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Project ID # JOET013

EVSE Soft Costs

2024 The Joint Office Annual Merit Review

June 6, 2024

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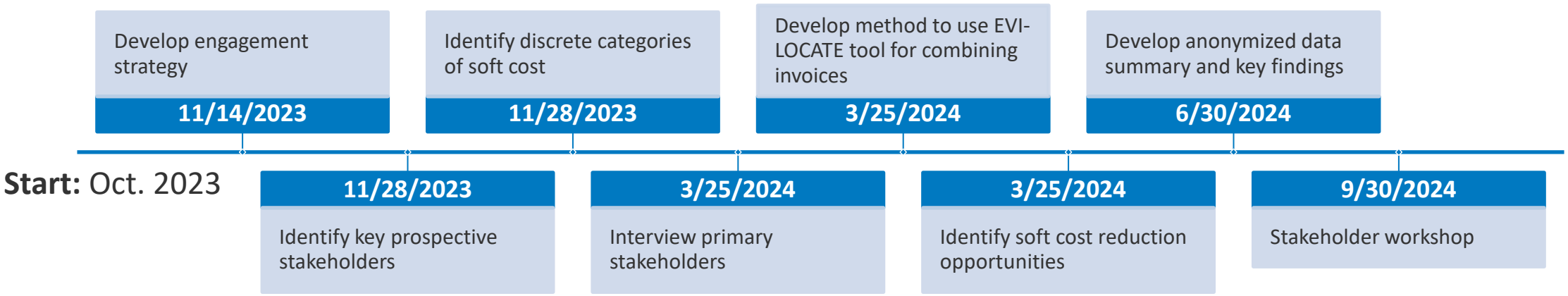
Agenda

1. Overview
2. Why do EVSE Soft Costs matter?
3. Permitting Process: What are the different processes?
4. Collaboration with Stakeholders: Understanding different perspectives
5. Invoices Analysis: What are the cost categories that we see in the invoices?
6. EVI-LOCATE: Leveraging cost estimation tool
7. Next Steps…

Overview

Timeline:



Budget:

	Received	Spent	Remaining
NREL	$500,000	$127,105	$372,895
LBNL	$275,000	$109,625	$165,375
INL	$205,000	$45,739	$159,261
Total	$980,000	$282,469	$697,531

Partners:

- NREL
- INL
- LBNL

Why do EVSE Soft Costs matter?

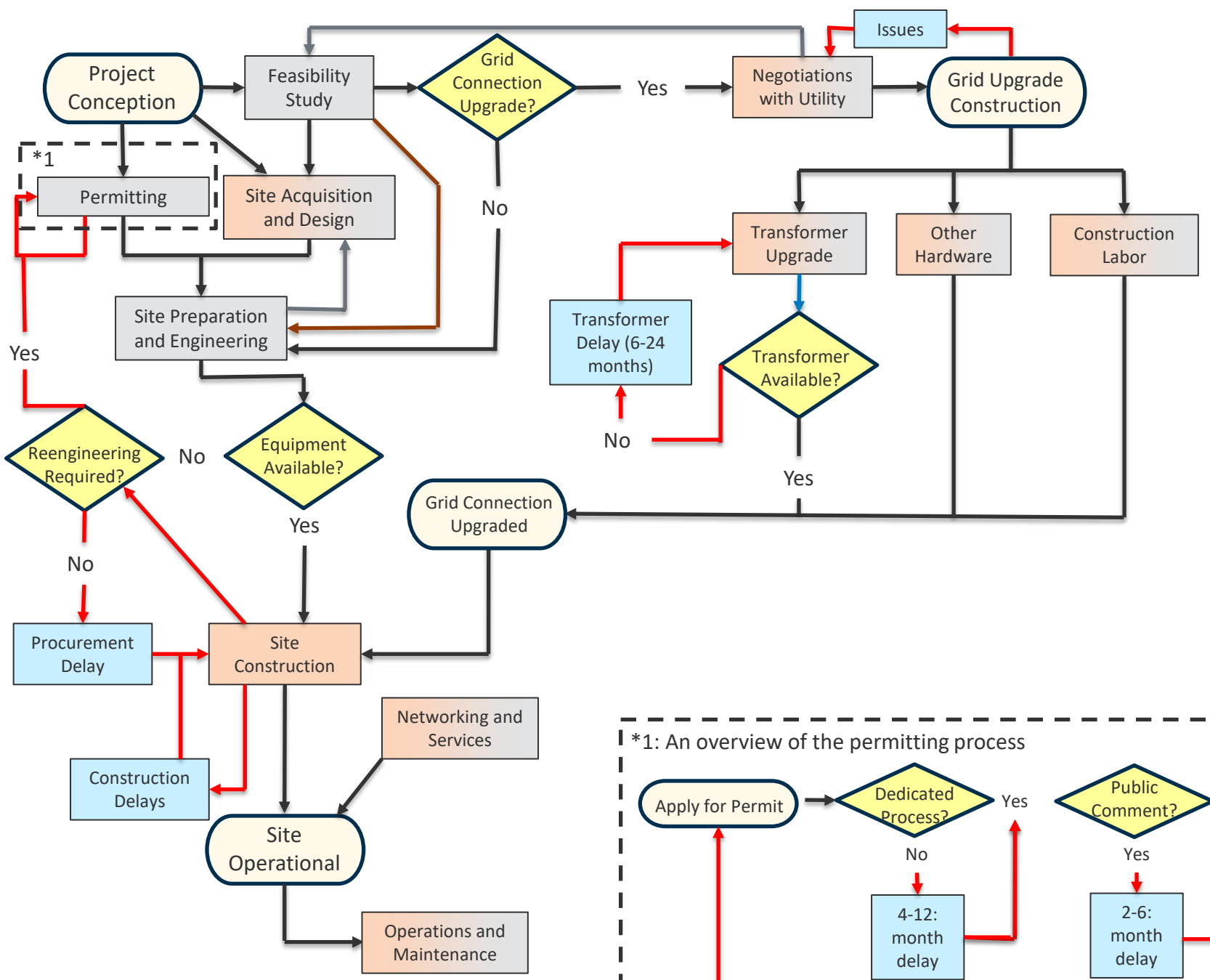
- **Access** to charging infrastructure is a **critical component** of EV ownership
- **Funding** for EV infrastructure projects is increasing, but projects frequently run **above projected costs** and **beyond projected completion time**
- **Lack of standardization and established definitions,** as well as inability to **track** soft costs, leads to **lack of knowledge** and **inability to address** these costs and how they affect projects
- On the other hand, understanding soft costs leads to **potential cost reductions** that benefit all stakeholders

