**December 2024**

# EV Payments Transparency:

Examining Confusion about Payments and Pricing at Public EV Chargers

**Author:**

CAL ITP

**Supported By:**

CALIFORNIA
AIR RESOURCES BOARD

## Executive Summary

**Why are payments and pricing at public EV chargers so confusing?** Throughout 2024, the California Integrated Travel Project (Cal-ITP), supported by the California Air Resources Board (CARB), conducted research to answer this question. We conducted:

- Over **20 interviews** with key public and private sector organizations in the EV charging, wayfinding, and payments industries.
- **A survey of over 1,200 EV drivers** nationwide with partner Plug in America, focused on preferences for and experiences with payments at public chargers.
- **Analysis of existing research** regarding consumer preferences, industry dynamics, and regulatory efforts from around the world.
- Direct **review of digital platforms**, including EV charging apps, wayfinding services, and charging provider websites, to catalogue information availability.

Based on this research, Cal-ITP identified the following key insights:

1. **Drivers rely on many apps/platforms to get information about payment methods and pricing from different charging providers, and often struggle to understand payments at chargers.** Confusing or negative payment experiences (not being able to pay, underestimating the price, etc.)  have adverse impacts, especially for low-income and disadvantaged communities. They reduce confidence in charging infrastructure, slowing adoption, and negatively impact providers' reputations.
2. **Charging providers tend to prioritize their own customer communication channels to protect their data and maintain control over driver's experiences,** but more and more drivers rely on third party platforms and are at a disadvantage compared to drivers using proprietary apps. Siloed information reduces competition among providers and encourages inefficient use of charging infrastructure.
3. **There is wide variation in how payments and pricing are communicated on digital platforms, making it hard for drivers to make informed choices.** Inconsistent public data reporting results in a lack of detailed and standard display features regarding payments. This creates friction for drivers, making it hard to compare chargers to get the best price.

It is Cal-ITP's belief that through **enhanced collaboration guided by the public sector**, industry can address these challenges without additional regulation. Improvements in data quality, accessibility, and distribution through third party platforms can ensure a higher level of transparency.

In 2025, Cal-ITP hopes to further align with other California state agencies, and to convene industry stakeholders to accelerate the deployment of accessible, transparent, and affordable EV charging infrastructure for all.

**EV Payments Transparency Report**
December 2024

# Table of Contents

## 1. Introduction

To support an equitable zero-emission future, California state agencies such as the California Energy Commission (CEC), the Governor's Office of Business and Economic Development (Go-BIZ), Caltrans, and the California Air Resources Board (CARB) are working together to accelerate deployment of electric vehicle (EV) charging infrastructure. This research, conducted by the California Integrated Travel Project (Cal-ITP) and supported by CARB, contributes to California's broader strategy for an equitable EV charging infrastructure rollout. It examines how the public charging experience can be more accessible, transparent, and affordable by focusing on the issues drivers face when learning how and how much they pay for public EV charging.

**Why do CARB and Cal-ITP care about EV payments transparency?**

CARB's equitable mobility incentive programs are making EV adoption more affordable for low-income and disadvantaged communities. To use these funds effectively, recipients must be able to access EV chargers that meet their needs and must be able to plan and control charging costs. To support them, CARB is exploring barriers to accessible and equitable charging, including payments and pricing transparency.

Cal-ITP's mission is to help everyone easily pay to access transportation in California. We also believe in aligning public and private sector interests to achieve meaningful change. To accelerate the electrification of our transportation system, we've worked to understand and elevate challenges with the payment experience at EV chargers, starting with the research summarized in Appendix 1. It is our goal to spark collaboration among government agencies, industry players, and advocacy organizations by bringing our expertise in mobility payments and data to EV charging.

## 2. Challenges in EV payments transparency

As EV infrastructure is deployed and the charging industry matures, it's important to consider the acessibility and user experience of functions like payments. To date, government and industry partners have focused on charger *deployment*, *availability*, and *interoperabilty* to build a foundation of charging infrastructure. To help ensure that California's EV infrastructure is also *accessible*, Cal-ITP is focused on the user experience, ensuring payments and pricing at public EV chargers are intuitive and understandable.
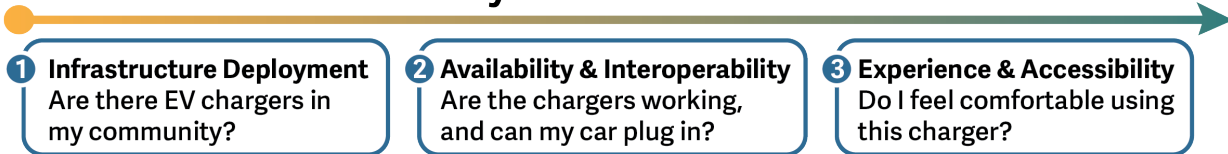
## ZEV Infrastructure Maturity

❶ **Infrastructure Deployment**
Are there EV chargers in my community?

❷ **Availability & Interoperability**
Are the chargers working, and can my car plug in?

❸ **Experience & Accessibility**
Do I feel comfortable using this charger?

*Figure 1: ZEV Infrastructure Maturity*

Based on our initial research (see Appendix 1), we identified the following challenges that we wanted to understand better through this research:

The Challenge:
**Payments and pricing for public EV charging are confusing for drivers.**

❶ Pricing structures and payment methods and procedures for EV charging are inherently complex.

❷ Drivers rely on multiple apps / platforms to get the information they need about pricing and payments at EV chargers.

❸ Accurate payments-related data is not consistently available across all platforms for most chargers, so comparing and choosing chargers is difficult.

*Figure 2: Challenges identified by Cal-ITP*

Surveys show that most EV drivers prefer to plan for charging ahead[1], so drivers need clarity on payments and pricing *before* selecting and navigating to a charger. Unfortunately, wayfinding platforms, charging apps, websites, and even chargers

