DOCKETED	
Docket Number:	18-MISC-04
Project Title:	Vehicle Grid Integration Roadmap Update
TN #:	224767
Document Title:	eMotorWerks Comments on VGI Roadmap Update Matrix
Description:	N/A
Filer:	System
Organization:	eMotorWerks/Marc Monbouquette
Submitter Role:	Public
Submission Date:	9/21/2018 2:13:33 PM
Docketed Date:	9/21/2018

Comment Received From: Marc Monbouquette
Submitted On: 9/21/2018
Docket Number: 18-MISC-04

eMotorWerks Comments on VGI Roadmap Update Matrix

Additional submitted attachment is included below.

eMotorWerks
An Enel Group Company

September 21, 2018

California Energy Commission
1516 9th Street
Sacramento, CA 95815

Re: eMotorWerks Comments on Goals, Issues, and Barriers Identified for Consideration in the Vehicle-Grid Integration Roadmap Update

Dear Commissioners and Staff,

eMotorWerks respectfully submits these comments on the Vehicle-Grid Integration (VGI) Roadmap Update initiated by the California Energy Commission (CEC) and jointly overseen by the California Public Utilities Commission (CPUC), Air Resources Board (CARB), and Independent System Operator (CAISO). Specifically, we respond to the invitation to provide feedback on the "Matrix of Goals, Issues, and Barriers" that is meant to guide VGI Roadmap Update discussions, beginning with a workshop scheduled for October 29-30, 2018.

eMotorWerks is a California-based leader in the electric vehicle (EV) charging market with more than 33,000 units of residential and commercial EV supply equipment (EVSE) products installed worldwide. The company's cloud-based software platform, JuiceNet™, enables electric vehicles to become part of the smart grid ecosystem. JuiceNet™ is embedded in a number of manufacturers' hardware devices, including eMotorWerks' JuiceBox™ Level 2 EVSE, the best-selling EV charger on Amazon.

eMotorWerks has been an active participant in the state's VGI conversations to date, and agrees with the CEC's recommendation in its 2017 Integrated Energy Policy Report (IEPR) that an update is needed to the original interagency VGI Roadmap drafted in 2014. To launch roadmap update conversations, the CEC provided stakeholders a matrix that lays out VGI goals across Economic, Customer, Technology, and Policy categories, and identifies specific problems or issues that stand in the way of achieving said goals. eMotorWerks comments on several of these problems or issues in the Excel Attachment appended hereto.

We appreciate the opportunity to provide this initial feedback, and look forward to working with agencies and other stakeholders to develop an effective Roadmap that will guide VGI market transformation in the state.

