ANGVA2U Info *9/2018. 8th November 2018. (for ANGVA members only)*

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1.0 Future of Natural Gas Vehicles? - *a viewpoint of Executive Director of ANGVA* (*Note:* *the view expressed in this write-up is the personal view of the Executive Director, not the view of ANGVA nor its members)*

In an effort to curb increasing emission of CO_2 into the atmosphere some countries had announced ban on sales of fossil driven vehicles by certain year (see Figure 1 below). Many governments and organizations are now focusing mainly on Electric Vehicles (EVs) and also Hydrogen Fuel Cell Vehicles (FCV). What then is the future of Natural Gas Vehicles?

Figure 1: Countries Banning Fossil Vehicles

Country	Ban announced	Ban commences	Scope	Selectivity
England Wales Northern Ireland	2017	2040	Gasoline and Diesel	New vehicle sales
Austria	2016	2020	Gasoline and diesel	New vehicle sales
China	2017	2040	Gasoline and diesel	Production & New vehicle sales
Costa Rica	2018	2021	Gasoline and diesel	New vehicle sales
Denmark	2018	2030 [a] 2035 [b]	Gasoline and diesel	New vehicle sales
France	2017	2040	Gasoline and diesel	New vehicle sales
Germany	2016	2030	Combustion engine	New vehicle sales
India	2017	2030	Gasoline and diesel	New vehicle sales
Ireland	2018	2030	Gasoline and diesel	New vehicle sales
Israel	2018	2030	Gasoline and diesel	New vehicle sales
Japan	1996	Ongoing	Incentives	New vehicle sales
Netherlands	2017	2030	All vehicles	New vehicle sales
Norway	2016	2025	Gasoline and diesel	New vehicle sales, buses are exempt
Portugal	2010	Ongoing	Incentives	New vehicle sales
Scotland	2017	2032	Gasoline and diesel	New vehicle sales
South Korea	2016	2020	Incentives	New vehicle sales
Spain	2017	Ongoing	Incentives	New vehicle sales
Taiwan	2018	2040	Non-electric	New vehicle sales

a. no ICE-only vehicles b. all vehicles with gas emissions

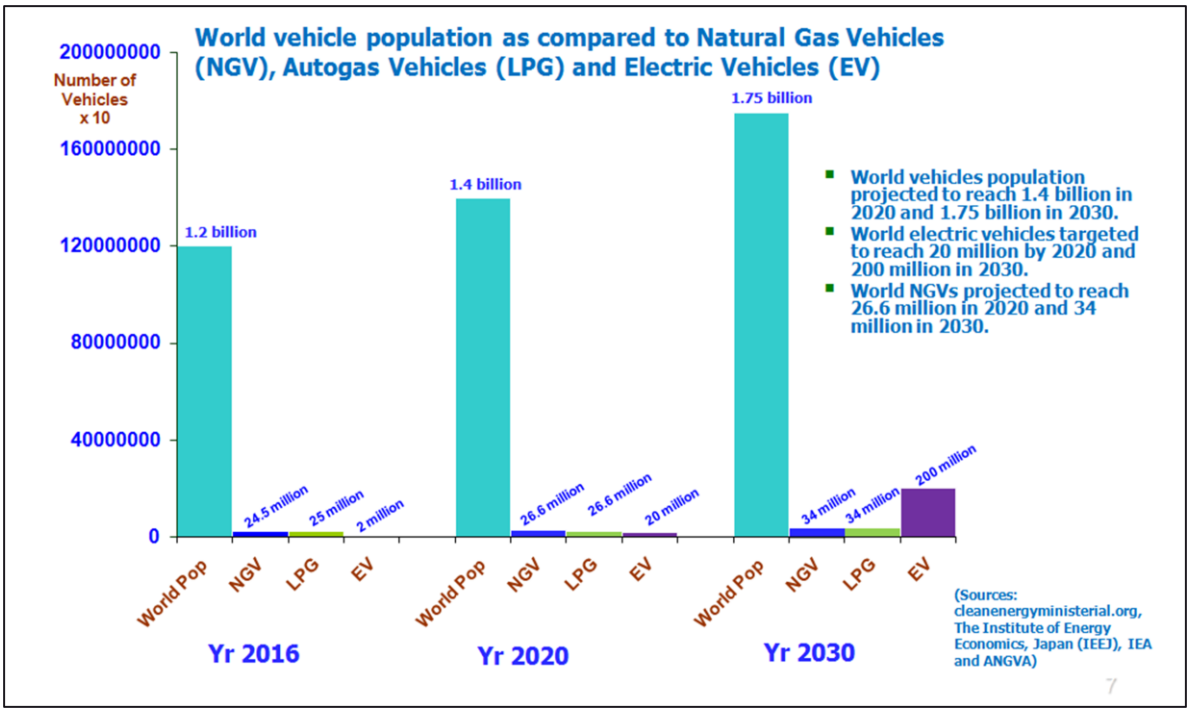
Source: https://en.wikipedia.org/wiki/List_of_countries_banning_fossil_fuel_vehicles

