Improving the Performance of EVs with Hydrogen and Fuel Cells

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The US Transportation Sector contributes 29% of all US greenhouse gas emissions

Zero Emission Vehicles are Needed:

Emissions often disproportionately affect communities

Fuel cells delivers significant value proposition to heavy duty vehicles

Zero emission mobility with no operation compromise:

**Range - Asset Utilization - Payload**

1. FCEV powertrains for trucks are cost competitive with BEV from 100 km range

2. Hydrogen refueling is 15 times faster than fast charging
   - After 10 minutes refueling/recharging time
   - 90% FCEV truck vs. 10% BEV truck of ~1000 km range

3. Recharging infrastructure...
   - requires 10-15x less space and creates flexible instead of peak load
Current market trends: growing interest for heavy duty fuel cell solutions

Deployment of larger fleets of fuel cell electric vehicles

Fuel cell trains and trams are now on the tracks

More OEMs are developing FC trucks and buses

Growing demand for marine applications

Energy Utility companies are investing in electro-mobility

Growing demand for renewable hydrogen driven by industry

Automotive Supply Chain is investing in fuel cell technology

Renewable energy is opening a path to low cost green hydrogen
Hydrogen is already here; Renewable Hydrogen is increasing:

• “... hydrogen produced using wind power in Germany and Texas is already cost-competitive, “... renewable hydrogen will become competitive with current large-scale industrial supplies from fossil fuels in the next decade or so.” Nature Energy.

• Air Liquide announces the construction in Canada of the largest PEM (Proton-Exchange Membrane) electrolyzer in the world with a 20 megawatts (MW) capacity for the production of carbon-free hydrogen.

• Washington State: PUDs can produce & market renewable H2.
The vision of the Hydrogen Council is achievable.
We deliver fuel cell power for a sustainable planet

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