ELECTRIC VEHICLES FOR CLIMATE CHANGE MITIGATION

TECHNOLOGY DESCRIPTION

TECHNICAL DESCRIPTION

Electric vehicle is a vehicle which uses one or more electric motors for propulsion. In many cases these electric motors are powered by rechargeable battery packs. EVs have several advantages compared to conventional vehicles which includes the following;

- EVs are more energy efficient: EVs convert over 77% of the electrical energy from the grid to power at the wheels. Conventional gasoline vehicles only convert about 12%–30% of the energy stored in gasoline to power at the wheels.
- EVs are considered to be more environmentally friendly since they do not emit air pollutants such as Sulphur dioxide, Nitrous oxide, Carbon monoxide and Particulate Matter. However, the power plant which is used for power the EVs may emit air pollutants. Nevertheless, electricity produced by solar power, wind power or nuclear power will not emit any air pollutants.
- Electric motors provide quiet, smooth operation and stronger acceleration and require less maintenance than internal combustion engines (ICEs).

There are some disadvantages of EVs in comparison with conventional vehicles. They include the following:

- EVs have a shorter driving range than most conventional vehicles—although EV driving ranges are improving. Most EVs can travel more than 100 miles on a charge, and some can travel in excess of 200 or 300 miles depending on the model.
- Fully recharging the battery pack can take 3 to 12 hours. Even a "fast charge" to 80% capacity can take 30 min.

EVs have significant potential to reduce climate change mitigation through reduction of the dependence of vehicles on fossil fuel combustion.

CURRENT TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

Technology Readiness Levels (TRL)

TRL 6 – technology demonstrated in relevant environment (industrially relevant environment in the case of key enabling technologies)

Currently, there are significant no. of EVs utilized in the country. However, the share of the EVs in the country is significantly less compared to conventional vehicles.

Commercial Readiness Index

Level 4 - Multiple commercial applications

There are very few companies which imports EVs however, the importation of EV is significantly less compared to conventional vehicles.

CLIMATE RATIONALE OF THE TECHNOLOGY

Electric Vehicles (EVs) are expected to contribute to GHG emission reduction provided that electricity generation are from renewable sources of energy;

- EVs have no tailpipe emissions.
- EVs are expected to reduce air pollution as conventional vehicles generate air pollutants.

AMBITION OF THE TECHNOLOGY

SCALE FOR IMPLEMENTATION AND TIME-LINE

The preliminary target for transfer and diffusion of EVs in Maldives is to increase the share of EVs to 20% of all the land-based vehicles operational in the Maldives.

There are 131,000 land use vehicles registered in the Maldives. Out of which only 4% of vehicles are EVs and most of these constitute of tricycles and e-bicycles.[1] Despite having customs duty advantages up to 150% for imported electric motorcycles and cars over conventional fossil fuel-based vehicles, very limited EV penetration has been observed in islands like Male', Hulhumale and Addu city.

Despite having customs duties advantages of up to 150% for imported electric motorcycles and cars over their fossil fuel counterparts, islands like Male, Hulhumale, Addu etc. have witnessed limited EV penetration among their resident populations.

AMBITION FOR TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

Technology Readiness Level

TRL 9 – actual system proven in operational environment

Commercial Readiness Index

Level 6 - "Bankable" grade asset class

EXPECTED IMPACTS OF THE TECHNOLOGY

[1] World Bank Group (2020) "Accelerating the electric vehicles transition in Maldives".

The expected impacts of the EVs are positive and negative impacts; The main position impacts include

- No tailpipe emissions. The utilization of EVs is expected to reduce transport sector carbon dioxide emissions by 21.53% by 2030 according to the National Action Plan on Air Pollutants (2019).
- Less air pollutants. The utilization of EVs is expected to reduce $PM_{2.5}$, by 23.77%, NO_X by 19.92% and black carbon by 19.92% according to the National Action Plan on Air Pollutants (2019).

The negative impacts of EVs include;

- The environmental impact of EVs depends significantly on how the electricity used to charge them is generated. If the electricity comes from fossil fuels, the overall emissions reduction benefits are diminished.
- Recycling of EV batteries at the end-life cycle is a significant challenge.
- Large investments are required to establish charging infrastructure.

POLICY ACTIONS FOR TECHNOLOGY IMPLEMENTATION

EXISTING POLICIES IN RELATION TO THE TECHNOLOGY

- Maldives Climate Emergency Act (08/2021)
- Maldives Energy Act (18/2021)
- Utility Regulatory Authority Act (26/2020)
- Regulation on Import Export, Re-export (2012/R-34)
- Maldives Energy Policy (2015)
- Maldives Climate Change Policy Framework (2015)
- Maldives Nationally Determined Contribution (2020)

PROPOSED POLICIES TO ENHANCE TECHNOLOGY IMPLEMENTATION

The main proposed policies for enhancement of EVs include;

1. Formulation of Regulation on importing, maintenance, and emission standards for EVs.

COSTS RELATED TO THE IMPLEMENTATION OF POLICIES

- The main cost for implementing the above-mentioned policy includes formulation of Regulation on importing, maintenance, and emission standards for EVs. The study is expected to cost 25,000 USD.

USEFUL INFORMATION

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LINKS TO TNA REPORTS

Technology Needs Assessment (TNA) Report and Barrier Analysis and Enabling Framework (BAEF) Report

https://tech-action.unepccc.org/country/maldives/

Maldives Biennial Transparency Report

https://www.environment.gov.mv/v2/en/news/30245

National Action Plan on Air Pollution

https://islands.irena.org/-/media/Sids/Files/Publications/Maldives---National-Action-Plan-on-Air-Pollutants-Determining-Nationally-Avoided-Emissions.pdf

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