**Response to Intervenor Final Argument. Phase1**

**Reference; C1-5 BC Hydro**

**Respectfully, the 'Executive Summary' should read,**

**"In order to accelerate the substitution of Battery and Fuel cell electric vehicles for carbon-fueled vehicles. BC Hydro supports executing an all-of the above energy strategy that includes considering use of modular nuclear reactors, carbon-controlled biomass or hydrogen-enriched fossil fuels to provide clean baseload power in the development and certification of combined seawater and reclaimed sewage/industrial wastewater-type pump-up storage hydroelectric plants (SPUSH).**

**BC Hydro is committed to being first in realizing the great potential of SPUSH technology to ensure the provision of lower cost electricity and hydrogen to fuel zero emission vehicle fleets in BC, California, Japan and other export markets, including within a combined SPUSH, elevated transit, multi- pipeline and sewage reclaim infrastructure development corridor framework that also promises to cost-effectively enable integrated capture, compression and control of raw smokestack emissions** by hydraulic methods **with surplus SPUSH hydro reservoir and intermittent run-of-river renewable-to-storage capacity**.

**The identified initial SPUSH plant locations that contain nearby high elevation decommissioned hydro reservoirs within close proximity to both Vancouver (Britannia Mines) and, Victoria (JOR) are considered as possibly ideal for allowing easy access demonstrations of the technology and also** allow SPUSH developers to cost-effectively collect, treat and reclaim municipal-industrial wastewater on a commercial basis by virtue of laying hydro reservoir-connected reclaim pipelines near these major urban centers.

**Such pipelines, in addition to having the capability to hydraulically collect and transport large volumes of greenhouse gases for treatment-reclaim-storage in nearby abandoned underground mine sites while also growing an independent ELV charging and fueling industry also would support large scale land-based aquaculture and related advanced low carbon biofuel and silvicultural industry development that, in turn eliminates any need for obsolete garbage landfills and carbon-spewing conventional sewage plants that can't compete.**

**While posing a competitive threat to the conventional wastes management and open pen aquaculture industries, BC Hydro does not believe that re-purposing decommissioned hydro reservoirs, abandoned underground mines and old railway corridors to access SPUSH sites also equipped with other bulk energy storage devices does not constitute a competitive threat to BC Hydro or that such development could otherwise undermine the foundation of the UCA and its goals**.

Additional Information

Zero Emissions Vehicles Program; Norway

Basically, their approach is that it should always be economically beneficial to choose zero and low emission cars over high emission cars.

The program applies the “polluter pays principle” in the car tax system, with high taxes for high emission cars and low taxes for low and zero emission cars, with taxes on polluting cars that finance incentives for zero emission cars without any loss in revenue.

In 2017, electric vehicles had a 21 % market share. This is first and foremost due to a substantial package of incentives developed to promote zero emission cars within the European Clean Power for Transport directive recommending that there should be approx. 25.000 public charging points available by 2020.

Even if EV owners are charging at home and manage without fast charging on a daily basis, they think it is important to have the option to fast charge when needed. They are also willing to pay a higher price for the service of fast charging whereby on average, they pay three times more than they pay for electricity at home.

Norway has launched a program to finance establishment of at least two multi standard fast charging stations every 50 km on all main roads (by 2017).

Zero-emissions incentives include: No purchase/import taxes; Exemption from 25% VAT on purchase/leasing; Zero annual road tax; No charges on toll roads; Ferry fares are reduced (50%); Free municipal parking; Access to bus lanes; Reduced fleet or company car tax/insurance; No re-registration tax for used zero-emission cars.

All purchase incentives for zero-emission cars will end in 2021. It will then be up to the local governments to decide regarding access to bus lanes and free municipal parking.

The Norwegian Parliament also has decided (as a goal) that all new cars sold by 2025 should be zero emission (electric or hydrogen).

## Zero Emissions Vehicle Program; Japan

Developing a non-fossil (or carbon-controlled fossil fuel?) hydrogen supply chain has become an important endeavor for companies in Japan who are working to establish a hydrogen society that derives much of its electrical power from fuel cell systems.

The demand for hydrogen-powered vehicles has skyrocketed in Japan in recent years, which has lead to an increase in the demand for hydrogen. Establishing an efficient and effective supply chain has, therefore, become a priority for companies looking to adapt to a rapidly changing energy market.

