Decision 22-08-024 August 4, 2022

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking to Continue the Development of Rates and Infrastructure for Vehicle Electrification.	Rulemaking 18-12-006

DECISION ADOPTING PLUG-IN ELECTRIC VEHICLE SUBMETERING PROTOCOL AND ELECTRIC VEHICLE SUPPLY EQUIPMENT COMMUNICATION PROTOCOLS

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DECISION ADOPTING PLUG-IN ELECTRIC VEHICLE SUBMETERING PROTOCOL AND ELECTRIC VEHICLE SUPPLY EQUIPMENT COMMUNICATION PROTOCOLS

Summary

This decision adopts a plug-in electric vehicle submetering protocol for Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, Liberty Utilities (CalPeco Electric) LLC, Bear Valley Electric Service Inc., and PacifiCorp d/b/a Pacific Power and requires the utilities to implement the submetering protocol for all customers with plug-in electric vehicles and customer-owned submeters. The submetering protocol is a fundamentally important means of accelerating the growth of electric vehicles. The protocol reduces the cost of electric vehicle charging; consumers can avoid having to install a separate utility meter and can instead use the technology to have their electric vehicle charging measured and billed separately from their primary utility meter. Submetering thus promotes the adoption of electric vehicles, the deployment of vehicle-grid integration, and the realization of the corresponding electric grid benefits.

This decision also adopts electric vehicle supply equipment communication protocols for Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, Liberty Utilities (CalPeco Electric) LLC, Bear Valley Electric Service Inc., and PacifiCorp d/b/a Pacific Power applying to electric vehicle supply equipment deployed through future transportation electrification efforts.

This proceeding remains open.

1. Background

Since the Commission's first electric vehicle (EV) Rulemaking (R.) in 2009, R.09-08-029, the Commission has evaluated policies to support the development

and deployment of infrastructure needed for widespread adoption of plug-in hybrid and plug-in electric vehicles (PEV) in California. Enabling PEV customers to simultaneously enroll in an EV-specific rate and a time-of-use (TOU) rate is one such supportive policy. Allowing a submeter to measure and bill EV charging separately from a customer's primary utility meter would help achieve this outcome without the need for an additional, costly utility meter.[1] Commission Decision (D.) 11-07-029 defines submetering as:

> [A]rrangements in which a submeter measures Electric Vehicle charging apart from the primary meter. This is similar to separate metering in that it uses a dedicated meter for the Electric Vehicle load. However, the submeter is typically located on the customer's side of the primary meter, making it possible to bill Electric Vehicle load and the remaining household load on different rate schedules.

Put another way, submetering allows a PEV's energy usage to be measured independently from the residence or business without the need to install a separate utility meter.

In D.11-07-029 and D.13-11-002, the Commission directed Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E), collectively referred to herein as the large investor-owned utilities (IOUs), to implement a submetering pilot program and develop rules to incorporate customer-owned submeters into their billing and metering systems for PEVs. The Commission split the submetering pilot program into two phases, with the goal of gathering data on the costs,

[1] To date, Pacific Gas and Electric Company's EV-B, Southern California Edison Company's TOU-EV-1, and San Diego Gas & Electric Company's EV-TOU tariffs all require the installation of a separate utility meter for enrollment.

benefits, and demand for submetering. The Commission ordered the IOUs to select a third party to evaluate the pilot program, and the IOUs selected Nexant.[2]

Phase 1 of the pilot program began in 2014. Phase 1 focused on single customers of record (SCOR), where one customer pays bills for both the submeter and primary loads, such as in most single-family homes or workplaces. Collectively, the IOUs enrolled 241 customers in Phase 1. In 2016, Nexant issued the Phase 1 evaluation report recommending that Phase 2 of the submetering pilot program prioritize streamlining the enrollment process to encourage more customers to sign up for submetering.

Phase 2 of the pilot program began in 2017 and incorporated recommendations from Phase 1. Phase 2 focused on gathering data regarding submetering for multiple customers of record (MCOR), where the submetered customer is different from the primary meter customer, such as in most multi-unit dwelling applications. In Phase 2, SCOR enrollment significantly increased to 449 customers, but there was no MCOR enrollment. Nexant submitted the Phase 2 evaluation report in 2019, highlighting the benefits of developing specific submetering performance management standards.[3] Nexant additionally recommended the development of a performance verification protocol.

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[2] D.13-11-002 at 36. In the decision, the Commission determined that an impartial third-party evaluator would provide a consistent and fair evaluation of the submetering pilot program at a reduced cost. The Commission directed PG&E to select and manage the contract with the third-party evaluator on behalf of all the IOUs.

[3] Administrative Law Judge's Ruling Directing Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company to Respond to Outstanding Questions on the Development of a Submetering Protocol, Jan. 23, 2020, Attachment C: Nexant California Statewide PEV Submetering Pilot – Phase 2 Report at 11.

The Commission's Energy Division served Nexant's Phase 2 evaluation report on the service list for R.18-12-006, along with a notice for a public workshop on submetering. At the June 24, 2019 workshop, Nexant presented its findings and recommendations from its Phase 2 evaluation report, and parties raised several questions related to Nexant's findings and gaps in its analysis of the submetering pilot program.

Following discussions at the workshop, the assigned Administrative Law Judge (ALJ) issued a ruling on January 23, 2020, directing the IOUs to file and serve responses to outstanding questions related to the development of a PEV Submetering Protocol that were not resolved in the Phase 2 evaluation report. On February 12, 2020, SDG&E, SCE, PG&E, the Public Advocates Office at the California Public Utilities Commission (Cal Advocates), Tesla Inc. (Tesla), and ChargePoint, Inc. (ChargePoint) and Enel X North America, Inc. (Enel X), jointly, filed opening comments on the ruling.[4] On February 24, 2020, SDG&E, SCE, PG&E, the Utility Reform Network (TURN), and ChargePoint and Enel X, jointly, filed reply comments.[5] The IOUs hosted a public workshop on May 22, 2020, to discuss a revised proposal for the PEV Submetering Protocol. On July 15, 2020, the IOUs submitted joint comments addressing party feedback provided during the May 2020 public workshop.[6] On August 19, 2020, the ALJ issued an email ruling to modify the procedural schedule set in the January 2020 ALJ ruling. On September 30, 2020, the IOUs jointly hosted a second public workshop to discuss outstanding issues on the development of the PEV Submetering Protocol. On October 12, 2020, ChargePoint and Enel X, jointly, EVgo Services LLC (EVgo),

[4] Citations to "Opening Comments" refer to these comments.

[5] Citations to "Reply Comments" refer to these comments.

[6] Citations to "IOUs Post-Workshop Comments" refer to these comments.

PG&E, and SCE filed post-workshop comments.[7] On October 22, 2020, ChargePoint and Enel X, jointly, Cal Advocates, and the IOUs filed post-workshop reply comments.[8] On December 21, 2020, the IOUs filed a revised PEV Submetering Protocol, which considered parties' comments. On January 11, 2021, ChargePoint and Enel X, jointly, and Cal Advocates filed comments on the IOUs' revised PEV Submetering Protocol. On January 20, 2021, ChargePoint and Enel X, jointly, Cal Advocates, and the IOUs filed reply comments on the IOUs' revised PEV Submetering Protocol.

On February 3, 2020, an ALJ ruling requested feedback on Energy Division's draft Transportation Electrification Framework (TEF) staff proposal, which was attached to the ruling.[9] On July 14, 2020, Bear Valley Electric Service Inc., BNSF Railway, Cal Advocates, the California Independent System Operator Corporation (CAISO), CALSTART, ChargePoint, City of Long Beach, Coalition of California Utility Employees (CUE), Electrify America LLC (Electrify America), Enel X and Nuvve Corporation (Nuvve), jointly, Environmental Defense Fund (EDF), EVBox North America Inc. (EVBox), EVgo, the Joint Commenters,[10] Liberty Utilities (CalPeco Electric) LLC, National Diversity Coalition (NDC), Natural Resources Defense Council et al. (NRDC et al.),[11] Peninsula Clean

[7] Citations to "Post-Workshop Comments" refer to these comments.

[8] Citations to "Post-Workshop Reply Comments" refer to these comments.

[9] Administrative Law Judge's Ruling Adding Staff Proposal for a Draft Transportation Electrification Framework to the Record and Inviting Party Comments Transportation Electrification Framework, Feb. 3, 2020, draft TEF.

[10] The Joint Commenters include East Yard Communities for Environmental Justice, Sierra Club, Union of Concerned Scientists, Center for Community Action and Environmental Justice, and Center for Biological Diversity.

