



Inputs to CPUC VGI Working Group Question #1

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Points of Contact for Responses

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Schedule

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Oral Presentation: January 22-23, 2020, at VGI workshop in San Francisco

1 Background

American Honda Motor Company, Inc. (Honda) is pursuing opportunities to create value for electric vehicle owners, charging location owners, and the electric grid. To these ends, Honda proposes to provide inputs to the CPUC VGI WG question: “What VGI Use Cases can provide value now and how can that value be captured?” The following content provides perspectives which Honda wishes to share.

2 Primary Influences That Drive VGI Work Group’s Focus on Use Case Valuation

2.1 Valuation Framework, Cost/Benefit Precedents and Comment Impacts on Analyses

Use Case Screening, Scoring and Ranking – Under the proposed framework, the Working Group’s efforts have been trained on vetting permutations of sector, application, type, approach, resource alignment and technology. These *dimensions* have been crafted enable objectification of the analyses used to address the CPUC’s first question, and Honda hopes to contribute to basic interpretations of the data so that we, as a group, can interpret and prioritize the VGI Committee’s focus on Use Cases. Gridworks, on behalf of the Working Group, seeks inputs on how to derive meaningful information from the Subgroup’s inputs pertaining to cost, benefit, and implementation scores. To determine which Use Cases can provide immediate value and what would need to be done to capture that value, we suggest that the Working Group train its focus on:

- Mining the scoring results to group, analyze, rank, and prioritize Use Cases using all data from the scoring results according to cost, benefit, and implementability
- Provide objective interpretation and rationale for treatment of Use Cases which were not scored

- Provide insights and methodology for interpretation and processing of Use Cases with widely-diverging scores
- Address the correlations between ranking and any statistically significant of responses found in the scoring inputs

Comments – The Working Group comments provide significant qualitative insight into the value of Use Cases. In reviewing them, Honda observes that there are many Use Cases which share similar comments, and in some cases, are duplicative. This leads to difficulties in attempting to tease out specific insights. In an effort to establish a method to derive value from these responses, we propose to consolidate Comments into categories or “bins,” summarize these in terms of trends, and, in so doing, capture the context of these insights by interpreting the results statistically. This will provide a primary setting of value description as well as a background of context.

2.2 Other Influences That Impact Use Case Valuation

Honda views the relative value of VGI Use Case comparisons not only in their individual scoring by the VGI Working Group, but also in the broad context of the market. This broad context takes into account major market influences that, if not factored in, would provide a potentially misleading valuation to certain Use Cases, whether an undervaluation or overvaluation. Two of the major market influences are: (1) California SB454 and (2) the IOU charging infrastructure programs for light duty and medium/heavy duty vehicles. Many other legislative drivers also have the potential to influence the value of particular Use Cases. These include: SB 327, ADA, LCFS, CALGreen, and others.

SB 454 – Senate Bill 454 has the charter to develop legislation that would require an equitable and open access payment system for publicly accessible EV charging infrastructure. The primary requirement is to install credit card readers at public EV charging stations. This requirement has the potential to negatively impact the value and implementation of all VGI Use Cases that include public charging. We propose to qualitatively assess the potential impact of SB454 on public charging infrastructure Use Cases and recommend whether this should affect their valuation relative to the CPUC question.

IOU EV Charging Infrastructure Programs – CPUC has approved the three IOUs to implement major EV charging infrastructure programs for light duty and medium/heavy duty vehicles that totals over \$1B. This requirement has the potential to positively impact the value and implementation of VGI Use Cases affected by these programs, including light duty residential, workplace, and destination, and medium/heavy duty fleet programs. We propose to qualitatively assess the potential impact of the IOU charging infrastructure programs on relevant Use Cases and recommend whether this should affect their valuation relative to the CPUC question.

