Electric Vehicles in Ireland: The Future?

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Abstract

This study explores the merits of the Electric Vehicle (EV) as an alternative mode of transportation in Ireland. The EV has been produced for many decades, but never in a mass production capacity. EVs do not require fossil fuels to power them. With fossil fuels being in short supply and as global climate change is deteriorating each year; the EV will help reduce Ireland's dependence on depleting fossil fuel resources. This current study seeks to establish if the EV can be part of the solution to prevent further un-repairable damage to the environment. The findings of this current study, demonstrate that EVs have the potential to contribute to significant CO_2 reductions in the transport sector. This research also outlines the main advantages and disadvantages of the EV, and reviews the future development of EVs. This research study focuses on the technology development, infrastructure development, consumer acceptance and appropriate measures that will facilitate a more rapid utilisation of EV technology. The Irish Government have an existing strategy for the adoption of electric cars, and if successful, the commercial vehicle industry and large trucks may factor into the longer term electric transport strategy. Ireland has some of the best natural resources and the EV will allow Ireland the opportunity to use these resources to generate electricity. This current study seeks to establish if the EV can help Ireland build a successful renewable future for all. The EV is exciting to drive, efficient, has great performance and above all, is environmentally friendly with Zero CO2 emissions.

KEYWORDS: Electric Vehicles, Environmentally Friendly, Climate Change, Emissions, Government incentives.

INTRODUCTION

This paper presents an overview of the future of EVs in Ireland. Substituting EVs for the traditional Internal Combustion Engine (ICE) vehicles could help to substantially reduce local environmental pollution and greenhouse emissions, currently emitted from the transport sector. According to Matthews (2009), Ireland imports over 90 per cent of its national fuel requirements and, like many other countries, is seeking ways to secure its energy supply. The Department of Communications, Energy and Natural Resources (2010) purports that it is the Irish Government's intention to have 10 per cent of all Irish cars powered by electrical methods by 2020. If this policy succeeds, Ireland will be amongst the first in the world with the national infrastructure to support this policy and will be viewed as a global leader in the green economy. Future mobility is now challenged due to the fossil fuel shortages and global warming concerns. The supply of low-priced oil is quickly diminishing, which means that the fossil fuels that previously powered cars, trucks, planes and ships, are becoming scarce and therefore more expensive. Rose (2010) states that the recent increases in oil are alarming for the world; and that this situation has to change, and fast. In addition, people are becoming more concerned about the environment, and especially, climate change. The automobile industry is one of the greatest consumers of the fossil fuels which continue to prove a serious problem for the environment and human life. The EV may be of substantial benefit, reducing harmful exhaust emissions in the future.

LITERATURE

EVs: A Renewed Interest

According to Leitman and Brant (1994), EVs were designed to do whatever was required in the past, and can be designed and refined to do whatever is necessary in the future. Cowan and Hulten (1996) state that the oil crises in 1973-74 forced many politicians to re-evaluate their transport systems' dependence on an unstable political regime in the Middle East. The oil crises, in particular, encouraged the creation of new EV programmes. Various research studies carried out during the 1970s and 1980s were commissioned, but this research did not result in the creation or recommendation of mass production of EVs. The majority of the research in the 1970s was built on the assumption that the battery technology used in the EV could improve its capabilities quickly.

Unfortunately, the improvement in battery technology never came to fruition and electric and hybrid vehicles have therefore remained uncompetitive. The viability of the internal combustion engine vehicle was questioned due to the increase in congestion in the road networks in large cities, the amount of vehicle accidents that claim thousands of lives every year and the air pollution generated. These were some of the main reasons that prompted doubts about the ICE vehicle (Cowan and Hulten, 1996). According to Dhameja (2002), by the middle of the 1900's the diminishing oil supplies and the growing demand on the fossil fuels began to re-kindle the aspirations of alternative energy sources and the discovery of alternate energy solutions. By the mid 1970's oil shortages led to the sudden and aggressive development of EV programs by manufacturers. Shortly afterwards, the concern with the oil supply was reduced as supply stabilised which in conjunction with a slow advancement in the alternate technology for batteries, impeded the development of the EV (Dhameja, 2002).