Toshiba Energy Systems & Solutions Corporation has launched a new demo project to establish a low-carbon hydrogen supply chain. It has partnered with the Iwatani Corporation for this new initiative. A hydrogen production facility based in the Hokkaido Prefecture is at the heart of the new project. The facility produces a relatively small amount of hydrogen by drawing electricity from a local hydropower plant, which was constructed by Toshiba.

According to Prime Minister Abe, hydrogen fuel will play a major role in Japan's national energy security. This fuel would allow Japan to rely less on fossil-fuels, such as gasoline and natural gas such that the country would not be beholden to other countries in order to receive the fuel it needs (but would it consider use of hydrogen-enriched LNG imports for subsequent steam reforming to recover H2?)

Establishing a hydrogen society is predicted to open up several new economic opportunities in Japan. The country is quickly on its way to becoming the world's leading fuel cell market and new opportunities are emerging on a seemingly daily basis. One of the government's primary goals is to significantly reduce the cost of hydrogen fuel for the projected 40,000 fuel cell vehicles in operation by 2020

Japan is targeting growing the FCEV fleet to 800,000 by 2030, and by 2050, Japan hopes to see hydrogen cost only one-fifth of what it does currently. This will allow hydrogen to be considerably more competitive with other forms of clean power thereby making it attractive to consumers as an alternative energy fuel.As such, finding a clean hydrogen production method that is also cheap, is highly favorable..

California; Alternative Low Carbon Fuel Program

In California, CNG and LNG have been historically less expensive than gasoline and diesel fuel on an energy- equivalent basis. However, NGVs and fueling infrastructure are more expensive. Also, natural gas heavy- duty vehicles (HDVs) have historically experienced a fuel efficiency penalty relative to diesel counterparts. Therefore, the overall economics are favorable if the net fuel cost savings (i.e., total fuel savings over diesel) can amortize the additional equipment, operation, and maintenance costs. This equation favors high fuel use applications, particularly HDVs, which represent the fastest growing NGV segment in California

Hybrid NGVs and Fuel Cell Vehicles: As hybrid vehicles become more widely accepted, integration of natural gas into advanced hybrid development programs and other markets may occur. The gradual emergence and acceptance of fuel-cell vehicles will be accelerated by NGVs because of the public's growing familiarity with pressurized natural gas fueling as a bridging technology for hydrogen use.

Develop Engine Technology Optimized for Hydrogen-CNG Blends Demonstrations of hydrogen-CNG blends (HCNG-blends)7 have involved re-calibration of engine controls and modification of engines themselves. There are examples of HCNG-blend NGVs in the demonstration phase for transit applications and a few trucks. For example, Sunline Transit has been operating some demonstration HCNG-blend buses since 2001. Combining hydrogen with natural gas further reduces the amounts of NOx produced and facilitates ignition of highly-lean and highly-exhaust diluted fuel mixtures. Demonstrations for specific transit-size engines show that a 50% NOx reduction is possible when using HCNG-blends. However, engine controls and natural gas engines generally will have to be modified to accommodate larger concentrations of hydrogen in CNG andit may be possible to use HCNG-blends in existing 1.5 to 2.0 g/bhp-hr NOx engines even further.

This technology needs additional research to show at what concentrations (if any) engine modifications would not be needed to accommodate HCNG–blends. Also, research is missing on the long-term deterioration effects of hydrogen in the combustion chamber, even in low concentrations. Also, economic incentives may be needed to support this development, perhaps in concert with efforts to develop hydrogen infrastructure and use.

Hydrogen-CNG blends (HCNG)— Studies have looked at HCNG operation under laboratory and limited on-road trials, but have not yet investigated full HCNG demonstration and deployment over a wide range of real-world applications.

Viable combined LNG/CNG/HCNG stations; there have been demonstrations of pairs of fuels, but the trio of fuels has not been deployed commercially.

The objectives and scope of the (AB 118) legislation are: • Deploy alternative fuels and advanced vehicle efficiency technologies • Emphasize technology deployment and commercialization • Emphasizes support for fuels that "…lead to sustainable feedstocks…" The AB 118 program can provide, grants, loans, loan guarantees, revolving loans, or other appropriate measures, to public agencies, businesses and projects, public-private partnerships, vehicle and technology consortia, workforce training partnerships and collaboratives, fleet owners, consumers, recreational boaters, and academic institutions to develop and deploy innovative technologies that transform California's fuel and vehicle types to help attain the state's climate change policies.

