 4-9pm).

In another scenario, if the utility can provide less power than is desired by the site, intelligent load balancing can ensure that more vehicles receive some level of charge rather than allowing a single vehicle to receive the faster charge. Many charging companies can split their charging speeds in half between 2-4 connectors, however, not as many can flexibly balance load across 8+ dispensers. This type of capability and flexibility will ensure that a site can flexibly react to the real-time needs of a public site (charge fast vs. charge cheap). Proterra has this type of experience from supporting sites with DC fast charging for hundreds of vehicles including sites paired with solar and storage to reduce peak energy costs and increase resilience.

6. What do you think the DCFC site of the future looks like? Will location to amenities be as important or will micromobility be used to get to the amenities? What innovations/disrupters are coming?

N/A at this time.

Partnerships and Business Models

7. Please explain any previous partnerships regarding EV infrastructure your organization has had including which parties initiated the outreach and what, if any, contracting mechanisms were used. These should include public and private entities as well as utility owners.

Proterra has leveraged partnerships with several third parties to support customer requirements for fleet electrification. Public RFP responses or federal grant programs (e.g., Low or No Emissions grants) are the typical mechanisms that have been used for public agencies to purchase Proterra equipment and services.

Partnerships between vendors typically include the OEMs and design-build subcontractors. On the customer

side it may just be the customer, or they may partner with their local utility as was the case with the Orlando Utility Commission and LYNX Transit from the 2019 Low or No Emissions grant program.
Proterra also offers fully financed turnkey projects through various structures of public/private partnerships, also known as P3's, which may involve OEMs, design-build contractors, energy producers, and financing partners.

8. Describe what makes a successful business model and partnership. Also, please describe threats that can lead to a business and partnership's failure. These can be examples from current and/or previous partnerships.

As stated in response to question 7, Proterra has a wide range of experience in various business models/partnerships. Each partnership has unique elements. However, generally the following have been present in all our successful partnerships:

- Honest, open communication from day one
- Mutual respect and an alignment on overall project goals
- Risk sharing with risks residing with the parties best situated to mitigate them
- A clear decision-making hierarchy that enables decisions to be made at the lowest possible level
- Ongoing structured partnering sessions throughout the project lifecycle

9. Please provide your organization's viewpoints on contracting methods for DCFC infrastructure, including leasing and/or revenue sharing agreements. Have you implemented any cost/revenue sharing models for the operation of DCFC EVSE? If yes, please share what you can about the terms of those partnerships.

Proterra believes that the best charging solutions are those that integrate a complete approach that considers energy needs for both the vehicles themselves and the charging solution that will provide the energy to the vehicles. The design of a charging solution can be coordinated in a way that incorporates the needs and goals of local, state, and federal government customers with those who can best provide this service through a public-private partnership. This approach allows each party to take on the appropriate risk that each is best suited to take on to provide the optimal complete solution.

Once project risks are identified and allocated to each of the project partners, private capital can be introduced to help pay for the project and lower the upfront cost. This approach allows some of the upfront costs to be shifted into operating costs, which can better match a customer's budget needs, and also ensure that project delivery and performance guarantees are met.

Proterra has prepared public-private partnership approaches that integrate complete electric vehicle and charging solutions that are paid for with private investment for some of the largest transit agencies in the United States and this approach has been well received. While procuring services and products using public-private partnerships requires a different procurement approach than is traditionally used for vehicles by government entities, the public-private partnership approach is an established market for delivering other similar infrastructure services and can be utilized for procuring EVs and charging infrastructure in a very efficient manner.

10. Does Florida have the workforce required to operate and maintain DCFC EVSE charging sites? If not, please describe what you think is required to develop it.

N/A at this time.

Equipment

11. On average, how long does it take to install a DCFC from start to finish? This includes site determination, design, permitting, site preparation, utilities, and installation.

N/A at this time.

12. Are you currently able to meet the requirements of Buy America for DCFC infrastructure projects? If not, please explain your plans to meet the requirements and any potential issues.

EV chargers have historically qualified for a waiver for FHWA Buy America because they are manufactured goods that are not made predominately of steel and/or iron. However, the recently signed Bipartisan Infrastructure Law appears to eliminate this waiver and instead require 55% of the total cost of components of a manufactured good to be produced in the U.S. Proterra is not aware of any EV charger manufacturer that could currently meet this standard.

13. Are there any components required for DCFC infrastructure that are in short supply that could delay the goals of the NEVI program? Please describe what steps you have taken or what processes you have implemented to ensure the continuity of your supply chain.

Proterra has long-term relationships with its suppliers and continues to overcome supply chain challenges, particularly those related to COVID-19 and the situation in Ukraine.

