INTER-AMERICAN DEVELOPMENT BANK

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THEMATIC BRIEF: ELECTRIC VEHICLES

THE PIVOT EVENT

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BACKGROUND

As environment concerns grow worldwide, one of the main targets in reducing greenhouse-gas emissions (GHG) is transport. Petroleum products represent 95% of the world's transportation energy, including the Caribbean. Currently, its population is a relatively large GHG emitter (2.3 times higher than middle income countries, which is 2.9 times higher than Latin America and the Caribbean combined, and 96% of OECD countries), especially relative to its economic size – its GDP per capita is 23% of OECD countries.

To minimise GHG emission levels, an ideal scenario would see the conversion of internal-combustion engine (ICE) vehicles to battery-electric vehicles. The worldwide share of electric cars is projected to be 15% by 2025[2]. Some governments, notably Britain and France, have already committed to prohibiting the sale of new ICE cars by 2040.

Otherwise, while road freight also constitutes a major part of ICE use and GHG emissions, a realistic transition of these larger vehicles to electric propulsion has yet to be put in place. Researchers have estimated that for a truck with a driving range of about 600 miles, the battery system necessary would cost more than $200,000, and weigh more than 10 tons. This would significantly reduce the truck's maximum permitted freight capacity[3]. The focus of this text will be on the opportunity of developing electric mobility.

The successful transition to electric vehicles in the Caribbean requires three main conditions to be met: a) there needs to be a sufficiently wide supply of different vehicle models, including lower cost ones, which rests mostly in the hands of major automakers; b) a significant demand shift from cars to other electric vehicles such as carts, scooters, tractors, etc. will need to be undertaken, and the availability of a corresponding supply as well to meet this demand; and c) a wide and efficient recharging network for all electric vehicles, including in residences, should be put in place and ideally with its electricity produced from clean and renewable energy sources. Other elements to consider will be how this shift from one propulsion mode to another will impact the status quo in other areas, like, for example, taxation, gas stations, commercial vehicles (e.g., light trucks, taxis), public and private charging stations, maintenance and repair service companies and so on.

PROBLEMS AND OPPORTUNITIES

Wide adoption of electric cars in the Caribbean is not yet feasible given the current infrastructure. Much of the energy used comes from fossil fuels, with renewable resources playing a minor role. However, because sun and wind are abundant, as are geothermal energy and hydropower, the potential of renewable energy for the Caribbean is considerable. Of note, renewable energy costs continue to trend downwards. Also, increasing the share of this type of energy would reduce fossil fuel imports, which represent nearly a quarter of the Caribbean's merchandise imports, and a sizeable source of global pollution.

The naturally variable production of solar and wind energy, combined with the Caribbean's weak grid infrastructure, will require energy storage systems (ESS) be implemented so as to control frequency, voltage regulation, and ramping. Even though ESS are costly, their price point is

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[2] The Economist, Big carmakers are placing vast bets on electric vehicles, April 17th 2019.

[3] https://pubs.acs.org/doi/pdf/10.1021/acsenergylett.7b00432

continually decreasing. In this context, the recharging needs of electric vehicles, although only met partially at this time, is able to complement the variable production of electricity from renewables, notably with proper pricing. As of September 2018, seven ESS were operational in the Caribbean, and another 11 were proposed, for a total projected installed capacity of 65 MW, at a projected cost of US$80.4 M[4]. However, data about these systems is incomplete. The implemented capacity and revenues stemming from these ESS in Latin America and the Caribbean (population: 1.1 % of Latin America) is expected to double over the coming five years.

For the deployment of ESS to make sense, renewable energy production also needs to grow alongside. With Suriname, Jamaica and the Dominican Republic leading the way, most Caribbean countries possess a certain capacity for renewable energy production, although not all are equipped with ESS. Many of these projects are financed by large international players, such as the Clinton Climate Initiative, the Rocky Mountain Institute and the United Arab Emirates.[5] To contribute to this development, the CARICOM Secretariat has launched the Caribbean Renewable Energy Development Programme (CREDP), which aims to remove the barriers to renewable energy and foster its development and commercialisation. Its mandate covers the following: policy (including legislation and regulation), capacity building (institutional, individual), information, and financing.

Private initiatives are also being developed. For example, the Caribbean-based equity firm MPC Caribbean Clean Energy Ltd., established in 2017, helps private and institutional investors from Jamaica and Trinidad and Tobago to put their money in one of the few funds that invests in renewable energy projects in Jamaica, Trinidad and Tobago and the wider Caribbean region.

In addition, non-car electric vehicles can be produced on a reduced scale, and may be less dependent on the development of the grid. Some of these vehicles, which are smaller than a car, can also be more adapted to the current state of the road infrastructure. This type of production may attract smaller investors, who may be less anchored and more amenable to a variety of locations across the Caribbean region.