In the legislation "Vehicle technology" means any vehicle, boat, off- road equipment, or locomotive, or component thereof, including its engine, propulsion system, transmission, or construction materials. Eligible Projects are: (1) Alternative and renewable fuel projects to develop and improve alternative and renewable low- carbon fuels, including electricity, ethanol, dimethyl ether, renewable diesel, natural gas, hydrogen, and biomethane, among others, and their feedstocks that have high potential for long-term or short-term commercialization, including projects that lead to sustainable feedstocks (2) Demonstration and deployment projects that optimize alternative and renewable fuels for existing and developing engine technologies (3) Projects to produce alternative and renewable low-carbon fuels in California (4) Projects to decrease the overall impact of an alternative renewable fuel's life-cycle carbon footprint.

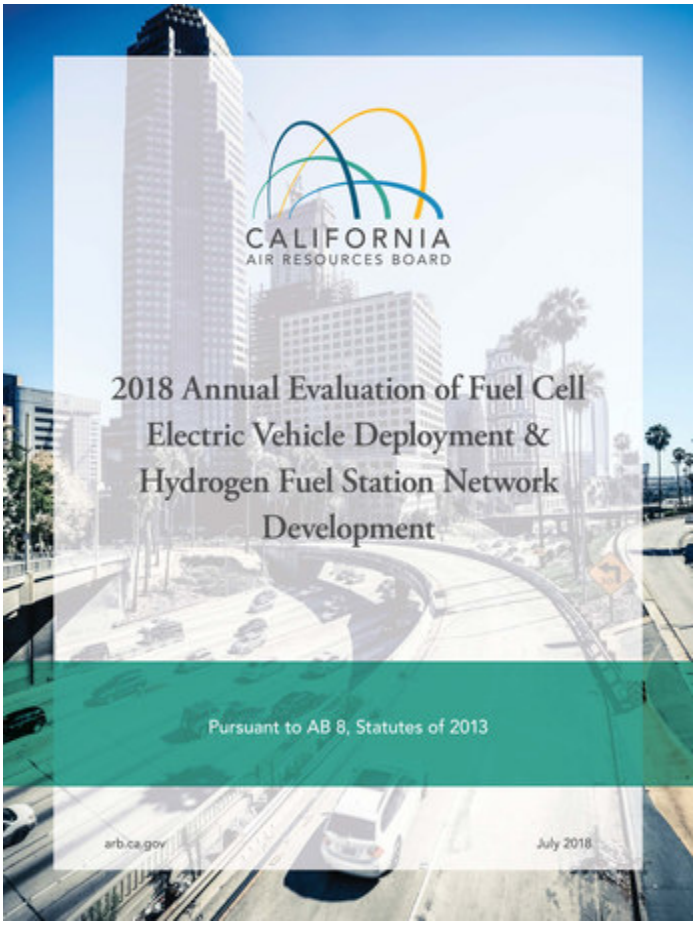
# CARB and California Fuel Cell Partnership to Co-Host Webinar on Fuel Cell Electric Vehicles and California's Hydrogen Fueling Network