Sincerely,

/s/ Marc Monbouquette

Marc Monbouquette
Senior Manager, Regulatory and Government Affairs
eMotorWerks

ATTACHMENT -- eMotorWerks' Comments on VGI Roadmap Update Matrix

Number (G.P/I.A) E=Economic; C=Customer; T=Technical; P=Policy	Goal	Problem/Issue	eMotorWerks comments
E1.1	Estimate the economic potential for Vehicle-Grid Integration under medium (2030) and long term (2050) scenarios.	Various scenarios of electric vehicle charging load shapes (system wide and disaggregated) are needed for effective utility resource planning. Planning frameworks must value grid integration and smart charging to minimize the costs of electrification.	Coordination is needed across the IEPR (CEC), Integrated Resource Planning (IRP) (CPUC), Distribution Forecasting (via the Distribution Resource Plan [DRP]) (CPUC), and the Transmission Planning Process (TPP) (CAISO). The latter three planning processes all start with IEPR forecasts of electricity demand and Distributed Energy Resource (DER) deployment, including forecasts of EV adoption and resulting load shapes. Subject to check, IEPR captures the forecasted impacts of nighttime residential charging but likely doesn't capture "mobile" (e.g., workplace, commercial) charging.
E1.2		Analyzing the supply push from solutions providers (i.e., automakers, equipment manufacturers, electric vehicle service providers, aggregators, and infrastructure installers) is needed to forecast the smart charging market and holistically assess the benefits of VGI to the state.	Characterizing the size of the opportunity is more relevant than trying to quantify a snapshot of the market's present capabilities to meet the opportunity. As in, if you determine the overall value of smart charging and know how much charging infrastructure is needed (via the AB 2127 EV charging needs assessment), this will provide a tangible target for the market to respond to.
E1.3		There is limited information on value to customers and ratepayers from V1G, V2G, and/or V2B. Some pilots have been completed and others are underway, however analysis is needed across user segments, across infrastructure design types, and under various policy scenarios for both direct beneficiaries and ratepayers at large.	1) The LBNL study from May 2018 showing the renewable integration benefits of VGI/V1G (vis-à-vis standalone energy storage) should be considered. (http://iopscience.iop.org/article/10.1088/1748-9326/aabe97) 2) Need to determine a value for increased reliability/operational flexibility, avoided GHG emissions/pollutants (via peaker displacement), avoided renewables curtailment, etc. that can be realized through VGI. It's likely that such values can be applied across all DERs that can provide dispatchable flexibility services.
E1.4		There are various valuation tools for estimating how future energy scenarios, including those with high rates of PEV adoption, achieve equity/societal and decarbonization goals, however the effectiveness of such tools require a high-level assessment of how VGI is characterized.	
E2.1	Identify promising business models for self-sustaining private development of infrastructure and markets for VGI	A lack of seamless grid integration of mobile resources across utility service territories and their different rate structures and policies may hinder the interoperability of PEVs and the large scale adoption of PEVs. Analysis of this seamless integration is needed including the range of cost for the different ways of communicating utility schedules with vehicle charging schedules.	
E2.2		Limited aggregation models available to third-parties across the load serving entities (IOU, CCE, POUs) have inhibited the scale-up of managed charging.	Third-party aggregation is challenging for publicly-owned utilities (POUs). More could be done for CAISO-integrated POUs to allow for aggregation. eMotorWerks has had success aggregating EV charging loads in CAISO energy markets via Proxy Demand Response (PDR), but better models to value avoided curtailment and ancillary services for V1G EV charging need a "model." That might be frequency regulation from PDR, or fixes to the Distributed Energy Resources Provider - Non-Generator Resource (DERP-NGR) model.
E2.3		There is limited understanding of "unbundling" (or the separate-purchase of) charging equipment and charging services, and the impact unbundling may have on the grid and market.	The industry's deployment of charging infrastructure to date has exhibited a fairly limited range of business models. As eMotorWerks has testified in the past, there are numerous customer and public benefits to be captured by implementing more innovative business models, including charging as a service, third party project financing, and layered revenue streams. The public funds deployed to date have been helpful for existing business models but have done little to stimulate innovation in this area. The State's ambitious transportation electrification (TE) goals can only be met if public funds are leveraged to attract private capital and facilitate a transition to an industry that can “pay its own way”, without public subsidies. We support exploration of new IOU/LSE and third-party business models with regards to EV charging infrastructure and supply deregulation (e.g., CPUC Green Book) to see how such models could unlock innovation in customer experience, EV adoption, and grid integration for both residential and non-residential customers. We further support work by the public agencies to understand the potential for financial and commercial innovation (in addition to technical innovation) and to incentivize the private sector in this direction.