---

[1] Plug in America. *Quarterly Survey Q1 2024*. 2024. https://pluginamerica.org/wp-content/uploads/2024/06/2024.05-Q1-Quarterly-Survey-Public-Charging-1.pdf

themselves often provide incomplete or confusing information about payments, preventing drivers from visiting chargers that meet their needs or budget. This stands in stark contrast to the experience with traditional gas fueling:
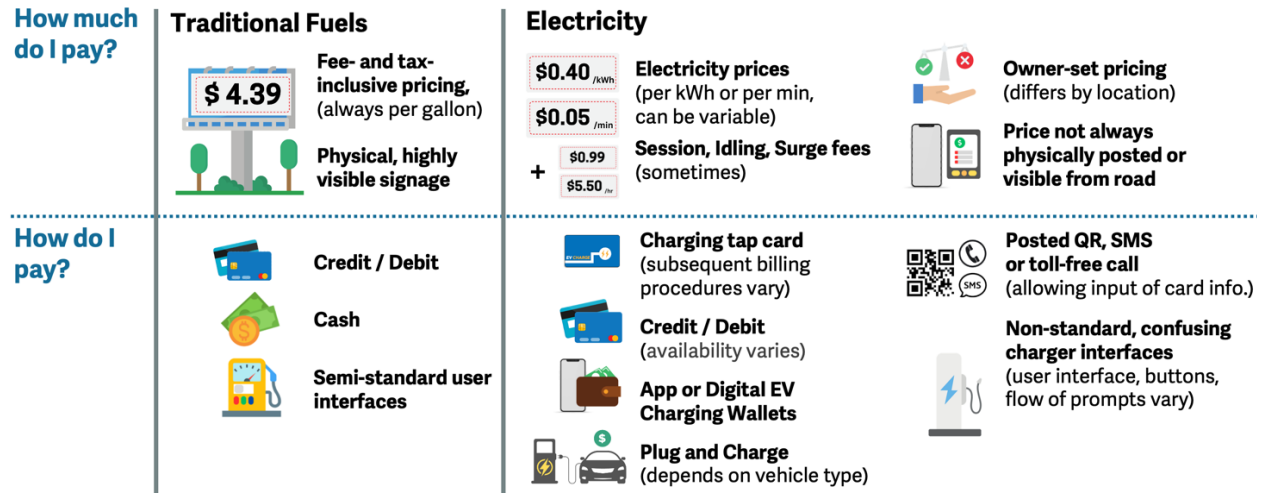


*Figure 3: The complex payment experience for public EV charging*

As a result of this complicated payment experience, customer confusion and surprise around EV charging prices is a significant challenge nationwide.[2] This especially impacts low-income or disadvantaged drivers, who rely more on public chargers, have less access to digital payments, have tighter budgets, and may struggle to understand information presented in inaccessible ways.

To help clarify what gaps exist in current payment experiences, Cal-ITP developed a framework to break the payment experience into three-phases, focusing on the subgroup of EV drivers utilizing open payments, rather than those with dedicated memberships and charging apps. The three phases are shown in the figure below, and a detailed outline of the elements that make these phases transparent for the customer in included in Appendix 2.



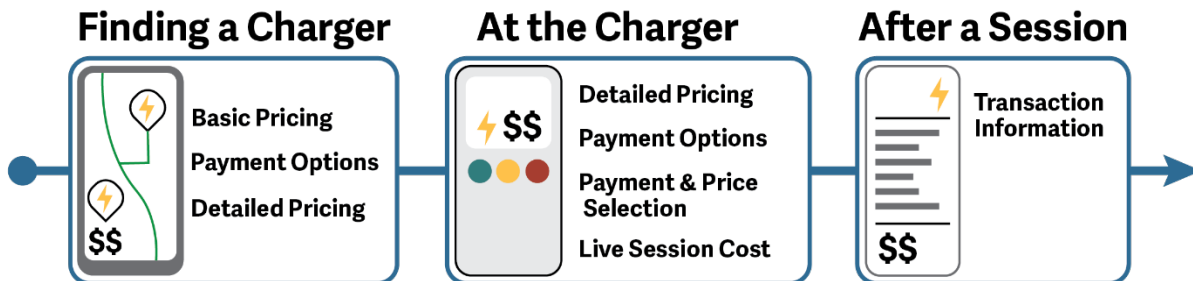*Figure 4: Phases of the EV charging payment journey*

---

[2] Transportation Energy Institute Electric Vehicle Council. *EV Market Insights*. 2024.
https://www.transportationenergy.org/wp-content/uploads/2024/05/24TEI_-EVC_MarketInsights_V04_web.pdf

## 3. Our research objectives and approach

To explore the challenges we identified, Cal-ITP launched a six-month research exercise to answer three primary questions:

**Our Research Questions:**

❶ **What are the challenges drivers face with payments and pricing transparency?**
Can we validate our initial research and the issues we've identified so far?

❷ **How big or widespread are these challenges at EV chargers?**
What is the impact on drivers? How much data exists (or doesn't exist)?

❸ **How can we help speed up solutions to these challenges?**
Which industry players can help, and how? What are roadblocks to making progress?

*Figure 5: Cal-ITP's research questions*

Our research methodology focused on collecting information from diverse sources to and multiple perspectives. These included:

**Desk research**:

- **Review of available research** including charging industry analyses, technology capabilities and standards, demographics, and consumer preferences for payments at EV chargers.
- **Review of regulations in peer countries** around the world focused on payments and information availability at public EV chargers.
- **Conceptual development of user experience** and challenges, and defining what constitutes a "transparent" payment experience.

**Industry & stakeholder engagement**:

- **Stakeholder mapping**, identifying the diverse players involved, such as vehicle manufacturers (OEMs), wayfinding, payments, charging providers, e-mobility service providers (EMSPs), data aggregators, etc.
- **Direct industry interviews**, including discussions with representatives from suppliers and industry associations (listed below) to understand perspectives on pricing transparency, data sharing, and payment method acceptance.
- **Engagement with staff at peer state agencies in California** and other domestic authorities focused on public charging infrastructure and experiences to align on priorities.

- **Discussions with advocacy groups** focused on EV equity to understand the unique challenges low-income drivers face, and the impact of pricing transparency.

| *Private and Non-Profit Entities* | | *California State Agencies:* |
|---|---|---|
| - *American Express*<br>- *Cal-ETC (California Electric Transportation Coalition)*<br>- *Chargepoint*<br>- *Chargetrip*<br>- *ChargeX Consortium*<br>- *Discover*<br>- *EVCA (EV Charging Association)*<br>- *EvGO* | - *Google Maps*<br>- *Mastercard*<br>- *Plug In America*<br>- *Plugshare*<br>- *Rivian*<br>- *Southern California Edison*<br>- *Tesla*<br>- *US Payments Forum*<br>- *ValleyCAN*<br>- *Visa* | - *California Energy Commission*<br>- *Governor's Office of Business and Economic Development*<br>- *California Air Resources Board*<br>- *California Department of Measurement Standards* |

*Table 1: Engaged parties*

**Direct data collection**:

- **Review of online user-facing platforms** including charging provider apps and websites and major wayfinding platforms, to catalogue current functionality, reporting capabilities, and available information about payments and pricing.
- **EV driver survey** development and distribution with Plug In America (full results forthcoming) focused on learning about EV drivers' real-world experiences and challenges with payments and pricing transparency.

## 4. Our findings

After the completion of our research, we distilled three key findings to clarify how and why drivers struggle to understand pricing and payments. These findings describe the intersection of driver experiences, data availability for payments and pricing, and EV charging industry dynamics. Additional insights from our research–including our definition of a what a "transparent" charging experience should be, and why payments transparency for EV charging is complicated to achieve–is provided in Appendix 2 & 3.