14. Please describe how your organization mitigates cybersecurity vulnerabilities. Is this consistent with industry standards? If not, where are the differences? Do you follow national cybersecurity standards including National Institute of Standards and Technology (NIST) Cybersecurity Framework? Do you comply with Florida's 60GG-2 for ensuring the security of your infrastructure? What other technologies do you offer for an end-to-end secured operation?

Proterra uses industry standard technology to identify vulnerabilities within our environment and follows industry standards. Our organization has a continuous vulnerability management program where we review and remediate critical vulnerabilities in our environment.

Proterra's cybersecurity program is based around NIST 800-53; we have not yet assessed compliance with Florida 60GG-2. We employ a variety of tools from IDS/IPS for edge protection, endpoint detection and response, antivirus, and real-time scanning sent to our SIEM/SOC.

Operation, Maintenance and Data Sharing

15. What are your current or planned fee structures (time-based, energy-based, power-based, etc.) and what payment mechanism do you accept? Please explain any issues you have encountered or identified.

N/A at this time.

16. Describe the typical maintenance for your organization's EVSE infrastructure as well as the maintenance schedule including any required hardware and software updates. Please include the typical lifecycle for your DCFC and what performance measurements are monitored.

As long as basic routine inspection and maintenance is performed, charging hardware is generally quite reliable and can have a useful life compared to a gas station pump. Some charging companies provide more modular hardware which can be easily replaced in case of damage, such as a cord replacement, whereas others may regularly require removal of the entire unit for replacement if damaged.

One of the largest stranded asset risks is commercial viability of the charging provider and a site host's ability to transfer EVSE operation to a new network provider if their existing provider goes out of business or no longer meets their needs (e.g., prices raised to untenable levels). While there are standards in place to prevent stranded assets, this risk remains.

The Open Charge Point Protocol (OCPP) developed by the Open Charge Alliance establishes a consistent communication methodology between charging hardware providers and charging network providers. Requiring that installed chargers be "OCPP certified" is necessary, but it may not be enough to ensure market interoperability and customer choice/freedom to switch network providers if they are dissatisfied, or if their provider ceases support. Specific language requiring charging providers to demonstrate their ability and experience hosting multiple charging network providers on their hardware platform seems prudent. Furthermore, charging vendors expressly permitting customers to switch network providers without undue burden if they are not satisfied with service should be allowed if the customer's and public's best interest is to be maintained.

17. How would your EVSE share data to a FDOT sponsored central data repository? What type(s) of data can you provide?

Proterra's cloud-based fleet and charge management platform provides detailed data on charger status, charging sessions, battery state of charge, and vehicle energy usage so that vehicle and charger fleet operations can be managed and maintained over time.

Example data available includes:

- Vehicle status and monitoring
- Charger status and monitoring
- Charging session data, with Charger ID, Bus ID (for Proterra vehicles), duration of charge session, energy (kWh)

- Charging energy kWh consumed and real-time load in kW
- Charger energy (kWh)
- Vehicle fault information
- Charger fault information
- Vehicle data including GPS information, subsystem energy consumption, battery metrics, and more

18. What should FDOT do to ensure the end-users of EVSE infrastructure have the most convenient and reliable charging experience? Please include how emergency evacuations and power outages should be addressed.

Proterra encourages FDOT to consider the demands that medium- and heavy-duty vehicles will place on the grid. Long-haul vehicles will need the support of high-power 350kW chargers along highway corridors. Furthermore, not all charging providers are able to deploy technology which can provide a range of charging speeds (e.g., ranging from 60kW to 350kW) with the same charging dispensers. Hardware providers often provide a solution at a set kW capacity.

Proterra encourages FDOT to consider the value of flexible and scalable charging providers that can significantly fluctuate the power dispensed to EVs depending on the number of vehicles charging or external factors such as the grid capacity and cost of electricity, which can be affected by the specific time of day or the number of vehicles charging simultaneously. If such a solution is not deployed, sites which deploy chargers that are only capable of 350kW charging, for example, would greatly reduce the total number of vehicles that can charge at one time. Conversely, sites which optimize for charging as many vehicles as possible will restrict the ability for larger battery vehicles (which can exceed 600kWh in battery size) from being able to charge in a reasonable amount of time.

Strategies for Low Utilization

19. FDOT is looking to provide DCFC in rural and disadvantaged communities that may have a lower return on investment and is interested in how to make these projects more desirable to potential applications. What strategies can FDOT utilize to encourage deployment of DCFC EVSE into rural, underserved, or disadvantaged communities? When answering please include information on driving factors.

a. Guaranteed number of projects for economies of scale
b. Short term operation and maintenance agreements (5 years or less)
c. Long term operation and maintenance agreements (longer than 5 years)
d. Any others?