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E3.1	Reduce cost of electrification by measuring how emerging opportunities can utilize vehicle-grid integration technologies	Autonomous, Connected, Electric, Shared (ACES) vehicles have unverified impacts on future electricity demand, traffic flow, and greenhouse gas emissions.	1) ACES EVs have unverified impacts because there have been no commercial deployments to date. Once they do come to market and charging and driving patterns emerge, this should get captured in the IEPR demand forecast and flow through CPUC and CAISO planning frameworks as happens today. For instance, in planning, you can compare ACES EV charging curves to IRP GHG curves, and adjust incentives and price signals to ensure ACES EV charging better aligns with the availability of GHG-free energy and does not contribute to local or system peaks. 2) The CEC could examine what "rules of the road" need to be implemented for ACES EVs because the use of DCFC without VGI for critical reliability periods could have cost impacts which are borne by more than ACES owners / operators. 3) It's not clear how VGI intersects with ACES EV traffic patterns. ACES EV charging will certainly be sited according to traffic patterns, but this does not entail VGI considerations separate from any other type of EV charging.
E3.2		Electrification and charging infrastructure operations can positively impact the development of sustainable communities and smart cities, but viable models are unproven or developing.	1) Not clear how this intersects with VGI. Clarity needed as to what is meant by a "viable model" for a "sustainable community" or "smart city." The electric system is only one element of a smart or sustainable city, and electrification and charging infrastructure are being addressed through IOU/LSE programs, CEC funding, and elsewhere. 2) Air quality benefits, from TE generally or avoiding peaker dispatches with smart EV charging, in or around disadvantaged communities (DACs) provide tangible community-level benefits.
E3.3		Characterizing the grid impacts of large scale transportation electrification for medium-duty and heavy-duty vehicles is needed to provide reliable service and minimize grid upgrade costs.	Grid impacts and potential upgrades associated with M/HDV fleet charging depend on the time and location of where charging occurs. Planned fleet charging locations and expected load curves would flow through IEPR forecasts and relevant planning processes. Rules 15/16 dictate customer cost responsibility for distribution line extensions and service upgrades, respectively, while distribution primary upgrades identified through annual planning process are ratebased and paid for by all ratepayers.
C1.1	Prioritize and track the benefits of managed PEV charging to low-income consumers and disadvantaged communities.	Current utility resource planning does not take into account the environmental and air quality outcomes from shifting how power plants operate (in response to managed PEV charging) near low-income and disadvantaged communities.	Agree. This would require much more locational granularity than what the IRP RESOLVE model is able to provide. Similar to item E1.3, this would require determining a value for avoided peaker dispatch / local air pollution, and flowing those benefits through to the customer or aggregator.
C1.2		Current metrics, such as those in the SB 350 Equity Indicators, do not report all charging infrastructure investment or smart charging customer enrollment.	
C2.1	Enhance the consumer experience.	Important consumer information, such as optimal times for charging and managed charging methods, incentives, and utility bill savings, is not disseminated at the scale necessary to achieve PEV goals.	Unclear if this is actually an issue. Agencies should first evaluate the effectiveness of IOU/LSE-customer communications regarding time-of-use (TOU) rates and managed charging programs.
C2.2		All makes of PEVs and charging equipment are not interoperable.	For VGI to be scalable, all vehicles that receive state rebates should be J1772 compliant even if they primarily use a proprietary port standard. Otherwise, VGI from Level 2 EVSE in residential and workplace could be hindered or stifled.
C2.3		The charging and payment process for workplace and public charging is evolving, but needs to simplify for drivers as PEV infrastructure is deployed.	A January 1, 2020 go-live date for NIST Handbook 44 compliance, enforced by the California Division of Measurement Standards, will standardize, to some degree, the charging and payment process for workplace and public charging.
C3.1	Increase the potential number of and readiness of future EVSE site hosts.	Standardized "make ready" infrastructure plans are not part of new construction and not all customers are aware of the possibility of EVSE integration.	eMotorWerks is part of a Coalition of EV industry participants and advocates that has supported the inclusion of proposed CALGreen EV infrastructure measures within 2019 amendments to the California Building Standards Code. Such measures would increase the minimum percentage of EV readiness within new multi-family construction and enable management of EV charging loads to limit required service capacity build-out. The state's building codes should continue to support the needed EV readiness of new construction to meet TE and EV adoption goals.
C3.2		EVSE integration can be challenging and cost-prohibitive at existing buildings.	
C3.3		Large scale EVSE installations across the state may be challenging for installers that operate in multiple locations due to development codes that can vary across cities and counties.	This could be addressed by legislation and/or standards adoption by the state agencies.