It is a known fact that Electric Vehicle (EV) and Hydrogen Vehicle (FCV) emits zero harmful tailpipe emissions, however their Well-to-Wheel emissions will depend on the sources of generation of electricity and production of hydrogen. Widespread propagation of EVs will also depend heavily on the sources and prices of their batteries and disposability / recyclability of used batteries. Similarly, for FCVs, it will depend on sources and prices of hydrogen.

While amount of electricity generated from Renewable Energy are on the increase, it is still small and generation cost is still above those from fossil fuel especially those generated from coals. Worldwide there are still many people without excess to electricity and in many countries the quality, reliability and stability of electricity supply and grids are still below par. And currently, production and distribution of hydrogen are still expensive and hydrogen (like natural gas) needs to be stored at high pressures (currently stored at 350 to 800 bar) in cylinders onboard FCVs.

While it is acknowledged that EVs and FCVs are the future, it will take a much longer time (probably 20 years or more) for the world road transport sector to be dominantly, if not completely, powered by electricity and hydrogen. See Table 2 below.

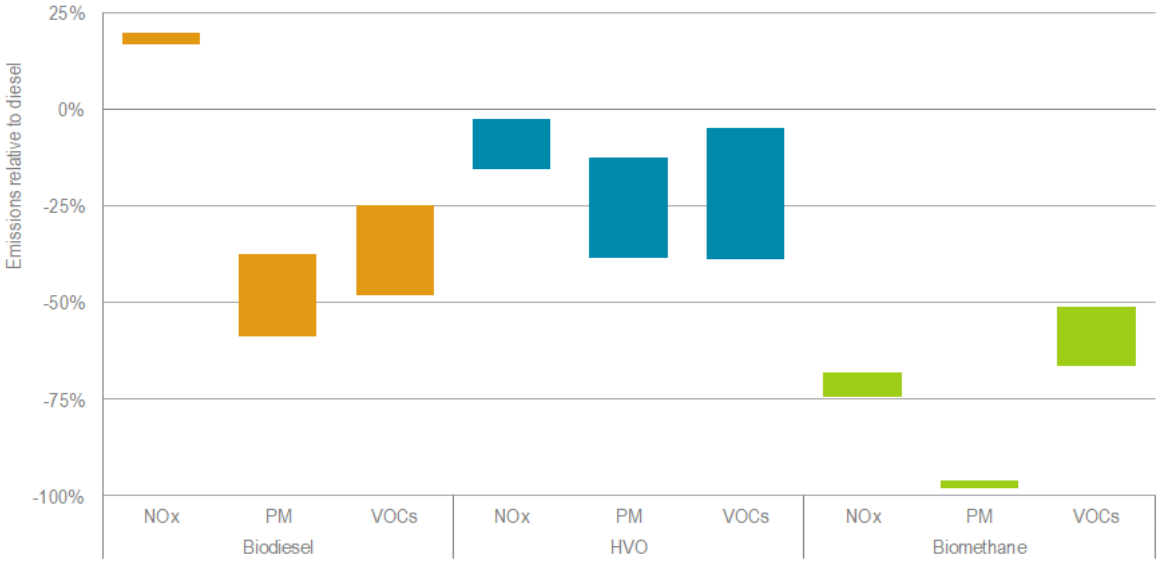
Figure 2: *Projected numbers of Electric Vehicles in future are still a small percentage of world vehicle population*



Meanwhile, climate change experts had warned that we do not have much time left to reduce carbon emissions to avoid the point of no return in the warming of earth atmosphere. Hence, while waiting for the mass deployment of EVs and FCVs, actions need to be taken now to reduce harmful emissions of internal combustion vehicles powered by gasoline and diesel. Besides introducing more stringent exhaust emission standards i.e. Euro 6 / Euro VI and above, there are still many existing vehicles that are plying the roads that can benefit tremendously from switching to cleaner fuel such as natural gas. As we know, natural gas is the cleanest commercially available fossil fuel

and with the emergence and commercialization of Biomethane / Renewable Natural Gas, Natural Gas Vehicles (NGVs) can now be greener and sustainable. Figure 3 below showed emissions of vehicles (Euro IV) when switched to Biomethane / Renewable Natural Gas as compared to diesel. This reduction in emissions will benefit countries (mainly Asian, African, and Latin American countries) where vehicles lifetimes are longer and regulated air pollutant emission levels for new vehicles are lax.