### Finding 1

**Drivers rely on many apps/platforms to get information about payment methods and pricing from different charging providers, and often struggle to understand payments-related parts of the charging experience.**

Results from the survey we co-developed with Plug In America (responses were collected from over 1,200 EV drivers nationwide) show that 50% of respondents rely on three or more apps/platforms to locate public EV chargers and understand payment methods and pricing. More than half of drivers have felt pressure at least sometimes to download apps from charging providers, even when they were not necessary:
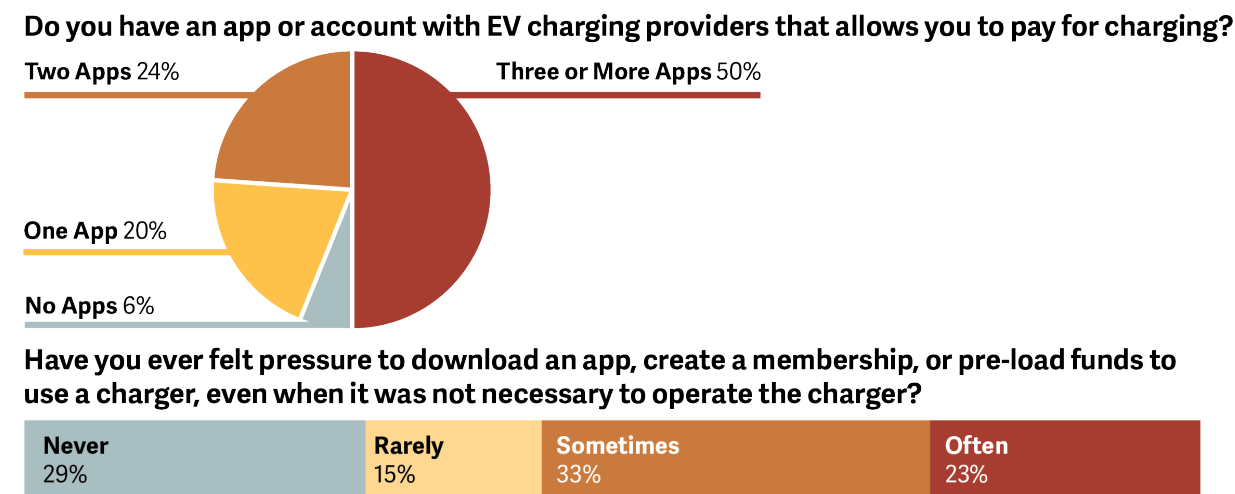
**Do you have an app or account with EV charging providers that allows you to pay for charging?**

Two Apps 24%
Three or More Apps 50%
One App 20%
No Apps 6%

**Have you ever felt pressure to download an app, create a membership, or pre-load funds to use a charger, even when it was not necessary to operate the charger?**

| Never 29% | Rarely 15% | Sometimes 33% | Often 23% |
|---|---|---|---|

*Figure 6: Summary of survey responses regarding EV charging app usage. Source: Plug in America Quarterly Survey (full results forthcoming).*

Additionally, a significant proportion of EV drivers struggle to understand payments and pricing at public chargers, and many have had negative payment experiences. Nearly 75% of respondents indicated that they have been unable to determine the price of a session in advance, with nearly 16% saying this occurs "often," while 39% of drivers have had charging experiences where they were surprised by the final cost:

**In your opinion, how easy is it to find information about the cost of charging at public EV charging stations before you arrive?**

| Very Easy 6% | Easy 15% | Neither Difficult Nor Easy 34% | Difficult 32% | Very Difficult 12% |
|---|---|---|---|---|

**In your opinion, how easy is it to find information about payment methods at public EV charging stations before you arrive?**
(such as whether it accepts credit/debit cards, your preferred account, or other payment options)

| Very Easy 7% | Easy 16% | Neither Difficult Nor Easy 41% | Difficult 26% | Very Difficult 10% |
|---|---|---|---|---|

**Have you ever been unable to determine what the cost of a charging session at a public EV charger will be in advance?**

| Never 26.3% | Rarely 25.2% | Sometimes 32.6% | Often 15.9% |
|---|---|---|---|

**Have you ever had to pay additional fees you weren't aware of, or paid a significantly higher price for EV charging than you were expecting?**

| No, Never 61.4% | Yes 38.6% |
|---|---|

*Figure 7: Summary of survey responses regarding confusing or negative payments experiences. Source: Plug in America Quarterly Survey (full results forthcoming).*

## Why is this finding important?

Confusing or negative payments experiences at public EV chargers have many adverse impacts, and place disproportionate burden on low-income and disadvantaged communities. They reduce the overall confidence in EV charging infrastructure, slowing adoption, and negatively impact charging providers' perception among customers.

**Impact on disadvantaged communities:** In our engagement with advocacy and community-based organizations focused on supporting low-income EV drivers, they shared that the communities they work with often require significant education about public charging, especially regarding payment procedures and pricing. When reflecting on their experiences onboarding low-income drivers to charging subsidy programs, they recounted the cumbersome process of helping participants download multiple charging apps, and the extensive education needed to help customers understand how and how much they would pay. Helping to reduce this confusion in low-income communities by providing a simpler experience and better data availability can support a faster, more accessible transition to EVs and improve drivers' perception of public charging. The survey results collected with Plug In America came from generally higher-income drivers, and we expect that confusion and negative payments experiences may be even more common in disadvantaged communities than was reflected in the survey data.

**Brand perception:** Cumbersome payment and confusing pricing hurt the brand perception and customer loyalty of charging providers. In our survey, we asked about how confusing or negative payment experiences impacted drivers' usage and perception of different EV charging providers. Of the responding drivers who had negative experiences, 42% of them shared that it discouraged them from visiting the same charger/brand again.

**If you have ever had trouble determining the price, had to pay more than expected, or were not able to pay with your preferred method at a charger, did this experience impact your perception of that charger brand?**



Never experienced 29%

Made me not visit that charger/brand again 30%

Did not impact perception of charger/brand 10%

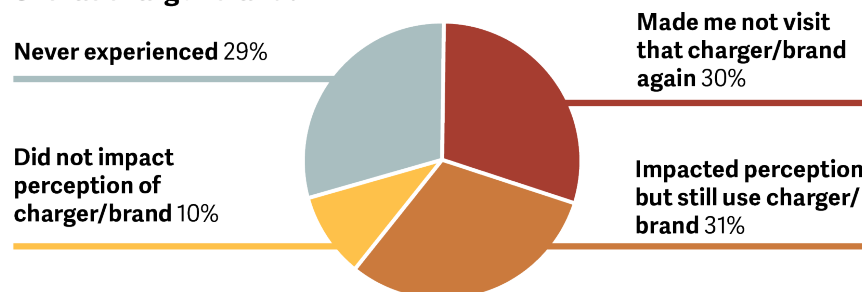Impacted perception but still use charger/brand 31%

*Figure 8: Impact of confusing or negative payments experiences on charger brand usage and perception. Source: Plug in America Quarterly Survey (full results forthcoming).*

## Finding 2

**Charging providers tend to prioritize their own customer communication channels to protect their data and maintain control over driver's experiences.**

During our engagement with leading charging providers, most emphasized a strong preference for customers to use their own company apps and websites to find and learn about chargers instead of third-party or shared platforms. Providers reiterated that they directly provide drivers the most reliable and specific payments information and acknowledged that the availability and accuracy of this information is poor in many third-party apps. This assertion was supported by our analysis of publicly available information and our survey results.