ATTACHMENT -- eMotorWerks' Comments on VGI Roadmap Update Matrix

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C3.4		Dense deployment of EVSE in specific locations can be challenging for utilities to integrate with the electric grid.	This should perhaps be moved to Section E3, and potentially combined with item E3.3.
C3.5		Information describing best practices for operating and maintaining EVSE from site hosts and EVSPs participating in publicly funded programs is not readily available.	
T1.1.1	Improve cybersecurity	Low cost and robust cyber security measures between the PEV-charger and charger-aggregator may not be readily deployed in today's charging market, and commercialization of smart chargers must continue to ensure safe data transfers from malicious attacks.	
T2.1.1		Wireless, V2G discharge, DC Fast Charging for light vehicles, and medium- and heavy-duty vehicle charging need to be prepared for advanced interoperability capabilities to enable the robust development of the charging network.	
T2.2.1		The lack of communication standardization for light-, medium, and heavy duty vehicle charging may inhibit the maximization of smart charging benefits and underutilize smart chargers and PEVs as grid resources.	
T2.3.1	Advance communication and hardware technology standardization and interoperability	PEVs are unable to participate in charging-specific tariffs and/or monetary compensation programs without highly accurate metering and communications necessary to provide accurate reporting and settlement and knowledge about the availability of integrated low-cost metering and communication solutions is incomplete.	Agree. IOU submetering pilots initiated by Resolution E-4651 are yet to be finalized. SDG&E's Residential Charging Program (RCP), adopted by D.18-05-040 (though still in the works) would enable an EVSE submetering option for EV-only TOU rates. The CPUC should take expeditious action to distill results from the pilot and SDG&E's RCP and adopt policies to enable a standardized EVSE submetering option across the three IOUs. Metering accuracy requirements for EVSEs with embedded meters should be standardized across the California (and national) utilities. A working group of California IOUs and EVSE manufacturers studied metering options and agreed to use the metering accuracy requirements of NIST HB44 (which covers retail charging) for use in the Submetering Pilot Phase II. NIST HB44 has already been adopted in California by the Division of Measurement Standards. Having a single metering accuracy standard for both utility and retail EV charging applications will reduce costs for the industry and promote faster vehicle electrification.
T2.4.1		Integrated solutions providing advanced communication and control functions that connect the PEV and/or charger with grid operators are needed to reduce implementation costs.	Agree. This problem is not limited to VGI, but extends to all DER technologies.
T3.1.1	Develop advanced battery and charging technologies	Manufacturers of solutions for MD/HD EVs need to accommodate high-voltage battery and charging systems to meet applicable vocational duty cycles.	
T3.2.1		Users need to understand the relationships between battery life, range, operations and their overall impact on total cost of ownership.	
T3.3.1		The load and grid upgrade requirements of fast charging to support long distance travel for light personal and light/medium/heavy commercial vehicles are unknown.	Similar to our comment on item E3.3, grid upgrade requirements will vary depending on the location, timing, and magnitude of DCFC.
T4.1.1	Improve technology transfer between stakeholders	Technology and knowledge transfer between local, state, and federal stakeholders (agencies, auto OEMs, charging technology providers, utilities etc.) is not yet occurring at a comprehensive scope or frequently enough to rapidly advance EV adoption.	Any such transfers should be limited to the extent necessary to enable VGI functions, and should not include potential overreach by utilities or other entities just to obtain data. Further, a scenario in which minimally-used standards create technical burdens for certain stakeholders should be avoided.
T5.1.1*	Identify scenarios and cost targets for future technology research and development	State agencies and stakeholders need a focused roadmap to direct VGI technology development, specified with technology metrics and informed by industry product roadmaps.	
P1.1		The interactions between the objectives and timelines of state transportation electrification and vehicle-grid integration policies and programs are unclear.	Agree, especially when considered alongside SB 100 (carbon-free grid by 2045) and EO B-55-18 (decarbonized economy by 2045), VGI presents an immense opportunity to at once decarbonize the transportation sector and integrate SB 100 renewables.
P1.2		Agencies or stakeholders may unknowingly develop policies, business processes, and market initiatives concerning EVs that counteract or contradict VGI resource certification efforts.	
P1.3	Frame the interactions between policy initiatives, market push, and demand pull factors that are required for	Rapidly evolving renewable portfolio standards, rate designs, and infrastructure incentive policies influence the usefulness of VGI, but utilities need certainty in charging infrastructure procurement policy and private companies need certainty in charging infrastructure technical specifications to successfully co-invest in charging.	