METHODOLOGY

Initially, an extensive review of the existing literature was conducted on the automobile industry and current global climate challenges, so as to provide a solid foundation for the research. The literature relays that interest in the EV is on the increase, and that current attention is unlikely to dissipate in the foreseeable future. Reasons range from climate change and environmental pollution, to the gradual depletion of fossil fuels worldwide, and to the nationalistic desire to reduce dependence on imported oil. Each country faces its own unique set of challenges but environmental pressures and the looming background threat of global warming are common to all. For this reason alone, interest in cleaner vehicles as alternatives to traditional gasoline powered cars will grow. EVs stand poised to fulfil a need, to aid the effort to curb harmful emissions from liquid fuels. Technology, economic context, and environmental issues are all aligning to create a more commercial backdrop for EVs.

The purpose of this research is to gain an understanding of the EV, and to determine the future of the EV in Ireland. The methodology is specifically chosen for its appropriateness for this research study. For the purpose of this research, a qualitative approach was taken in the form of semi-structured interviews, as rich informative data was required on the topic. An interview guide emerged from gaps in the existing literature and was used for discussion. A pilot interview was undertaken initially, to establish the validity and reliability of the instrument. The order of the questions was adapted according to the flow and direction of the conversation. The interviewer conducted the personal interviews with twelve purposely picked informed individuals, in a face-to-face context, where the researcher met with the appropriate twelve interviewees and questioned them in detail on EVs in Ireland. The data collection process ensured a high level of knowledge and insight into the topic of EVs. Ethical considerations were taken into account, and the data collected and processed guaranteed the responses would only be used for this required study.

FINDINGS

This paper analyses the changes that have taken place in the automobile industry in Ireland. This research focuses on how Ireland needs to adapt and prepare for the introduction of the EV. The findings of this current study suggest that to enable the EV to be successful in Ireland, government incentives are required, combined with additional support for car manufacturers to enable manufacturers to migrate the EV into mass production. This will then afford the EV the additional benefit of utilising economics of scale which will help to reduce the final purchase cost of the EV and put the EV in a competitive position.

The Automobile Sector

The Automobile industry was very successful during the Celtic Tiger era, but since the economic downturn, the motor industry has suffered an unprecedented decline. In 2008, the Government Budget announced that the vehicle registration tax and annual road tax systems were to change with effect from July 1 2008. The new system links the tax rates directly to specific CO_2 emissions (CO_2 g/km) rather than engine size. It established a strong purchasing signal, promoting lower-emissions cars. Participants in this study believe that there is no evidence that the tax change resulted in consumers purchasing smaller cars, but there has been a distinct shift towards diesel-fuelled cars. The share of new diesel engine vehicles has been increasing, from 10 per cent in 2000, to 34 per cent in 2008. During the first half of 2008, the share was 28per cent of sales; after July, it increased to 54 per cent.

The Future of the Automobile Sector

The EV will have a role in the future of the automobile industry, because of the need to reduce emissions. It will always be necessary to buy new vehicles, as a vehicle's performance and ability will decline with age.

Also, the public transport facilities are very underdeveloped and this allows the opportunity for increased car sales. The future for the automobile sector is looking promising, with the electric vehicle providing a great opportunity, but it is clear from the key interviewees in this study, that there is further research and development required for the successful advancement of the EV. Is the infrastructure and technology in place to embrace the EV? EVs require an electrical charge to operate their motors in order to allow them to operate. The ESB are installing an initial infrastructure to ensure that 3,500 charging points are available throughout Ireland. There is a perception among participants that there will be high costs associated with the EV, and a lot of uncertainty in the market place in relation to the price of the EV. This paper also found that the EV is still expensive to purchase, and for the next few years or so, the EV will only suit a niche segment of people in urban cities. The driving range is an issue, and until this is resolved people will not fully transfer to this mode of transport. The EV will need to advance to the stage where mass production is a reality; this in turn will help reduce the price by economies of scale, but it will not be until this point that the traditional motorists will choose to drive the EV.

DISCUSSION & RECOMMENDATIONS

From this current research it is clear that Ireland has to reduce its dependence on fossil fuels. As the prices of these fuels are continuingly increasing, there is an increased focus to further investigate alternative transportation. The EV is clearly an option to help reduce Ireland's dependence on foreign imported fossil fuels and to reduce Ireland's GHG emissions.

