SOLAR CHARGING STATIONS AND ELECTRIC VEHICLES

TECHNOLOGY DESCRIPTION

TECHNICAL DESCRIPTION

Battery electric vehicles are vehicles that run solely on batteries as they do not contain any internal combustion engine. They are considered to be zero emission emitters as they do not generate emissions from their tailpipe or air pollutants that fossil fuel powered vehicles do.[1] They are refuelled by charging the vehicle into a wall outlet or an installed charging station. Figure 1 below shows the components of an electric vehicle.

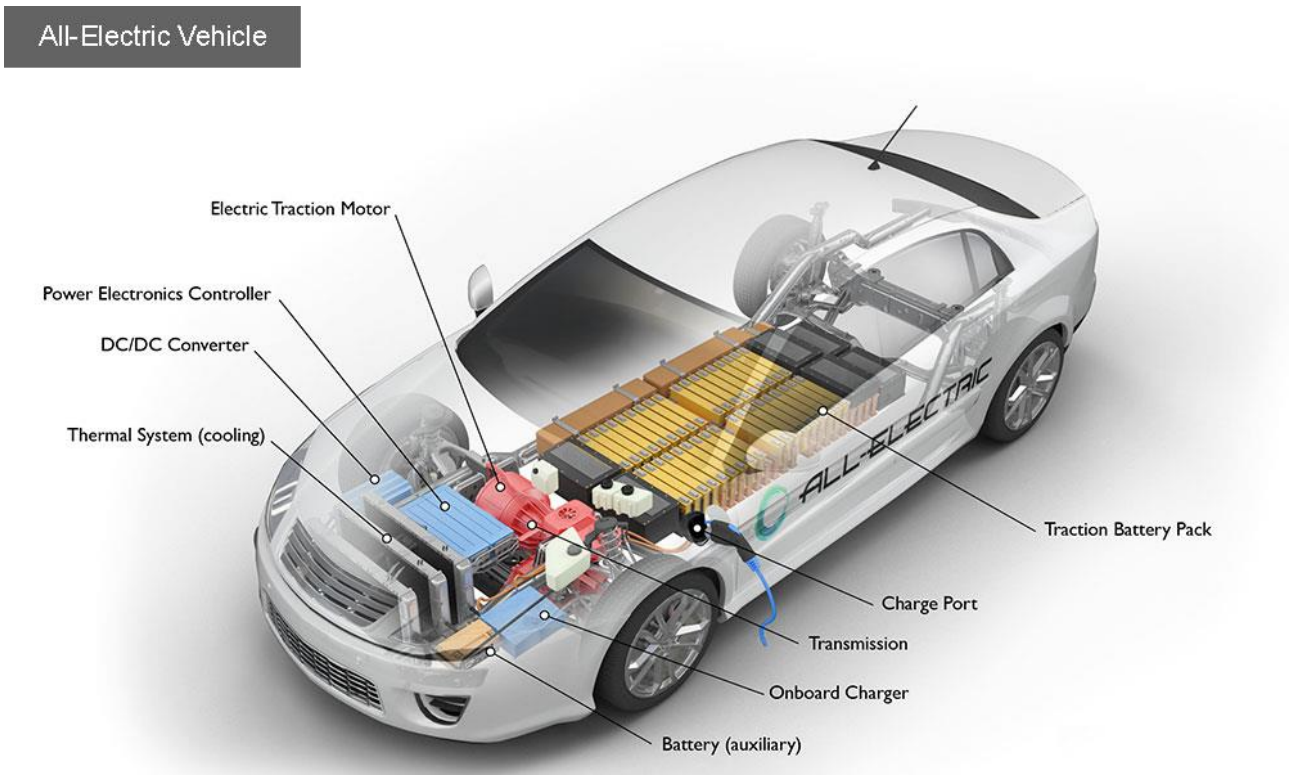

Figure 1: Components of Electric Vehicle

Solar charging stations are powered by solar panels and contain battery storage which provides a 24 hour supply of electricity. Battery electric vehicles can plug into a charging station and recharge. These systems are sustainable, and do not produce any CO_2 emissions since they are not powered by fossil fuel-based electricity. Figure 2 depicts a solar charging station.

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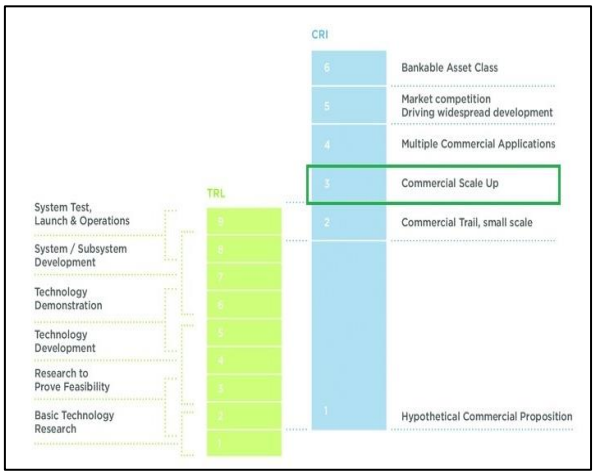
Figure 2: Solar-powered charging station

CURRENT TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX



The Commercial Readiness Index (CRI) is a framework used to assess the commercial maturity of the technology under investigation using six (6) indicators (see figure). It complements and is often used in tandem with the Technology Readiness Level (TRL) method which measures the technology's technical maturity.

