**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA**

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| In the matter of the Order Instituting Rulemaking Pursuant to Assembly Bill 2514 to Consider the Adoption of Procurement Targets for Viable and Cost-Effective Energy Storage Systems | Rulemaking 10-12-007<br>(Filed December 16, 2010) |

# COMMENTS OF THE CALIFORNIA HYDROGEN BUSINESS COUNCIL ON THE PROPOSED DECISION OF COMMISSIONER CARLA PETERMAN OF 09/03/2013 IN THE ENERGY STORAGE RULEMAKING


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September 23, 2013

**BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA**

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Pursuant to the California Public Utilities Commission's ("Commission") Rules of Practice and Procedure and the rulings of the Assigned Commissioner, the California Hydrogen Business Council (CHBC) submits its comments in response to the Proposed Decision of Commissioner Carla Peterman dated September 3, 2013.

The California Hydrogen Business Council continues to support the Commission's efforts to ensure that adequate energy storage resources are available to support the goals defined in the Proposed Plan of the Assigned Commissioner's Ruling (ACR). "Storage procurement policy should be guided by three purposes

1) The optimization of the grid, including peak reduction, contribution to reliability needs, or deferment of transmission and distribution investments;
2) The integration of renewable energy; and
3) The reduction of greenhouse gas emissions to 80 percent below 1990 levels by 2050, per California's goals."[1]

As outlined in the comments of the California Hydrogen Business Council on the ACR from 06/10/2013, submitted by the CHBC on July 3rd, 2013, the CHBC believes that Hydrogen Energy Storage (HES) can play a key role in meeting these goals, specifically renewable energy integration and zero greenhouse gas emissions, in a cost-effective manner. However, the CHBC is of the opinion that the Proposed Decision needs further clarity, particularly with regard to the

[1] R.10-12-007 COM/Cap/jv1 09/03/2013

specified procurement buckets and requirements, in order to avoid disadvantaging potentially attractive options, such as hydrogen energy storage, in the procurement process. Specifically:

1. The CHBC requests that the Proposed Decision be modified to more clearly define the procurement buckets:
   a. Voltage and power levels or more precise definition of transmission and distribution levels should be added to ensure maximum clarity.
   b. The CHBC recommends that the procurement buckets be defined as the point at which the storage services are delivered to the grid. There are a number of technologies, including Hydrogen Energy Storage, that convert electricity to another form of energy that can be transported by means other than the electric grid for delivery to the grid at another location. For example, hydrogen can be produced by electrolysis at one location, transported to another location via pipeline or other means and then be converted back to electrical energy for injection onto the electrical grid at another location (see Exhibits 1 and 2).

2. The Proposed Decision refers to energy storage in terms of power (MW), rather than energy (MWhr). Without any specification or minimum duration defined, energy storage devices that have high energy ratings, but can provide that rating only for a very short duration will likely emerge as the "low cost option" but not provide the full range of functionality and benefit that the Commission is seeking through this proceeding.[2] There is no certainty that this issue will be addressed through the benefit to cost evaluation methodology. The CHBC recommends that the commission consider establishing minimum energy storage values (e.g. duration and power rating) for some or all of the utilities' procurement obligations to ensure that procurement targets are met in a way that provides maximum benefit and allows a full spectrum of technologies as illustrated in Exhibit 3.

3. Table 1 on page 14 of the Proposed Decision maps the storage use-cases to grid domain. Hydrogen energy storage can serve all use-cases outlined in Table 1 of the Proposed

[2] As an extreme example, it is conceivable that a utility may procure an inexpensive energy storage system that can discharge 10 MW but lasting only for seconds, thereby meeting the procurement targets, but not providing value to established energy storage objectives.

Decision. However, the Power-To-Gas option wherein electricity is used to produce gas which is injected in a pipeline and recovered downstream to produce electricity is a unique, but viable use-case (Exhibit 5 shows an operating system), which is not reflected in the Table. As illustrated in Exhibit 3, this pathway has the potential to store large amounts of energy for extended duration. Therefore, the CHBC recommends adding to the example use-cases the Power-To-Gas (and back to electricity) option that hydrogen energy storage allows as illustrated in Exhibits 1 and 2. Suggested edits to the table are provided as Exhibit 4.

The CHBC stands ready to lend its expertise to ensure that the full range of HES pathways is considered.

Dated this 23rd day of September, 2013, in Los Angeles, California.

