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Summary Record of the Electric Vehicle and Hydrogen Technology Policy Workshop

Wellington, New Zealand, 21 November 2017

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New Zealand hosted the 54th APEC Energy Working Group (EWG) meeting in Wellington in November 2017. As part of the EWG meeting, an Electric Vehicle (EV) and hydrogen technology policy workshop was held on 21 November 2017. The aim of the workshop was to:

- gain a deeper understanding of the trends and opportunities presented by hydrogen and EV technologies, their potential impact on regional and national energy systems, and the role these technologies could play to facilitate APEC economies' transition to a low-carbon future, and
- identify barriers to the development and uptake of these technologies and share best policy practice.

The workshop agenda was as follows:

1. Electric Vehicle Trends and Potential Impact on Regional and National Energy Systems
2. Electric Vehicle Policy Best Practice: Case studies from APEC members
3. International Trends in Hydrogen
4. New Zealand Developments in Hydrogen

Approximately 170 people, including both EWG representatives and non-members from relevant sectors, attended this workshop.



Summary of Discussions

Session One: Electric Vehicle Trends and Potential Impact on Regional and National Energy Systems

In his presentation *Clean Disruption – Why Conventional Energy & Transportation Will Be Obsolete by 2030*, Tony Seba, the workshop’s keynote speaker, told delegates he forecasts that the cost of building a mid-range EV would become so economical that no petrol vehicles will be built after 2025. Also, by 2030, 95 per cent of passenger-miles in the USA would be taken in Uber-style, self-driving vehicles (referred to as Transport as a Service, or TaaS).

Pierpaolo Cazzola from the International Energy Agency (IEA) also noted the fast increase in the global EV fleet in recent years, but said that the development of the EV market over the next decade will still require supporting policy instruments, such as financial incentives, standards, and deployment of charging stations.

Session Two: Electric Vehicle Policy Best Practice: Case studies from APEC members

There were five presentations in Session Two, with speakers from the USA, China, Japan, Australia and New Zealand. The presentations show a common trend across these member economies — we are beginning to see a reduction in barriers to EV uptake; technology is improving and battery and vehicle prices are reducing, while consumer awareness and information is also improving. Economies continue to use a range of policy initiatives to support uptake, with financial policies being a clear theme.

Economy	Summary of case study
Australia	The Australian Electric Vehicles Council talked about short-term policy opportunities to support the uptake of EVs in Australia. This included short-term tax exemptions intended to reduce the total cost of ownership of EVs, and ensuring a clear regulatory framework to encourage manufacturers to import EVs into the market (e.g. Vehicle Emissions Standards).
China	FDG Electric Vehicles (China) presented on EV development in China, and how FDG's approach involves taking an integrated approach across the supply chain. Notably Government EV subsidies in China are being phased out, with plans to launch a new 'Dual-Credit' scheme in 2019. Under this scheme, car manufacturers will earn or have to purchase credits, depending on the fuel consumption and driving range and the car models that they produce. For example, if a car manufacturer does not produce any EVs, it will need to buy credits from an EV maker; EV models with longer electric range will receive more credits.
Japan	The Japanese Ministry of Economy, Trade and Industry (METI) talked about the Japanese Government's initiatives for promoting EVs, including: <ul style="list-style-type: none"> • preferential tax treatments • a subsidy based on the driving range of a car model • a subsidy scheme for charger installation • a research and development programme for new generation batteries • harmonisation of charging technologies.
New Zealand	The Energy Efficiency and Conservation Authority (EECA) talked about New Zealand's journey towards its EV target. With a high proportion of electricity from renewable sources in New Zealand, EV is a technology that can facilitate New Zealand's decarbonisation. The EV uptake has been rising in New Zealand, supported by policy initiatives such as a Low Emission Vehicles Contestable Fund (to co-fund innovative projects related to EVs), and an exemption from Road User Charges.
USA	Frontier Energy (California, USA) talked about the importance of infrastructure funding, the integration of standards (particularly around charging), and addressing consumer awareness and acceptance of EV technology.

Session Three: International Trends in Hydrogen

The next session included presentations from METI Japan, the IEA, Frontier Energy, the APEC Research Centre for Advanced Bio-Hydrogen Technology (ACABT) and Mitsubishi. Themes included the importance of establishing infrastructure to support fuel cell transport technology, and that high costs are a key challenge of hydrogen uptake. Public-private partnerships appear to be a growing initiative to address this challenge.

METI's and Mitsubishi's presentations discussed Japan's focus toward building hydrogen supply chains and a full-scale introduction of hydrogen power generation. The Government has also undertaken regulatory reform to streamline the regulations for fuel cell vehicles and hydrogen refueling stations, such as safety inspection and quality control methods. A joint venture company

aiming for the strategic development of hydrogen stations has also been set up. This involves eleven private sector companies and is supported by Government subsidy.

Mitsubishi talked about its involvement in the establishment of a hydrogen supply chain to Japan. It has a new hydrogen related business model, building on its worldwide and longstanding experience in the LNG space (Mitsubishi was the first LNG importer to Japan). A supply chain demonstration project is currently being run, with hydrogen being produced in Brunei and transported to Kawasaki, Japan.