Solar charging stations and electric vehicles are currently at Level 3 commercial scale up, which indicates that the technology is commercially available in Antigua and Barbuda.

However, there are other technologies such as used ICE vehicles which are less efficient and cheaper. There is currently limited verifiable data about what factors most often influence consumer choice but the cost of technology is a major influence. This is the reason people tend to lean towards the cheaper technology option.

CRI Level 3 indicates that solar charging stations and electric vehicle technology are in the Deployment phase of Technology Readiness.

CLIMATE RATIONALE OF THE TECHNOLOGY

In 2015, the National Greenhouse Gas Inventory reported that 76% of the country's emissions were generated by fuel consumption in the energy sector due to the burning of heavy fuel oil by power producers[2]. The West Indies Oil Company (WIOC) is responsible for the importation of all the fossil fuel that is utilized in the country. A high percentage of the fuel is used in the transportation and energy sector.

[2] Antigua and Barbuda's national greenhouse gas reduction report / Climate Analytics

The Department of Environment and the Ministry responsible for Energy, through a directive from the GoAB, is working on implementing technologies that will reduce fossil fuel dependence and reduce the GHG emissions of the country in order to uphold the country's obligations to the Paris Agreement.

The adoption of electric vehicles and solar-powered charging stations are in line with Antigua and Barbuda's Nationally Determined Contributions (NDCs), which describe a transition away from new internal combustion vehicles to electric vehicles by 2030.

AMBITION OF THE TECHNOLOGY

SCALE FOR IMPLEMENTATION AND TIME-LINE

The country's ambition is to increase the capacity of the country to maintain and operate electric vehicles. In order to accomplish this, actions taken will include upgrading educational institutions to deliver specialized courses in operation and maintenance of electric vehicles and charging stations, embarking on various public awareness campaigns to accelerate the uptake of the technology and increasing the number of public solar charging stations to meet the anticipated EV demand. Additionally, "training of trainers" programs for electric vehicles and solar systems to transform the workforce and social development in the country will be undertaken. This will include the re-training of at least 10 existing mechanics and teachers to repair and service EVs. Finally, a pilot study will be conducted on 50kW of solar panels to serve 10 level-2 chargers for 20 EVs of the government fleet. This initiative could reduce GHG emissions by 56.15 tCO_2e using an electricity conversion factor of 0.6154 tCO2e/MWh[3].

AMBITION FOR TECHNOLOGY READINESS LEVEL OR COMMERCIAL READINESS INDEX

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EXPECTED IMPACTS OF THE TECHNOLOGY

The adoption of electric vehicles in Antigua and Barbuda would decrease the dependence on fossil fuels in the transport sector. Currently, most of the vehicles on the island are powered by gasoline and diesel, which means there is a high level of fuel importation annually to meet the requirements of these vehicles. However, with the transition to electric vehicles, the source of power for transport can be changed. Additionally, the implementation of solar charging stations would ensure that the vehicles are recharging using clean energy rather than using energy from the grid that is created by the burning of Heavy Fuel Oil.

POLICY ACTIONS FOR TECHNOLOGY IMPLEMENTATION

EXISTING POLICIES IN RELATION TO THE TECHNOLOGY

NAME	YEAR ADOPTED	MAIN CONTENTS
Environmental Management and Protection Act	**2019**	Established the Environment Registry which will undertake to monitor pollutants and support GHG inventories through continued data collection

[3] Antigua Grid, CM 2017 - 2019

Sustainable Energy Action Plan	**2013**	Renewable energy developments to reduce fossil fuel dependence, high energy costs, and energy import bills
Environmental Levy Act 2002	**2003**	Outlines the tariffs for vehicles imported into the country
Renewable Energy Act	**2015**	Legislation drafted to promote the use of renewable energy resources and technologies such as solar PV, wind, biomass, hydropower, geothermal, and wave/tidal. The act established the responsibilities to be carried out by the Minister Responsible for Energy. It also established APUA's net billing policy and energy wheeling policies.

PROPOSED POLICIES TO ENHANCE TECHNOLOGY IMPLEMENTATION

For the increased diffusion Antigua and Barbuda needs to implement policies that would reduce the importation of internal combustion vehicles. At the present time (2022), there are no restrictions on the age of vehicles that can be imported into the country. Additionally, there are no emission standards for the importation of vehicles. Therefore, citizens tend to purchase older vehicles which would cost them cheaper. In order for electric vehicles to be adopted, policies for age limitation and emission standards of vehicles need to be implemented.

COSTS RELATED TO THE IMPLEMENTATION OF POLICIES

According to the breakdown provided in the Technology Action Plan, the revision of the External Trades Act, along with other policies will cost approximately USD 21,900.

USEFUL INFORMATION

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LINKS TO TNA REPORTS

https://tech-action.unepdtu.org/country/antigua-and-barbuda/