Beyond the commercial advantages of keeping customers within their own ecosystem (capturing market share, having more access to customer data, keeping more control to positively influence customer experiences, etc.), a handful of the industry players interviewed also shared their concern that sharing real-time pricing data or other detailed charging information with third parties via open APIs could allow external entities to "scrape" their data, damaging their commercial and operational position. This sentiment was also reflected in industry responses to the data reporting standards of the National Electric Vehicle Infrastructure (NEVI) funding program (explored further in Regulatory Approaches: Funding Requirements), where the Federal Highway Administration received similar responses pushing back on reporting

requirements. Providers claimed in those responses that "making the data freely available will… translate into charging networks subsidizing competitors' new business models that could then unfairly attract drivers to use their mobile applications and payment/subscription services."[3]

**Why is this finding important?**

Because of the wide differences in information available across platforms (see Finding 3 for more detail), drivers are left at a disadvantage if they aren't using proprietary apps from charging providers. They may be unable to access clear pricing information, leaving them unaware of potential fees, and may only realize once they have arrived at a station that their preferred payment method is not accepted, leaving them unable to charge.

**This gap is growing:** Historically, charging providers have shared payments information only within their network and with roaming partners in formats such as Open Charge Point Interface (OCPI) feeds. This approach worked well before the rise of open payments; drivers needed to be enrolled with a provider to initiate a charge, meaning they must have already learned about a charging network's unique payment and pricing policies before arriving at a charger.

Payments with bank cards have become more popular for EV charging (29% of EV drivers today prefer paying by credit card),[4] and there is consensus that interoperability of charging apps, plugs, payment methods, and no mandatory memberships is critical for charger accessibility. As result, bank card acceptance and prohibition of mandatory memberships is increasingly required by governments worldwide (see Section 5 on government regulations). Because of these advances, the number of drivers arriving at any given station without the provider's app or proprietary payment method is increasing, making the disparity in information available on unaffiliated platforms a growing problem.

**Siloed infrastructure is inefficient and inaccessible:** Cal-ITP recognizes that charging providers use their own apps, communication channels, and payment methods to offer differentiated user experiences and compete in a highly dynamic industry. As the deployment of public EV chargers across California continues to ramp up, however, we must provide drivers better access to accurate and complete information and ensure there is true interoperability, more like what we currently observe in the traditional gas fueling experience (see Figure 3).

---

[3] Federal Highway Administration (FHWA), U.S. Department of Transportation (DOT). *NEVI Final Rule*. 2023. https://www.federalregister.gov/documents/2023/02/28/2023-03500/national-electric-vehicle-infrastructure-standards-and-requirements

[4] Transportation Energy Institute Electric Vehicle Council. *EV Market Insights*. 2024. https://www.transportationenergy.org/wp-content/uploads/2024/05/24TEI_-EVC_MarketInsights_V04_web.pdf

Whether or not they are technically required for charging, there is a burden associated with unique apps, memberships, and payments for each charging provider, which can pose a barrier to access. There is an investment of time to download apps, set up accounts, learn how to navigate each platform differently, and understand different pricing structures from each provider. There can also be an investment of financial resources, as some providers utilize pre-loaded funds for charging accounts. These funds cannot be used across different brands of chargers and restrict drivers' ability to use their money for other essentials before they incur charging costs. These investments of time and money in individual providers' networks make it more difficult for drivers to use available charging infrastructure from other providers.

Beyond the driver experience, there are inherent customer benefits when information is available in centralized platforms rather than siloed in providers' apps, since it facilitates price competition that lowers costs and enables more efficient use of all available infrastructure.

## Finding 3

**There is wide variation in how payments and pricing are communicated on digital platforms, making it hard for drivers to make informed choices.**

Through our analysis of charging and wayfinding apps and websites we confirmed that the payments information available varies widely in format and level of detail, even when looking at the same charger. This makes it hard for customers to compare options, especially if they want to do so without consulting many apps at once.

To demonstrate this variability, we recorded what payments and pricing information available for a mix of selected chargers from different providers around the Bay Area. The text included below is copied directly from the named platforms to demonstrate differences in language and formats that drivers would find on these sites:

| *Charger Nickname* | *PlugShare* | *Apple Maps* | *Google Maps* | *Provider's App / Website* |
|---|---|---|---|---|
| "**No Network Eddie Souza Park**" | *Overview:* "No payments detail available"<br><br>*Station details:* "Unknown" | "Paid" | *Charger not shown* | *Could not determine charging provider's app or website remotely* |
| "**Chargepoint San Jose Fire Station**" | *Overview:* "Payment Required 12:00 AM - 08:30 AM $0.20/kWh 08:30 AM - 09:30 PM $0.25/kWh 09:30 PM - 12:00 AM $0.20/kWh"<br><br>*Station details:* | "Paid"<br><br>"Good to know: Contactless Payments" | *Charger not shown* | 12am - 8:30am $0.20/kWh 8:30AM - 9:30PM $0.25/kWh 9:30pm - 12 AM $0.20/kWh Est. $1.65 per hour |

| | | | | |
|---|---|---|---|---|
| "Unknown" | | | | |
| "*Electrify America 1375 Blossom Hill*" | *Overview:* "Payment Required - please refer to station details" <br><br> *Station details:* $0.56 per kWh, 1-350 kWh <br> Parking Info: $0.40 per hour | "Paid" <br><br> "Good to know: Contactless Payments" | *No payments detail* | "Pricing may vary, check the charger's display for more detail" <br><br> "Pass Pricing: 0.56/kWh idle fee: $0.40 /min after 10 mins" |
| "*No Network Prologis*" | *Overview:* "Payment Required $0.5/kwh + 1.5/hr. $10 max. Pay at kiosk between stations." | "Paid" | *Charger Not shown* | *Could not determine charging provider's app or website remotely* |
| "*Tesla Cupertino*" | *Overview:* "Payment Required - please refer to station details" <br><br> *Station details:* "$0.48/kWh" | "Paid" | *No payments detail* | 4am-12pm $0.37/kWh <br> 12pm-7pm $0.56/kWh <br> 7pm-11pm $0.44/kWh <br> 11pm-4am $0.32/kWh <br> Idle fees (up to) $1.00/min |
| "*EV Connect HoopSphere Basketball Academy*" | *Overview:* "Payment Required - please refer to station details" <br><br> *Station details:* "$1.50/hr" | "Paid" | *No payments detail* | *Can not view charger details remotely on app without scanning station QR / ID* |
| "*Blink Hyatt Place Newark*" | *Overview:* "Payment Required - please refer to station details" <br><br> *Station details:* "$0.49 per kWh" | "Paid" <br><br> "Good to know: Contactless Payments" | *No payments detail* | Start fee: $0.49 per session <br> Energy: 0.49 per kWh |

