



Smart Electric  
Power Alliance

Case Study —

# Providing EV Load Capacity Maps

---

**A Case Study with Dominion Energy**

October 2023

## Copyright

© Smart Electric Power Alliance, 2023. All rights reserved. This material may not be published, reproduced, broadcast, rewritten, or redistributed without permission.

## Authors

**Drake Moran** Analyst, Research & Industry Strategy  
Smart Electric Power Alliance

**Garrett Fitzgerald** Senior Director, Transportation  
Electrification  
Smart Electric Power Alliance

## About SEPA

The Smart Electric Power Alliance (SEPA) helps all electric power stakeholders accelerate the transformation to a carbon free electricity system. SEPA concentrates our focus on the following areas to maximize impact: Transportation, Storage, Resilience, Emerging Technology, and Policy.

SEPA delivers value to our members through research, education, events, working groups, peer engagements, and member projects. We facilitate collaboration, develop innovative strategies and guidance for regulatory and business innovation, and provide actionable solutions for our members and partner organizations. For more information, visit [www.sepapower.org](http://www.sepapower.org).

## Disclaimer

All content, including, without limitation, any documents provided on or linked to the SEPA website is provided “as is” and may contain errors or misprints. SEPA and the companies who contribute content to the website and to SEPA publications (“contributing companies”) make no warranties, representations or conditions of any kind, express or implied, including, but not limited to any warranty of title or ownership, of merchantability, of fitness for a particular purpose or use, or against infringement, with respect to the content of this web site or any SEPA publications. SEPA and the contributing companies make no representations, warranties, or guarantees, or conditions as to the quality, suitability, truth, or accuracy, or completeness of any materials contained on the website.

## Acknowledgments

SEPA would like to thank Noel Freeman, Melissa Peskin, Brady Quinn, and Kristopher Russell from Dominion Energy for making this case study possible.

### The Challenge

Electric fleets and charging infrastructure providers need to understand the grid’s ability to support their charging needs.

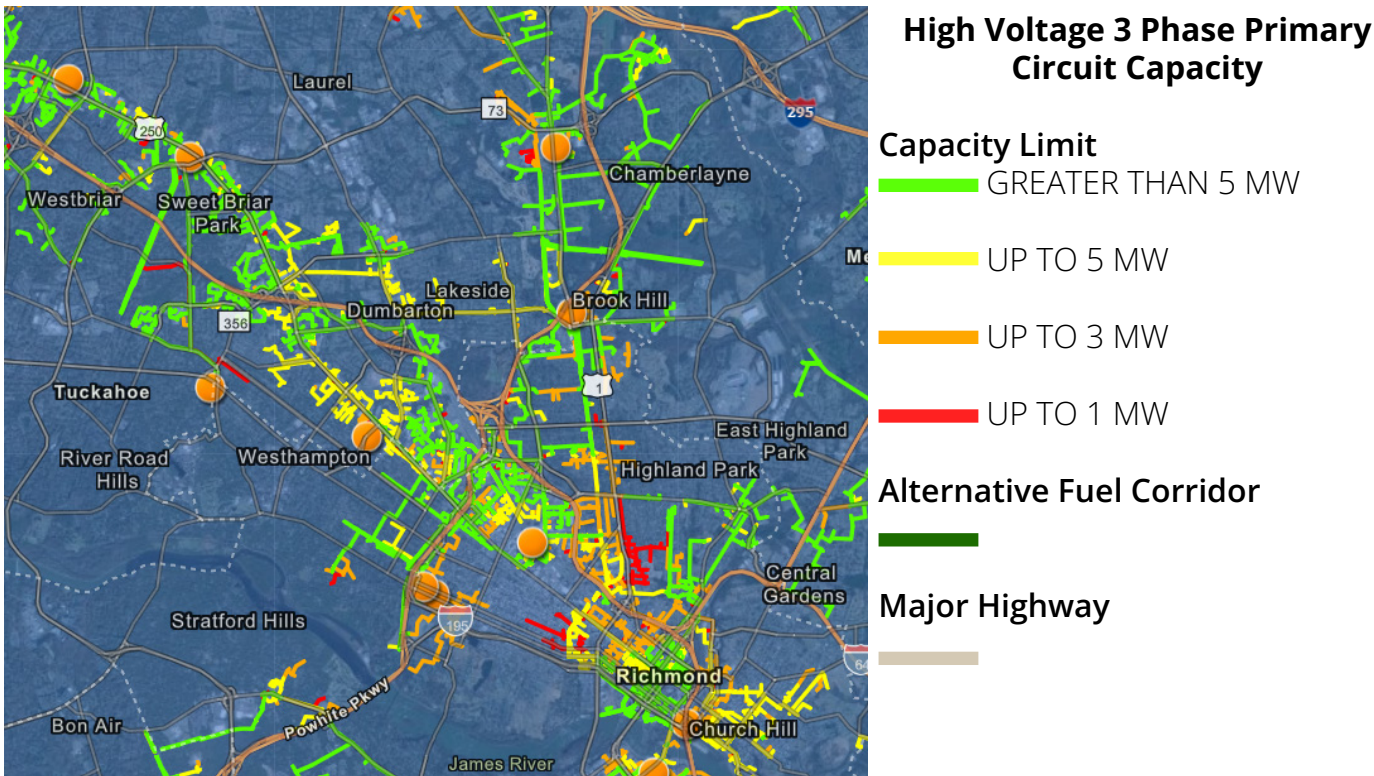
### The Solution

EV load capacity maps.