It is critical to address the need for EV charging infrastructure in underserved communities. The environmental impacts that many disadvantaged communities face come from diesel particulates from ports or distribution centers. If public chargers can be sited near a heavy-duty industrial location, it will further ease concerns of the businesses about the availability of chargers and thus, increase their likelihood of investing in electric vehicles.

Transitioning heavy-duty diesel fleets to electric will significantly improve the air quality in local communities. For this reason, Proterra recommends consideration of the community benefits of publicly available charging infrastructure in disadvantaged communities, as well as in areas adjacent to these communities (e.g., within 5

miles of a designated census tract).

Similarly, for school buses, if school districts and bus operators in rural areas and disadvantaged communities know there are public DC fast chargers available that can serve them for "opportunity", or "on route", charging, they're going to be more comfortable buying electric buses. Electrifying the nation's school bus fleet will have an immediate positive impact on the quality of the air children breathe while riding to school. Proterra recommends that FDOT consider the community benefits of publicly available charging infrastructure located near schools.

20. To increase utilization rates to rural, underserved, or disadvantages communities what considerations or innovation solutions should be considered?

See response to question 19.

Specific Information Requested

Interested vendors may respond to some or all the following topics, based on their proposed role in the creation of a DCFC EVSE network:

1. Summary of Experience
FDOT is interested in a summary that describes your organization's experience with DCFC EVSE.

Headquartered in Burlingame, California, Proterra has additional manufacturing facilities in City of Industry, California and Greenville, South Carolina. Proterra offers a full suite of options that enable turnkey delivery of a complete energy ecosystem for heavy-duty electric fleets, including design, build, financing, operations, maintenance and energy optimization. With this comprehensive solution, operators of medium- and heavy-duty vehicle fleets such as transit bus, school bus, truck and others can lower upfront cost, reduce risk, and simplify the transition to electric vehicles.

2. System Block Diagram
FDOT is interested in a high-level system block diagram that illustrates all components and connections required to create the proposed system.

N/A at this time.

3. Hardware Information
FDOT is interested in datasheets and technical specifications for components included and required to create a typical DCFC system.

Datasheets and specifications for Proterra's chargers and charging infrastructure can be found at: https://www.proterra.com/products/battery-technology/ and https://www.proterra.com/products/charging-infrastructure/

4. Software Information

FDOT is interested in information on software components included and needed to create a typical DCFC system.

Proterra offers multiple fit-for-purpose maintenance and service options. APEX is Proterra's fleet and energy management platform, offering historical and real-time performance information about your battery electric vehicle fleet and management of EV charging infrastructure. APEX combines detailed, real time asset data with Proterra knowledge and experience to help you optimize your EV fleet charging and operations.

APEX is designed for easy access anywhere, anytime, and does not require any software installation. The platform is highly scalable and supports your deployment of battery electric vehicles and charging infrastructure as they grow.

Proterra connected vehicles and chargers continuously record and transmit operational data to a secure server. Robust data security keeps information safe and available for APEX authorized users. Customers who subscribe to an APEX software-as-a-service subscription have access to this data and applications through the platform.

5. Maintenance Plan

FDOT is interested to know about the maintenance services and typical maintenance schedule for DCFC infrastructure.

Proterra's Fleet and Energy Management platform solution is a cloud-based platform that provides management of electric vehicle fleets and EV charging infrastructure. The platform was created to combine detailed, real time asset data with Proterra knowledge and experience to optimize electric fleet charging and operations. Proterra's platform is a cloud-based portal designed for access anywhere, anytime, on any connected device, and does not require any software installation or maintenance. The platform is highly scalable and supports deployments of battery electric fleets as they grow. Fleet performance data is automatically recorded and continuously transmitted to a secure server. Robust data security keeps fleet information safe.

DCFC equipment maintenance should be carried out on a regular basis. For example, certain power cabinet annual maintenance would consist of a power test and a dead test (no voltage, stopped, uncharged, and isolated). The time to complete these test procedures is approximately an hour and 45 minutes. The power test consists of an environmental condition check and visual and manual checks while the equipment is in operation. The dead test is then performed once the equipment is completely off. The dead test consists of cleaning and several inspections within the internals of the DCFC equipment. Annual performance of these tests would ensure that DCFC equipment continues to run safely and efficiently.

6. Project Approach

FDOT is interested in the approach that your organization would take to deliver the DCFC EVSE.

More information would be needed before we could provide a specific approach.