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P1.4	achieving widespread deployment of managed charging and grid reliability goals and propose changes to EV deployment plans and VGI policy to address gaps.	State agency units implementing VGI-related policy measures are independent, yet require improved awareness of related activities. E.g. ZEV and Infrastructure Targets (B-48-18), Utility Transportation Electrification and Integrated Resource Planning (SB 350), CA Energy Demand Forecast and Transportation Energy Demand Forecast (IEPR), CARB Climate Change Scoping Plan and Mobile Source Strategy (Medium and Heavy assessment, Sustainable Freight, Innovative Clean Transit, Advanced Clean Trucks), Research Assessments (EPIC, ARFVTP, CARB Research), Rulemakings (R.13-11-007, Title 20, Rule 21 Interconnection, Open Access, Low Carbon Fuel Standard)	
P1.5		Impacts of concentrated local and individual efforts related to smart EV charging (ZNE homes codes for EV and DR capability, Local Climate Action Planning, Fleet Procurements, Low-Income and Disadvantaged Community programs) are not readily transparent, which may result in poor estimates of charging demand and grid upgrades.	
P2.1	Identify the current and emergent needs of the electric grid and where feasible, determine the potential benefits from managed electric vehicle charging	Utility programs, procurements, and tariffs could be served by the use of EVs as distributed energy and demand response resources, but requirements between utilities and service providers or participants may prevent robust participation in multiple markets.	Agree. This speaks at once to the very present challenge of establishing a viable, diverse DR market in California, as well as the need to transition away from traditional notions of DR in order for DERs to provide highly-granular flexibility services across grid domains (customer, distribution, transmission) needed to integrate SB 100 renewables.
P2.2		Some of the reliability needs of Balancing Authorities could be met by the use of EVs as distributed energy and demand response resources, but uncertain market size and pricing dampens market participant interest.	1) eMotorWerks has had success deploying DR resources comprised of aggregated EV charging loads into CAISO energy markets via PDR. CAISO has approved EVSE submetering for settlement, available Fall 2019. 2) EV Charging is not typically a "block resource," so it may not fit within the current Resource Adequacy (RA) construct. 3) Market participation enhancements are still needed to enable Frequency Regulation via PDR, and to resolve the issue of 24x7 double payment by DER Aggregators for EV consumption under the (DERP-NGR) model. Both of these issues need to be addressed to better enable aggregated EV charging participation in ancillary service markets. 4) A long term price signal for ancillary services from VGI would provide great value, and there may be a role for IOUs to play to ensure zero-carbon ancillary services as we work towards SB 100 goals.
P3.1	Align stakeholders' interests in robust open markets for smart infrastructure investment	The wide variety of terms to qualify charging technologies into different state, local, and utility charging or EV-related programs have fragmented equipment design and can inhibit the benefits of economies-of-scale production for charging equipment.	
P3.2		The traditional "rate of return" regulatory designs may cause utilities to underestimate the grid impact mitigation potential from smart charging infrastructure and grid upgrade planning methodologies may need to be updated. Regulatory changes that accommodate and encourage third party aggregation of charging may be needed.	1) We agree that traditional cost-of-service ratemaking discourages utilities from seeking smart EV charging capabilities. Well-designed modifications to utility business models could properly value and incentivize utility procurement of VGI flexibility services--and services from all DERs, for that matter. 2) SDG&E's RCP has a performance-based ratemaking (PBR) element for EVSE deployment, off-peak charging, and DACs, but it has been difficult to make maximizing the range of VGI service offerings the focus of a PBR incentive because of market immaturity and dearth of standardized service pathways. The state should pursue a pilot to test a PBR incentive for VGI.