*Table 2: Payment information available online across selected chargers and brands.*

As shown above, the specificity of pricing information varies widely, and no platform offers specific data for all chargers. Even on PlugShare, the platform that we found had the best availability of payments information easily accessible across charger brands, the location where the information was displayed varied, meaning we needed to check in the "charger overview" popup and the separate "station details" page depending on the charger. For some of the chargers, we couldn't determine what app to use, or couldn't view detailed information remotely without access to information provided at the charger itself, such as the unique station ID or QR code. There is a general lack of specific payment method information across all platforms when viewing specific charger details, other than Apple's notices about contactless payment acceptance.

For some chargers, additional fees or inconsistent costs were shown across different platforms.

In our interviews with major wayfinding platforms, charging data aggregators, and charging providers, we heard that they address data formatting and reporting in different ways, resulting in this observed inconsistency in data availability. While the emergence of multi-provider roaming networks and apps has helped improve this, coverage is still far from universal, and the lack of standardization remains a significant challenge.

In conversations with wayfinding platforms, they were clear about the obstacles they face in displaying payment and pricing information for EV chargers. They lack access to complete, standard, and accurate real-time and static data for many charging stations, making it hard to justify investments in display features that would help drivers understand payment options and pricing. Since the data is not readily available, wayfinding providers sometimes rely on direct data sharing agreements with select charging providers, but these agreements are a piecemeal solution. Review of online tech support forums for major EV wayfinding apps, such as A Better Route Planner, also indicated that better display features related to payments are consistently requested by users, but are difficult to implement due to inconsistent data availability.[5]

As a result of poor data availability, stemming from inconsistent implementation of widespread data standards such as OCPI or lack of reporting at all, wayfinding platforms and multi-operator charging network apps still rely on some amount of user-generated data, which can be inconsistent, inaccurate, and is seldom available in real time. Moreover, the inherent complexity of EV pricing and payment structures—such as varying rates, fees, and payment methods—makes it difficult to present information completely and accurately.

Private data aggregators have attempted to address this issue by collecting, cleaning, and publishing payment data, but these efforts are not always done in real-time, and the information is not always publicly accessible or freely available for app developers.

**Why is this finding important?**

Inconsistent public data reporting results in a lack of detailed and standard display features regarding payments. This creates friction for drivers, making it hard to compare chargers to get the best price or prioritize a preferred payment method. While this impacts all drivers, low-income EV users are particularly harmed by not

---

[5] ABRP Request A Feature - *prices-of-charging-points*. Accessed November 15th, 2024
https://abrp.upvoty.com/b/request-a-feature/prices-of-charging-points/

having accurate, timely and complete information that gives them the ability to plan where and when to spend their charging budget.

**Drivers need clarity:** To make informed decisions about public charging, drivers must access clear information about EV chargers, ideally in centralized locations that use the same terminology and units across chargers. This applies not only to payments, but also to other basic charger attributes like charging speed, plug type, and availability. While there has been significant progress on these issues, including ongoing consolidation around per-kWh pricing and the rise of OCPI feeds shared between networked providers, more standardized data reporting practices, more consistent pricing structures, and common consumer-facing terminology are needed.

Improving the quality and consistency of data will help reduce the learning curve for new EV drivers, improve their ability to choose preferred chargers, and support lower-income communities by reducing anxiety around public EV charging costs. Facilitating this consolidation will require enhanced collaboration between charging providers and with external stakeholders like the payments industry, wayfinding platforms, and data aggregators. Based on our conversations, we believe that new data standards are not needed, only more consistent application and wider reporting using existing ones.

## 5. Government efforts to improve EV payments transparency

Governments have multiple tools to improve the reporting of data–including pricing and payment methods–from EV chargers. We researched three common types of regulations:

- **Funding requirements**, which must be met to access public funding for charger installations.
- **Measurement standards,** that ensure chargers' ability to accurately measure and report the price of energy delivered to a driver.
- **General payments and data sharing ordinances,** that set requirements to accept specific payment methods, provide charger functionality such as roaming support, or publicly report specific data.

To understand how different jurisdictions have begun to address the challenges explored through our research, we summarized existing rulemaking in California and abroad:


### Funding Requirements

In California, the most important sources of funding available for EV charging infrastructure include California's distribution of National Electric Vehicle Infrastructure (NEVI) program funds, in addition to the CEC's own grant programs under the Clean Transportation Program such as Cal-eVIP, supported by California's general fund and the Greenhouse Gas Reduction Fund.

NEVI establishes specific requirements for payment acceptance at all funded chargers, including "a contactless payment method that accepts major debit and credit cards," and either automated toll-free phone or SMS-based payments. Payments at NEVI-funded stations must not require membership, and energy delivery cannot be altered based on the payment method used. The per-kWh price must be "transparently communicated prior to initiating a charge" and any other fees (i.e. parking, idling, demand charges etc.) must be clearly explained via an application, website, or other means in "a manner of like prominence to the price anytime the price is displayed." Display of fees and payment information cannot be membership-based.

Additionally, NEVI requires states and other designated funding recipients to ensure that basic charging station information is available free of charge to third-party software developers through application programming interface (APIs). This includes specific requirements to publish "pricing and payment information, pricing structure, real-time price to charge at each charging port in terms defined by OCPI 2.2.1, and payment methods accepted at the charging station."

In line with the NEVI Program requirements, the CEC has proposed requirements for charging providers of all state- and ratepayer-funded publicly available Level 2 and DC fast chargers in California to share real-time data with third-party software developers publicly via API, including the same OCPI data fields identified in the NEVI requirements relating to real-time pricing and payment methods.[6]

## Measurement Standards

In California, the [Department of Measurement Standards](#) (DMS) is responsible for setting requirements for how chargers measure and price electricity delivered to consumers. The Department also certifies charger designs to ensure accuracy and compliance. The standards set forth by DMS (Title 4 of the California Code of Regulations (CCR) Sections [4000](#), [4001](#) and [4002](#)) are based on the [NIST Handbook 44](#), and apply to chargers themselves in addition to the "indicating elements" (screens) that users interact with when viewing the price and electricity delivered by an EV charger at the station. While these regulations provide highly specific requirements for communication *at the charger*, including what information must be recorded by the charger machinery and communicated to the user via displays or receipts, the rules do not currently apply to real-time data reporting or price disclosure on digital interfaces that can be viewed by drivers remotely.