[11] The following parties signed on to the NRDC et al. opening comments: NRDC, CUE, Greenlots, Siemens, and EVBox.

Energy Authority, PG&E, SCE, SDG&E, Tesla, Utility Consumers' Action Network (UCAN), and Vehicle-Grid Integration Council (VGIC) filed opening comments on Sections 7 and 8 of the draft TEF, which addressed technology and standards, including submetering.[12] On August 7, 2020, Advanced Energy Economy (AEE), BNSF Railway, Cal Advocates, ChargePoint, CUE, EDF, Electrify America, Enel X and Nuvve, jointly, EVgo, Greenlots, NDC, NRDC et al.,[13] PacifiCorp, PG&E, SCE, SDG&E, Tesla, TURN, UCAN, and VGIC filed reply comments on Sections 7 and 8 of the draft TEF.

2. Issues Before the Commission

The Assigned Commissioner's Scoping Memo and Ruling, issued on May 2, 2019, included the following two issues within the scope of this proceeding: "policies to support sub-metering and billing for [zero-emission vehicles]" and "[t]he development and adoption of vehicle-grid integration (VGI) policy and technologies."[14] The January 2020 ALJ ruling included Nexant's PEV Submetering Pilot Phase 2 evaluation report as an attachment and requested comments on various questions to finalize the development of the PEV Submetering Protocol, following completion of the submetering pilot program. Questions focused on data communication and reliability, submetering accuracy, standards applicable to PEV submetering, and outstanding concerns with the Phase 2 evaluation report. In this decision, we resolve those issues and adopt the PEV Submetering Protocol and electric vehicle supply equipment (EVSE) communication protocols for customers of the large investor-owned utilities and

[12] Citations to "Opening Comments on Draft TEF Chapters 7 and 8" refer to these comments.

[13] The following parties signed on to the NRDC et al. reply comments: NRDC, CUE, Siemens, EVBox, and the Alliance for Automotive Innovation.

[14] Assigned Commissioner's Scoping Memo and Ruling, May 2, 2019, at 6.

the small and multi-jurisdictional utilities (i.e., Liberty Utilities (CalPeco Electric) LLC, Bear Valley Electric Service Inc., and PacifiCorp d/b/a Pacific Power).[15]

3. Discussion

This decision considers comments filed in 2020 and 2021 and resolves the issues in the following discussion sections: 1) PEV Submetering Protocol, 2) EVSE communication protocols, and 3) implementation and timeline.

3.1. PEV Submetering Protocol

The Commission adopts the PEV Submetering Protocol included as Attachment A to this decision. This section of the decision addresses all regulatory and technical elements of the adopted PEV Submetering Protocol, except for EVSE communication protocols, which we address in the next section.

3.1.1. Submeter Ownership

The January 2020 ALJ Ruling requested feedback on the preferred submeter ownership model for the PEV Submetering Protocol (*i.e.*, utility ownership, customer ownership, third-party ownership, or a hybrid model that provides customer choice).

PG&E recommends an ownership model where the utility owns the embedded submeter separately from the EVSE owner.[16] PG&E believes that this model addresses many of the outstanding issues, such as meter accuracy, network reliability, data transfer, and cybersecurity.[17] PG&E supports evaluating the use of its advanced metering infrastructure (AMI) network to relay data to

[15] The large investor-owned utilities and the small and multi-jurisdictional utilities are collectively referred to herein as "the utilities."

[16] PG&E Reply Comments at 6.

[17] *Ibid*.

the utility billing system because the AMI network is utilized for Meter-to-Cash[18] billing data.[19]

TURN argues "the cost of installing separate utility-owned meters to enable submetering would be overly burdensome and is not a scalable solution."[20] Cal Advocates comments that in the case of EVSE-embedded submeters, ownership of the submeter should correspond to ownership of the EVSE and that for other forms of submetering, the end-use and the location of the submeter should determine ownership.[21] For example, third-party ownership or utility ownership may be appropriate at parks, multi-unit dwellings, or public applications, whereas, customer-ownership may be appropriate at residential and commercial locations.[22]

ChargePoint and Enel X note that market trends indicate EVSE will incorporate embedded submeters, in which case the owner of the EVSE hardware will likely own the submeter.[23] Having the owner of the EVSE also own the embedded submeter enables tracking of the PEV's energy use.[24]

We agree with parties that a submeter either owned by the customer or a third party and operated and maintained by either the customer or a third party is the best option. With proliferation of embedded submeters, ownership of the submeter should align with ownership of the EVSE. Further, recent Commission

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[18] Meter-to-Cash is a utility's daily process of checking on a customer's meter performance (e.g., load, accuracy, and meter-data reliability).

[19] PG&E Reply Comments at 3.

[20] TURN Reply Comments at 2.

[21] Cal Advocates Opening Comments at 14.

[22] *Ibid*.

[23] ChargePoint and Enel X Opening Comments at 14.

[24] *Ibid*.

decisions have limited utility ownership of the EVSE.[25] This decision therefore limits ownership of the submeter to the customer or a customer-selected third party.

3.1.2. Submeter Accuracy

At the June 24, 2019 workshop, parties presented information on the current state of third-party submetering equipment, which can meet accuracy standards of 2 percent in the field and 1 percent in the laboratory—meaning that the equipment is 98 percent accurate in a field setting and 99 percent accurate in a laboratory setting. Given this, parties commented that it would be difficult to meet the current 0.2 percent accuracy standard required by the CAISO and the IOUs for "revenue-grade" meters. In this proceeding, the IOUs propose adopting the American National Standards Institute (ANSI) C12.20 standards for submeters, which require 0.5 precent accuracy in the laboratory and 2 percent accuracy in the field.

Cal Advocates argues that the benefits of achieving 0.2 percent accuracy for revenue-grade submetering may outweigh development and implementation costs, especially when compared to the cost associated with installing a separate meter.[26] At a time when deployment of PEV, EVSE, and other distributed energy resources (DER) is quickly expanding, Cal Advocates states that it is critical for the Commission to establish a standard process to implement revenue-grade submetering in the near future and that minimum submeter accuracy requirements should be mandated so that meter data management agents

[25] D.21-04-014 limited IOU ownership of the EVSE to only multi-unit dwellings located in underserved communities. Additionally, D.21-07-028 limits IOU ownership of the EVSE for future transportation electrification programs to only sites located in underserved communicates.

[26] Cal Advocates Opening Comments at 8.

(MDMAs)[27] know what standards EVSE submeters must meet.[28] To ensure adequate performance, Cal Advocates recommends identifying and selecting appropriate testing standards for EVSE submeters.[29]

ChargePoint and Enel X comment that a 0.2 percent accuracy standard would add unnecessary costs to charging stations. ChargePoint and Enel X believe that requiring 1 percent accuracy, tested under standard laboratory conditions, is sufficient for EV-only metering and billing for the PEV customers based upon the amount of energy delivered to the vehicle.[30] ChargePoint and Enel X point out that customers always have a primary revenue-grade meter, which is measuring not only the energy delivered to the vehicle but all of the other energy consumed by the station (e.g., modem, screen, etc.).[31] ChargePoint and Enel X comment that accuracy standards of 2 percent in the field and 1 percent in the laboratory are reasonable because they would be consistent with industry views on and historical development of EVSE submeters, would provide accurate billing and transparency to consumers, and would keep hardware costs lower.[32]

In reply comments, PG&E notes that the level of difficulty in meeting the CAISO-required 0.2 percent accuracy for revenue-grade meters depends on

[27] MDMAs are the responsible party that collects and distributes PEV submetering data from the EVSE submeter to the utility. The MDMA role is generally served by, but not limited to, the electric vehicle service provider.

[28] Cal Advocates Opening Comments at 8-9.

[29] *Ibid*.

[30] ChargePoint and Enel X Opening Comments at 7-9.

[31] *Ibid*.

[32] *Id*. at 8-9.

which submeters are utilized.[33] The accuracy standards used in PG&E's submetering pilot are ANSI C.12.20 class 0.5 percent in the laboratory and 2 percent in the field. PG&E notes that its SmartMeters meet the CAISO's 0.2 percent accuracy requirement.[34] PG&E acknowledges that third-party meters will likely require more work to determine whether they can meet 0.2 percent accuracy reliably, continuously, and in mass market manufacturing contexts.[35] ANSI C.12.20 standards also apply to revenue-grade meters but are less stringent than the CAISO's 0.2 percent accuracy requirement. Accordingly, PG&E recommends a 0.5 percent accuracy standard as the minimum to align with existing revenue-grade meter standards. PG&E cautions that "a looser standard of 1-2 percent meter accuracy will make it easier for multiple third parties to meet the requirements . . . delaying the advancement of meter accuracy technology due to low incentives to improve meter accuracy."[36] PG&E believes a more stringent accuracy standard is necessary to ensure accurate billing and customer confidence. PG&E requests if that if accuracy standards of 2 percent in the field and 1 percent in the laboratory were to be adopted for PEV submetering, any costs not collected due to inaccurate billing from submetered users should be collected from the utility account that is affiliated with the primary utility meter, not shifted unfairly to the wider base of non-participating customers.[37]

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[33] PG&E Reply Comments at 8.