Figure 3: Air pollutant emissions from biofuel buses and medium freight trucks as compared to diesel



Source: International Energy Agency - Advanced Motor Fuels Group (IEA – AMF) Annex Report. Oct 2018.

In the short and medium terms, NGVs can play a very important role in mitigating global warming and also helping to achieve the 17 Sustainable Development Goal (SDG) targets in 2030, especially SDG 11 (Sustainable Cities and Communities), SDG 7 (Clean and Affordable Energy) and SDG 13 (Climate Action).

There are ample opportunities for Natural Gas Vehicles, at least for the next 20 years or more. There will also be many other opportunities arising from the mass deployment of EVs and FCVs. The widespread use of EVs will means more electricity will be needed, this means more natural gas, supply through pipeline or Liquefied Natural Gas (LNG), will be made available thus opening up new areas for usage of natural gas as fuel for the transport sector. The utilization of hydrogen for FCVs means opportunity for manufacturers of CNG compressors, cylinders, regulators, valves, pipings, fittings, receptacle, etc to diversify their products into hydrogen. For CNG workshops, EVs and FCVs still have tyres, brakes, air-conditioners/heaters, car body/chassis, etc to be serviced and repairs. The NGV industry especially ANGVA members, must be ready for changes and ready to seize opportunities as the world moves towards next generation vehicles which will be powered by electricity, hydrogen and low carbon (or carbon neutral) fuels such as biomethane / Renewable Natural Gas.

2.0 Selected News

2.1 India

India to have 10,000 CNG stations in next 10 years, on track to adapt cleaner fuels: Dharmendra Pradhan. Bilal Abdi | ETEnergyWorld | September 06, 2018, 14:37 IST Newsletter

Pradhan said that after the 9th City Gas Distribution round government's access to the CGD networks would increase to more than 300 districts, which will entail an investment of more than Rs 70,000 crore

New Delhi: Oil MinisterDharmendra Pradhan on Thursday said the country was on its way to construct more than 10,000 compressed natural gas (CNG) stations in the coming decade. He was speaking at an event held by the Society of Indian Automobile Manufacturers.

"CNG vehicles are cheaper and less polluting and for this reason, according to the road map created by the government, India will get 10,000 CNG stations in the coming 10 years from around 1,400 today. These numbers are not part of any announcement; the numbers are based on the commitments made by winning bidders under the 9th City Gas Distribution (CGD) round," Pradhan said.

He added that the government had initiated the process to launch the 10th CGD bidding round as well.

Pradhan said that after the 9th CGD round government's access to the CGD networks would increase to more than 300 districts, which will entail an investment of more than Rs 70,000 crore. Earlier, in 2014 only 73 districts in the country had accessibility to the CDG networks.

Speaking on the country's energy imports, Pradhan said, "India imports around 3,500 million tonne (mt) of crude oil, coal, LPG, LNG and if we calculate the waste and unused carbon available in the country in the form of agri-waste, forest waste, etc, it comes to around 4,500 mt."

He added that the country's oil-marketing companies (OMCs) were building 12 second-generation ethanol plants, which would produce ethanol from agriculture and urban waste.

On country's biofuel foray in powering aircrafts, the oil minister said, "India uses around 6 mt of aviation turbine fuel (ATF), India's forests hold around 7 mt of non-edible oil producing plants, which can be used to produce bio-ATF. Technology is not a challenge anymore."

Pradhan added that even though the use of biogas had been around for some time, the country needs to further convert it into bio-CNG to utilise it in the transportation sector.

"In order to give stimulus to the sector, government-owned OMCs have decided to provide complete off-take guarantee of bio-CNG at a good price. Also, bio-CNG and biofuel can become viable alternative for the transportation sector," Pradhan said.

He added that the country is moving towards adapting cleaner fuels such as biofuel, bio-CNG, coal to gas, and coal to methanol projects, and would be able to meet Prime Minister's target of decreasing the country's energy imports.