*California Air Resources Board sent this bulletin at 08/22/2018 01:44 PM PDT*



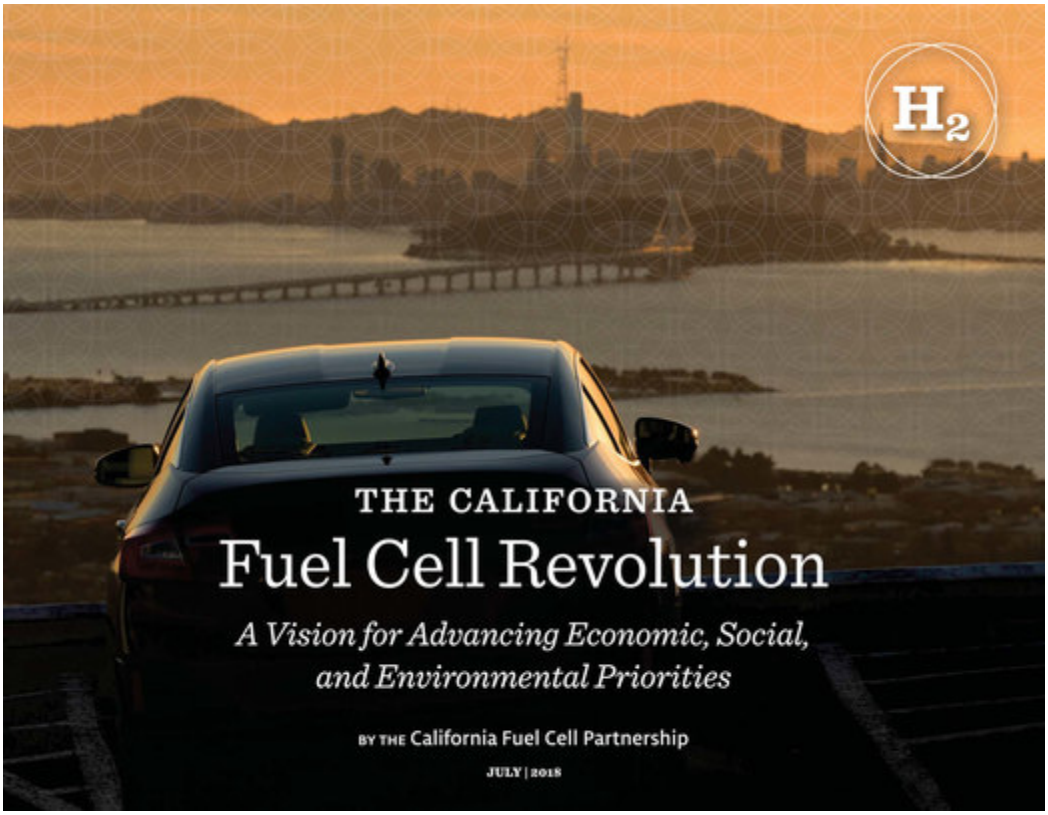
## CARB and California Fuel Cell Partnership to Co-Host Webinar on Fuel Cell Electric Vehicles and California's Hydrogen Fueling Network

### Organizations to provide overviews of *2018 Annual Evaluation* and *The California Fuel Cell Revolution*




The California Air Resources Board (CARB) and California Fuel Cell Partnership (CaFCP) invite the public to participate in a co-hosted webinar summarizing two recent hydrogen and fuel cell electric vehicle (FCEV) publications. The webinar will take place on **Thursday August 30, 2018 from 10 to 11 AM PDT** and focus on current status, near-term evaluation, and long-term vision of public-private efforts to support expanding deployment of FCEVs in California. CARB staff will present findings and special topics discussed in the **2018 Annual Evaluation**, including updates on current and projected volumes of vehicles deployed in the state, hydrogen station network development, and needs for future State co-funded development. CaFCP will additionally provide an overview of **The California Fuel Cell Revolution**, which presents its members' collaborative vision for reaching a sustainable market for

fuel cell vehicles and hydrogen by 2030, development of 1,000 hydrogen fueling stations, and enabling deployment of upwards of 1,000,000 FCEVs. Supporting analysis completed with the **California Hydrogen Infrastructure Tool** will also be discussed. Participation is available via web only.




PUSH Feasibility Study;

Additional Proposed PUSH Hydrogen-Electric and Advanced Bio-Economy Corridors;

- VASH-ACCESS PUSH and Carbon Control Corridor, Fort Nelson; see VSI/BC Hydro LTAP, 2009
- TMX Lower Fraser Valley Manure Slurry and Carbon Offsets Pipeline Proposal, see VSI 2016
- Mainland-to-Campbell River Railway and PUSH Corridor (MCR); see - Route Profile for CPR
- Waddington-BC Hydro Chilko-Homathko Hydroelectric Corridor Tunnel-Penstock Project; see; BC Hydro/Royal Engineers/Geographic Society Reviews for CH project
- MCR-to-E&N RR Extension Corridor Plan In from Williams Lake via Bute Inlet; see VSI-E&N RR Extension Plan for FCEV-powered train, VSI proposal , 1994
- MCR Cariboo Beetle-Killed Wood Chip Slurry Pipeline-to-PUSH and New Prosperity Mine tailings slurry export/treatment/reclaim pipeline corridor-see VSI proposal, 2010