[34] *Ibid*.

[35] *Ibid*.

[36] *Id*. at 8-9.

[37] *Id*. at 9.

We understand the need for clearly defined accuracy standards for PEV submeters. Moreover, we understand the need for transparency and accurate customer bills. Regarding the CAISO's standards, its Business Practice Manual for Metering, Attachment G, Section III recognizes that DER aggregations may include resources that are on a single-phase service connection, in which case the DER aggregation must meet the requirements stated by the local regulatory authority, the Commission in this instance. The CAISO only requires three-phase metering devices meet the 0.2 percent accuracy standard when the local regulatory authority has not set standards. Thus, the Commission may adopt different submetering accuracy standards here, and we find that the CAISO 0.2 percent accuracy standard is not necessary for PEV submetering.

We find the IOUs' original proposal would not allow for the use of currently available third-party PEV submeters and would lead to unreasonable costs for customers. Moreover, the California Department of Food and Agriculture, Division of Measurements and Standards (CDFA-DMS) adopted accuracy standards contained in the latest edition of the National Institute of Standards and Technology (NIST) Handbook 44, which addresses specifications, tolerances, and other technical requirements for weighing and measuring devices.[38] The requirements apply to all EVSE used for "commercial purposes."[39]

[38] 4 Cal. Code Regs. § 4000 *et seq*. CDFA-DMS excludes certain requirements from NIST Handbook 44 and adds additional requirements not published in NIST Handbook 44.

[39] Cal. Bus. & Prof. Code § 12500(e) ("'Commercial purposes' include the determination of the weight, measure, or count of any commodity or thing that is sold on the basis of weight, measure, or count; or the determination of the weight, measure, or count of any commodity or thing upon which determination a charge for service is based. Devices used in a determination upon which a charge for service is based include, but are not limited to, taximeters, odometers, timing devices, parcel scales, shipping scales, and scales used in the payment of agricultural workers.").

The accuracy tolerances published in NIST Handbook 44, Section 3.40 equally apply to errors of under registration and over registration.

CDFA-DMS also adopted Accuracy Classes for alternating current (AC) EVSE and direct current (DC) EVSE.[40] NIST Handbook 44 sets the acceptance tolerance for AC EVSE at 1 percent, which applies to a device during type evaluation (i.e., in a laboratory-like setting) and when commercially used for the first time (i.e., installed in the field and ready for transactions of electricity as motor fuel).[41] The maintenance tolerance is 2 percent and applies to a device already placed in service and under normal operation. For a period of 10 years, beginning January 1, 2023, CDFA-DMS allows for broader acceptance and maintenance tolerances of 2.5 percent and 5 percent, respectively, for DC EVSE that will revert to 1 percent and 2 percent, respectively, beginning January 1, 2033.[42] CDFA-DMS began type evaluating AC EVSE in late 2019 in anticipation of the adopted regulations becoming effective on January 1, 2021. Completed type evaluation certificates of approval are published on CDFA-DMS's California Type Evaluation Program website.[43] Officials from CDFA-DMS and county offices of weights and measures have begun inspecting, testing, and sealing AC EVSE installed for commercial use. As of June 2022, 12 AC EVSE manufacturers submitted 16 AC EVSE makes and models that passed the type of evaluation process. CDFA-DMS issued certificates of approval

[40] 4 CCR § 4002.11, T.2.

[41] NIST Handbook 44.

[42] *See* CDFA-DMS, Division of Measurements and Standards Electric Vehicle Supply Equipment 2020 Reference Document, available at: https://www.cdfa.ca.gov/dms/pdfs/CA_EVSE_Regulation_Reference_Document.pdf/.

[43] CDFA-DMS, Division Of Measurement Standards: California Type Evaluation Program website, available at: https://www.cdfa.ca.gov/dms/programs/ctep/ctep.html/.

for these 12 devises, meaning the devises are compliant with requirements published in NIST Handbook 44 and CDFA-DMS' AC EVSE regulations.

The Commission has recognized "the vital importance of national standardization in keeping equipment costs down."[44] Multiple states, including Maryland,[45] Minnesota,[46] New Hampshire,[47] and New York are exploring alternatives to ANSI C.12 accuracy standards for PEV submetering, and EVSE manufacturers currently develop products to meet NIST Handbook 44 requirements. For these reasons, we adopt submeter accuracy standards of 1 percent accuracy tolerance and 2 percent maintenance for AC EVSE submeters to align with NIST Handbook 44 and CDFA-DMS' AC EVSE regulations.

3.1.3. Submeter Certificate Tests

Telsa supports the adoption of equipment testing standards for determining the accuracy of PEV submeters.[48] Tesla states that new equipment testing standards do not have to be developed and should, instead, leverage processes like the CDFA-DMS' evaluation.[49]

The IOUs' proposal assumes that the submeter would be a second stand-alone utility-grade meter, which would justify the use of the ANSI test.

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[44] D.11-07-029 at 35 (citing D.10-06-047 at Conclusion of Law 5).

[45] In January 2019, the Maryland Public Service Commission instituted a five-year waiver of four submetering standards to permit PEV submetering while exploring a permanent pathway. This waiver includes the requirement that submeter type and design meet the applicable provisions of the latest edition of ANSI C.12.

[46] The Minnesota Public Utilities Commission authorized Xcel Energy to implement a PEV Submetering Pilot, which in part investigates the use of NIST Handbook 44 regulations for PEV Submetering. *See* Minnesota Public Utilities Commission Docket 17-817.

[47] The New Hampshire Public Utilities Commission is currently exploring the use of embedded submeters that utilize NIST Handbook 44 in Docket DE 20-170.

[48] Tesla Opening Comments at 6.

[49] *Id*. at 7.

NIST Handbook 44 does not yet have certificate testing requirements that are parallel to the ANSI test proposed by the IOUs. However, CDFA-DMS has already developed a testing process for type evaluation of commercial EVSE, including meter accuracy tests. Additionally, the California Energy Commission (CEC) will likely open the Vehicle-Grid Innovation Laboratory (ViGIL) in summer 2022 to provide a voluntary pathway for stakeholders to test and validate whether a product meets the state's standards and requirements.[50] ViGIL will likely create procedures for testing whether PEV submeters meet NIST Handbook 44 standards.

In lieu of adopting ANSI certificate tests or no tests, we require all PEV submeters to meet the applicable and most up-to-date certificate tests used by CDFA-DMS to certify non-publicly accessible EVSE (i.e., all tests with the exception of display requirements).[51] EVSPs or MDMAs shall submit EVSE for submeter accuracy validation testing at Nationally Recognized Testing Laboratories (NRTLs), or one of the following comparable facilities: 1) government laboratory, 2) field test site, or 3) manufacturer or third-party laboratory. NRTLs or comparable facilities would perform tests in accordance with existing CDFA-DMS test procedures and produce documentation to validate that the submeter meets the above accuracy standards. The utilities shall

[50] CEC, ViGIL website, available at: https://www.energy.ca.gov/solicitations/2021-05/gfo-20-610-vehicle-grid-innovation-lab-vigil/. In the ViGIL grant funding solicitation, the CEC states the intent of ViGIL is to "[t]o fill [the] market gap [of excluded testing services in NIST] by providing testing services for charging equipment used in non-commercial applications (including at workplaces, multi-unit dwellings, single family homes, etc.) and facilitating certification with appropriate Nationally Recognized Testing Laboratories . . . to support the California Public Utilities Commission's current sub-metering proceeding (R.18-12-006) and address customer-owned, residential, and workplace charging equipment."

[51] *See* CDFA-DMS, CTEP Type Evaluation Checklist. CDFA-DMS periodically updates the checklist. Parties must use the most up-to-date version of it for certification.

maintain and publish on their websites lists of approved EVSE submeters and/or approved submeter equipment.

3.1.4. Data Communication

Data communication standards are needed to ensure a submeter reliability transfers energy usage data to the utility. During the June 24, 2019 workshop, parties had varying views on the submetering pilot program's data transfer process and whether there is a scalable path forward to communicate data recorded on a third-party submeter with a utility billing system.