A major finding from this paper is that there is a lack of consistent information in the public domain about the EV. There is a lot of confusion between motor manufacturers and the consumer. The Government along with the automobile manufacturers need to outline a clear communication strategy to educate consumer about the EV. It is clear from this current research that there is increasing interest among customers for EVs. Manufacturers in conjunction with the government need to respond by stepping up efforts to bring these models to the marketplace alongside some of the latest-generation, fuel-efficient petrol and diesel powered models. If, for example, a traffic restriction zone comes into effect in Dublin, the only option might be the EV in these restricted zones. The researcher recommends that the internal combustion engine manufacturers consider the environment in their future strategic decisions and management strategies. It is clear that the car manufacturers have certainly made and continue to make more fuel efficient and lower emission vehicles.

The Government envisage that 10 per cent of all cars will be electric by 2020 in Ireland. It is intended that the EV will replace the internal combustion engine during the next two to three decades. This transport evolution will occur chiefly because of the decline in world oil production. Electricity from renewable energy and other sources will be the most feasible alternative fuel. These societal benefits come at high cost to the owner of EVs in terms of price, driving range, availability, loading capacity, speed and acceleration. The practicality of the EV is unfortunately hampered by the lack of infrastructure for recharging. Skilful marketing will certainly be needed if EVs are to be accepted and diffused throughout Ireland.

The Future of the Automobile Industry

The future of the automobile industry will most certainly focus on reducing the CO_2 emissions from this sector. "The European union is mandating maximum levels of CO_2 emissions from vehicles". This mandating of more efficient cars will ensure that car manufacturers provide more fuel efficient vehicles and more environmentally friendly. "They are going to push the manufacturers into producing cleaner cars and more recyclable cars and clearly the mix of units that is going to be sold will be an amalgam of the conventional vehicles and most certainly, the EVs". While the EV has some issues, the Hybrid vehicle will greatly assist with the transition from the internal combustion engine to the EV. Another significant finding that emerged from this research is that the Hybrids are more suited to the heavy commercials. Until the EV has been fully developed the Hybrids will help the EV get there in the mean time".

The Role of the EV

According to Leitman and Brant (1994), the EV can solve a lot of transport concerns. EVs bypass high energy prices, they are relatively low cost to charge and have zero exhaust emissions. EV predominantly use electricity from power plants to charge their batteries, they can also use electricity that has been developed from solar, wind and any other renewable resources.

If all EVs used electricity generated at power plants to recharge their batteries, the amount of emissions generated to produce this electricity would still be less that the emission emitted by a similar amount of vehicles propelled by the internal combustion engine. This current study also finds that a major factor in the future of the EV will be its ability to equally match and in certain cases exceed the capability and practicality of the internal combustion engine vehicle. The EV will need to be aesthetically pleasing to the point that it should almost be an extension of the person buying the car. The EV will also need to meet and exceed the structural and safety attributes of the current internal combustion engine (Leitman and Brant, 1994). It is guaranteed that the EV will be subject to a vast array of future improvements to meet customer expectations such as top speed, driving distance range and even increased overall efficiency. "From an environmental point of view the EV is clearly sought after, but it is not without its limitations. Some of these will be difficult to overcome in the short term". "I'm quite sure in the fullness of time that there will be a win, win situation for EVs". The EV is going to challenge current models; there will need to be a revised business model to adhere to the EV.

Previous research by Brooks (2010) has shown that perhaps both the Hybrid and the EV technologies will find their own large niches in due course, but it is nevertheless striking that the majority of the world's automobile manufacturers seem to be supporting electrics vehicles over plug-in hybrids. The EV is one of the "great white hopes of the industry" it does have a great "buzz about it". A further interviewee stated that the "EV is here to stay but not in any total domination role". Participants believe that "the EV is more of a niche for big cities for — city slickers, for a typical Londoner", but the majority believe that the EV is very desirable and appeals to a large segment. "People from all walks of life from the young to the old have a genuine interest in the EV. It suggests that it is funky and safe for future generations". An important finding is that the automobile industry is continuously evolving; "look at the big picture and back in time, we started with the steam engine, we are now in the Internal Combustion Engine age; alternative fuels are going to be the future for transportation".

EVs: Infrastructure

To enable and encourage widespread consumer adoption and utilisation of EVs, an infrastructure with sufficient public recharging locations to afford drivers to opportunity to recharge their vehicle on a regular basis during the day will be necessary (Tanaka, 2009). This type of infrastructure will effectively increase the daily driving range of EV and increase its level of practicality and broaden its appeal to the end user. Public charging infrastructure could include opportunities for rapid recharging, either via fast recharge systems or via battery swapping stations that allow the quick replacement of discharged battery packs with fully charged battery packs.

