Bermuda's Zero Emission Vehicle Policy & Strategy Development

Public Consultation Document

GOVERNMENT OF BERMUDA
Ministry of Transport

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Issue

The Ministry of Transport is seeking feedback on a proposed policy to transition to 100% zero-emission vehicle (ZEV) sales. Transportation is a primary contributor of greenhouse gases (GHGs) around the world—in Bermuda, 10% of CO2 emissions come from the transport sector, making it the third most polluting sector on the island. Eliminating emissions from transport will not only reduce Bermuda's contribution to climate change but improve local air quality and reduce Bermuda's dependence on foreign oil—especially as the energy system transitions to local renewable generation.

Globally, many countries, states, and provinces have adopted measures intended to accelerate the transition to ZEVs. Further, global automakers are investing heavily in ZEV technology while phasing out investment in gasoline and diesel vehicles. The combination of these forces is rapidly pushing the world toward a tipping point.

ZEV Definitions

ZEVs, or zero-emission vehicles, is a term used to refer to several vehicle types:

- **EVs** – Fully-electric vehicle with no internal combustion engine (ICE) powered exclusively from electricity stored in a battery
- **PHEVs** – plug-in hybrid vehicles with a small electric-only range combined with an ICE
- **FCEVs** – fuel cell electric vehicles powered by hydrogen (a zero-emission fuel source)

The vehicle technologies included in Bermuda's ZEV policy will be finalized after the public consultation process is complete to ensure all use cases and consumer driving requirements are considered. Hybrid vehicles with no battery or fuel cell component are not considered ZEVs at this time.

Bermuda must transition away from high emission vehicles or risk being left behind in the global ZEV transition. The island is uniquely positioned to benefit from a transition to ZEVs due to the low annual mileage requirements of its vehicles and increasing renewable energy generation but must take swift policy measures to ensure it is not left with outdated technology and little infrastructure investment.

The following document details the strategic necessities and goals of the ZEV transition that are in development, provides examples of similar transition measures in other geographies, and outlines a public feedback process.

Need for Island-Scale Vehicle Electrification

As the global vehicle market moves towards electrification, it will become increasingly important for Bermuda to prepare for this transition. ZEVs, specifically fully-electric vehicles (EVs), offer multiple benefits including lower fuel and maintenance costs, increased efficiency, and improved local air quality. To take advantage of this newer technology and not limit the island to older, less efficient internal combustion engine (ICE) vehicles, ZEV adoption should be accelerated.

Perhaps the largest benefit of ZEVs is their ability to improve local air quality. Vehicular emissions from burning fossil fuels contributes to ambient air pollution that can cause damage to the neurological, cardiovascular, and respiratory systems, and even contain potential carcinogens. The WHO estimates 4.2 million premature deaths occur globally due to ambient air pollution every year[1]. Children, seniors, people with pre-existing medical conditions, and those living in poorer communities are at higher risk of adverse health impacts due to air pollution. Transitioning the transport sector away from ICE vehicles will reduce these emissions drastically, improving local air quality in Bermuda and fostering a healthier environment for its residents.

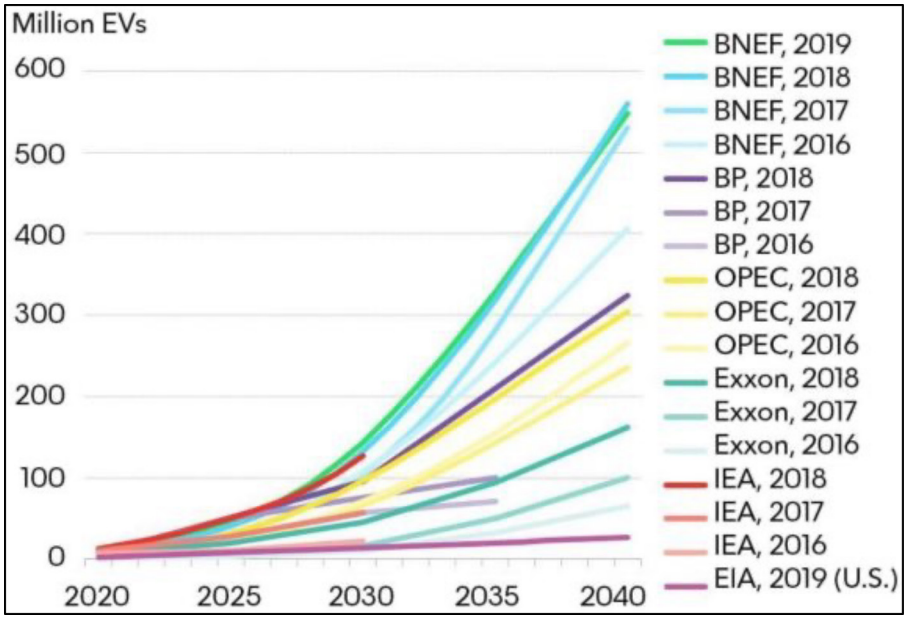
1 Factsheet on Ambient (outdoor) air pollution, WHO (2021). **Available here**.