Respectfully submitted,

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## Exhibits:

**Exhibit 1 - Electrolysis to methane pathway using the gas grid for storage and transport for reconversion using dispatchable generation resources.**

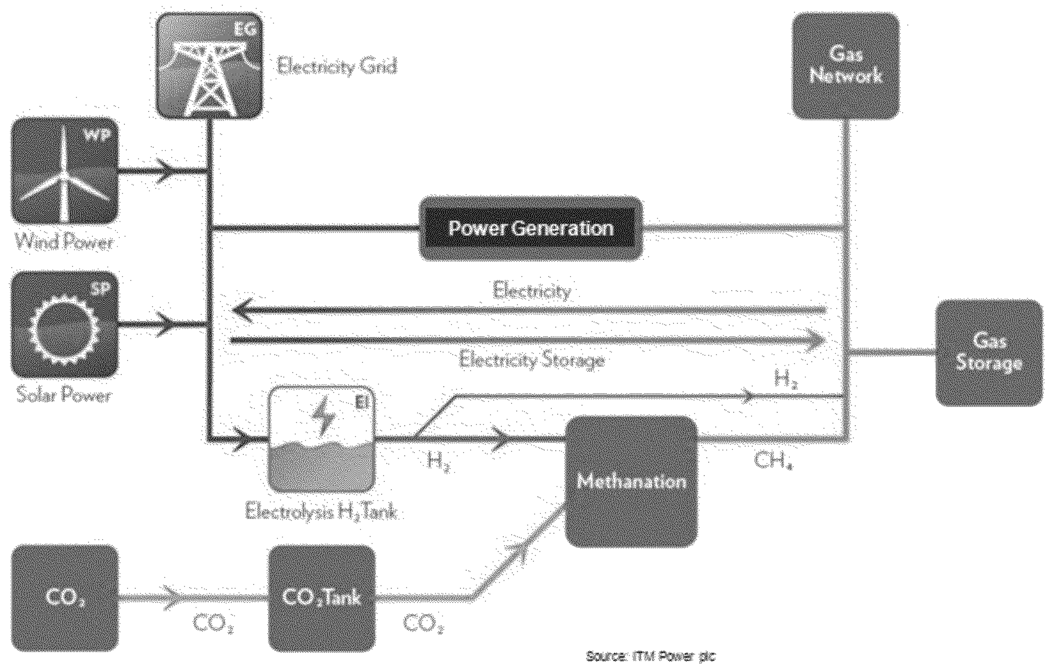


**Exhibit 2 - Dual use Hydrogen Energy Storage system producing vehicle fuel, providing storage services and Combined Heat and Power (CHP)**

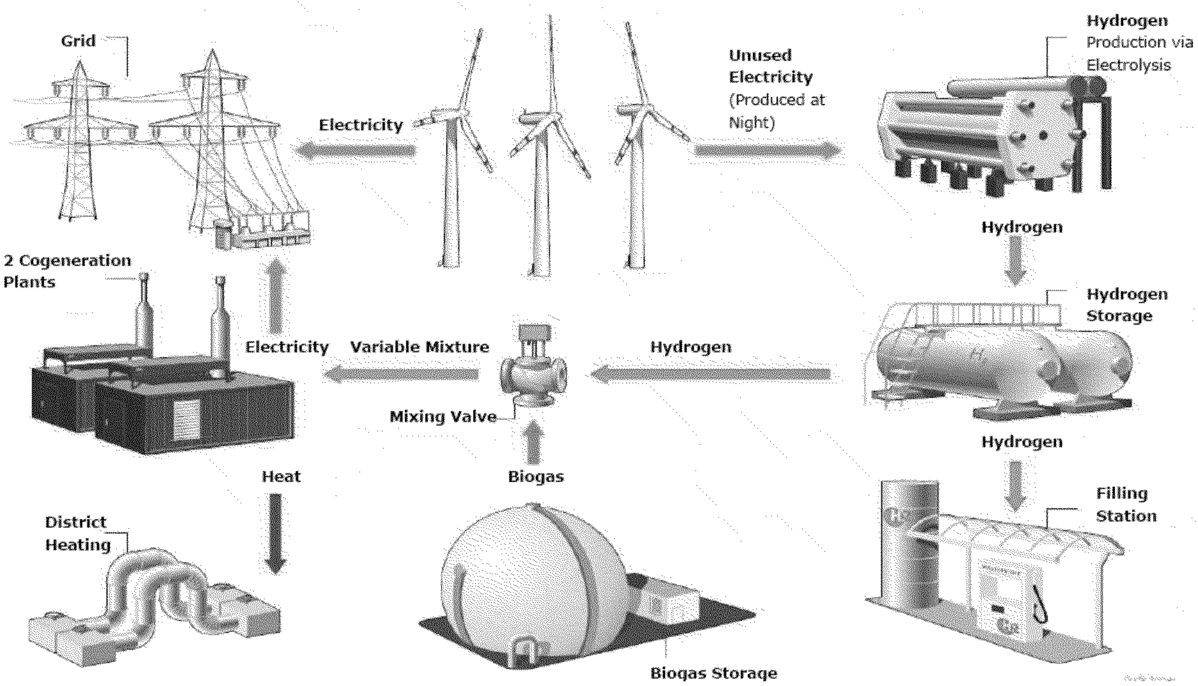




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**Exhibit 3 - Energy Storage Technology Overview – Comparing Storage Capacity verses Energy Discharge Time**