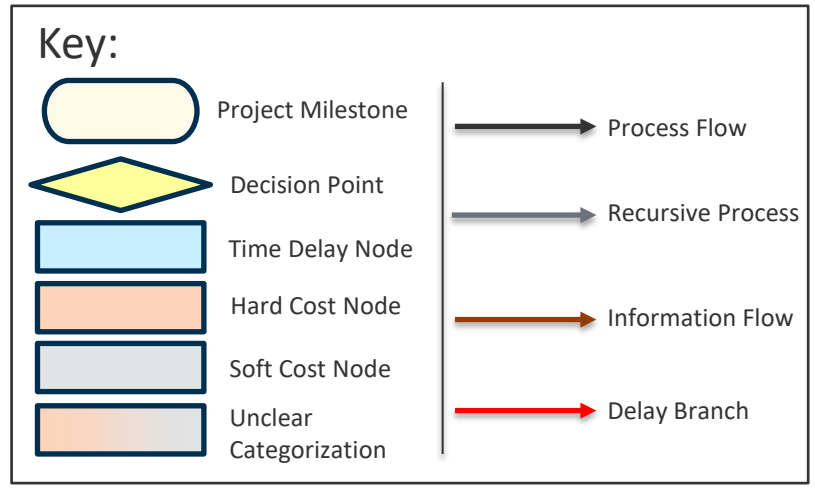
Literature insights: What we have learned so far

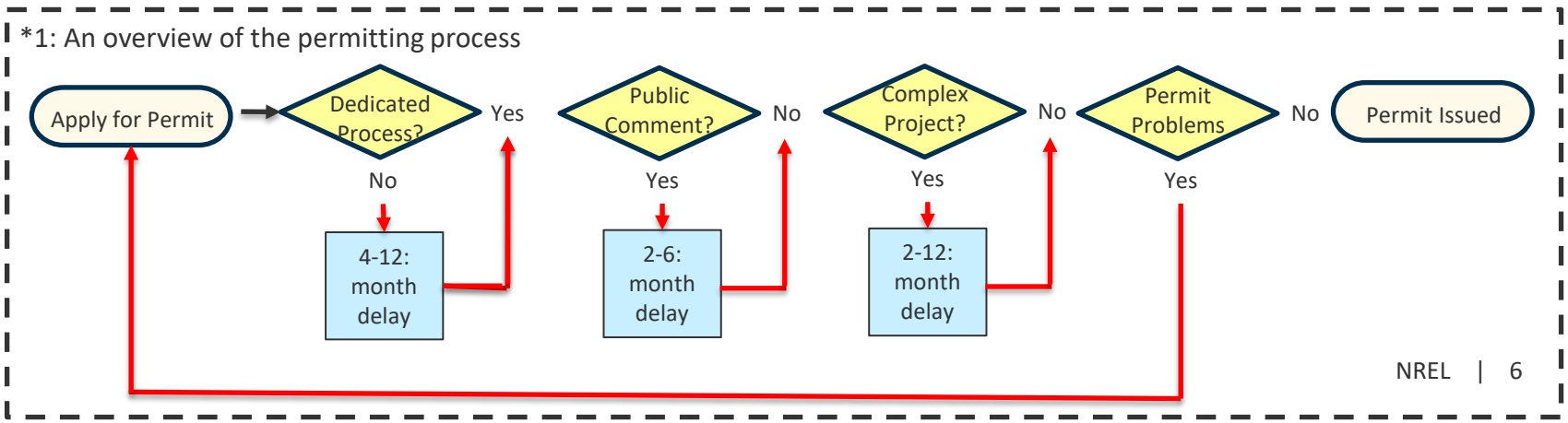
Numerous authors address the general concept of EVSE Soft Costs and acknowledge their importance, but specific information is largely absent

