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On Hydrogen Station Capacity Model (HYC) Workshop

Additional submitted attachment is included below.

From: W.Leighty@shell.com
Sent: Tuesday, June 26, 2018 3:09 PM
To: Energy - Docket Optical System
Subject: 18-HYD-02, Hydrogen Station Capacity Model (HYC) Workshop

To whom it may concern:

We support the work on the ***Hydrogen Station Capacity Model (HyC)*** as described by CEC and NREL at the public workshop held 18 June 2018, and offer the following comments in support of this work.

We recognize and acknowledge in these comments that even as the modeling is designed, there will likely be interfaces with potential applications, two of which have been identified: Hydrogen Refueling Infrastructure (HRI) crediting in the Low Carbon Fuel Standard (LCFS), and scoring criteria in the next Grant Funding Opportunity (GFO) from the California Energy Commission (CEC).

In general, we understand and agree with the design principles of creating a capacity model that can be universally applied, is transparent in how it works, and produces a fair and accurate evaluation of capacity across all station designs. Of necessity, the modeling may not exactly reflect aspects of station design (e.g., unique controls) and is not meant to be a station design tool.

We understand the modeling tool developed will offer the capability to evaluation station capacity for a wide range of station designs, fueling profiles, and time periods. In other words, the model could simply represent the maximum capability of the station design, and it could also represent specific scenarios for station performance according to input parameters that, for example, define a demand profile. As such, we believe it can become a flexible tool for more than one application, as discussed further below.

- The prescribed demand profile, if any, can be determined by and for the application
- The prescribed time period, if any, can be determined by and for the application

To enable use across a range of applications, the modeling output could include iso-lines for station capacity over a range of demand and/or time period. This could enable reading a value from the chart for a particular application's specification for demand profile and time period.

One might also anticipate and prepare for periodic updates to the modeling tool being required, for example as new technologies are incorporated into station designs. Some expansions in the range of station configurations that can be modeled have already been identified, including cooling and liquid storage. A generic approach may be tailored to specific applications of the model, for example:

- Schedule of periodic updates could be complemented with,
- a petition process to request update (initiated by the party who has basis for the request), and
- even more responsive consideration of change within an application of the model (e.g., a method within GFO solicitation to consider information provided by an applicant pertaining to the modeled station capacity).

Reasonable simplicity and accuracy in the modeling should alleviate the motivation for administrative simplicity in a "standard capacity" per fueling position independent of station design and technology. We should aspire to a capacity model and administration in each application that would accurately evaluate station capacity. If achieved, station designs with less than a "standard capacity" would not receive excess credit toward each application, and stations designs with greater than the "standard capacity" would be appropriately rewarded and incentivized for improvement above the standard.

Specific to the application of HyC to a "Fill Scenario" for use in evaluating Design Nameplate Capacity for LCFS HRI crediting, we recommend the following. Note, we intend to provide similar comment to the ARB docket on the LCFS Rulemaking.

- **Time Period:** use an 18-hour period, from 0500 to 2200 hours, on maximum station capacity to align the incentive for station design created by the HRI to serving approximately 95% of customer demand in a typical gasoline station fueling profile.
- **Fill Schedule Demand Profile:** if the "Chevron Friday Profile" is to be used as a typical fueling profile, then the full 24-hours of that profile should be used as 24/7 operation would truly match the customer service of most gasoline refueling stations.
- **Waiting Period between Fills:** allow the station equipment to determine this parameter rather than making it a fixed parameter in the Fill Scenario.

Specific to the application of HyC to evaluating cost/benefit ratio in scoring applications to GFO solicitations, we recommend the following.

- Application to scoring criteria should be made based on reasonable accuracy. This reinforces the approach of developing and validating the capacity modeling to be reasonably accurate regardless of station design, rather than designing standard capacity metrics.

Finally, we recognize that maintaining credibility of the modeling will depend on clear understanding and documentation of the purpose, and how to interpret accuracy of modeled capacity vs. actual station performance. To this end, we recommend the following:

1. Let's run stations through a beta version of the model to validate and assess accuracy.
   - Test and validate model results according to a prescribed demand profile (e.g., the Chevron Friday Profile) across a range of station design to verify expected results.
   - Test and validate model results for existing stations compared to observed loading to assess the potential magnitude of difference between modeled capacity and actual full loading.
2. Let's have a process for verifying claimed station design.
   - Include in applications of the model a process to validate and verify claimed station design.
3. Let's clearly identify the intended purpose and limitations of the model.
   - Some disclaimers regarding "actual may vary" may be appropriate. For example, variation around the Chevron Friday Profile in customer arrivals may cause lines to form at a fully loaded station, which should be interpreted according to standard queueing theory rather than as error in the modeling of station capacity. As another example, variations around the modeled State of Charge (SOC) when vehicles arrive, along with customer behavior at the pump, could impact vehicle throughput at the station and volume dispensed. Again, these actual situations and anecdotes that are very real customer experiences should be interpreted according to standard queueing theory rather than as error in the modeling of station capacity.

Thank you for your consideration,

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