## General Payments and Data Ordinances

California's EVCS Open Access Act ([SB 454](#)) established regulations for all Level 2 and DC fast chargers publicly accessible in California in 2013, requiring them to:

- Provide an option for drivers to pay without a membership,
- Offer payment "via credit card, mobile payment, or both,"
- Disclose the "total actual charges" associated with a charging session at the point of sale, and
- Report data to the National Renewable Energy Laboratory (NREL) including the "charging station's geographic location, a schedule of fees, accepted methods of payment, and the amount of network roaming charges for nonmembers, if any."

In 2023, [SB123](#) updated the EVCS Open Access Act, refining the credit card acceptance requirement to mandate a "contactless payment method that accepts

---

[6] CEC - Revised Proposed Regulations for Tracking and Improving Reliability of California's EV Chargers [Presentation](#), and CEC Second Draft [Staff Report](#) Tracking and Improving Reliability of California's Electric Vehicle Chargers. Available in CEC Docket Log 22-EVI-04.
[https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=22-EVI-04](https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=22-EVI-04)

major credit and debit cards," in addition to SMS or automated toll-free phone-based payment, and plug-and-charge compatibility for all DC fast chargers. The rule also maintained the requirements for point-of-sale disclosure while specifying pricing per-kWh, and maintained reporting to NREL. While the enforcement authority for SB 454 was originally held by CARB, SB123 migrated this authority to the CEC, which may, starting in 2028, add or change required payment methods based on payment technology advancement.[7]

### International Examples

**United Kingdom.** The Public Charge Point Regulations mandate that charging providers must clearly display the maximum per kWh price of charging services, including any taxes and additional fees, to drivers before the initiate a session. This can be communicated either via the charger interface or via an app or other digital device. If operators make pricing information available through an app or digital device, membership cannot be required to view detailed payment information. The regulations also require that provider's charger reference data, including pricing schedules, and OCPI feeds, including payment methods accepted, are made publicly accessible to all government bodies, Distribution Network Operators, Transmission Owners, and Electricity Systems Operators on a real-time basis.[8]

**European Union:** The EU introduced cross-border regulations in April 2024 concerning EV charging and payment options, known as AFIR, requiring spontaneous "ad hoc" charging to be supported at any station, even without a charge card. In addition to these EU-wide regulations, member states have implemented more stringent measures. Of EU member states, just 6 out of 27 studied do not already have a requirement in place to accept open payment methods including bank cards, with most of these requirements enacted since 2021.

AFIR states that "price transparency is crucial to ensuring seamless and easy recharging and refueling," and requires providers to make price information, including sub-itemized price components, available to users before the start of the recharging or refueling session. Notably, if prices for "ad hoc" sessions are provided on a dedicated webpage, it must be the same page used for the payment of the session.[9]

---

[7] California Senate Bill 123, July 10th, 2023. https://legiscan.com/CA/text/SB123/id/2833534
[8] United Kingdom. *Public Charge Point Regulations.* 2023. https://www.gov.uk/government/publications/the-public-charge-point-regulations-2023-guidance/public-charge-point-regulations-2023-guidance
[9] European Union. *Alternative Fuel Infrastructure Regulations.* 2023 http://data.europa.eu/eli/reg/2023/1804/oj

## Comparison to the Fuel Industry

There is currently no specific federal regulation requiring display of gas pump prices, yet nearly every gas station in America features a billboard with real-time prices, and most major wayfinding platforms offer a high degree of visibility on easily comparable gas prices. Some state-level regulations do require gas stations to post prices with clear signage on-site, but none that we are aware of address real-time data reporting. Despite few regulatory requirements, the emergence of high-quality data providers like GasBuddy and OPIS have made pricing display features reliable, since they provide widespread coverage and real-time pricing data from nearly all gas stations.

In the UK, the Competition & Markets Authority (CMA) found through a market study in 2023 that price-based competition at gas pumps has been reduced in recent years, and as part of their recommendations, the CMA has recommended the creation of an "Open Data Fuel Finder" scheme, where gas pricing is consolidated and made accessible to third-parties. At the moment, the CMA launched an opt-in data collection scheme with the largest fuel retailers and trade associations to promote pricing transparency. At the moment, 35% services stations throughout the UK have signed in, representing 60% of the fuel volume sold.[10] A similar opt-in model could be explored for EV charging.

## Payments Sector Regulation & Forces

General payments sector policies and requirements can exert widespread influence on the payments experience at EV chargers and help standardize industry practices. One key example includes the policies and requirements set by the Federal Trade Commission and followed by the payment networks, who ensure these regulations are applied by all merchants accepting card payments.

The payment networks follow the Fair Credit Billing Act, enabling both business and private customers to withhold payment for charges on items not purchased, incorrect amounts, or any unauthorized charges.[11] Merchants must, therefore, communicate prices clearly and accurately to consumers before a transaction occurs, as failure to do so can result in disputes and chargebacks, which can be costly and damaging to both the merchants' and the card brands' reputations.

---

[10] United Kingdom. "What we're doing to provide access to road fuel price data". *Competition & Markets Authority*. 2023 https://competitionandmarkets.blog.gov.uk/2023/08/31/what-were-doing-to-provide-access-to-road-fuel-price-data/

[11] Unites States Federal Trade Commission, Fair Credit Billing Act. https://www.ftc.gov/legal-library/browse/statutes/fair-credit-billing-act

## 6. Next Steps and Recommendations

To address the challenges identified in this research, Cal-ITP would like to facilitate further engagement with industry players to ideate, share best practices, and collaborate on solutions that meet the needs of drivers across California and the United States. We are also committed to continue working alongside our state agency partners to improve the payment experience at EV chargers by aligning on our key priorities and coordinating our efforts to engage with the private sector. We will continue our work keeping these partners informed on the nuances of the payment technology ecosystem and user experiences.

Throughout 2025, Cal-ITP is hoping to convene both government and industry players to discuss the findings of this research and align on improvements to transparency and interoperability. Through these discussions, Cal-ITP suggests addressing the following:

- **Ensure existing standards are implemented to facilitate greater transparency**:
  - Help coordinate within the industry and diverse government entities working on EV equity to agree on a more consistent approach to reporting, using existing standards.
  - Explore what incentives can help facilitate consolidation on data reporting practices.
  - Create a cross-industry action plan to better utilize data from existing reporting requirements, such as those in NEVI, to improve the visibility of payment information for EV drivers in digital interfaces.
- **Improve the security, quality, and accessibility of payments-related data**
  - Evaluate if current standards should be refined or expanded to better organize the diversity of payment methods and pricing structures, and to accommodate industry constraints in displaying standardized data.
  - Work with charging providers to develop strategies to protect sensitive data from misuse or scraping while improving accessibility for third parties and visibility for drivers.
- **Evaluate improvements in payments transparency over time**:
  - Coordinate efforts among government entities and industry to develop a framework for measuring and tracking improvements in data availability and transparency over time and further measure the impact of these changes on driver experience.
  - Explore how shifting industry dynamics (changing customer preferences, new payments technology, plug-and-charge) may change data needs for transparency over time.