Frontier Energy talked about the California Fuel Cell Partnership (CaFCP), a public-private partnership working to commercialise Fuel Cell EVs (FCEVs) and hydrogen fueling stations. In 2012 the CaFCP developed a roadmap for the rollout of FCEVs and fueling stations, which required an initial network of 100 hydrogen refueling stations to be established (highlighting the importance of infrastructure development). A key feature of this type of network is to have stations in strategic connector and destination locations, that enable FCEV drivers to move around the state like conventional drivers do.

There are now 31 hydrogen stations across California, with a further 30 in development. The state government is supporting the development of the first 100 stations, committing \$20 million annually to establish the initial infrastructure network.

The IEA discussed its roadmap for hydrogen and fuel cell technology. It talked about how the use of hydrogen in transport can enable long distance, low carbon driving, which is particularly useful in decarbonising the more challenging sectors of heavy-duty road transport (i.e. trucking and buses).

The IEA described some of the challenges related to the uptake of hydrogen technologies, including that current hydrogen production pathways are carbon-intensive, and costs remain high. They also highlighted the importance of building up sufficient refueling infrastructure as a key prerequisite for the deployment of hydrogen powered motor vehicles.

There were two APEC ACABT presentations on biohydrogen and its development and application. The presentations discussed the case for developing biohydrogen technologies, noting the abundance of hydrogen, its low carbon content and its properties as an energy carrier. They also discussed the biohydrogen technologies that Feng Chia University, Chinese Taipei is developing. Their projects include a large-scale pilot plant of high-rate hydrogen-methane production (using wastewater from the food industry).

Session Four: New Zealand Developments in Hydrogen

The final session included five presentations from speakers involved in New Zealand's potential as a hydrogen production hub. The presentations discussed the economic case for a hydrogen industry in New Zealand, and how this is supported by New Zealand's significant renewable energy resource.

Concept Consulting talked about the case for a hydrogen economy in New Zealand, and potential entry points. The opportunity for export is based on New Zealand's high percentage of renewable generation, isolated grid and low cost electricity, but in their view remains a distant possibility at this stage.

Concept Consulting also talked about the opportunity for hydrogen to address storage issues, such as managing the variability in renewable generation, and reducing emissions, particularly in heavy-vehicle transport.

The Unitec Institute of Technology presented on the key messages from its energy-economic modelling of zero-emission vehicle technologies. The findings of Unitec's modelling suggest that infrastructure support has a significant influence on vehicle market evolution. The modelling also found that a 90 per cent reduction in vehicle emissions is possible by transitioning to the use of HFCVs, but would also increase national electricity consumption by 41 per cent in 2060. This means the long-term viability of the New Zealand fleet depends on the availability of low cost electricity (which is used in electrolysis).

The Hydrogen Energy Consortium New Zealand presented on New Zealand's energy use and emissions profile. It noted that the transport and industry sectors are driving an increase in consumer energy demand, which is a key problem as they are largely run on fossil fuels. The Consortium is looking to develop a regional hydrogen model that can be replicated across New Zealand, supporting New Zealand's position in the global hydrogen economy.

Hiringa Energy talked about its mission to provide zero emissions hydrogen energy for businesses and communities, and is currently working with vehicle manufacturers, fuel cell manufacturers and customers in NZ to develop the market. The opportunity for New Zealand to become a hydrogen exporter is supported by New Zealand's renewable energy potential, which exceeds current consumption.

Hiringa Energy discussed the key commercialisation barriers for the uptake of hydrogen, in terms of cost, perception, structural and technological barriers. Again capital cost and infrastructure spend were highlighted as key barriers, as well as matching vehicle development and infrastructure, and having the right regulatory settings. It believes public and private investment is required, and that there is a role for public sector intervention to bridge the early financing gap.

Callaghan Innovation discussed its role in building New Zealand's innovation capability, and specifically about its creation of a unique energy storage and transmission system. Using Callaghan's Hylink technology, the system uses an electrolyser to make hydrogen gas from water, using electrical energy produced from the wind and sun. This system is being used in appliances at a test site, for both cooking and hot water heating.

Conclusions

The presentations in this workshop suggest that:

- Both EVs and hydrogen can potentially play a role in improving energy, transport, health and environmental outcomes.
- Policymakers should plan for the energy sector's transition and ensure that the market and regulatory settings allow for technological innovation, as well as effective management of risks to public safety.
- Supportive policies can assist early adoption of new technologies, such as EVs, and development of the relevant infrastructure, such as the rollout of EV charging stations.
- Well-implemented subsidies and preferential tax treatments can stimulate the uptake of new technologies in the short term but may need to be reviewed periodically to prevent inefficient outcomes.
- Information and consumer awareness are key to developing markets for new technologies.

Next Steps

To continue to build on the information shared in this workshop, New Zealand will lead, with the support of other member economies, further discussion on the policy implications of continuing development of EV and hydrogen technologies. This could be undertaken as a future work stream for the APEC Expert Group on New and Renewable Energy Technologies (EGNRET), and may require collaboration with the APEC Automotive Dialogue.