- What constitutes “soft costs” is **highly variable and ill-defined**
- The economic impact of “soft costs” is **project- and location-dependent**
- “Soft costs” are sometimes regarded as “hidden” or “surprise” costs
- Estimates of “soft cost” components are difficult to determine beyond qualitative ranges … and even these are somewhat inconsistent or are not current

Simplified Process Flow Diagram: shows delays that cause EVSE Soft Costs







Permitting Process

What does permitting process look like
across different states?

EV Charger Permit Process: Framing the Challenge

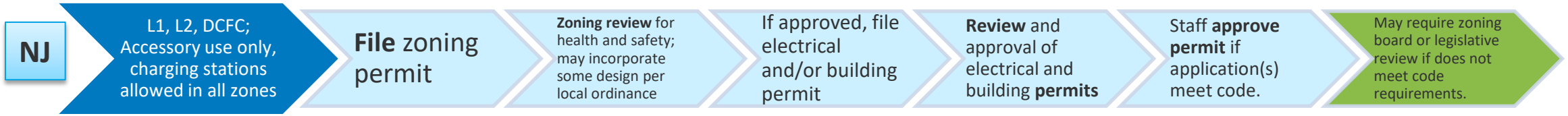
- Land use and development codes and permits have the **most variety** across the nation
- EV Charging is relatively **new and not always explicitly outlined** in zoning codes
- **Lack of clarity within codes** and **variance across Authorities Having Jurisdiction (AHJs)** leads to process uncertainty
- If an EV charging station is considered (or interpreted) **as a fueling station** within a zoning code, then a **highly restrictive allowance in zones** may apply
  - If **EV charging is considered accessory use**, it may be highly permissible in many zones
  - **Strict zoning and plan review** may entail both staff review and planning commission or other quasi-legislative review (i.e., lengthy process)

Standardized Permitting Process for EV Charging Stations in New Jersey and California

Outlier examples also show variations in their processes

California Notes:

No review for zoning (i.e., design, aesthetics, etc.) **EV charging must be considered and addressed in all zones**. Staff have **5 days to review** for complete application and an additional 20 to complete health and safety review, and issue permit.



New Jersey Notes:

Primary site use as **EV charging is not covered under this standard ordinance and would be handled through a zoning process** likely requiring approval by the zoning board. Staff have **20 days to review and issue permit**.

Definitions

Accessory Use: a land use that is a supporting (i.e., not primary) use on the property, such as parking at a retail store

Allowed In All Zones: does not need an approved variance to be built in that location

Zoning Review*: a discretionary review that includes review of plan for aesthetics, use allowance within zone, often includes review by staff, recommendation to zoning board or legislative body, and approval by that legislative body; based on locally adopted zoning code and comprehensive plan

Health and Safety Review: limits review to basic health and safety considerations and is administrative, meaning plan will not go to review by legislative body

Building, electrical, and fire code reviews: non-discretionary review for code compliance based on locally adopted national codes

* Can be restricted to health and safety review only.

Stakeholder Engagement

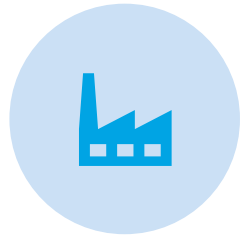
What are the different perspectives?

Identified Stakeholder Groups

EV CHARGING STATION SERVICE PROVIDERS

CONTRACTORS AND INSTALLERS

AHJs (STATE AGENCIES/COUNTY AND CITY GOVERNMENTS)



UTILITIES

SITE HOSTS

Insights: What we have learned so far

- Who pays:
  - Cost to the consumer, and burden to the business
- Language matters
  - EV Charging Stations OR Fueling Stations
- Permitting process is inconsistent, even within jurisdictions
  - In certain jurisdictions, an ad hoc process is used as there is no standard procedure for EVSE infrastructure
- Major supply chain issues are causing significant project delays
  - Interconnection equipment, especially transformers, is the biggest culprit
  - Delays can last from months to a year or longer
- Regulators and electric utilities that are forward thinking about EVs provide better, faster service and reduced costs to installers

Team worked with four different state agencies to get invoices that state agencies have paid for to install public charging stations

Invoices Analysis

What are the cost that are reflected on the invoices?