It is Cal-ITP's belief that through enhanced collaboration guided by the public sector, charging, payments, and wayfinding providers can close the gaps we have identified in

payments transparency without the need for additional regulation or requirements. As it stands today, ample data is being collected and reported by charging providers, but improvements in data quality, accessibility, and distribution through third party platforms can ensure a higher level of visibility for drivers.

By working together to make progress on these topics, Cal-ITP is excited to accelerate the deployment of accessible, transparent, and affordable EV charging infrastructure for all.

## Appendix

### 1. Summary of Cal-ITP Payments at EV Chargers Brief (Summer 2023)

As electric vehicles gain popularity, public EV charging stations are becoming a critical part of the state's transportation infrastructure. As we work to transition to low-carbon mobility, the payment experience at EV chargers can pose a barrier to options, as it is more complex than traditional gas refueling, slowing adoption among drivers and posing particular challenges to marginalized communities. Cal-ITP is focused on bringing our expertise in mobility payments to the EV charging domain, helping enable a more simple, accessible, standard, and affordable charging experience for all.

**The Complexity of EV Charging Payments**

Compared to buying gas, paying to charge an EV in America is quite complicated. This complexity not only makes switching to an EV more intimidating and expensive, but also disproportionately impacts minority, low-income, and non-English speaking populations. To demonstrate the relative complexity of paying to charge an EV, the following graphic provides information about the two relevant questions drivers must ask themselves at the station – "what price do I pay," and "how do I pay" – compared to when they buy gas. This graphic includes consideration of the three domains explored in this memo: (1) payment methods, (2) pricing policies, and (3) payments information and user interfaces, which together compose the driver payment experience. While the payment experience for gas is simple, standard, and intuitive, the experience of buying electricity is complex, varies significantly, and is difficult to understand and navigate. Simplifying the payment process for EV charging can help reduce anxiety about charging, a key sticking point for EV adoption, and enable more inclusive, convenient access to critical mobility infrastructure.
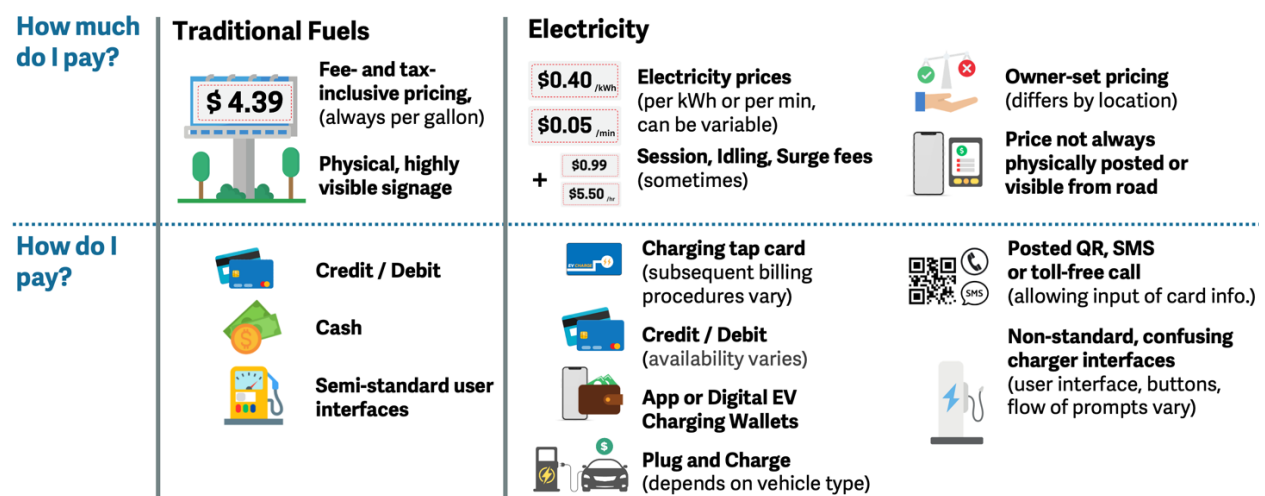


*Figure 4 (repeated): The complex payment experience for public EV charging*

**EV Payments Transparency Report**
December 2024

Payment difficulties at EV chargers can leave drivers stranded, especially those reliant on public charging. Low-income individuals are more likely to depend on public chargers since private residential chargers may not be accessible to those living in multi-family units or rental properties. Additionally, most public EV chargers do not accept cash, presenting challenges for unbanked or underbanked populations. Addressing these issues is essential to make the EV transition equitable and to ensure no one is left behind in the move to zero-emission transportation.

**Payment Methods**

Payment options for EV charging vary significantly across different chargers and regions. While many chargers rely on app-based payments, which require pre-loaded accounts or linked cards, the acceptance of other payment methods, such as open-loop bank cards, varies. Contactless mobile wallets, RFID tap cards, and newer technologies like Plug-and-Charge are being adopted, but they are not yet universally available. Universal payment standards that do not require drivers to pre-register or download specific apps are needed to ensure that all drivers can pay as they go without extra steps or costs.

**Pricing Policies**

EV charging pricing is influenced by a range of factors, including energy prices, session fees, idling fees, and dynamic demand-based pricing. Pricing transparency is critical to avoid confusion, as the cost of a charging session can fluctuate based on the time of day and location. Regulators have made strides toward standardizing per-kWh pricing, but continued efforts are needed to ensure that drivers can understand and compare prices between charging stations. Clear and upfront communication of all fees, including session, parking, and processing fees, is essential for building trust and encouraging more drivers to switch to EVs.

**Payments Information & User Interfaces**

Unlike gas stations, which display prices clearly on billboards, EV chargers often lack visible and clear pricing information. Drivers must rely on apps or interfaces that may not show complete or real-time data. Third-party platforms, such as wayfinding apps, often struggle to report comprehensive pricing information due to the lack of standardized data reporting. Initiatives like the Open Charge Point Interface (OCPI) and aggregation projects such as the Alternative Fuels Data Center are working to address these gaps, but more work is needed to make real-time pricing and payment information readily available to all drivers before they arrive at a charging station.

