## Problem and Objective

| **Problem Statement:** Design costs and timelines add significantly to EVSE installation scope |
| **Objective:** Simplify the EVSE design and cost estimation process with a web tool |
EVI-LOCATE (Electric Vehicle Infrastructure – Locally Optimized Charging Assessment Tool and Estimator)

- Plan charging station deployments
- Assess site-specific electrical needs
- Calculate local project costs
EVI-LOCATE: EV Charging Station Design Tool

Cost Calculations and Image Processing

Site Inputs
- Agency
- Location
- Chargers needed

EVSE Site Design and Report
- Site Design
- Cost estimates

Cost Calculations
- EVSE site layout
- Area cost factor
- Electrical upgrades and National Electric Code
- Deep learning pixel classification
- GIS analysis
- Component-Level costs
Project Team

Funders

FedFleet 2024
Access

- Website: [https://evi-locate.nrel.gov](https://evi-locate.nrel.gov)
- Email: evi-locate@nrel.gov
- Federal employees can sign up for accounts directly
- Federal contractors need to email evi-locate@nrel.gov with Federal EVI-LOCATE users CC’ed
EVI-LOCATE Site Tour
Welcome to EVI-LOCATE

The Electric Vehicle Infrastructure-Locally Optimized Charging Assessment Tool and Estimator (EVI-LOCATE) is a comprehensive design tool to get you started on your electric vehicle supply equipment (EVSE) charging station deployments plans from layout to cost estimates.

Here are some key points to help you get started:

1. Charger requirements (desired number of charging ports and power level)
2. Existing utility assets (transmitters and service panels that might connect to your chargers)

It is fine if you do not have all the information now. Your work will be saved, you can come back and edit your project later, and you can review sticking points with EV charging experts at NREL. Contact us at evi-locate@nrel.gov if you have any questions.

EVI-LOCATE is currently available only to federal users with a valid email address.

Log in to Get Started

Email

| cabell.hodge@nrel.gov |

Password

| ****************** |

Login

Sign up for a New Account

Forgot Password
Site Selection

Select Agency

Select State

For Department of Defense > Select Base

Select your Agency

Pick from the Agency list below.

This should default to the agency that you registered with, but some folks may represent multiple agencies.

Defense Agency

-- National Average --
Army - Anniston Army Depot - Alabama
Army - Fort Rucker - Alabama
Air Force - Maxwell Air Force Base - Alabama
Army - Mobile - Alabama
Navy - Mobile Area - Alabama
Army - Montgomery - Alabama
Army - Redstone Arsenal - Alabama
Army - Anchorage - Alaska
Air Force - Clear Air Force Base - Alaska
Air Force - Eareckson Air Force Base - Alaska
Air Force - Eielson Air Force Base - Alaska
Army - Fairbanks - Alaska
Army - Fort Greely - Alaska
Army - Fort Walnwright - Alaska
Air Force - Joint Base, Elmendorf - Alaska
Air Force - Davis Monthan Air Force Base - Arizona
Army - Fort Huachuca - Arizona
Define Site Boundary

Define Site

• Draw a polygon around EV parking area
• Name your site
• Make sure the polygon is large enough to include service transformer, panel and charging stations
Select EVSE Type

Select EVSE Charger Template

• Users can filter to their preferred charger or select generic charger option

*EVSE: electric vehicle supply equipment
EVSE: Behind the Scenes

- All AC Level 1 and Level 2 options from GSA Blanket Purchase Agreement are available in tool
- Generic selections use median values
Locate Chargers

Drop Chargers on Map

- Currently users can only select AC Level 1 and Level 2 unidirectional chargers
- Working on DC fast chargers and bidirectional chargers
Manage Transformer
These questions will help you identify whether you need a new transformer to support EVSE charging stations or have sufficient physical and electrical capacity to use a new transformer if you would like.

Would you like to include Transformer costs in your project estimate?  
- Yes  - No

Details
EVSE Charger Level: Level 2  
Total Number of EVSE Ports: 16
Amperage: 45  
Power Factor: 0.95  
Loading Limit: 85%

Do you want to add a new transformer or upgrade an existing transformer?  
- Add New  - Upgrade Existing

What is the secondary voltage rating for the existing transformer?  
208V

What is the rating (in kVA) of the existing transformer?  
200 kVA

What is the total peak load (in kVA) drawn from the existing transformer?  
50 kVA

Success! Your existing transformer appears to have sufficient capacity to connect the EVSE charging stations that you would like to install. Therefore, EVI-LOCATE does not recommend installing a new transformer and that a new transformer is not required.
Transformer Questions

Determine Transformer Needs

• Default power factor (0.95) and loading limits (0.85) can be updated
• Transformer rating?
• Secondary voltage rating?
• Existing peak load?
Transformer Continued: Peak Load

Three places to find existing load
1. Utility bills (only if at transformer level)
2. Check demand meter
3. Use a CT to measure load

<table>
<thead>
<tr>
<th>Company B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billing Element</td>
</tr>
<tr>
<td>Energy Usage</td>
</tr>
<tr>
<td>Demand Charge</td>
</tr>
<tr>
<td><strong>Total Charges</strong></td>
</tr>
</tbody>
</table>

Table 1 - Demand charge calculation
What is the voltage rating of your service panel?  
208V

Are there any open spaces to install additional circuit breakers in the existing service panel?  
○ Yes  ○ No

How many unused Circuit Breaker spaces are available on the existing service panel to support 10 spaces.