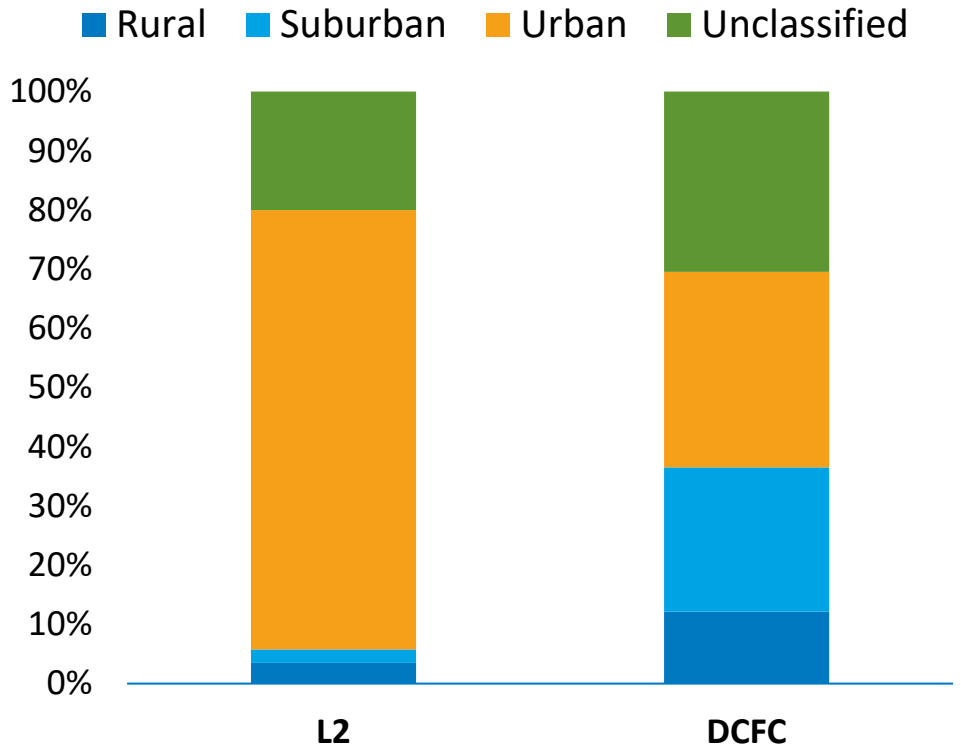
Invoices Analysis

Invoices Processed

- Three state agencies
- 4,178 invoices processed

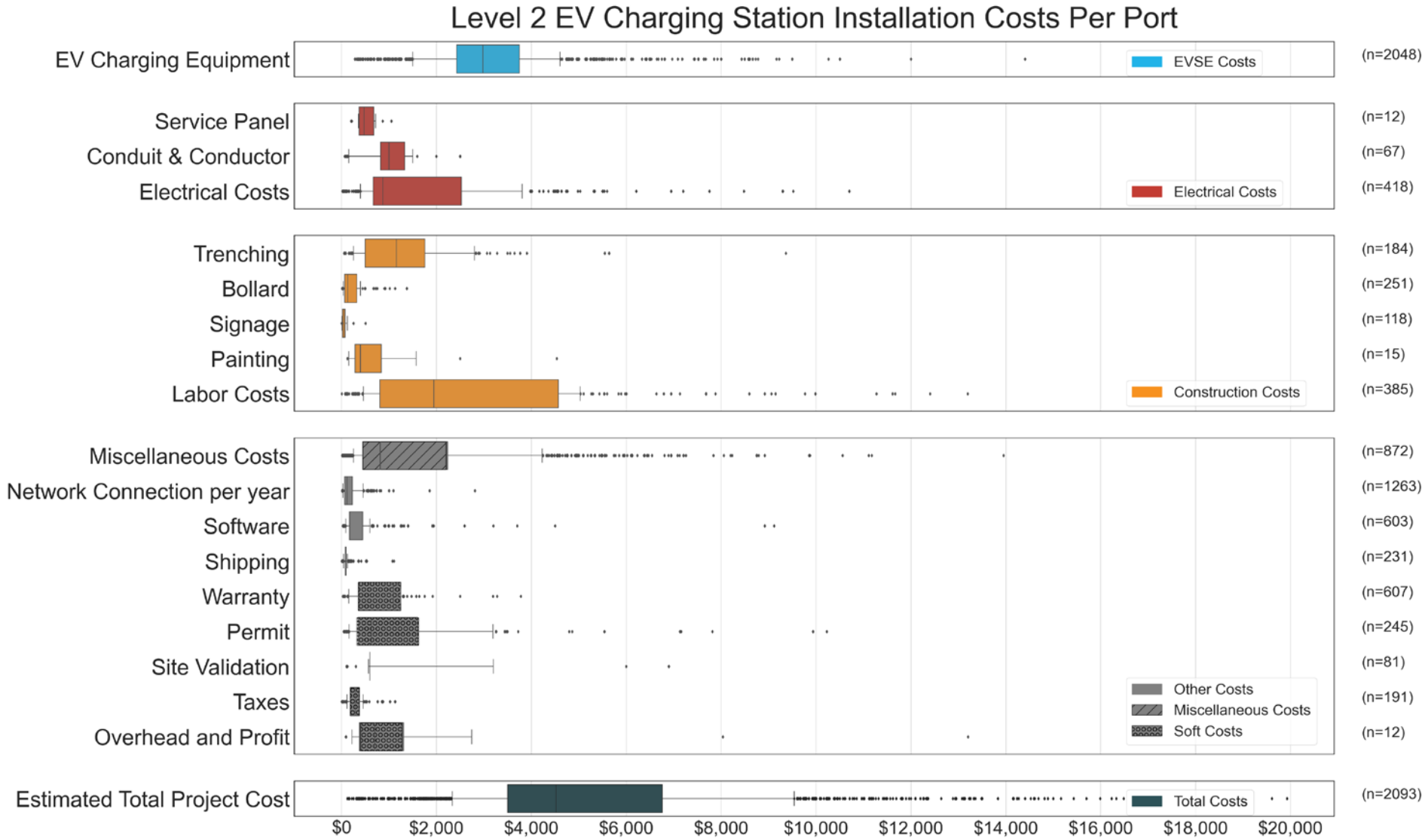
Location sizes

- 0-2 ports: 970
- 2-4 ports: 579
- 4-10 ports: 485
- 10-18 ports: 108