As the Integrated Resource Plan[2] for Bermuda's electricity system is implemented, the adoption of renewable energy technologies is set to increase in Bermuda. EVs offer an opportunity to utilize locally generated, clean energy to further reduce the country's reliance on imported gasoline and diesel fuel. This is particularly relevant in times with volatile oil prices and availability issues due to geopolitical conditions. Even if the vehicles are charged using the current BELCO electric grid, which is primarily fueled by imported diesel, the greater efficiency of the EVs will still translate to overall savings in energy, fuel, and emissions[3].

ZEV Landscape Overview

Of the ZEVs available now, EVs have seen significantly higher global market adoption in the passenger car segment than other fuel types such as hydrogen-powered fuel cell electric vehicles (FCEVs). Policy measures encouraging the adoption of ZEVs vary across geographies in terms of vehicle technology, but more than 20 countries have announced vehicle electrification targets in the form of ICE bans and ZEV sales requirements. One of the most noteworthy policies is the UK's ban of diesel and gasoline powered vehicle sales starting 2030[4]. Latin America and the Caribbean are also moving forward, with Barbados aiming for 100% electric bus and government fleet by 2030[5], Chile's goal to phase out ICE sales by 2035, and Costa Rice targeting 70% zero-emission buses and taxis by 2035. Major EU member countries such as Norway, Denmark, and Portugal, as well as island countries such as Singapore, Japan, and Cabo Verde have announced 100% ZEV sales targets as early as 2025 to 2035[6]. In the US, California, which on its own would be the tenth largest car market in the world, has also formally banned ICE sales by 2035[7]. Massachusetts, New York, Oregon, and Vermont are all in the process of setting their own rules by the end of 2022, to follow California's lead.

Global EV Outlook, 2020-2040



Source: **BNEF**

2 Bermuda Integrated Resource Plan (IRP), Regulatory Authority of Bermuda (2019). **Available here**. "The initial IRP was published in 2019. The RA is currently requesting responses from BELCO through November 2023."

3 "Electrifying transportation reduces emissions and saves massive amounts of energy", Yale Climate Connections (2022). **Available here**.

4 Department of Transport, "Government takes historic step towards net-zero with end of sale of new petrol and diesel cars by 2030", Government of the United Kingdom (2020). **Available here**.