Source: *https://energy.economictimes.indiatimes.com/news/oil-and-gas/india-to-have-10000-cng-stations-in-next-10-years-on-track-to-adapt-cleaner-fuels-dharmendra-pradhan/65700258*

2.2 China

Van maker catches the eye with natural gas technology

Huang Yixuan 08:13 UTC+8, 2018-11-07

A van from IVECO's Daily Blue Power range which uses natural gas technology.
Dong Jun / SHINE

Shanghai: IVECO confirmed its long-term commitment to the Chinese market as the only major manufacturer of imported commercial vehicles to exhibit at the first China International Import Expo.

The company introduced its natural gas technology with its Daily Blue Power range of vehicles which won the "International Van of the Year 2018" award, and highlighted their environmental and financial advantages.

"The China International Import Expo shows China's determination to further open its market to the world, and IVECO is here, signaling its commitment to continue to play a part in the long-term development of the automotive sector in China," said Tommaso Croce, IVECO China's business director.

In July, China's State Council of China issued its "Three-Year Action Plan for Winning the Battle to Defend the Blue Sky," which set specific targets and actions for the prevention and control of pollution, with the aim of continuously improving air quality.

Croce said he hopes that his company's exhibits will engage local authorities, and that they will see the environmental advantages of natural gas and consider it a viable complement to electric solutions.

Source: *www.shine.cn/biz/auto/1811074738/*

2.3 Europe

NGVA calls for more emissions transparency

News. Tim Harrup. 5 Nov 18

Image: trustar energy

Following a European Parliament plenary vote in early October, the European Biogas Association (EBA), EUROGAS, Gas Infrastructure Europe (GIE) and the Natural & bio Gas Vehicle Association (NGVA Europe) have said they are jointly underlining the importance of natural and renewable gas as a pragmatic solution to quickly start the decarbonisation process and tackle air quality issues in urban areas of passenger vehicles.

The associations state that following the Paris agreement, the CO2 emissions standard regulation for passenger cars and light duty vehicles needs to be updated. A Well-to-Wheel approach needs to be implemented in order to be in measure to assess the GHG emissions from future combinations of vehicle technologies and fuels.

Andrea Gerini, Secretary General of NGVA Europe, comments: "We are addressing future technologies with the wrong tool: tailpipe CO2 emissions measurement does not anymore express

either a vehicle's efficiency on hybrid architectures, or climate change impact when renewable fuels are used."

For this reason, it is crucial to amend the current proposal of the Regulation to include the benefits from the use of renewable gas and, more generally, from renewable fuels in road vehicles. The proposed amendment, the implementation of the Carbon Correction Factor – CCF – is a pragmatic transparent way towards a Well-to-Wheel approach."

"The Carbon Corrector Factor does not bring any 'dual accounting', but it solves the limitation of the current methodology (tailpipe emissions measurement) which does not distinguish the origin of the fuel. We are not looking for a double incentive or a cheating way to be compliant with CO2 emissions targets, but are simply reflecting reality into legislation."

Source: *www.fleeteurope.com/en/taxation-and-legislation/europe/news/ngva-calls-more-emissions-transparency*

2.4 Italy

Italian government gives green light to hydrogen at 700 bar.

Author: PetrolPlaza Correspondent Pablo Plaza. Last update: November 7, 2018

Storage tanks for hydrogen cars are currently limited at 350 bar.

Filling stations for green hydrogen in Italy will be able to upgrade the capacity of their pumps from 350 to 700 bar. The announcement was officially published on 5 November by la Gazzetta Ufficiale under the signature of the Minister of Interior and the Minister of Infrastructures and Work.

With this meassure hydrogen cars will see their autonomy doubled. It will also speed up the filling process to around 3 minutes approximately. The new policy establishes, however, that the building of new hydrogen filling stations will be limited to areas with low-density population.

With this move, Italy conforms to the European Union's standards on the matter. Though today there is only one hydrogen filling station in the country, located in the Bolzano region (South Tyrol/Alto Adige), it is hoped that the decree will boost the development of more hydrogen filling stations all over the country.

Source: www.petrolplaza.com/news/9582

3.0 Events

3.1 The 36th ANGVA Board Meeting will be held on 28th November 2018 in Jakarta, Indonesia, 0900 hrs to 1200 hrs. Members interested to attend as observers to this board meeting are requested to contact ANGVA Secretariat.

3.2 There are no other ANGVA supported, endorsed or organized events from now till end of December 2018.

4.0 End

Any comments and suggestions on the topics and information covered and to be covered in future are most welcome. Please send your comments and suggestions to Lee Giok Seng at email: leegs@angva.org