- >18 ports: 88



How much does the cost of installation vary?

- Public Level 2 EV Charging stations
- Data from three different state agencies

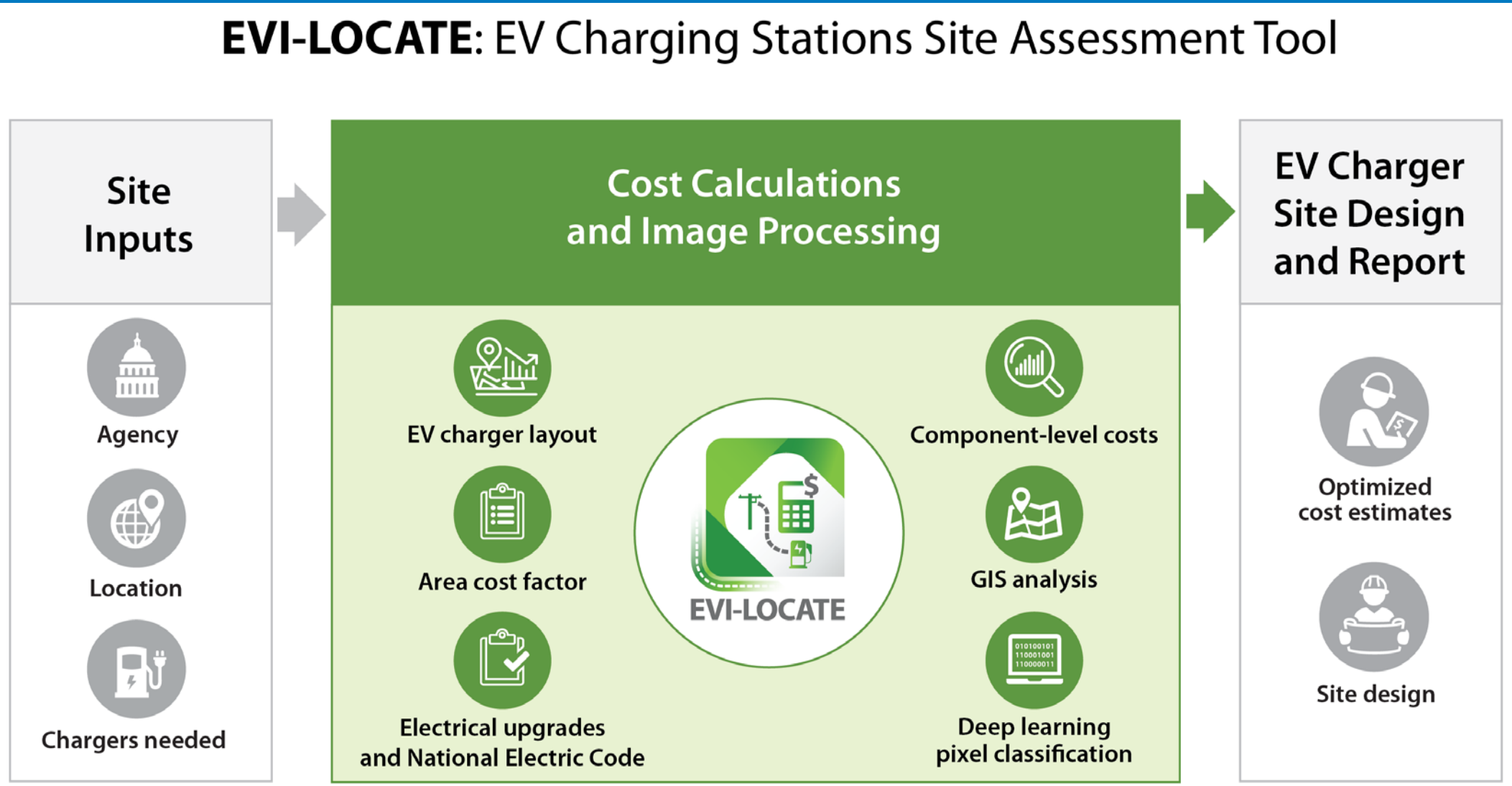


⚠ Work in progress Continuous and future work is expected to change this analysis.