Cal Advocates argues that the current meter data transfer process (i.e., recording, submitting, and processing raw data) is not scalable because the process is not sufficiently standardized.[52] Cal Advocates recommends that the PEV Submetering Protocol should have minimum standards for recording and submitting the raw meter data, in order to provide MDMAs clear guidance on how to store and process the raw meter data.[53] Cal Advocates suggests storing the raw meter data for a predetermined amount of time to allow the utilities to correct billing inaccuracies and automate data transfer.[54] Cal Advocates recommends that MDMAs store the raw meter data for at least 45 days after the billing period, or for a duration sufficient to capture the average utility revenue lag.[55] Revenue lag is the number of days from the time utility service is delivered to the time a customer's payment is available in a utility's bank account. Finally,

[52] Cal Advocates Opening Comments at 4.

[53] *Ibid*.

[54] *Ibid*.; Nexant Phase 2 Report at 95.

[55] Cal Advocates Opening Comments at 5.

Cal Advocates supports a payment system where MDMAs pay for data and storage costs, which can be recovered from their customers.[56]

Tesla supports a requirement to store raw submeter data, stating that doing so can be useful for connectivity issues and addressing data discrepancies on the server side. Tesla recommends "some amount of local storage on the device as well as some storage on the server side."[57]

ChargePoint and Enel X recommend storing the raw meter data for 90 days. ChargePoint and Enel X argue that the 90-day requirement has been adopted for comparable programs and represents a reasonable amount of time to correct for WiFi connectivity issues or power outages.[58] ChargePoint and Enel X caution that a less than 90-day storage period may require further discussion to determine the memory storage associated with the required number of charging sessions.[59] PG&E and SDG&E also support a 90-day raw data storage requirement.[60] SCE argues for storing raw data for a minimum of 39 months, as SCE did in the submeter pilot program, regardless of the submeter owner.[61]

Another issue related to data communication in the PEV Submetering Protocol is how to store and transfer the raw meter data. To clarify, the EVSE does not transfer data directly to the IOU; the EVSE transfers data to the EVSP's cloud server first, and then to the utility.[62]

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[56] *Id*. at 5.

[57] Tesla Opening Comments at 3.

[58] ChargePoint and Enel X Opening Comments at 3-4.

[59] *Id*. at 4.

[60] PG&E Opening Comments at 4; SDG&E Opening Comments at A-2.

[61] SCE Opening Comments at 4.

[62] *See* ChargePoint and Enel X Opening Comments at 5.

ChargePoint and Enel X comment that WiFi is a viable pathway, so long as the customer is responsible for maintaining connectivity on some reasonably consistent basis.[63] Cal Advocates argue that WiFi connectivity can be a significant source of data reporting issues.[64] Cal Advocates notes that transmitting data through WiFi could exclude MCOR sites, as these sites may not have public WiFi available to transmit data.[65] Cal Advocates contends that WiFi access is especially a concern at MCOR sites where EVSE parking spaces are located in remote parking structures.[66] TURN recommends the Commission develop standard minimum local station data storage requirements to enable both the preservation of usage data when WiFi is temporarily down and the submission of that data once WiFi is restored.[67]

Nexant's Phase 2 evaluation report identified some concerns with the use of WiFi to communicate submeter data to the utility; however, remote and on-site data storage requirements can address these concerns. Parties agreed that the use of the utilities' AMI networks or a customer's cellular connection would be more reliable than WiFi, but more costly and not necessary.[68] Storing raw data would allow a utility and a customer to resolve any discrepancies that arise

[63] *Ibid*.

[64] Cal Advocates Opening Comments at 6.

[65] *Ibid*.

[66] *Ibid*.

[67] TURN Reply Comments at 2.

[68] To the extent any customer is affected by affordability issues related to cellular service, they can seek information on the LifeLine program at: https://www.cpuc.ca.gov/consumer-support/financial-assistance-savings-and-discounts/lifeline/california-lifeline-eligibility/. Additional information regarding affordable internet and WiFi is available at: https://www.cpuc.ca.gov/industries-and-topics/internet-and-phone/california-low-cost-internet-plans/.

between the submeter's load readings and the customer's monthly bill. We therefore require the use of WiFi or cellular networks for submeter data communication. We also require that the submeter data be stored onsite for 30 days and remotely for 90 days to ensure any billing disputes can be accurately addressed with the stored consumption data.

3.1.5. Billing and Data Disputes

In their revised PEV Submetering Protocol, the IOUs propose that in the event of a customer data or billing dispute, the IOUs and MDMAs should try to resolve the dispute first. In comments, Cal Advocates, ChargePoint, and Enel X generally agreed with the IOUs' position, but ChargePoint and Enel X clarified that beyond troubleshooting data issues and providing an initial point of contact, EVSPs would need to refer a customer to a utility to resolve billing disputes.[69] We find that the utilities, EVSPs, and/or MDMAs should first attempt to resolve data or billing issues. All parties also agree that if any issues arise with a customer's submeter data, the customer should be billed based on the master meter. Therefore, we require that if parties cannot resolve an issue, the customer will be billed at the primary meter rate for the time intervals during which the disputed charging occurred. The PEV Submetering Protocol has several measures that allow customers to submit accurate data and correct any billing errors, including the 30-day on-site and 90-day remote data storage requirements.

3.1.6. Scope of PEV Submetering Protocol

In response to the January 2020 ALJ Ruling requesting feedback on MCOR PEV submetering, the IOUs argue the Commission and IOUs should seek more

[69] ChargePoint and Enel X Post-Workshop Reply Comments at 6-7; Cal Advocates Post-Workshop Reply Comments at 7-8.

data and information regarding the barriers MCOR face for accurate PEV submetering. The IOUs believe additional evaluation of submetering for MCOR is needed before allowing MCOR PEV submetering. SDG&E highlights the limited MCOR interest and participation in its Power Your Drive pilot.[70] On a similar note, SCE recommends the Commission evaluate commercial customer submetering and demand needs before subscribing such customers to the adopted PEV Submetering Protocol.[71]

We disagree that more time, delineation, and understanding of technical issues are needed before allowing submetering for MCOR. In the Phase 2 evaluation report, Nexant did not identify any technical barriers to enrolling and performing submeter tasks for MCOR. Instead, the report explained that MCOR customers did not participate in the pilot due to "timelines of the pilot, and the complexities of signing up MCOR customers (which requires multiple customers and the property owner and/or manager to sign the [customer enrollment agreement])."[72] This conclusion is shared by ChargePoint and Enel X, who commented "[a]lthough the submetering pilot was not able to evaluate a multiple customer-of-record configuration, nor a configuration wherein a single submeter enables billing multiple EVSE on a separate tariff from the master meter, we believe that the final [PEV Submetering Protocol] should largely be able to incorporate these arrangements in substantially the same way as for single-family residential, with the potential for slight variations off of the requirements for certain protocol elements, e.g., the ability to use cellular

[70] SDG&E Reply Comments at 4.

[71] SCE Reply Comments at 5.

[72] Nexant Phase 2 Report at 12.

communications for data transfer instead of a residential customer's WiFi."[73] Cal Advocates agreed with ChargePoint and Enel X, commenting that "many of the technical specifications in the [PEV Submetering Protocol] are not unique to residential submetering."[74]

We agree that the barriers to allowing submetering for MCOR and non-residential customers are not technical and do not require additional pilot programs to address. We find that it is reasonable to allow submetering for MCOR and non-residential customers, and therefore the utilities shall work to resolve any potential barriers to submetering for MCOR and non-residential customers. These ongoing efforts shall not preclude existing MCOR from participating in submetering if they submit a completed application.

3.1.7. Net Energy Metering Customer Exclusion

The submetering pilot programs excluded net energy metering (NEM) customers from participating. In comments, the IOUs express there is no current way to ascertain whether a NEM customer's energy consumption registered on a PEV submeter is sourced from the IOU distribution grid, local renewable generation, or battery storage system.[75] Additionally, simply subtracting the EV consumption from the whole house meter and bill would not be accurate due to the method for crediting NEM exports. NEM customers would need to install additional meters to track and measure the output of their onsite generation/battery storage system. The IOUs would then need to implement a software billing solution to properly account for the various energy sources and the associated EV consumption. Enel X and ChargePoint agree with the IOUs

[73] ChargePoint and Enel X Post-Workshop Comments at 5.

[74] Cal Advocates Post-Workshop Reply Comments at 9.

