INTRODUCE TAX REDUCTION ON ELECTRIC VEHICLES(EVs) IN VANUATU

TECHNOLOGY DESCRIPTION

Remove or mitigate financial and economic barriers through the Establishment of a working agreement with the Custom's Department to introduce tax reduction or exemption on the EV imports

TECHNICAL DESCRIPTION

Most electric vehicles today use an electric battery, consisting of electrochemical cells with external connections in order to provide power to the vehicle (Crompton, 2000).

Battery technology for EVs has developed from early lead-acid batteries used in the late 19th century to the 2010s, to lithium-ion batteries which are found in most EVs today (Hiroyuki, Ryuichi, Yutaka, Takenori, & Taizou, 2018) . The overall battery is referred to as a battery pack, which is a group of multiple battery modules and cells. For example, the Tesla Model S battery pack has up to 7,104 cells, split into 16 modules with 6 groups of 74 cells in each. Each cell has a nominal voltage of 3-4 volts, depending on its chemical composition.

Electric cars have traditionally used series wound DC motors, a form of brushed DC electric motor. Separately excited and permanent magnet are just two of the types of DC motors available. More recent electric vehicles have made use of a variety of AC motor types, as these are simpler to build and have no brushes that can wear out. These are usually induction motors or brushless AC electric motors which use permanent magnets. There are several variations of the permanent magnet motor which offer simpler drive schemes and/or lower cost including the brushless DC electric motor.

Once electric power is supplied to the motor (from the controller), the magnetic field interaction inside the motor will turn the drive shaft and ultimately the vehicle's wheels (Tristan, 2018).

EV battery storage is a key element for the global energy transition which is dependent on more electricity storage right now. As energy availability is the most important factor for the vitality of an economy the mobile storage infrastructure of EV batteries can be seen as one of the most meaningful infrastructure projects facilitating the energy transition to a fully sustainable economy based on renewables. A meta-study graphically showing the importance of electricity storage depicts the technology in context (Berdelle, 2020).

Electric vehicles produce no greenhouse gas (GHG) emissions in operation, but the electricity used to power them may do so in its generation (Nealar, Reichmuth, & Anair, 2015). The two factors driving the emissions of battery electric vehicles are the carbon intensity of the electricity used to recharge the Electric Vehicle (commonly expressed in grams of CO2 per kWh) and the specific electricity consumption (in kilometers/kWh).

The carbon intensity of electricity varies depending on the source of electricity where it is consumed. A country with a high share of renewable energy in its electricity mix will have a low C.I. In the European Union, in 2013, the carbon intensity had a strong geographic variability but in most of the member states, electric vehicles were "greener" than conventional ones. On average, electric cars saved 50%–60% of CO2 emissions compared to diesel and gasoline fueled engines.

Moreover, the de-carbonization process underway in electricity production is constantly reducing the GHG emissions due to the use of electric vehicles. In the European Union, on average, between 2009 and 2013 there was a reduction

in the electricity carbon intensity of 17% (Moro & Lonza, 2018). In a life-cycle assessment perspective, considering the GHG necessary to build the battery and its end-of-life, the GHG savings are 10-13% lower (Moro & Helmers, 2015).

GHGs are also emitted when the electric vehicle is being manufactured. The lithium-ion batteries used in the vehicle take more materials and energy to produce because of the extraction process of the lithium and cobalt essential to the battery (Nealar, Reichmuth, & Anair, 2015). This means the bigger the electric vehicle, the more carbon dioxide emitted.

The mines that are used to produce the lithium and cobalt used in the battery are also creating problems for the environment, as fish are dying up to 150 miles (240 km) downstream from mining operations due to chemical leaks and the chemicals also leak into the water sources the people that live near the mines use, creating health problems for the animals and people that live nearby (Katwala, 2018).

CURRENT TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

TRL 1 attained the basic principles for the technology and mostly through desktop studies and summarizing the background analysis of the barriers to low carbon development in Vanuatu's land transport sector.

CLIMATE RATIONALE OF THE TECHNOLOGY

The transport sector is the largest GHG emitter and fossil fuel consumer of energy sector in Vanuatu. The sectorial contribution of GHG emissions in Vanuatu during year 2007-2015 shows that the transport sector has a share of 9.35% and it is the second largest sub-sectorial source of GHG emissions in Vanuatu, followed by the Livestock Enteric Fermentation and Manure Management. The energy sector contributes 19.2% of total emissions, therefore about half of the energy sector emissions attributes to the transport sector.