Leveraging EVI-LOCATE

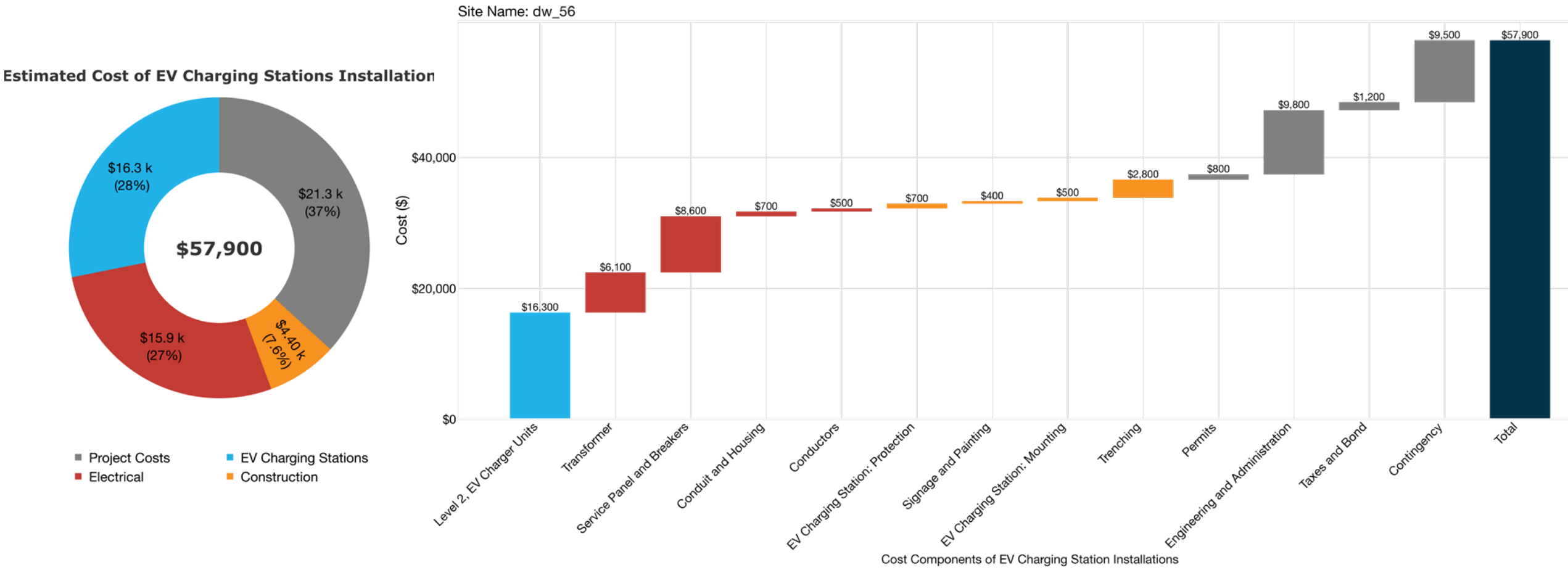
- EVI-LOCATE: Electric Vehicle Infrastructure: Locally Optimized Cost Assessment Tool and Estimator
- Allows: Site-specific, Location-specific and User-specific cost estimates to install EV Charging Stations

EVI-LOCATE: Electric Vehicle Infrastructure-Locally Optimized Cost Assessment Tool and Estimator



EVI-Locate (Electric Vehicle Infrastructure - Locally Optimized Charging Assessment Tool and Estimator) [SWR-23-52]. Web. doi:10.11578/dc.20230920.2.

Detailed Cost Estimates



Currently available only for Federal users.
Public release at the end of FY24

What are the challenges we are facing

Concern of divulging ‘business secrets.’

Most stakeholders loosely track the soft costs.

Getting the agreements in place takes time.

Next Steps

Presentations and Reports

- “Reviewing the understanding of vehicle charging soft costs as a barrier to EV adoption”, Cell Symposia: Technical barriers to electric vehicle implementation, May 2024 (Accepted)
- Detailed synthesis on the literature review of the EVSE Soft Costs

Collaboration with EV U-Finder

- EV U-Finder is a tool provides details of utility in the area

Potential Stakeholder Engagements

- Federal Fleets
- Clean Cities Coalitions

Website for EVSE Soft Costs

Summary

Relevance

- Significant investments are being made in U.S. EV charging infrastructure
- Deployment is smooth if the individual projects are smooth
- Clarity on the cost components and the uncertainties would help

Approach

- Engage Stakeholders' insights to understand the nuances
- Leverage EVI-LOCATE to address the uncertainties

Collaboration

- Three national labs
- Multiple stakeholder groups
- Engaged stakeholders

Technical Accomplishments

- Collecting data from different stakeholders
- Leveraging existing tools

Thank you

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NREL/PR-5400-89856

This work was authored by the National Renewable Energy Laboratory, operated by Alliance for Sustainable Energy, LLC, for the U.S. Department of Energy (DOE) under Contract No. DE-AC36-08GO28308. Funding was provided by the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Vehicle Technologies Office. The views expressed in the article do not necessarily represent the views of the DOE or the U.S. Government. The U.S. Government retains and the publisher, by accepting the article for publication, acknowledges that the U.S. Government retains a nonexclusive, paid-up, irrevocable, worldwide license to publish or reproduce the published form of this work, or allow others to do so, for U.S. Government purposes.