What is the current rating in ampere (A) of the Main Circuit Breaker on the existing service panel?  
200 ampere (A)

What is the total peak load (kW) drawn from the existing service panel?  
50 kilowatt (kW)
Panel Questions

Determine Service Panel Needs

- Voltage rating?
- Unused circuit breaker spaces?
- Main breaker current rating?
- Existing peak load?
Wiring: Connecting the Equipment

Wiring Run

• Tool identifies low-cost line from transformer to panel to chargers
• Identifies hardscape and softscape
Wiring: Behind the Scenes

Wiring Run

- Siting algorithm uses near infrared imagery to distinguish surface type and buildings
- Identifies least cost path to run conductors and conduit
Wiring Run

- We cannot see under the ground, so final designs should reflect existing utilities and conditions.
Cost Calculations

Cost Adjustment

- Slider bars for project costs
- e.g., Feds may not need to pay taxes

Edit Percentages

- State and Local Sales Tax Percent: 0%
- Contractor Overhead Percent: 15%
- Contractor Profit Percent: 10%
- Bond Costs Percent: 2.5%
- Permits and Zoning Percent: 2%
- Contingency Cost Percent: 20%

Please include 'Agency Supervision, Inspection, and Overhead' costs along with 'Contingency Cost'.
Cost Estimator Components and Data Sources

- Location
- EVSE Charging Stations
- Electrical Equipment
- Distances
- Construction Costs
- Project Costs
- Localized Cost Estimate
- Base Adjustment Factor / RSMeans
- National Electrical Code
- RSMeans
- GSA Pricing Schedule
- ArcGIS Analysis
- Invoice Data
### Higher Level Costs and List of Materials

#### Estimated Cost of EVSE Installation

- **$27.8 k (32%)**
- **$20.5 k (24%)**
- **$32.2 k (37%)**
- **$5.40 k (6.3%)**

#### Cost Breakdown

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Level 2 Dual Port Pedestal Stations</td>
<td>5</td>
<td>each</td>
</tr>
<tr>
<td>Pad-Mounted Transformer</td>
<td>1</td>
<td>each</td>
</tr>
<tr>
<td>Service Panel for Indoor Parking</td>
<td>1</td>
<td>each</td>
</tr>
<tr>
<td>Main Circuit Breaker</td>
<td>1</td>
<td>each</td>
</tr>
<tr>
<td>Pull Boxes</td>
<td>2</td>
<td>each</td>
</tr>
<tr>
<td>Circuit Breakers</td>
<td>10</td>
<td>each</td>
</tr>
<tr>
<td>EMT-Electrical Metallic Tubing Conduit</td>
<td>195</td>
<td>L.F.</td>
</tr>
<tr>
<td>THWN Conductors</td>
<td>12</td>
<td>C.L.F.</td>
</tr>
<tr>
<td>Bollards</td>
<td>10</td>
<td>each</td>
</tr>
<tr>
<td>Wheel stops</td>
<td>10</td>
<td>each</td>
</tr>
<tr>
<td>Signage Posts</td>
<td>10</td>
<td>each</td>
</tr>
<tr>
<td>Painting</td>
<td>290</td>
<td>ft</td>
</tr>
<tr>
<td>Hardscape Trenching</td>
<td>150</td>
<td>L.F.</td>
</tr>
</tbody>
</table>
## Dashboard and Agency Organization

### Total Number of Study Sites

- **Total Number of Study Sites:** 306

### EV Charges by Type

- **Total Details:**
  - Type 1: 31.3%
  - Type 2-DC: 21.8%
  - Type 2-CC: 0.4%
  - Type 2-TM: 11.2%
  - Type 2-50kW: 11.2%
  - Type 2-150kW: 11.2%
  - Type 2-300kW: 11.2%
  - Type 2-750kW: 11.2%

### Total Number of Transformers

- **Total Number of Transformers:** 346

### Total Number of Service Panels

- **Total Number of Service Panels:** 314

### Total Number of EV Chargers

- **Total Number of EV Chargers:** 1.6k

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# EVI-LOCATE Benefits

<table>
<thead>
<tr>
<th>Benefit</th>
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<tbody>
<tr>
<td>Accelerate the site design process</td>
</tr>
<tr>
<td>Unify assumptions for cost calculations</td>
</tr>
<tr>
<td>Generate detailed government estimates in 20 minutes</td>
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<tr>
<td>Organize EVSE planning throughout agency</td>
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</tbody>
</table>
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