[75] IOUs Post-Workshop Comments at 7-8.

that PEV submetering at a site with solar PV on a NEM tariff presents a complex situation. ChargePoint and Enel X note that "[u]neducated customers can swing from minimal electricity costs under NEM, to the undesirable combination of net excess annual generation and payment for submetered EV charging . . . and EV charging coincident with solar generation can result in EVSE submetered consumption greater than the load recorded at the master meter."[76]

Due to the issues raised in comments, we do not extend the PEV Submetering Protocol to NEM customers at this time. In comments, the IOUs proposed, and ChargePoint and Enel X supported, investigating additional submetering and data requirements that would be needed for NEM customers.[77] We agree with parties that more investigation into this issue is needed. Therefore, within one year of the issuance of this decision, the IOUs shall host a public workshop to explore potential pathways to allow PEV submetering for NEM customers. In preparing for this workshop, the IOUs shall coordinate with Energy Division staff. Within 60 days of hosting the workshop, the IOUs shall file and serve a workshop report on the service lists of R.18-12-006 and R.20-08-020, or any service lists for successor proceedings of R.18-12-006 and R.20-08-020. The workshop report shall summarize the issues and parties' positions and recommend solutions to resolve the issues. The workshop report shall also include a discussion on whether an additional workshop may be necessary after the Commission approves a NEM successor tariff in R.20-08-020.

[76] ChargePoint and Enel X Post-Workshop Comments at 7.

[77] IOUs Post -Workshop Comments at 7-8; ChargePoint and Enel X Post-Workshop Comments at 7-8.

3.2. EVSE Communication Protocols

Energy Division's draft Transportation Electrification Framework recommended adoption of EVSE communication protocols, which staff deemed important to enable the deployment of VGI use cases at scale.[78] The TEF discussed the importance of investing ratepayer funds to support EVSE that could communicate VGI signals directly with a utility or a third party.[79] Staff additionally recommended the adoption of standards to support communication between EVs and the EVSE.[80] These recommendations included the adoption of the following EVSE communication protocols: 1) Society of Automotive Engineers (SAE) J1772 standard connector for all AC-conductive EVSE, 2) Combined Charge System (CCS) standard connector for all DC-conductive EVSE, 3) Open Charge Alliance (OCA) Open Charge Point Protocol (OCPP) 1.6 or later, and 4) International Organization for Standards (ISO) 15118.

SAE J1772 is the connector standard for AC charging that allows for rudimentary communications between an EV and the EVSE. SAE J1772 is the generally accepted standard for most level 1 and level 2 chargers in North America, and it is commonly used for home, workplace, and public AC chargers. All chargers that are compliant and equipped with an SAE J1772 connector are capable of rudimentary vehicle-to-charge communications, such as charge current available and request. CCS is comparable to SAE J1772 but for DC chargers.

OCPP allows for communication between a power flow entity and the EVSE. Any EVSE compliant with OCPP will work with any back-end network

[78] Draft TEF at 79.

[79] *Id*. at 80.

[80] *Id*. at 82.

that is also OCPP complaint, giving site hosts and operators flexibility and control over their chargers (*e.g.*, monitoring charger status, responding to local electricity pricing signals, and participating in demand response events). Additionally, OCPP compliance ensures that the EVSE does not become a stranded asset if the EVSP goes out of business, as a new EVSP can seamlessly manage the abandoned EVSE.

ISO 15118 provides a standardized method for an EV and the EVSE to communicate information that enables authentication, automatic billing, and bidirectional charging. ISO 15118 can also serve as a common language to communicate data between an EV and the EVSE and to support smart charging capabilities (*e.g.*, charging based on a driver's requested range and desired departure time, optimization of charging with electric rates and local power availability, and participating in demand response events).

Parties offered various opinions on the draft TEF's recommendations for EVSE communication protocols. Cal Advocates agreed with the draft TEF's approach of "ensuring that EVSEs installed through the IOUs' EV Infrastructure Programs are able to support ISO 15118 standard and also be capable of obtaining 'over-the-air' updates to be compatible with other required communication standards."[81] Cal Advocates also urged the Commission establish a more permanent communication standard to further reduce the possibility of stranded assets.[82] ChargePoint stated it "supports the requirement that EVSE funded through [ratepayer-funded transportation electrification] programs contain networking capabilities[, and it] supports ISO 15118, but

[81] Cal Advocates Opening Comments on Draft TEF Chapters 7 and 8 at 4.

[82] *Ibid*.

encourages the Commission to continue to allow global discussions on standard development to occur before prematurely implementing ISO 15118 as a program requirement."[83] NRDC et al. add that "the Commission should require that open communication protocols be actively utilized between the EVSE and the cloud—installed and utilized on the EVSE at the time of deployment—to insure against stranded assets, support competition, innovation and customer choice through customer hardware and software switching ability, and to ensure EVSEs supported by utility customer dollars are fully interoperable."[84]

Other parties, including PG&E, SCE, and Tesla presented issues with the draft TEF's recommendations. PG&E stated they "do not recommend the Commission attempt to dictate or regulate EVSE equipment standards" and emphasized the need for flexibility in designing and seeking approval of technical standards.[85] SCE argued that they anticipate a lower-cost solution to ISO 15118 may be available via [Institute of Electrical and Electronics Engineers (IEEE)] 2030.5, as it can utilize a gateway which can communicate with multiple EVs, unlike ISO 15118.[86] Tesla stated it is not supportive of mandates regarding ISO 15118 as the key communication protocol for any publicly accessible EVSE under transportation electrification programs, as "ISO 15118 continues to be in the development phase and is still a relatively immature standard when looking at the many areas it tries to address beyond just VGI facilitation."[87] ChargePoint and Enel X argued "[t]he Commission should instruct the utilities to adopt a

[83] ChargePoint Opening Comments on Draft TEF Chapters 7 and 8 at 7-8.

[84] NRDC et al. Opening Comments on Draft TEF Chapters 7 and 8 at 1, 3.

[85] PG&E Opening Comments on Draft TEF Chapters 7 and 8 at 5.

[86] SCE Opening Comments on Draft TEF Chapters 7 and 8 at 4.

[87] Tesla Opening Comments on Draft TEF Chapters 7 and 8 at 5.

consistent and standard approach, such as (but not necessarily) OpenADR reports, that exposes a cloud-to-cloud protocol between the third-party meter and the IOU billing system."[88]

After reviewing parties' comments, we find that it is appropriate to adopt EVSE communication protocols now. In multiple decisions in 2021, the Commission required the use of the four EVSE communication standards identified in the draft TEF.[89] Additionally, the CEC's Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment report (AB 2127 report) discussed the importance of adopting communication protocols, recommending that "where possible, state agencies should leverage procurement requirements to accelerate market unification around interoperable communication protocols."[90] The report recommends that all light-duty AC EVSE be equipped with an SAE J1772 connector, be capable of high-level communications using the ISO 15118 protocol, and be compliant with OCA OCPP, stating that the latter two are key protocols that fill two communication gaps critical to achieving convenient, grid-integrated charging.[91] Additionally, in February 2022, the CEC published a recommendation on ISO 15118 which reiterates and further clarifies the role of

[88] ChargePoint and Enel X Opening Comments at 3.

[89] D.21-04-014 adopted SDG&E's Power Your Drive Extension program. The decision required SDG&E to qualify EVSE that are equipped with an SAE J1772 connector, compliant with OCA OCPP, and have hardware that is remotely upgradeable to offer various AC charging features using ISO 15118 high-level communications. Resolution E-5175 directed SCE to revise its Standard Equipment EVSE Qualification Package for Charge Ready 2 to require: 1) all AC-conductive EVSE deployed through the program be compliant with SAE J1772, 2) all DC-conductive EVSE must be compliant with CCS, 3) communications and control between a network service provider with the EVSE shall be compliant with OCA OCPP 1.6 or later, and 4) all EVSE shall be capable of enabling high level communications using the ISO 15118 protocol to communicate with the vehicle.

[90] AB 2127 Report at 53.

[91] *Id*. at 59, 62.

ISO 15118 for charging communication, specifically recommending that "charging providers pursue widespread deployment of ISO 15118-ready chargers."[92] SAE J1772 and CCS are already the *de facto* connectors for light-duty EVSE in North America. OCPP is also the *de facto* standard for charger network companies and has already been adopted by the Commission in recent transportation electrification programs.[93] Additionally, as of September 2021, at least 20 EVSE manufacturers and 32 network providers state that they offer equipment with or capable of communicating via OCPP.[94]

While we require all ratepayer-funded AC-conductive EVSE utilize SAE J1772 connectors and DC-conductive EVSE utilize CCS connectors for light-duty use cases, we do not extend this requirement to medium- and heavy-duty EVSE. While these connectors may be appropriate for most medium- and heavy-duty customers, we recognize these sectors are still in a nascent stage and may require the use of proprietary connectors that are incompatible with some vehicles.[95] However, where appropriate and possible, the IOUs shall prioritize the deployment of EVSE with SAE J1772 and CCS connectors for medium- and heavy-duty use cases.