Besides renewable energy production and storage, another major technical challenge (and opportunity) is installing a sufficient number of recharging stations that are properly distributed geographically, and which are efficient enough in terms of charging speed to constitute a viable and practical alternative to ICE vehicles. While this deployment may be easier at first to pursue in urban or more densely populated areas, it should also be planned for rural and less-populated areas as well. Likewise, the configuration of these stations should be flexible enough to accommodate the inevitable technological changes that will improve their efficiency over time. For example, charging cars wirelessly is becoming an increasingly realistic possibility, which would require updating existing cable-based recharging stations[6].

CURRENT REGULATORY AND LEGAL ENVIRONMENT

Electric vehicles essentially possess the same functionalities ICE vehicles do, minus the deleterious effects of their use on GHG emissions, noise levels, and other external phenomena. Therefore, as ICE vehicles are already widely used in the Caribbean, there is little or no need to change permit or licensing regulation to facilitate their wide-scale adoption. Therefore, the main policy and regulatory focus will be on infrastructure: reinforcing and expanding all elements of grid infrastructure, as well as regulation on public and private charging stations.

Several policy initiatives related to renewable energy are ongoing in many Caribbean countries. However, the size and technical complexity of these projects, coupled with their importance across all sectors of the economy, make them challenging to develop. In this perspective, the successful

[4] https://www.researchgate.net/publication/328030940

[5] See note 2.

[6] The Economist, Wireless charging of cars looks increasingly promising, May 14th 2020.

expansion of the wind energy industry in developed countries (public tenders, regional spending requirements, operators paid for electricity delivered) could be a useful model to follow.

In line with the comparison between ICE and electric vehicles, any type of charging stations represents an urban and environmental improvement over conventional gas stations. Therefore, adapting and modernizing existing land use to encourage the development of these stations should not represent a significant challenge for regulators.

Lastly, considering the existing taxes on petroleum products, governments would need to replace a portion of this revenue with another stemming from additional electricity sales, as well as from other forms of taxation. However, a financial margin needs to be conserved to create incentives and programs that will encourage individuals and entrepreneurs to switch to electric vehicles.

SUCCESS FACILITATION AVENUES

Besides the elements mentioned above, a key component of this successful transition will be to properly match the growth in electric vehicles with that of recharging facilities. On this subject, recharging capability must progress faster than the demand, to both encourage the adoption of electric vehicles and send a clear signal of the country's aim for the future of road transport. Doing so will require close and continuous monitoring of the existing stock of vehicles, notably by accounting for age by type of vehicle; the probability of replacement as a function of age and vehicle type; and the availability of a wide array of electric vehicles to satisfy the expected shift in demand.

It will be also important to address the needs for peripheral goods and services to support the long-term adoption and growth of electric vehicle fleets, such as access to replacement parts for cars and charging stations, properly-trained mechanics to maintain these vehicles and stations, and so on.

In recent decades, the accelerated development of digital technologies has transformed nearly every sector and aspect of our daily lives. It has reshaped our work practices and environments, provided instant access to droves of public and private information, simplified international trade, and facilitated learning and socialization. Electronic commerce, and its counterpart, electronic payments, are now commonplace in many countries. Notably, they have enabled a means for manufacturers and retailers to survive the pandemic, and consequently have given locked down consumers access to many products. Video-sharing platforms have become an increasingly significant source of entertainment and education. Video games now occupy a significant portion of leisure time, especially for the younger population. In 2020, audio and video social interactions rely increasingly on IP communication. Artificial intelligence, machine learning, robotization and automation are here to stay and will continue to have an impact on this profound and fast-paced transformation.

The Caribbean has adopted several of these digital innovations, but nevertheless still lags behind the rest of the world in many regards. While fixed broadband subscriptions have increased yearly by 8 to 10% since 2010, their absolute level of 15.3 subscriptions per 100 people remains at about half the level observed in OECD countries. In comparison, mobile cellular subscriptions per capita are now at nearly 90% of levels observed in high income, European, and North American countries. These are positive results. However, the proportion of individuals using the Internet in the Caribbean is estimated at only 50%, a fairly low level relative to cellular uptake. Unsurprisingly, exports of information and communication technology (ICT) goods represent less than 0.5% of total exports, while imports of these ICT products comes in at less than 5% of the total – indicating real room for growth.

In this context, digital technologies offer significant opportunities to stimulate productivity and improve quality of life across Caribbean economies. While it may not yet be realistic to expect a stream of breakthrough innovations from the region, a much broader appropriation of these

technologies by firms, workers, consumers and the public sector is to be anticipated. Reinforcing digital transmission infrastructure, automating factories and agricultural facilities, integrating real-time data collection and intervention capacities, improving online public services, and building e-commerce networks all have the power to rapidly increase the economic efficiency of farms, businesses (across a very wide spectrum of sectors), and governments. For this to happen, an effective digital transformation strategy needs to be implemented, and should consist of three main components: 1) building a reliable and powerful digital infrastructure; 2) improving all levels of education and technical training programs; and 3) developing programs designed to effectively disseminate applied knowledge throughout the economy. Most of these strategies must be conceived of at the mezzo level, using appropriate sector financing instruments to allow for radical coordinated change.