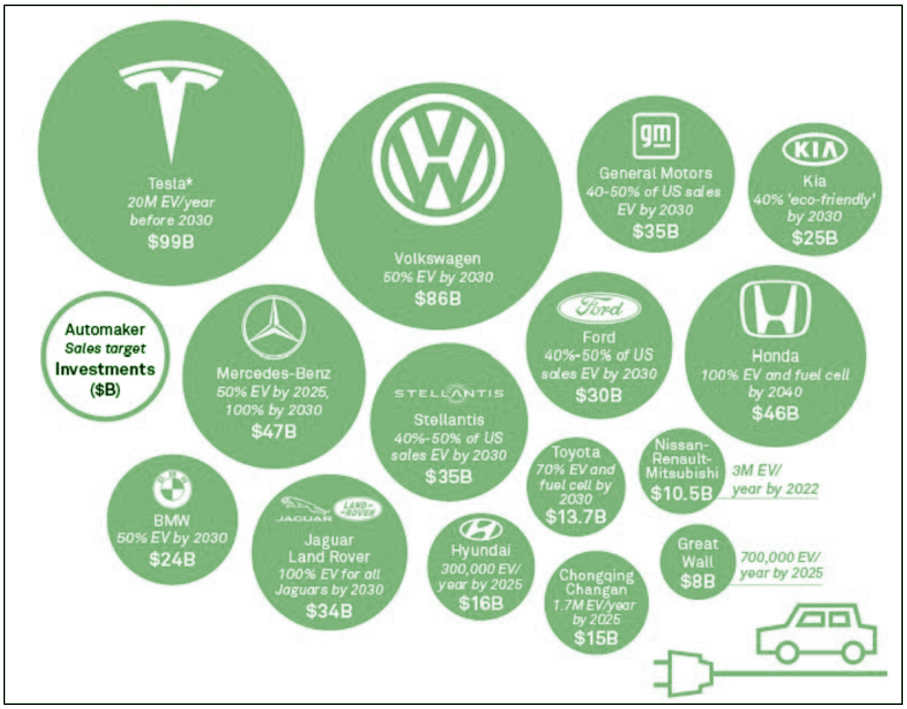
5 "National Energy Policy 2019-2030," Barbados Ministry of Energy & Water Resource (2021).

6 IEA (2021), Global EV Outlook 2021, IEA, Paris. **Available here**.

7 California Executive Order N-79-20 (**Available here**), codified by Advanced Clean Cars II regulation. **Available here**.

Complementary to national goals, automakers have announced commitments to expand ZEV manufacturing through increased product volume and model availability. At least 10 automakers are promising to make only ZEVs within this decade: General Motors, BMW Mini, Jaguar, Bentley, and Mercedes being some that have made pledges as early as 2030. The Volkswagen brand has 70 new EV platforms in the pipeline and announced that EVs will be 70% of its sales in Europe in 2030. They intend to make their last ICE platform in 2026. Hyundai has committed to selling 23 new types of EVs—in addition to 11 from the Kia brand—by 2025, and the automaker has invested $7.5 billion in EV manufacturing in the US. Toyota expects to offer 70 EV models by 2025.

Automaker Investments in Next-Generation Vehicles



Source: **SNL**

The primary roadblock towards large scale ZEV adoption is higher upfront cost than ICE vehicles. EVs specifically are currently 20% more expensive than ICEs, on average; a price premium that, in some countries such as the US, Norway, New Zealand, Thailand, and Costa Rica, has been partially or wholly alleviated through tax incentives and rebate programs. However, like most new technologies, the price of EVs is expected to decrease with further advancements in battery technology, as well as economies of scale. Bloomberg New Energy Finance forecasts that light-duty ZEVs such as passenger cars will reach cost parity with ICE cars by 2025, while electric trucks will close the gap in the last quarter of this decade.

Local State of Charge: ZEVs in Bermuda

Bermuda is no stranger to the ZEV transition with fully electric rental car fleets and the recently introduced electric public buses. Being less than 25 miles long and 2 miles at its widest point, the island is a prime candidate for ZEVs without the need for long-range vehicles or frequent charging. However, most of the nearly 22,000 licensed private vehicles are still ICE vehicles. The slow pace of adoption can be attributed in part to the limited availability of ZEV models on the island, as well as the lack of purchase incentives.

Electric Bus at Cabinet House

A recent ZEV success story on the island comes from the first summer of operation of the thirty electric public buses. The buses have been in operation for four months over which they have saved the Department of Public Transportation (DPT) an estimated $50,000 in fuel costs alone. These savings do not include maintenance costs, which are expected to be nearly half those of diesel buses. Early experience in the maintenance shop indicates that the required services are simple and quick to complete. Additionally, these buses have led to significant energy and emissions savings over the summer. About 120,000 liters of diesel fuel were avoided through August, equivalent to the fuel burned over a typical 8-hour transatlantic flight. This further indicates that an estimated 120 MTCO2 emissions were avoided, equivalent to the emissions from 205 passenger cars in Bermuda.

