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Description:	20-IEPR-01 HD Zero-Emission Vehicle Market Trends — Hyundai Motor Company's Statements regarding Swiss Fuel Cell Electric Truck Efforts
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Organization:	California Energy Commission
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Dear Commissioner Monahan & other honorable representatives of the California Energy Commission,

as a major manufacturer of eco-friendly battery and fuel cell electric passenger cars & commercial vehicles, Hyundai Motor Company (HMC) seeks to comment on the CEC's 2020 Integrated Energy Policy Report Update Workshop concerning the current Heavy-Duty Zero-Emission Vehicle Market Status.

Hyundai Motor Company would like to highlight it's efforts in Switzerland regarding the world's first rollout of serial produced fuel cell electric heavy duty trucks starting in 2020.

Hydrogen fuel cell electric commercial vehicles offer distinctive advantages over battery electric counterparts like higher payload capacity, longer driving range & lesser downtime due to fast refueling. This allows matching existing Diesel vehicle's duty cycles in almost all scenarios, often enabling 1:1 replacements. Since fuel cell electric vehicles do not draw any power from the existing electricity grid, refueling operations can happen at any time and with smaller footprint than battery electric counterparts. Added complexity in the vehicle design & the surrounding supply chain as well as competitive pricing of hydrogen [compared to Diesel & grid electricity] remain major challenges for mass commercialization.

Hyundai Motor Company is convinced that due to lacking competitiveness in regards to Total Cost of Ownership with Diesel [with TCO as the major buying criterion for most fleets and owner operators], regulative & financial support from state & federal governments is necessary to accelerate the transition to eco-friendly technologies in the commercial vehicle space.

We would like to summarize current status of our European fuel cell heavy duty truck business by following bullets:

Timeline & Responsible Corporate Structure

- First announcement of Hyundai Fuel Cell HD Truck Development on 2018 IAA Commercial Vehicles in Hanover, Germany; Signing of a Memorandum of Understanding with H₂Energy to develop a commercialization model for the Swiss market together <https://www.freightwaves.com/news/technology/hyundai-hydrogen-fuel-cell-iaa-2018>
- Signing of JV contract between Hyundai Motor Company & H₂Energy on April 15th, 2019; JV is called “Hyundai Hydrogen Mobility” (HHM) <https://hyundai-hm.com/en/2019/08/26/hyundai-and-h2-energy-sign-joint-venture-contract/>
- HHM was established on June 17th, 2019 in Zurich, Switzerland. It is HMC’s EU regional HQ for fuel cell heavy duty truck business expansion (Including all GVW >5 ton hydrogen powered trucks and buses)
- The solution (truck + commercialization scheme) won the 2019 “International Truck of the Year Truck Innovation Award” and prevailed against competitors like Daimler (eActros) and Nikola Motors (Nikola Fuel Cell Electric Truck) <https://hyundai-hm.com/en/2019/11/19/hyundai-hydrogen-mobility-wins-2020-truck-innovation-award-2/>

Commercialization Scheme

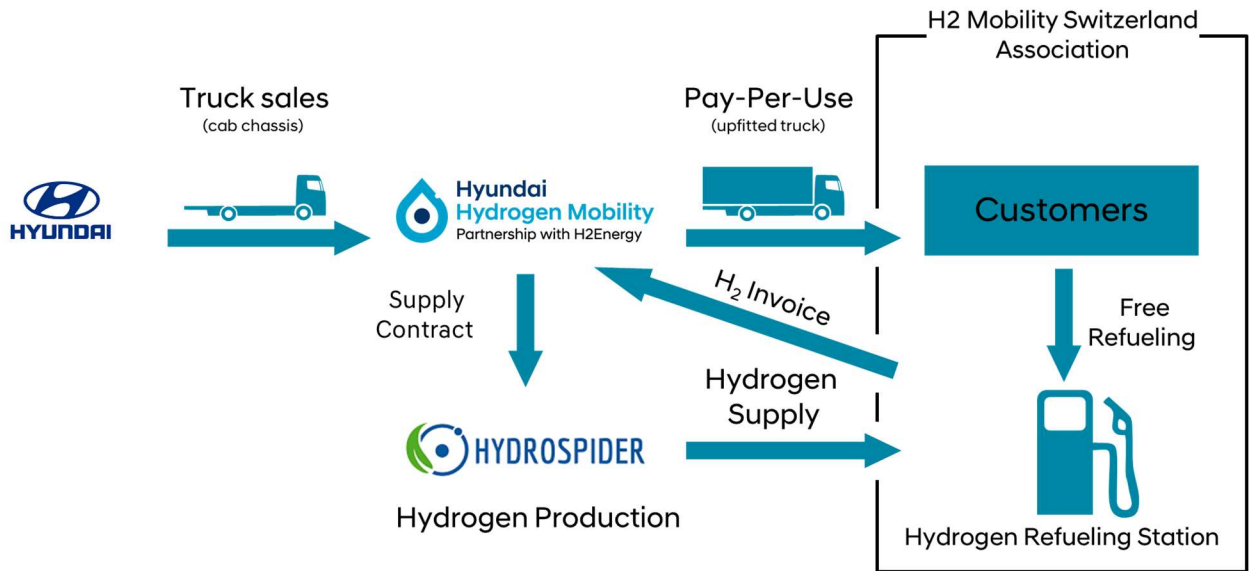
- Delivery of 1,600 4x2 and 6x2 “Class 8” Heavy Duty straight trucks by 2025 solely for Switzerland (current status, with the possibility of additional volume & business expansion to other European countries)
- Targeting Switzerland customers (fleet customers like grocery chains) first; Customer operation starts 2020
- Many of the target customers are organized in the “Association pro H₂ Mobility Switzerland” (<https://h2mobilitaet.ch/en/>) and some of those customers will also be operating hydrogen refueling stations by themselves (e.g. COOP with their mineral oil branch “COOP Mineraloel AG”)

- Unit CHF price ‘per km’, pursuing TCO parity with diesel truck including fuel, maintenance and service costs. This removes customer anxiety towards new powertrain technologies & truck resale value
- Business case is enabled by road tax exemption for zero emission commercial vehicles in Switzerland (roughly 0.80 CHF/driven km)
- Self-sustainable eco-system without direct subsidies, funding with various value chain partners
- 8-year fuel cell system and high voltage battery warranty
- Customer specific upfit, done by certified partners
- 2-year warranty and outsourced nationwide service network expansion
- Service is done by local partner “Auto AG” which received special training in how to handle HMC’s fuel cell system & other high voltage components
<https://hyundai-hm.com/en/2020/02/06/hyundai-hydrogen-mobility-ag-hhm-selects-auto-ag-truck-as-service-partner-in-switzerland/>

Hydrogen Production & Supply

- 100% green H₂ production with renewable energy and PEM electrolysis under newly found company “Hydro Spider”
- Secured investments from energy companies ALPIQ, LINDE and H₂Energy for Hydro Spider
- HRS (H₂ Refueling Station) at existing gas stations to lower investment costs
- Special containers with 350 kg H₂ to transport H₂ from production to HRS
- 10-15 heavy duty trucks per HRS will guarantee station’s profitability

Overview of the Business Scheme:



Please feel free to reach out for additional questions or comments.

Respectfully,

Dr. Benjamin Happek

Hyundai Motor Company

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