To ensure interoperability and open standards, the utilities shall implement the EVSE communication protocols recommended by the CEC and

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[92] CEC, Recommendation for Deployment of ISO 15118-Ready Chargers, Feb. 22, 2022, available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=241955/.

[93] D.21-04-014; Resolution E-5175.

[94] *See* CEC, California Electric Vehicle Infrastructure Project (CALeVIP) Connects website, available at: https://calevip.org/calevip-connects?category=79&county=All&op=%EF%80%82&keys=OCPP/.

[95] AB 2127 Report at 63.

required by recent Commission decisions. Accordingly, we adopt the following requirements for the utilities' EVSE communication protocols:

1. All AC-conductive EVSE deployed on or after July 1, 2023, for light-duty use cases in ratepayer-funded, or utility-administered, behind-the-meter transportation electrification infrastructure programs must be equipped with an SAE J1772 connector;
2. All DC-conductive EVSE deployed on or after July 1, 2023, for light-duty use cases in ratepayer-funded, or utility-administered, behind-the-meter transportation electrification infrastructure programs must be equipped with a CCS connector;
3. All ratepayer-funded, or utility-administered, behind-the-meter transportation electrification infrastructure programs implemented on or after July 1, 2023, communications and controls between a network service provider and the EVSE shall be capable of operating on OCA OCPP 1.6 or later, and similar communication standards may be implemented in addition to OCPP; and
4. All EVSE deployed on or after July 1, 2023, for ratepayer-funded, or utility-administered, behind-the-meter transportation electrification infrastructure programs must be ISO 15118 ready. ISO 15118-ready chargers are equipped with onboard hardware that enable high-level communications with the vehicle using ISO 15118. An ISO 15118-ready charger is capable of, at minimum, the following: a) powerline carrier based high-level communications as specified in ISO 15118-3; b) secure management and storage of keys and certificates; c) Transport Layer Security (TLS) version 1.2, with additional support for TLS 1.3 or subsequent versions recommended to prepare for future updates to the ISO 15118 standard; d) receiving remote updates to activate or enable ISO 15118 use cases; e) connecting to a backend network; and f) selecting the appropriate communication protocol used by the vehicle.

3.3. Implementation and Timeline

The PEV Submetering Protocol included as Attachment A to this decision is adopted. The protocol will be posted to the Commission's website and maintained by Energy Division. Energy Division may periodically update the protocol through a public, stakeholder process by issuing a resolution for the Commission to consider.

We direct PG&E, SCE, SDG&E, Liberty Utilities (CalPeco Electric) LLC, Bear Valley Electric Service Inc., and PacifiCorp d/b/a Pacific Power to update their respective electric rules (e.g., SCE's Electric Rule 18 and SDG&E's Electric Rule 19) to reflect the adopted PEV Submetering Protocol. One important update is that the utilities' current rules prohibit customers from using non-utility grade meters for measuring the electric load for billing purposes, unless the submeter maintains accuracy comparable to utility revenue-grade meters. Accordingly, the utilities shall update their respective rules to ensure accurate billing and compliance with the adopted PEV Submetering Protocol. In each rule, the utility shall add subsections under "Residential Service" and "Non-residential Service" to say "Where electricity is furnished for EV charging, a customer may use the EVSE as a submeter to measure EV charge load, and ancillary EV charge service (i.e., demand response, vehicle-grid integration, etc.). All EVSE used for submetering purposes must meet the requirements established in the Plug-in Electric Vehicle Submetering Protocol." Within 30 days of issuance of this decision, the utilities shall each file a Tier 2 advice letter updating their respective rules to ensure compliance with the adopted PEV Submetering Protocol.

For all the utilities, we adopt the IOUs' proposed 24-month timeline to incorporate submetering into their billing systems. Within 90 days of issuance of this decision, the utilities shall begin accepting submetering applications and

shall perform the necessary billing reconciliation for submetered customers, while upgrading their billing systems. The utilities should work proactively with the Energy Division staff to relay any timing concerns. Within 24 months from the date of adoption of this decision Energy Division staff will host a public workshop to discuss the PEV Submetering Protocol and identify whether any updates are necessary. Energy Division may propose periodic updates to the PEV Submetering Protocol by issuing a resolution for the Commission to consider. Finally, by July 1, 2023, the utilities must implement the EVSE communications protocols for all ratepayer-funded or utility-administered programs.

4. Conclusion

This decision adopts the PEV Submetering Protocol included as Attachment A and requires the utilities to implement it for all PEV customers with customer-owned submeters. This decision also adopts EVSE communication protocols and requires the utilities to qualify EVSE that meet the minimum performance standards for all future transportation electrification efforts. The PEV Submetering Protocol and EVSE communication protocols adopted in this decision support statewide transportation electrification goals by providing more affordable and optimal EV charging, and the communication protocols advance the deployment of VGI at scale.

5. Comments on Proposed Decision

The proposed decision of Commissioner Clifford Rechtschaffen in this matter was mailed to the parties in accordance with Section 311 of the Public Utilities Code and comments were allowed under Rule 14.3 of the Commission's Rules of Practice and Procedure. On July 20, 2022, AEE, Alliance for Automotive Innovation (Auto Innovators), CAISO, California Association of Small and

Multi-Jurisdictional Utilities (CASMU),[96] ChargePoint and Enel X, jointly, EDF, EVgo, Fermata Energy LLC (Fermata), Nuvve, PG&E, SCE, SDG&E, Tesla, and VGIC filed comments on the proposed decision. On July 25, 2022, Cal Advocates, ChargePoint and Enel X, jointly, EDF, Fermata, PG&E, SCE, SDG&E, Siemens, VGIC, and Weave Grid Inc. (Weave Grid) filed reply comments on the proposed decision.

In comments, parties discuss implementation issues associated with the PEV Submetering Protocol and the communication protocols. The utilities urge the Commission to authorize memorandum accounts to track and recover implementation costs. EDF disagrees with the utilities' proposal, arguing that the utilities have sufficient opportunities to record these costs in existing accounts. AEE generally supports the Commission's proposed implementation of the PEV Submetering Protocol and the communication protocols. The utilities propose that the Commission require them to each file a Tier 2 advice letter with an implementation plan containing a timeline to modify its billing system to incorporate the PEV Submetering Protocol, the timelines and process for resolving billing disputes, the estimated costs associated with implementing the requirements of this decision, and a standardized data format and transfer protocol to share data between an EVSP/MDMA and a utility. The IOUs, EDF, VGIC, ChargePoint, and Enel X propose processes to standardize data formats and transfer protocols. VGIC, ChargePoint, and Enel X conditionally support the implementation advice letter requirement, subject to certain filing and implementation deadlines.

[96] CASMU represents Liberty Utilities (CalPeco Electric) LLC, Bear Valley Electric Service Inc., and PacifiCorp d/b/a Pacific Power.

We adopt the IOUs' proposal and authorize them to open memorandum accounts in order to promote transparency in tracking specific costs related to implementing the submetering requirements in this decision. We also partially adopt the IOUs' proposal to file advice letters with implementation plans, which will allow the utilities to analyze and propose tailored plans to implement the requirements of this decision. The utilities and EVSPs should jointly develop standardized data formats and transfer protocols for inclusion in the implementation advice letters. After filing the implementation advice letters, the utilities may later modify the standardized data formats and transfer protocols without seeking Commission approval through an additional advice letter. Energy Division may also modify the standardized data formats and transfer protocols.

CASMU argues that the Commission should not impose any submetering requirements on their members, the small and multi-jurisdictional utilities, until they have fully deployed advanced metering infrastructure (AMI). If the Commission does require the small and multi-jurisdictional utilities to implement the requirements of this decision, CASMU proposes that the Commission defer implementation for its members until their automated billing systems can accommodate submetering.

We decline to adopt CASMU's proposals. AMI is not needed to implement the requirements of this decision. Further, the small and multi-jurisdictional utilities can perform billing reconciliation for submetered customers while completing the necessary billing system upgrades.

Concerning the approved submeter list, VGIC urges the Commission to clarify that a customer may use a device for submetering once it appears on the list. This aligns with the Commission's intent in this decision. We clarify that

customers may install and utilize all submetering equipment included on the utilities' lists.