3 Proposed Methodology

The VGI Working Group scored Use Cases according to costs, benefits, and implementability. Use Cases typically received scoring from more than one party, which resulted in highs and lows, and GridWorks then processed these scores into averages. Assessing each Use Case for so many variations and types of scores is challenging. To bring together these scores, we suggest use of a “Value Metric” which is the product of the average costs, benefits, and implementability scores. By using a simple arithmetic factoring of the scores, the results can be ranked without introducing analytical influence.

One processing treatment had to be applied to the costs scores, however, before using for the Value Metric processing step. During scoring, the costs were scored from 1 (low costs) to 5 (high costs), which was the opposite scoring scale for benefits and implementability, which were scored from high to low. Hence, the costs scores can be adjusted by subtracting them from 5.01 to avoid a zero cost score.

The Value Metric we are suggesting is calculated for each Use Case by using the following equation:

$$\text{Use Case Value Metric} = (5.01 - \text{Cost}) * \text{Benefit} * \text{Implementability} \text{ (avg scores)}$$

The following is a screenshot of the LDV Excel spreadsheet with Column J showing the Value Metric sorted from high to low.

	Benefits			Costs			Implementability			Use Case Screening Status	Use Case ID	Sector	Application	Type	Approach	Resource Alignment	Battery Capacity (kWh)	Charger Power (kW)	
	Benefits Avg	Benefits Min	Benefits Max	Costs Avg	Costs Min	Costs Max	Impl. Avg	Impl. Min	Impl. Max	Cost*Benefit*Imp									
3	8.0	5.4	8.7	1.0	1	1	5.0	5	5	161.40	Passed	205	Residential - Single Family Home - R	Customer - Bill Management	V1G	Indirect	EV-EVSE Unified, Aligned	20-40kWh	7kW
4	8.3	7.3	8.7	1.0	1	1	4.9	4	5	161.10	Passed	1.1	Residential - Single Family Home	Customer - Bill Management	V1G	Indirect	EV-EVSE Unified, Aligned	240+miles, 10-20kWh	5kW
5	8.1	7.3	8.7	1.0	1	1	4.9	4	5	158.05	Passed	1.2	Residential - Single Family Home	Customer - Bill Management	V1G	Indirect	EV-EVSE Unified, Aligned	240+miles, 10-20kWh	L1
6	7.5	6.2	8.2	1.0	1	1	4.7	4	5	140.85	Passed	853	Commercial - Workplace	Customer - Renewable Se	V1G	Indirect	EV-EVSE Unified, Aligned		
7	7.8	7.2	8.1	1.0	1	1	4.3	3	5	134.67	Passed	13.1	Residential - Single Family Home	Customer - Upgrade Defe	V1G	Indirect	EV-EVSE Unified, Aligned		3.3kW
8	7.6	7.2	7.8	1.0	1	1	4.3	3	5	131.61	Passed	13.2	Residential - Single Family Home	Customer - Upgrade Defe	V1G	Indirect	EV-EVSE Unified, Aligned		L1
9	7.5	6.2	8.2	1.0	1	1	4.3	4	5	130.79	Passed	854	Commercial - Workplace	Customer - Renewable Se	V1G	Indirect	EV-EVSE Fragmented, Aligned		
10	6.1	5.4	6.3	1.0	1	1	5.0	5	5	121.33	Disputed	614	Residential - Multi-Unit Dwelling - R	Customer - Bill Management	V1G	Indirect	EV-EVSE Fragmented, Aligned		
11	7.1	6.2	7.7	1.0	1	1	4.0	3	5	114.68	Passed	830	Commercial - Workplace	Customer - Upgrade Defe	V1G	Indirect	EV-EVSE Fragmented, Aligned		
12	7.0	6.2	7.3	1.5	1	2	4.5	4	5	111.06	Passed	313	Residential - Single Family Home - R	System - Renewable Integ	V1G	Indirect	EV-EVSE Unified, Aligned		
13	7.5	4.8	8.2	1.7	1	3	4.4	4	5	109.90	Disputed	818	Commercial - Workplace	Customer - Bill Management	V1G	Indirect	EV-EVSE Fragmented, Aligned		