### 2. What Comprises a Transparent Experience?

Customers should be able to answer two key questions easily and accurately; **how do I pay**, and **how much do I pay**? For the purposes of this research effort, Cal-ITP defined the payment experience at EV chargers across three phases of the charging user journey, focusing on the subgroup of EV drivers utilizing open payments, rather than those with dedicated memberships and charging apps. The three phases are shown in the figure below, followed by a detailed outline of the elements that make these phases transparent for the customer.
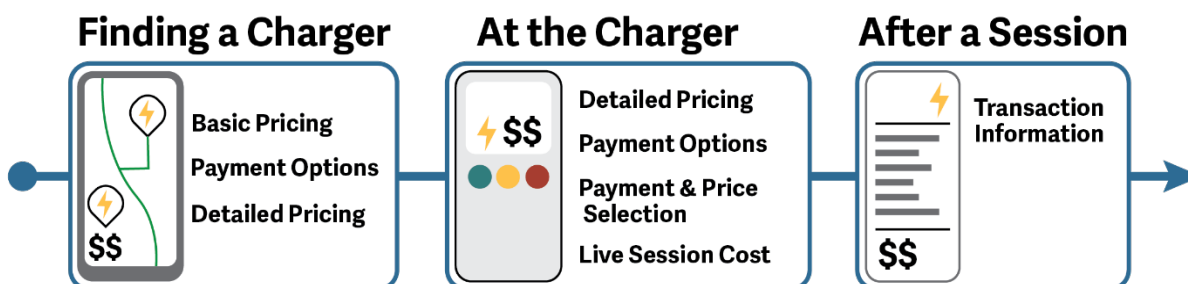


*Figure 4 (repeated): Phases of the EV Charging Payment Journey*

### Finding a Charger

When drivers are looking for a charger or selecting the charger they want to visit, they should have access to the following in all relevant interfaces where they look for EV chargers alongside other basic information such as charging speed and plug type. This information is presented clearly and intuitively, and where possible in a standard format:

- **Basic pricing information:** the basic fee structure in place at a given charger, including an accurate price per kWh for "ad hoc" charging customers (drivers utilizing open payments).
- **Available payment options:** the kinds of payments accepted at a given charger, including contactless payments, mobile payments, EV charge cards, fleet cards, SMS or Toll-free phone-based payments, etc.
- **Detailed pricing information**: where possible, additional pricing information beyond the per-kWh price, such as clarity about session fees, available discounts with memberships, pre-authorization holds, etc.

### At the Charger

Once a driver arrives at a charger and while they initiate a charging session, the driver should again be presented with the **detailed pricing information** and **available payment options** included above, in addition to the following:

- **Payment and price selection:** drivers should be able to easily select their preferred payment method without being guided towards proprietary or membership-only payment methods first.
- **Live session cost:** wherever possible, drivers have real-time visibility of the session price as the vehicle charges.

### After a Session

Following the successful completion and payment for a charging session, drivers should be able to access the following at the charger, online, or in the app where they paid:

- **Transaction information**: an itemized receipt (either printer or electronic) that shows all the costs incurred at the charger, with per-kWh prices and all additional fees clearly marked.[12]

Cal-ITP's definition can be a tool to help map whether these principles are being met across charging providers, and evaluate industry best-practice on an ongoing basis.

---

[12] Additional details on required receipt contents can be found in NIST Handbook 44 (https://tsapps.nist.gov/publication/get_pdf.cfm?pub_id=956954) 3.40.S.2.6. (Required under California CCR Sections 4000, 4001 and 4002)

### 3.   Why is achieving transparency at EV chargers complicated?

When looking for answers to the questions, "how do I pay?" and "how much do I pay?" drivers may be looking in many different places. Depending on the hardware and software capabilities of the charger in question and the specific entities the driver is interacting with, relevant channels for the necessary communications about payments may include a physical screen at the charger, an in-car navigation system, a website, a third-party smartphone app such as Google or Apple Maps, a charging-specific smartphone app that aggregates many brands, or a charging-specific smartphone app that only contains information about one network of chargers.
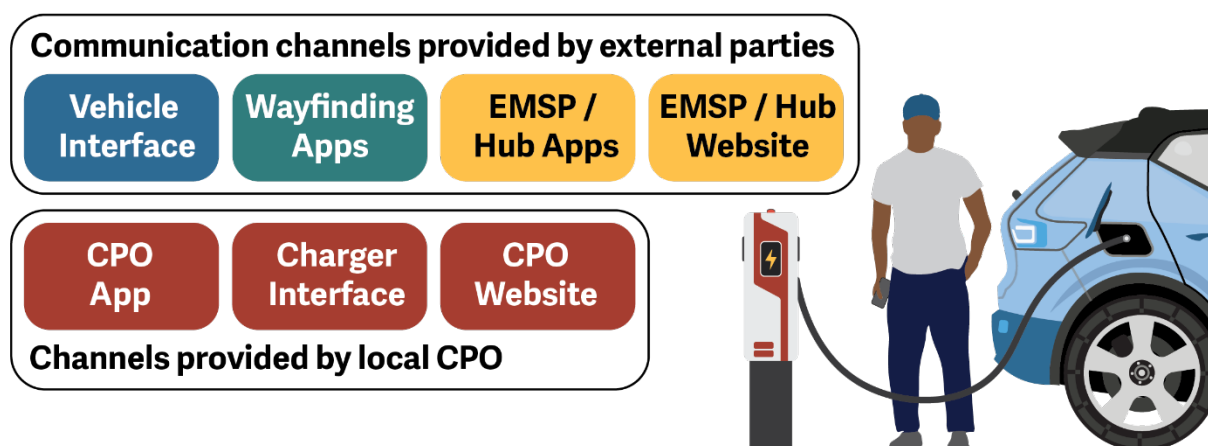


*Figure 5: Communication channels for key charging information.*

As is noted in the graphic, many of these channels are maintained by entities other than the local CPO, meaning that complex and reliable data sharing is required to ensure accurate information is available wherever drivers may be looking for it. The exchanges of this data, including pricing, payment methods, and other relevant real-time information such as availability, is complicated by factors such as inconsistent communication practices, the need to protect sensitive business information, and competition among these entities to capture drivers' charging experiences. These challenges are explored in greater detail in the findings section of this report. It is Cal-ITP's belief that with robust and open data standards and infrastructure, all these channels can facilitate the customer communications necessary to support a transparent charging experience aligned with our definition above.

Beyond the challenges with *communicating* prices and payment methods, the underlying price and payment methods accepted are also inherently complex. While the global EV industry is moving toward standardizing pricing per kWh (as opposed to per minute, etc.), various additional pricing structures remain in use. Extra fees such as plug-in or idling fees are common and often not included in the per-kWh rate. Further complicating matters, e-mobility service providers and roaming partners can offer

different prices at the same charger, leading to different rates depending on customers' payment method and affiliations. Finally, energy prices fluctuate regularly, and high demand can significantly raise costs for both CPOs and drivers. To manage expectations around price fluctuations, per-kWh pricing is sometimes communicated as a range rather than a fixed amount, and some charging providers offer flat-rate pricing for members. With regards to payment methods, a single EV charger can accept many different types of payments, many of which are proprietary to specific charging providers.