Project factors to consider when thinking about EVSE Soft Costs

- Public, workplace, fleet, personal
- For fleets … behind the fence vs. in front of the fence
  - Trucks (MDHD) and commercial fleets vs light-duty fleets
- Internally-operated or outsourced
- Land use … ownership vs leased
- EVSE cost offset by subsidies/grants vs not
- Urban … exurban … suburban … rural (with various categories of rural)
- Turnkey vs not
- New construction (greenfield) vs retrofit (brownfield)
- Types of chargers … e.g., L2 vs DCFC
- Size/extent of project (e.g., how many chargers)

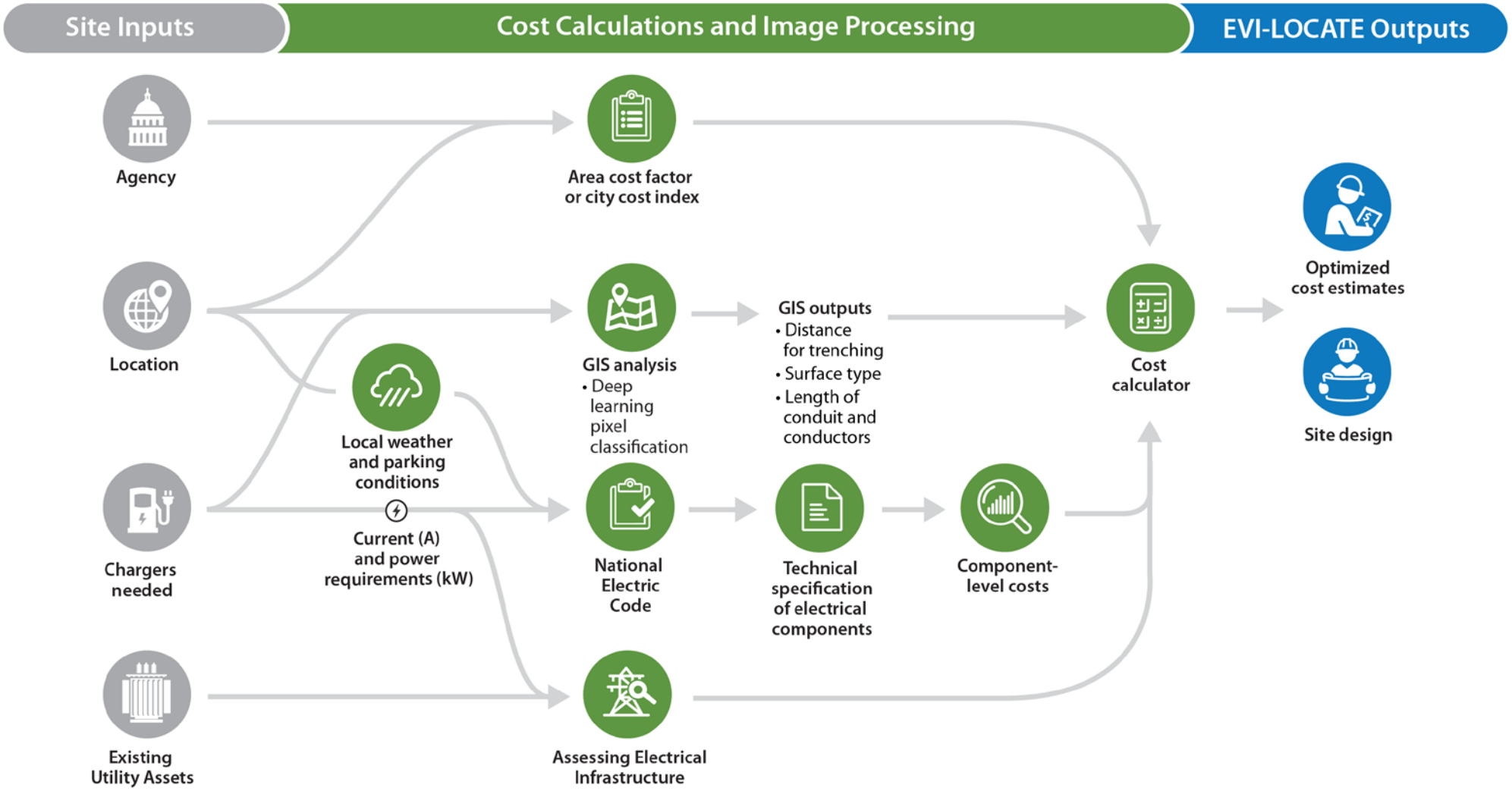
Examples from the literature

- “In addition to the cost of the electrical vehicle supply equipment (EVSE), there will be installation costs to consider, such as the cost of running electrical wiring to the charging station, installation/construction labor costs, electrical grid updates, and permitting/compliance costs. Factors that will determine the price of these additional costs are grid access, distance from the electrical panel, site readiness, and inspections.” …. **SparkCharge, n.d., EV Charging Station Infrastructure Costs and Breakdown**