The GHG emissions from the transport sector has been rapidly increasing from 18.93 Gg in 2007 to 72.14 Gg in 2015 (1Gg = 1000 tons)

Among the transport sector, the road transportation has the highest share of 83% in total fuel consumption (and GHG emission) and the most important sources of emissions to be mitigated. Besides, the road transport consumes just over 50% of all petroleum products imported for domestic consumption.

AMBITION OF THE TECHNOLOGY

SCALE FOR IMPLEMENTATION AND TIME-LINE

Feasibility studies and market surveys have already proved the viability of the EV technologies. The existence of incentives and seeking to reform import duties, tariffs and VAT to encourage imports of EVs will lessen the high initial cost effect and encourage users to import these vehicles. This in its turn may encourage internal and external investors to participate actively in business transactions in the country. Eventually, this will contribute to mitigating GHG emissions.

And the timeline for the implementation of the policy is two (2) years.

AMBITION FOR TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

TRL 2 – A tax reduction concept has been formulated and enforced for adoption of the EVs

EXPECTED IMPACTS OF THE TECHNOLOGY

- Institutional aspect:

  The impact potential is significant as the introduction and operation of EV are new in Vanuatu and are cross-sectoral issues in nature. So it is effective to form an inter-ministerial coordinating entity on EV promotion such as committee and working groups to make decisions and implement actions on promotion of EV. This transformation is promoted by the Ministry of Climate Change of Vanuatu, because there is serious concern for the current situation of land transportation from the viewpoint of environmental impact. Meanwhile the power sector has key roles in this transition to EV in the sense that the collaboration with the government and power sector is so essential. Because considering the tariff for EV charging, development of charging stations, incentives including electricity tariff for EV to make EV more affordable, renewable energy development to increase the share of renewable energy to maximize GHG emission reductions through the EV transition is significant.

- Public transportation's aspect:

  Improving public transportation is one of the key points in realizing low carbon transportation in Vanuatu. In the current situation, types of public transportation in large cities in Vanuatu such as Port Vila are limited in mini-bus (commonly defined as vans) and taxi. They are mostly individually owned and not by such as public transport companies, and have no fixed route operation. The vehicles used for the public transportation are often old second-hand vehicles and suppose to emit more air pollutants and use more fuels. From private vehicle ownership to public transportation with introduction of EVs is large impact to those who are engaged in privately vehicle operation business, however such transformation brings about improvements in many aspects such as the environment and the elimination of traffic congestion. Setting up public transport companies (or a well-organized association) that can run mini-buses more efficiently and effectively in terms of costs and environmental effects would be a solution.

- Financial aspect:

  Most of the mini-buses and taxis are individually owned, therefore the replacement of these vehicles to new and low emission vehicles are dependent on individual's budget and decisions. The price of transport services such as buses, taxis, airfares and shipping are not regulated or are regulated in part. Setting up public transport companies (or a well-organized association) can be one solution to effectively introduce public transportation vehicles with low emission technologies.

POLICY ACTIONS FOR TECHNOLOGY IMPLEMENTATION

EXISTING POLICIES IN RELATION TO THE TECHNOLOGY

The national policies and strategies includes;

1. National Sustainability Development Plan 2016 to 2030
2. Updated Vanuatu National Energy Road Map 2016 to 2030
3. National Determined Contribution 2020 to 2030

PROPOSED POLICIES TO ENHANCE TECHNOLOGY IMPLEMENTATION

1, Develop EV policy

2. Establish regulatory mechanism for EV Projects to promote mitigation technologies for EE improvements

COSTS RELATED TO THE IMPLEMENTATION OF POLICIES

Indicative total project cost (GCF + co-finance) is USD11M

USEFUL INFORMATION

CONTACT DETAILS

1. TNA Coordinator, Mr. Neil Malosu, nemalosu@vanuatu.gov.vu
2. Senior Mitigation Officer, Department of Climate Change, Mr. Nelson Kalo, nkalo@vanuatu.gov.vu
3. PACCIL Influencing Officer, Oxfam Vanuatu, Mr. George Koran, georgek@oxfam.org.au

LINKS TO TNA REPORTS

https://tech-action.org/