Feasibility Assessment

As Bermuda plans for accelerating large scale ZEV adoption, there are key considerations that must be accounted for to make this transition feasible. Potential barriers and proposed solutions are presented here for consideration. In addition to the barriers presented below, further research and stakeholder feedback will be conducted to determine which type(s) of vehicles will qualify as a ZEV in the Bermuda context, and the timeline and/or ZEV sales targets by vehicle type. Some ZEVs are likely to be more economical and technically applicable for the Bermuda use case in the near-term.

Increased electricity demand due to EVs

- It is estimated that electrifying all 22,000 private cars on the island would lead to an 8–10% increase in total electricity demand, served by approximately 5 MW of generation capacity. It is worth noting that because of the long-term trend of population decline in Bermuda, the current electricity system has more than 5 MW of spare capacity.

- Increased electricity demand will also lead to increased utilization of electric infrastructure on the island, thus creating a potential opportunity to reduce the overall cost of electricity.
- This additional electricity load will call for faster scaling of renewable energy resources to ensure an inexpensive supply of clean energy. As the Integrated Resource Plan continues to be implemented, over 100 MW of renewable generation capacity is expected to be installed on the island by 2040. Analysis to support this and account for the increased electric demand due to EVs will continue to be expanded, as relevant stakeholders are engaged such as the utility and Regulatory Authority to ensure coordination between the necessary stakeholders.

Deployment of a comprehensive charging infrastructure network for EVs

- Given the shorter driving distances in Bermuda, most private electric car and motorcycle owners will only require a low-power supply such as a typical residential wall outlet would provide. This will reduce the need and cost of building a public EV charging network throughout the island, with chargers only needed in strategic locations to meet demand such as in Hamilton, Dockyard, the town of St. George's, and the Airport with private vehicle fleet owners investing in their own charging infrastructure.
- For all buildings with two-unit dwellings or less, a 1.4 kW home charger outlet is expected to be the primary source of charging. For all residential buildings with three or more units or apartments, it is anticipated that Level 2 charging pedestals offering 7.2 kW or higher may be better suited to allow faster charging and utilization by more vehicle owners.
- Based on early estimates of the charging needs for full-scale private vehicle electrification, 2,000 Level 2 chargers are expected to serve charging demand at multi-unit dwellings, workplaces, and other public locations across the island. At least 16,000 low-power home outlets would further be required to support charging personal vehicles at home[8]. These estimates are preliminary and will continue to be revised as more data is available, while the relevant stakeholders are engaged to develop a comprehensive infrastructure deployment strategy.