Several parties request clarification and/or expansion of submeter eligibility criteria. PG&E, SCE, and Siemens support expanding the available submeter ownership options to include submeters that communicate through the utilities' AMI systems and are utility-owned. EDF, Cal Advocates, ChargePoint, and Enel X disagree, arguing that the benefits of utility ownership of behind-the-meter charging infrastructure have not been shown. EDF, EVgo, VGIC, ChargePoint, and Enel X propose expanding eligibility to external submeters (i.e., energy management systems not directly embedded within the EVSE). VGIC, ChargePoint, and Enel X request that the Commission clarify whether DCFC submeters are eligible under the PEV Submetering Protocol, and VGIC requests clarification that bidirectional chargers are eligible to both charge and discharge under protocol.

We decline to expand eligibility to utility-owned submeters that use the utilities' AMI systems because the benefits of utility ownership have not been demonstrated. We also adopt the proposal to expand eligibility to external submeters because they can be installed at a later date and at a lower cost compared to fully replacing the EVSE. Lastly, we clarify that DCFC and bidirectional charging and discharging are eligible for submetering if the submeters meet the requirements of this decision.

Parties also provide comments on customer and program eligibility. VGIC urges the Commission to direct the utilities to assess and modify their demand response programs to incorporate submetering. SDG&E requests that the Commission exclude discounted customers as well as those with complex billing scenarios (e.g., conjunctive billing) from the PEV Submetering Protocol.

We decline to adopt VGIC's recommendation concerning the utilities' demand response programs. There is no record in this proceeding to support VGIC's proposal, and we agree with CAISO that it is unclear whether the adopted submeter accuracy standards are appropriate in other contexts. We also decline to adopt SDG&E's requests. Customers receiving California Alternate Rates for Energy (CARE) and Family Electric Rate Assistance Program (FERA) discounts are eligible for submetering. The utilities shall apply CARE and FERA discounts to both the load measured at the primary meter and the submetered load if the tariffs allow for CARE/FERA enrollment. Further, complex billing scenarios alone do not justify excluding customers from submetering.

Parties request a number of changes related to the communication protocols. The IOUs, VGIC, ChargePoint, and Enel X ask the Commission to clarify whether the protocols apply only to specific utility-administered transportation electrification programs and not to the utilities' rules concerning EV charging infrastructure (*e.g.,* SCE Electric Rules 16 and 29). The IOUs request that vendors be responsible validating compliance with any communication protocols that require testing. Cal Advocates and SDG&E request clarification that EVSPs, and not the utilities, are responsible for any data fees required to submit submetered load data. EDF, EVgo, Fermata, Nuvve, Tesla, VGIC, ChargePoint, and Enel X present issues with the implementation deadline for the communication protocols and urge the Commission to adopt a timeline that matches the requirements of the National Electric Vehicle Infrastructure program and the CEC's CALeVIP 2.0.

We clarify that the communication protocols apply only to ratepayer-funded and utility-administered transportation electrification programs supporting behind-the-meter charging infrastructure, and not to the

utilities' rules concerning EV charging infrastructure or customers taking service under an EV rate or tariff. We further clarify that validation of compliance with the communication protocols must align with the CEC's process, which requires the EVSPs to seek OCA certification. The IOUs must simply confirm that the EVSE has obtained OCA certification. We agree with Cal Advocates that there is no record in this proceeding to support passing on data costs to ratepayers; therefore, the EVSPs are responsible for those costs. We also modify the implementation timelines for the communication protocols to align with existing deadlines for EV charging infrastructure in California adopted by the CEC.

Finally, numerous parties highlight the ability of vehicle telematics to provide cost-effective submetering. Auto Innovators, Weave Grid, and VGIC request that the Commission immediately advance efforts to incorporate telematics into the PEV Submetering Protocol. Cal Advocates, PG&E, and SDG&E caution that more work is needed before the Commission can move forward, with Cal Advocates and PG&E supporting a workshop to explore the issues within one year of the effective date of this decision.

We agree that it is premature to move forward with telematics at this time. However, we recognize the benefit of hosting a workshop for parties to explore issues associated with telematics. Thus, we direct the IOUs to host a workshop on vehicle telematics within one year of the effective date of this decision. After the workshop, parties may file a proposal for a PEV telematics submetering protocol or amendments to the submetering protocol to include telematics.

We carefully reviewed and considered the parties' comments and made appropriate changes to the proposed decision where warranted. We find that all further comments not specifically addressed by revisions to the proposed decision do not raise any factual, legal, or technical errors that would warrant

modifications to the proposed decision pursuant to Rule 14.3 of the Commission's Rules of Practice and Procedure.

6. Assignment of Proceeding

Clifford Rechtschaffen is the assigned Commissioner and Brian Korpics and Marcelo Poirier are the assigned ALJs in this proceeding.

Findings of Fact

1. Recent Commission decisions have limited utility ownership of EVSE.
2. A submeter either owned by the customer or a third party and operated and maintained by either the customer or a third party is the best ownership option.
3. Submetering equipment can currently meet accuracy standards of 2 percent in the field and 1 percent in the laboratory—meaning that the equipment is 98 percent accurate in a field setting and 99 percent accurate in a laboratory setting.
4. The 0.2 percent accuracy standard for "revenue-grade" meters required by the CAISO and the IOUs is not necessary for PEV submetering.
5. The Commission may adopt PEV submetering accuracy standards that differ from the CAISO's 0.2 percent accuracy standard.
6. ANSI C12.20 standards require 0.5 precent accuracy in the laboratory and 2 percent accuracy in the field.
7. Multiple states, including Maryland, Minnesota, New Hampshire, and New York are exploring alternatives to ANSI C.12 accuracy standards for PEV submetering.
8. NIST Handbook 44 requires 1 percent accuracy tolerance and 2 percent maintenance for AC EVSE submeters.

9. CDFA-DMS adopted requirements contained in the latest edition of NIST Handbook 44 for EVSE used for commercial purposes.

10. Submetering accuracy standards of 2 percent in the field and 1 percent in the laboratory would provide accurate billing and transparency and would lead to lower hardware costs compared to the other options considered.

11. The CEC will likely open ViGIL in summer 2022 to provide a voluntary avenue for stakeholders to test and validate that a product meets the state's standards and requirements.

12. CDFA-DMS has developed a testing process for type evaluation of commercial EVSE, including testing for meter accuracy.

13. NRTLs or comparable facilities (i.e., government laboratories, field test sites, or manufacturer or third-party laboratories) can test PEV submeters in accordance with existing CDFA-DMS test procedures and produce test report documentation to validate that a PEV submeter meets the required accuracy standards.

14. Storing PEV submeter data onsite for 30 days and remotely for 90 days would ensure any billing disputes can be accurately addressed with the stored consumption data.

15. WiFi and cellular networks are both viable options for submeter data communication.

16. The utilities, EVSPs, and/or MDMAs are best positioned to resolve submetering data and billing disputes.

17. For any unresolvable submetering data or billing disputes, a utility may bill a customer at the primary meter rate for the time intervals during which the disputed charging occurred in order to ensure costs are not shifted to other utility customers.

18. More time, delineation, and understanding of technical issues is not needed before allowing submetering for MCOR or non-residential customers.

19. The submetering pilot programs excluded NEM customers from participating in the programs.

20. Additional submetering and data requirements are required to allow NEM customers to use PEV submeters.

21. The draft TEF recommended the adoption of EVSE communication protocols.

22. Resolution E-5175 and D.21-04-014 require the use of the four EVSE communication standards identified in the draft TEF.

23. The CEC's AB 2127 report discussed the importance of adopting EVSE communication protocols.

24. The connector standards for light-duty EVSE have consolidated around SAE J1772 and CCS.

25. Medium- and heavy-duty EVSE currently lack an industry accepted connector standard.

26. The EVSE communication protocols recommended by the CEC and adopted in recent Commission decisions promote interoperability and open standards.

27. Establishing a memorandum account will allow a utility to track and record the incremental costs associated with implementing the submetering protocol, to be reviewed for reasonableness and cost recovery in a future general rate case.

28. All utility electric vehicle rates and tariffs applicable to electric vehicle charging do not currently reference EV submetering capabilities.

29. Standardized data formats and transfer protocols are needed to share data between an EVSP/MDMA and a utility.

30. Utility implementation plans are needed to work out the details of implementing the PEV submetering requirements in this decision.

31. While completing the necessary upgrades to their billing systems, the utilities can perform billing reconciliation for submetered customers.