14	7.5	4.8	8.2	1.8	1	4	4.5	3	5	109.88	Passed	817	Commercial - Workplace	Customer - Bill Management	V1G	Indirect	EV-EVSE Unified, Aligned	10-20kWh	7kW
15	7.6	5.6	8.4	1.6	1	3	4.2	2	5	108.21	Passed	410	Residential - Multi-Unit Dwelling	Customer - Bill Management	V1G	Indirect	EV-EVSE Fragmented, Aligned		L2
16	6.8	6.2	7.3	1.5	1	2	4.5	4	5	107.68	Passed	518	Residential - Multi-Unit Dwelling	System - Renewable Integ	V1G	Indirect	EV-EVSE Fragmented, Aligned		
17	7.3	6.2	7.8	1.5	1	2	4.0	2	5	102.54	Passed	109	Residential - Single Family Home	System - Renewable Integ	V1G	Indirect	EV-EVSE Unified, Aligned	240+miles, 25kW	6kW
18	7.9	6.7	8.4	1.8	1	3	4.0	3	5	100.89	Passed	133	Residential - Single Family Home	System - RA, System Capa	V1G	Indirect	EV-EVSE Unified, Aligned		
19	6.6	6.2	6.8	2.0	2	2	5.0	5	5	99.56	Passed	1753	Commercial - Public, Commute - R	System - GHG Reduction	V1G	Indirect	EV-EVSE Unified, Aligned	Vans	L2 ChargeP
20	7.0	4.8	7.7	1.0	1	1	3.5	2	5	98.26	Passed	241	Residential - Single Family Home - R	Customer - Renewable Se	V1G	Indirect	EV-EVSE Unified, Aligned		
21	7.5	6.8	8.2	1.0	1	1	3.3	2	5	97.20	Passed	37	Residential - Single Family Home	Customer - Renewable Se	V1G	Indirect	EV-EVSE Unified, Aligned	240+miles	
22	7.4	4.8	8.4	1.5	1	2	3.8	2	5	97.07	Passed	337	Residential - Single Family Home - R	System - RA, System Capa	V1G	Indirect	EV-EVSE Unified, Aligned		
23	7.2	7.2	7.2	1.7	1	3	4.0	2	5	95.97	Passed	121	Residential - Single Family Home	System - GHG Reduction	V1G	Indirect	EV-EVSE Unified, Aligned	25kWh	6kW
24	7.3	4.8	8.0	1.8	1	3	4.0	3	5	94.61	Passed	458	Residential - Multi-Unit Dwelling	System - Grid Upgrade De	V1G	Indirect	EV-EVSE Fragmented, Aligned		
25	7.9	4.8	8.4	2.0	1	3	4.0	2	5	94.57	Passed	49	Residential - Single Family Home	System - Grid Upgrade De	V1G	Indirect	EV-EVSE Unified, Aligned	240+miles, 25kW	6kW ; L2
26	7.8	6.2	8.7	2.0	1	3	4.0	3	5	94.06	Passed	160	Residential - Single Family Home	System - RA, Local Capaci	V1G	Direct	EV-EVSE Unified, Aligned	25kWh	6kW
27	7.6	6.7	8.1	2.0	2	2	4.0	3	5	91.19	Passed	16	Residential - Single Family Home	Customer - Upgrade Defe	V1G	Direct	EV-EVSE Unified, Aligned	240+miles, 25kW	6kW
28	7.5	4.8	8.1	2.0	1	3	4.0	3	5	90.59	Passed	148	Residential - Single Family Home	System - RA, Flex Capaci	V1G	Direct	EV-EVSE Unified, Aligned	25kWh	6kW
29	6.8	5.6	7.3	2.0	1	3	4.3	4	5	89.05	Passed	866	Commercial - Workplace	System - Grid Upgrade De	V1G	Indirect	EV-EVSE Fragmented, Aligned	25kWh	6kW ; L2
30	8.2	7.3	8.7	2.2	1	3	3.9	3	5	88.80	Passed	4	Residential - Single Family Home	Customer - Bill Management	V1G	Direct	EV-EVSE Unified, Aligned	240+miles, 10-20kWh	L1
31	7.5	5.6	8.2	2.0	1	3	3.8	3	5	85.89	Passed	413.2	Residential - Multi-Unit Dwelling	Customer - Bill Management	V1G	Direct	EV-EVSE Fragmented, Aligned		
32	8.1	5.4	8.7	2.0	1	3	3.5	2	5	85.67	Passed	1226	Commercial - Public, Destination - R	Customer - Bill Management	V1G	Indirect	EV-EVSE Fragmented, Aligned	50-80kWh	150 kW, 35kW
33	7.4	5.6	8.1	2.0	1	4	3.8	3	5	85.62	Passed	542	Residential - Multi-Unit Dwelling	System - RA, System Capa	V1G	Indirect	EV-EVSE Fragmented, Aligned		
34	7.5	5.4	8.2	2.0	1	3	3.8	3	4	85.05	Passed	208	Residential - Single Family Home - R	Customer - Bill Management	V1G	Direct	EV-EVSE Unified, Aligned	20-40kWh	7kW
35	7.9	6.8	8.4	2.0	1	3	3.5	2	5	83.57	Passed	1430	Commercial - Public, Commute	Customer - Bill Management	V1G	Indirect	EV-EVSE Fragmented, Aligned	20kWh	DCFC ; 150kW