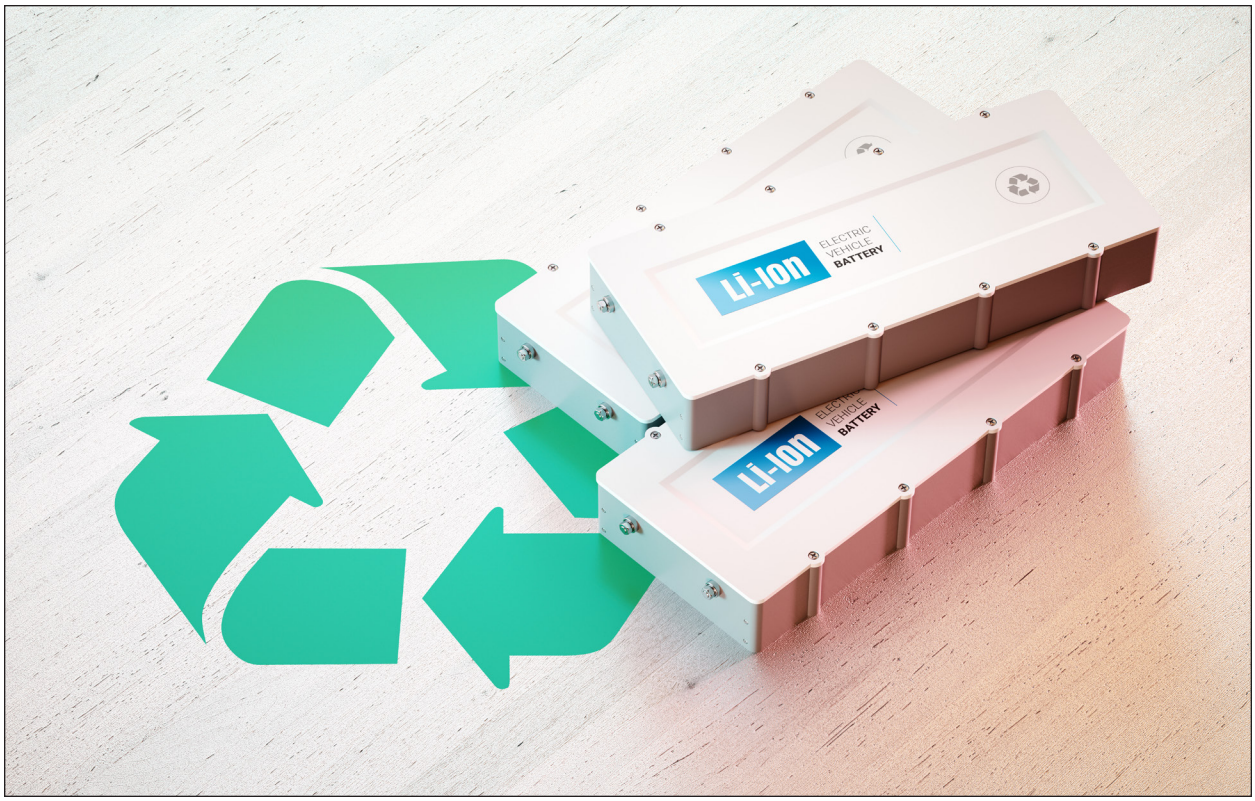
8 It is assumed that each of the approximately 16,000 one and two-unit dwelling has at least one vehicle domiciled and charging at the location. Multi-unit dwellings would be served by higher powered Level-2 chargers that would be present at residential as well as public locations, with the assumption that five car owners can be served by one such two-port charger.

Higher purchase price and limited vehicle model availability of EVs on the island

- Up to 10 electric passenger car models from global automakers are currently available in Bermuda, and more are anticipated soon according to local dealers. EVs are currently about 20% more expensive than their ICE counterparts, on average.
- As the global market expands and matures, ZEV prices will continue to decrease while model availability improves—Bermuda will also feel the positive effects of that natural transition. However, to accelerate the local market and incentivize vehicle buyers, early coordination and engagement with dealers will be key to bring more ZEV models on the island at competitive prices.

Developing local ZEV maintenance and servicing capacity

- ZEV maintenance infrastructure and servicing support on the island is currently limited to auto dealers that provide ZEV models, DPT's electric bus fleet, and electric car rental companies.
- The Government understands that this is a key service to bring to the island to facilitate ZEV adoption. A strategy will be explored through potential coordination between the relevant government departments, dealers' association, and Bermuda college to develop on-island ZEV support and servicing capacity. The Electric Vehicle Maintenance Fundamentals course at the Samuel Jackman Prescod Institute of Technology (SJPI) in Barbados is an example of such an initiative that Bermuda could learn from and implement locally.



Recycling and disposal of EV batteries and other components

- The Government recognizes the current issue of disposal of vehicle components and views this as an opportunity to build vehicle and battery recycling, reuse, and disposal infrastructure on the island.
- Other geographies such as the US are working on battery recycling programs, with investments happening in research and development as well early deployment of such facilities. The feasibility of implementing such facilities in Bermuda will be explored as well.

Next Steps

To facilitate public feedback regarding the proposed ZEV policy, the following engagement structure will take place:

- **Q&A webinar:** On February 15th, 2023, a webinar will be held to offer the public an opportunity to learn more about the proposed policy and ask questions before submitting feedback responses. The webinar will be hosted by the Ministry of Transport and provide an overview of the proposed policy, details of the public engagement process, and a Q&A. Please submit questions for the Q&A webinar **here**.
- **Public feedback submissions:** Stakeholders will be asked to submit any feedback on the proposed ZEV policy and strategy by March 23rd, 2023. Submissions will be accepted on a rolling basis through **forum.gov.bm**. All feedback received through the process will be reviewed and considered for inclusion in future policy recommendations. For any questions related to this effort, please email **zevpolicy@gov.bm**.

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