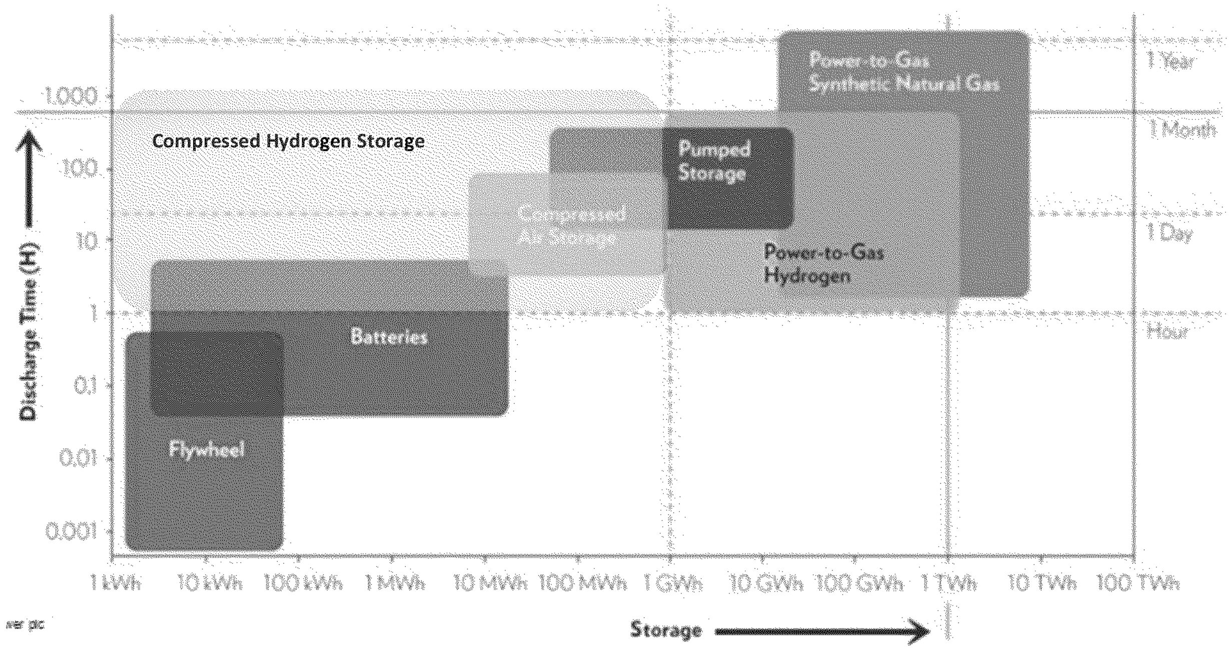


**Exhibit 4 –Modified Table 1 provided in Proposed Decision, including key Hydrogen Energy Storage use-cases and Frequency Regulation**

| **STORAGE GRID DOMAINS** (Energy Delivery Point) | **REGULATORY FUNCTION** | **USE-CASE EXAMPLES** |
|---|---|---|
| **Transmission-Connected** | Generation/Market | **(Co-Located Energy Storage)** Concentrated Solar Power, Wind + Energy Storage, Gas Fired Generation + Thermal Energy Storage, Hydrogen Production via Electrolysis + Energy Storage (Power-To-Gas) |
| | | **(Stand-Alone Energy Storage)** Ancillary Services, Peaker, Load Following |
| | Transmission Reliability (FERC) | Voltage Support |
| **Distribution-Connected** | Distribution Reliability | Substation Energy Storage (Deferral) |

| | | |
|---|---|---|
| | Generation/Market | Distributed Generation + Energy Storage |
| | Dual-Use (Reliability & Market) | Distributed Peaker |
| **Behind-The-Meter** | Customer-Sited Storage | Bill Mgt/Permanent Load Shifting, Power Quality, Electric Vehicle Charging, Electrolysis |

**Exhibit 5 – Operating Hydrogen Energy Storage (Power-to-Gas) Facility in Falkenhagen, Germany**