A check of this Value Metric approach shows that the Use Cases with the highest values have:

- Low costs
- High benefits, and
- Low implementability requirements

Conversely, Use Cases with the lowest values are those “disputed” and have high costs, lower benefits, and high implementability requirements.

Approaching Gridworks Questions of the Subgroup

3.1 Use Case Scoring – How We Will Group, Analyze, Rank, and Process?

Processing is the first step, which we suggest accomplishing, at least initially, via the Value Metric calculation shown above. This provides a focus set of high value Use Cases for more in-depth analysis.

The methodology we suggest for performing this analysis is:

- Choose a threshold, say the top 20 Use Cases, by “Value Metric” ranking
- Analyze these Use Cases by Groupings and the three VGI scores
- Analyze the Comments for these Use Cases
- Analyze Comments for other Use Cases to assess any correlations to those among the top 20

3.2 How We Will Handle Non-Scored Use Cases?

- What are the observable trends of Non-Scored Use Cases?
 - 15 Use cases were not scored – all of them disputed
 - 12 of the Use Cases were Commercial, 3 were Single Family Residential
- Note non-scored Use Cases for future discussion
 - Scored and Non-scored Use Cases of similar sector and application both show low ranking
 - All non-scored Use Cases were disputed, suggesting that future treatment may be necessary to build their viability

3.3 How We Will Handle Widely Diverging Use Scores?

- Use Average Scores
 - Can the average cost, benefit and implementability values be used? **Yes, using the “Value Metric” approach, the top 100 Use Cases don’t show significant divergence.**
 - Note which Use Cases show widely diverging scores, along with potential reasons – e.g., type of scorer (utility, OEM, etc. – without attribution).
- No Significant Impacts from Widely Diverging Use Case Scores
 - Does divergence represent a problem? **No.**
 - Would more consensus and adjustment change the “Value Metric” scores? **Not significantly, at least for the highly ranked Use Cases.**

3.4 How We Will Make Use of Comments?

The VGI Working Group Use Case comments, which comprise approximately 1,000 comments, are highly valuable commentary on managed EV charging. One challenge in compiling and bringing out the essence of these comments is that they are dispersed among specific Use Cases, often duplicative, and not in any prioritized order. We propose to start with those comments associated with the highest ranking Use Cases (by Value Metric) and subsequently include observations regarding other common comments which are relevant.