Utility capacity maps are tools designed to assist customers and developers in site selection for EV charging and distributed energy resource (DER) projects. These maps can provide a range of data, including hosting capacity, forecast data, grid needs, and other details about the electric distribution grid. The information presented is dynamic and subject to change or modification over time due to circuit upgrades, new loads, new DERs, new circuits, and seasonal switching. Many factors can influence interconnection capability and costs, and the maps do not guarantee that developers can interconnect.

Dominion Energy has proactively developed an [EV Capacity Map](#), an interactive tool that helps optimize the installation of EV fast charging stations. The tool shows which parts of the electric distribution system may be more suitable for EV fast charging station installations.

Figure 1: Example of EV Load Capacity Map



Source: Dominion Energy, 2023

## Approach to Developing EV Capacity Maps

Dominion Energy is an example of a utility recognizing charging infrastructure providers' growing need for EV load capacity maps. They are proactively developing EV load capacity maps to support their customers' interest in electrification. Dominion Energy's effort can serve as an example to other utilities that wish to follow suit.

Dominion Energy used the following steps to develop its EV capacity maps:

### 1. Needs Assessment and Internal Alignment:

Dominion Energy identified the need to provide customers with an EV hosting capacity map and secured developed internal alignment on a solution. The tool displays the grid's capacity for additional EV load to aid in site selection, expediting EV charging station deployment.

### 2. Utilize Existing Experience Mapping DER

**Resources:** Dominion Energy had previously developed solar hosting capacity maps. This prior experience served as a foundation for developing the EV load capacity maps, expediting the process.

### 3. Data Acquisition, Software Selection, and Incremental System Analysis:

Data sets (either new or from existing resources) on utility system components such as feeders, substations, distribution lines, and transformers must be obtained to be synthesized into GIS graphs. Dominion Energy used a software product called Synergi Electric provided by [DNV](#) for electrical load modeling. This software ran simulations to predict impacts at various locations and times. Dominion Energy applied an incremental analysis approach to improve the software capability further, assessing each piece of the distribution capacity system separately. They added load to each segment for each possible grid constraint and monitored the changes until a constraint was met.

**4. Collaboration with GIS Team:** After analyzing and validating the necessary data, Dominion Energy's GIS

team created an external map tool. Utilities without GIS specialists may need assistance turning data into functional customer facing EV load capacity maps.

**5. Updating EV Load Capacity Maps:** Dominion Energy tries to ensure the EV load capacity maps reflect the most recent grid capacity data through periodic updates. Due to the significant amount of data processed, the entire computation to update EV load capacity maps takes approximately 15 days, involving the analysis of about one million line segments. Currently, Dominion updates these maps quarterly.

**6. Continuous Improvement:** EV load capacity maps are a great tool; however, the industry is evolving rapidly. In the future, Dominion Energy plans to enhance the maps based on feedback from customers, such as:

- **Timelines of Updates:** EV load capacity maps are a snapshot in time from when the data was internally run. Some utilities update their maps annually, biannually, or quarterly. Dominion updates its maps quarterly but recognizes this may need to improve to meet customers' needs.
- **Claim on Capacity:** Currently, it's difficult to understand whether certain available grid capacity has been claimed but not yet recognized on the hosting capacity map. As a result, it can be challenging for charging developers to understand the actual availability of grid capacity in real time.
- **Data Granularity:** While the EV load capacity maps provide a broad overview of the grid capacity, more precise and localized information can better support decision-making for EV charging providers.

During this entire process, it is essential to maintain a balance between transparency and security. Some grid details are sensitive or pose security risks and should be excluded from the map to also maintain utility infrastructure security.

Case Study: Providing EV Load Capacity Maps

Utility Benefits	Customer Benefits
<b>Better Customer Interactions:</b> An interactive tool such as capacity maps simplifies communication with customers. Rather than dealing with lengthy email threads or time-consuming phone calls, utilities can direct customers to the map for information, thus expediting and improving the quality of their customer service.	<b>Streamlined Decision-Making and Strategic Planning:</b> The EV load capacity maps provide customers visibility into the available grid capacity, facilitating early planning for EV fleet charging locations. This transparency leads to more efficient and strategic EV fleet expansion, eliminating guesswork and significantly reducing potential delays.
<b>Strategic Planning:</b> Utilities can leverage these maps for strategic planning. By understanding areas of high demand or potential growth, utilities can proactively plan infrastructure upgrades or expansions. This proactive approach can improve customer satisfaction, service reliability, and operational efficiency.	<b>Efficiency:</b> The EV load capacity maps lessen the need for an extensive back-and-forth between customers and the utility staff, speeding up decision-making and shortening overall timelines.
<b>Streamlined Operations:</b> With the distribution capacity map serving as a centralized, readily available information source, utilities can minimize individual inquiries and allocate resources more efficiently.	<b>Improved Budgeting:</b> By understanding the existing grid capacity, customers can more accurately estimate the costs associated with developing charging infrastructure in a particular area, improving budgeting and financial planning.
	<b>Proactive Engagement:</b> The EV load capacity maps give customers a clearer understanding of how utility infrastructure is evolving to support electric transportation. This active engagement can lead to stronger relationships between customers and utilities, fostering a collaborative environment for further growth of the EV ecosystem.



**Smart Electric  
Power Alliance**

1800 M STREET, NW FRONT 1

#33159

WASHINGTON, DC 20036

[sepapower.org](http://sepapower.org)

©2023 Smart Electric Power Alliance. All Rights Reserved.