The ESB have committed to install 3,500 charge stations 'juice points' in Ireland. 2,000 of these will be installed in the homes for the first 2,000 consumers to purchase EVs with the remaining 1,500 being installed strategically throughout Ireland. "There is momentum from the ESB and there certainly is a business plan behind it also". Another interviewee felt that the electric infrastructure is not available at the moment, but this is all going to change. Ireland does lack the infrastructure for the EV, but implementing the infrastructure should be possible. "It's just a case of adding the charging points to the existing stations ", but charging times and the cost of the EV are important factors. "Two important aspects for us are cost of the EV as well as the charge times". It is necessary to understand the obstacles facing electricity utilities**,** and the emerging EV industry. It is now essential to develop an understanding of the intermediary technologies that will aid the development of an EV charging infrastructure. It is only through gaining a comprehensive knowledge of the uses of these technologies that an efficient and viable Infrastructure will be established. Coupled with accurate projections of consumer charging behaviour and the subsequent effect on the grid, it is possible to plan the most effective uses of these technologies.

Challenges for the EV

The major concerns facing the EV industry is the driving range, top speed, and purchase cost of the vehicle (Leitman and Brant, 1994). Ultimately, the batteries will determine the cost and the performance of EVs. The only waste elements from the EV are its battery. According to (Rose, 2010; & Brooks, 2010), driving range is a crucial factor. Drivers who use their cars only for commuting and driving around town might manage quite easy—if there are sufficient charging points. There are the large numbers of commuters who regularly travel over 100 kilometres a day and this would create further problems— range continues to be an issue. "I would not be impressed about charging a vehicle. It's fine if you are doing short distances. If I was travelling a longer distance and had to stop every 80 km or so to charge it then, I would have an issue with this". Another negative is that the EV is a nice pleasant drive, but there is a safety issue that needs to be addresses due to the lack of drive train noise, "pedestrians will not hear the electric approaching".

It has emerged from this study that the cost of the EV is still expensive. Consumers will not benefit from the reduced savings on fuel savings, as people that drive short distances do not spend a substantial amount of money on fuel. "The cost of the EV is incredible; people are not going to reap the benefits of potential fuel cost savings. People that are driving short distances are not spending the money on fuel compared to those driving longer distances". The EV needs to be attractive. "I think that the EV needs to be more than just an unexciting quiet clean vehicle. The EV needs to be every bit as exciting if not more than the other vehicles". Now may not be an appropriate time to launch the EV with only few vehicle purchases. "The EV is being brought to market at the wrong time ".

Opportunities for the EV

According to Leitman and Brant (1994), the internal combustion engines are nearly at the end of their product / technological life cycle. As the technology for internal combustion engine declines, technological advances for EVs are only at the embryonic stage. Once lithium battery technology becomes the standard, EVs will be able to travel 300 to 600 miles. Unquestionably, the future looks bright for EVs because the best is yet to come. Rose (2010) states that there are several attractive reasons to purchase an EV, you won't be subject to road tax and you have 'done your bit' for the environment, and the more widespread adoption of the EV will help to reduce the cost.

Powered by lithium-ion batteries that can be recharged in just minutes, these nimble commuter cars might have a range of more than 180 miles, depending on the battery pack. For example, an EV with a range of 100 miles would cost less than one with a 200 mile range. Larger EVs probably will be plug-in hybrids that have a gasoline, diesel or an alternative fuel engine that combines the virtues of both electric motors and internal-combustion engines, and burns some form of renewable fuel. Hydrogen or methanol fuel-cell range extenders could follow in a decade or two. Ireland is a perfect location to operate a pilot programme and is continuing to develop the technology and infrastructure required. It is important that Ireland avail of the opportunity on the international stage to gain a competitive edge. Urgent action is required to ensure that Ireland will benefit from first mover advantage. "The EV technology will allow us as a nation to lead other countries". "The only choice that Ireland has to make is, do we want to lead with the EV revolution, or do we want to wait until someone takes the reins"?