- Group and Consolidate Comments
 - Analysis of Use Case scoring comments: consolidation, trending, sorting, prioritization
 - Capture context of consolidated comments

- Frame the comments under impacts from Legislative Drivers including Utility planning and Infrastructure Programs
- Example of duplicative comment
 - “Benefit: \$/EV based on internal analysis using RA prices from PUC reports” occurs 16 times.
- Example of multiple comments on one Use Case
 - Use Case 133 has comments from 5 parties
- Summarize
 - Capture context for the highest value Use Cases for recommendation to CPUC
 - Capture notable comments from other Use Cases that reflect on the high value Use Cases

3.5 How We Will Take Key Legislative Drivers into Account?

The California legislative landscape is highly complex and would require an enormous effort to assess relative to EV charging infrastructure. We propose a tightly focused approach that will investigate specific legislative drivers that might impact the value of a particular Use Case. For example, if a forthcoming decision to implement SB454 requires credit card readers to be installed on public charging infrastructure, then the Use Cases affected by this law could be impacted negatively on both costs and implementability. Hence, it may be most appropriate to implement a more qualitative assessment of the following key legislative drivers for impacts on Use Case scoring.

- **SB 327** – Cybersecurity directives covering “smart” devices for the Internet of Things
- **SB 350 TE** – CPUC has approved the three IOUs to implement major EV charging infrastructure programs for light duty and medium/heavy duty vehicles that totals on the order of \$1B
- **SB 454 (forthcoming)** – The primary requirement is to install credit card readers at public EV charging stations. This has the potential to negatively impact the cost and implementation characteristics of all VGI Use Cases that address public charging
- **Other Key Legislative Drivers** – LCFS, ADA, Governor Brown’s EV and Infrastructure Executive Orders, CALGreen (buildings), etc.

4 Objectives for Report Preparation

The VGI Working Group’s charter is to recommend high value Use Cases and how to capture this value. To accomplish this, Honda recommends focusing on the highest ranked (by Value Metric) Use Cases, say the top 20, and including inputs from both the contextual analyses of the Comments associated with those Use Cases, and any potential impacts by the aforementioned key legislative drivers.

- **Inputs to Question 1**
 - Recommend VGI Use Cases – How will we defensibly state which Use Cases show the highest value and should be promoted to capture that value?

- Characterize how answering Question 1 will inform the approaches to be undertaken answering Questions 2 and 3?
- Summarize Work Group B Scoring comments to provide meaningful context.
- Provide legislation and programs analysis to clarify WG perspectives on impacts to Use Case value.
- **Present Backup**
 - Working group work product from participants, meetings, workshops
 - Use Case scoring methodology, Use Cases which are disputed
 - Comments: interim and final interpretations
- **Present Additional Takeaways**
 - What else might mining of the scoring & ranking data reveal?
 - What foundational tenets apply VGI implementations?

5 Suggested Tenets of Intelligent Charging from a *Voice of the Customer* Perspective

We believe it important to preserve the Voice of the Customer (VOC). As with the utility's charter, we must abide by the obligation to serve.

- Maintain Vehicle-User Centric VGI
 - The vehicle must be charged when the driver needs it.
 - VGI activity (V1G and V2G) needs to be governed by the vehicle, under the control of the user. Specifically with regard to the State of Charge (SOC) depth of useage, minimum SOC, departure time SOC, etc.
 - VGI activity (V1G and V2G) needs to be clearly communicated to the user.
- There must be an upside to the customer, an enhanced value proposition.
 - LCFS credit awards to the customer, in one way or another.
 - Visibility: Utility rate structures should provide for some form of on-bill credits or rewards.
 - CCAs must appropriately carry weight of VGI capacity procurement.
 - Aggregators should be required to share proceeds under an equitable mechanism.