32. More work is needed on vehicle telematics before they can be used for PEV submetering.

Conclusions of Law

1. Customers or third parties should own, operate, and maintain PEV submeters.

2. The Commission should adopt submeter accuracy standards of 1 percent accuracy tolerance and 2 percent maintenance for AC EVSE.

3. The Commission should require all PEV submeters to meet the applicable and most up-to-date certificate tests used by CDFA-DMS to certify submeter accuracy for non-publicly accessible EVSE (*i.e.,* all tests with the exception of display requirements).

4. The Commission should require EVSPs or MDMAs to submit test documentation to the utilities to certify submeter accuracy.

5. The Commission should require the utilities to maintain and publish on their websites lists of approved EVSE submeters and/or approved submeter equipment.

6. The Commission should require PEV submeters to use WiFi or cellular networks for data communication.

7. The Commission should allow PEV submetering for MCOR and non-residential customers.

8. The utility, EVSP, and/or MDMA should first attempt to jointly resolve submeter billing and data issues.

9. If the utility, EVSP, and/or MDMA are unable to resolve submeter billing or data issues, the Commission should require the utility to bill the customer at the primary meter rate for the time intervals during which the disputed charging occurred.

10. The Commission should not adopt the PEV Submetering Protocol for NEM customers at this time.

11. The Commission should require the IOUs to host a workshop on the unresolved PEV submetering issues for NEM customers.

12. The Commission should require all ratepayer-funded AC-conductive EVSE to utilize SAE J1772 connectors and DC-conductive EVSE to utilize CCS connectors for light-duty use cases, but the Commission should not extend this requirement to medium- and heavy-duty EVSE.

13. Where appropriate and possible, the utilities should prioritize the deployment of EVSE with SAE J1772 and CCS connectors for medium- and heavy-duty use cases.

14. The Commission should require the utilities to implement the EVSE communication protocols recommended by the CEC and adopted in recent Commission decisions for EVSE deployed through ratepayer-funded and utility-administered behind-the-meter transportation electrification programs.

15. The Commission should authorize each utility to file a Tier 1 advice letter to establish a memorandum account to track and record the incremental costs associated with implementing the PEV submetering protocol, to be reviewed for reasonableness and cost recovery in a future general rate case.

16. The utilities and EVSPs should jointly develop standardized data formats and transfer protocols to share data between an EVSP/MDMA and a utility.

17. The Commission should authorize Energy Division to modify to the standardized data formats and transfer protocols.

18. The Commission should require the utilities to each file a Tier 2 advice letter updating their respective electric rules to implement the adopted PEV Submetering Protocol. The advice letter should propose revisions to all relevant electric vehicle rates and tariffs applicable to electric vehicle charging to reference the PEV Submetering Protocol. The advice letter should include an implementation plan containing a timeline for the utility to modify its billing system to incorporate the PEV Submetering Protocol, the timelines and process for resolving billing disputes, the estimated costs associated with implementing the requirements of this decision, and a standardized data format and transfer protocol to share data between an EVSP/MDMA and a utility.

19. The Commission should require the utilities to begin accepting plug-in electric vehicle submetering applications within 30 days of Commission approval of the Tier 2 implementation advice letters.

20. While completing the necessary upgrades to the utilities' billing systems, the Commission should require the utilities to perform billing reconciliation for submetered customers.

21. The Commission should grant Energy Division authority to propose periodic updates to the PEV Submetering Protocol by issuing a resolution for the Commission to consider.

22. The Commission should require the IOUs to host a workshop to explore incorporating telematics into the PEV Submetering Protocol.

O R D E R

IT IS ORDERED that:

1. The Commission adopts the Plug-in Electric Vehicle Submetering Protocol included as Attachment A to this decision.

2. Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, Liberty Utilities (CalPeco Electric) LLC, Bear Valley Electric Service Inc., and PacifiCorp d/b/a Pacific Power may each file a Tier 1 advice letter within 30 days of the issuance of this decision to establish a memorandum account to track and record the incremental costs associated with implementing the submetering protocol, to be reviewed for reasonableness and cost recovery in a future general rate case.

3. Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, Liberty Utilities (CalPeco Electric) LLC, Bear Valley Electric Service Inc., and PacifiCorp d/b/a Pacific Power shall each file a Tier 2 advice letter within 120 days of issuance of this decision updating their respective electric rules to implement the adopted Plug-in Electric Vehicle Submetering Protocol consistent with Section 3 of this decision. Each advice letter shall propose revisions to all relevant electric vehicle rates and tariffs applicable to electric vehicle charging to reference the Plug-in Electric Vehicle Submetering Protocol. Each advice letter shall include an implementation plan containing a timeline to modify the utility's billing system to incorporate the Plug-in Electric Vehicle Submetering Protocol, the timelines and process for resolving billing disputes, the estimated costs associated with implementing the requirements of this decision, and a standardized data format and transfer protocol to share data between an electric vehicle service provider/meter data management agent and a utility.

4. Within 30 days of Commission approval of the Tier 2 implementation advice letter described in Ordering Paragraph 3 of this decision, Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, Liberty Utilities (CalPeco Electric) LLC, Bear Valley Electric Service Inc., and PacifiCorp d/b/a Pacific Power shall each begin accepting plug-in electric vehicle submetering applications and shall perform billing reconciliation for plug-in electric vehicle submetered customers, while completing the necessary upgrades to their billing systems.

5. Within one year of issuance of this decision, Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E) shall jointly host a public workshop to explore potential pathways to allow net energy metering (NEM) customers to use the adopted Plug-in Electric Vehicle Submeter Protocol. PG&E, SCE, and SDG&E shall coordinate with Energy Division staff to prepare for the workshop. Within 60 days of hosting the workshop, PG&E, SCE, and SDG&E shall jointly file and serve a workshop report on the service lists for Rulemaking (R.) 18-12-006 and R.20-08-020, or any service lists for successor proceedings of R.18-12-006 and R.20-08-020. The workshop report shall summarize the issues and parties' positions and recommend solutions to overcome the issues. The workshop report shall include a discussion on whether an additional workshop may be necessary after the Commission approves a NEM successor tariff in R.20-08-020.

6. Each of Pacific Gas and Electric Company, Southern California Edison Company, San Diego Gas & Electric Company, Liberty Utilities (CalPeco Electric) LLC, Bear Valley Electric Service Inc., and PacifiCorp d/b/a Pacific Power shall, where relevant, implement the electric vehicle supply equipment (EVSE) communication protocols described in Section 3 of this decision, requiring that:

1) All alternating current conductive EVSE deployed on or after July 1, 2023, for light-duty use cases in ratepayer-funded, or utility-administered, behind-the-meter transportation electrification infrastructure programs must be equipped with a Society of Automotive Engineers J1772 connector;

2) All direct current conductive EVSE deployed on or after July 1, 2023, for light-duty use cases in ratepayer-funded, or utility-administered, behind-the-meter transportation electrification infrastructure programs must be equipped with a Combined Charge System connector;

3) For all ratepayer-funded, or utility-administered, behind-the-meter transportation electrification infrastructure programs implemented on or after July 1, 2023, communications and controls between a network service provider and the EVSE shall be capable of operating on Open Charge Alliance Open Charge Point Protocol (OCPP) 1.6 or later, and similar communication standards may be implemented in addition to OCPP; and

4) All EVSE deployed on or after July 1, 2023, for ratepayer-funded, or utility-administered, behind-the-meter transportation electrification infrastructure programs must be International Organization for Standards (ISO) 15118 ready. ISO 15118-ready chargers are equipped with onboard hardware that enable high-level communications with the vehicle using ISO 15118. An ISO 15118-ready charger is capable of, at minimum, the following: a) powerline carrier based high-level communications as specified in ISO 15118-3; b) secure management and storage of keys and certificates; c) Transport Layer Security (TLS) version 1.2, with additional support for TLS 1.3 or subsequent versions recommended to prepare for future updates to the ISO 15118 standard; d) receiving remote updates to activate or enable ISO 15118 use cases; e) connecting to a backend network; and f) selecting the appropriate communication protocol used by the vehicle.

7. Within one year of issuance of this decision, Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric

Company shall jointly host a public workshop to explore issues associated with incorporating vehicle telematics into the Plug-in Electric Vehicle Submetering Protocol.

8. Rulemaking 18-12-006 remains open.

This order is effective today.

Dated August 4, 2022, at San Francisco, California.

ALICE REYNOLDS
President
CLIFFORD RECHTSCHAFFEN
GENEVIEVE SHIROMA
DARCIE L. HOUCK
Commissioners

Comr. John Reynolds recused himself from this agenda item and was not part of the quorum in its consideration.