The Future of the EV in Ireland

According to Dennis (2010), The Chevrolet Volt, and the Nissan Leaf were presented in select markets in 2010, and tens of thousands of people have their names on waiting lists to reserve one. Mitsubishi and Ford plan to debut their electric cars, and several other automakers are endeavouring to get into the EV industry as soon as possible. Dennis (2010) states that electric car advocates believe that as battery technology continues to advance, electric model prices someday will fall to the point that millions of people will be driving an EV. A significant finding supporting Rose (2010) is that "ultimately, it will be the price of petrol that will turn people to use electric cars". For now, we all need to be aware that the case for EVs depends on vast, profound changes being made to our lives. "The oil crisis is obviously getting worse. I think that when people get their heads around the electric car, people will gradually begin to drive it". Participants in this research believe that it is important for people to understand that there is "no quick fix".

RECOMMENDATIONS FOR PRACTICE

Ireland has to reduce its dependence on fossil fuels, and there is an increased urgency to further investigate alternative transportation. The EV is clearly an option to help reduce Ireland's dependence on foreign imported fossil fuels and will also help to reduce Ireland's GHG emissions. There are a number of obstacles that EVs must overcome to ensure that they succeed commercially. Successful business models will need to be developed to overcome these following obstacles: The monetary savings achieved by the fact that the EV does not require fuel can be used to offset the battery costs in a manner that may be much more acceptable to consumers. A car with a limited driving range (e.g.,150 km) will need to have ample opportunities to recharge its battery. Recharging stations will be needed at high-traffic locations such as train stations, shopping centres, and public parking areas. Rapid recharge or battery swapping systems may also be important, particularly on highways and along other routes where a quick recharge will be needed. EVs will best suit urban areas, because the technology is still developing and there is clearly an issue with the driving range and high cost. Eventually, mass production will help to reduce the cost of the EV. This study has exposed the fact that there is a lack of consistent information about EVs. The Government along with the automobile manufacturers need to outline a clear communication strategy to educate the consumer.

It is clear that there is increasing interest among customers for EVs. Manufacturers in conjunction with the government need to respond by stepping up efforts to bring these models to the marketplace alongside some of the latest-generation, fuel-efficient, petrol and diesel models. If a traffic restriction zone comes into effect in Dublin, for example, the only option might be driving the EV there. It is also evident that consumers are very price conscious due to the economic downturn. Therefore, the price of the EV needs to be introduced at an attractive launch price to consumers. It is also clear that people would like to be more environmentally aware. Due to the fact that the Government has set out an objective of 10 per cent of all cars to be run by electricity by 2020 in Ireland, the researcher recommends that the government have adequate support in place to ensure that this objective is reached to ensure the future success of the EV.

It is envisaged that 'EVs' will replace the internal combustion engine vehicles during the next two to three decades. This transport evolution will be driven chiefly by the decline in world oil production. Electricity from renewable energy and other sources will be the most feasible alternative fuel. These societal benefits come at high cost to the owner of EVs in terms of price, driving range, availability, loading capacity, speed and acceleration. In addition, the practicality of the EV is hampered by the lack of infrastructure for recharging. Overall such a product, given current practicalities, is not a very attractive product to potential customers. Beside supportive national policies, skilful marketing is needed to get it accepted and diffused throughout society. Automobile manufacturers need to demonstrate to people how the EV operates and performs as there is generally a lack of information and confidence about EVs in the market place. Manufacturers should offer demonstration fleets of EVs to afford people the opportunity to drive these vehicles. This would help drivers to become familiar with the EV. A training course would also help to ensure that useful data can be produced under realistic operating conditions.

CONCLUSIONS

This current research has established that the role of the EV is vital in defining the future of the automobile industry in Ireland. In the past decade, the automotive industry has started to change the way fuel is viewed. A multitude of exciting new technologies emerged, and among them are some very real and practical cars that are increasingly efficient and economical. This paper has examined the key elements of the 'EV in Ireland' as it is perceived now, and the issue of the over dependence on imported fossil fuels for the transport sector. The EV is still a developing technology and does require further development before it is brought to market. The previous negative perceptions of the EVs still resonates in consumer's minds, so there is a task to ensure that consumers understand that this generation of the EV is a reformed desirable product. Transport in Ireland has become unsustainable, primarily as a result of years of poor planning, leading in turn to an over dependence on the private car as a single means of transport. Technological development, infrastructure development, and consumer acceptance with appropriate measures will facilitate a more rapid uptake of EV technology in the future. The automobile industry is now forced to consider vital green and consumer issues and, if EVs are the future, it is fair to say that the future is still one governed by many uncertainties requiring clever executive thinking and forward governmental planning.

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