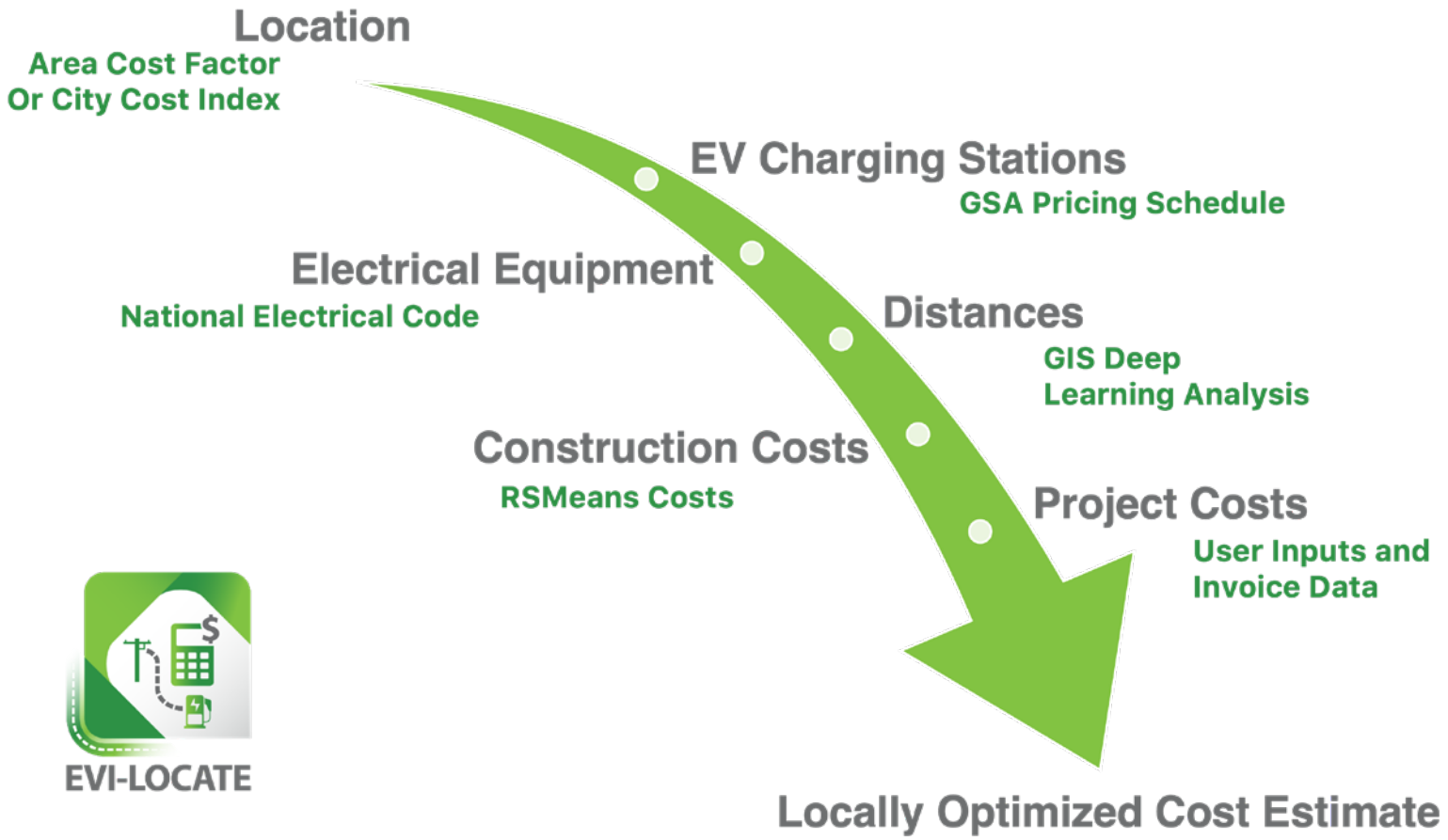
- “Soft costs are those involved in the project, but not directly attributable to the hardware or the installation—think permits, zoning, signage, carports, bollards, etc.” … **Andreson, G., 2022, The Real Cost of Commercial Electric Vehicle Charging Stations. Inovis Energy**

- “In addition to hardware and installation costs, soft costs can be a significant cost driver for EV charger deployment. The infrastructure cost estimates above do not include costs such as data agreements, product warranties, process costs, costs of delays in permitting, and costs of building extra capacity to help “future-proof” sites.” … **Hsu, C.-W. et al., 2021, Colorado charging infrastructure needs to reach electric vehicle goals. International Council on Clean Transportation (ICCT), Working Paper 2021-08**

EVI-LOCATE (Process Flow)



Cost Estimator Components and Data Sources



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