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SURVEY TO ASSESS THE BARRIERS TO WIDESPREAD ELECTRIC VEHICLE USE IN A MEDITERRANEAN ISLAND SETTING

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Abstract:

We reviewed the current state of electric vehicles registration, charging infrastructure, purchase incentive schemes, and electric vehicle price levels in Malta. At 169 out of 283,138 licensed passenger vehicles in the beginning of 2017, the number of electric vehicles remains low, especially in comparison to 90 public charging points put on the roads in an EU-funded project. We conducted a survey that was quantitatively sufficient to represent the population of residents aged 18 years and older, but was distorted towards respondents of higher educational level and previous electric vehicle experience. The survey revealed that an information campaign is required to stimulate the purchase of electric vehicles. The majority of respondents had never noticed any of the public charging points, while the overall top concern of respondents was the availability of charging points. Similarly, the third-ranking concern was the purchase price of electric vehicles, while an overwhelming majority did not know about the grant scheme now providing up to €8,000 for the purchase of an electric vehicle.

Keywords: electric vehicles, charging infrastructure, grant schemes, Malta

1 Introduction

The small European Union island nation of Malta has in recent years reduced its carbon footprint substantially by shifting electric power generation from oil to gas, and by commissioning an interconnector to Sicily (Weissenbacher and Muenchrath, 2014). Transport, the second largest sector in terms of greenhouse gas contribution, offers itself as another main target for decarbonization. In a previous study a model was devised to evaluate the potential of biofuels to reduce carbon dioxide emissions and to reach the mandatory EU 2020 goal of 10 percent renewable energy in transport (Lauri, Sant, and Weissenbacher, 2014). In a current study we attempted to assess the possibility to achieve a large electric vehicle fleet in Malta. This involved a review of policies to incentivize electric vehicle use in various countries, a cost-benefit analysis of introducing such policies in Malta, and an investigation to identify the reasons for the existing incentive schemes to fail triggering high or at least modest demand for electric vehicles. We are here reporting the results of a survey conducted to clarify the latter and to determine the perception and opinion of potential electric vehicle buyers.

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2 Methods

We reviewed electric vehicle registration figures, current electric vehicle prices, purchase incentives schemes, and the state of the charging infrastructure. We then conducted a paper and online survey, with the link to the online survey being sent to email addresses and social media platforms with local interest groups. Email recipients were encouraged to pass on the link to the survey platform. The survey distribution channels were chosen to achieve demographic variety within the overall respondent target group of residents 18 years and older. The survey was not limited to car owners or holders of a driver's license. This target group, or, in statistical terms, population, was calculated to be 338,086 based on the latest demographic review of 2014. The confidence level, i.e. the probability that the sample accurately reflects the attitudes of the population, was set at 95%, while the margin of error, reflecting the range that the population's responses may deviate from the sample's, was set at 10%. This way the sample size was calculated at 97. The survey consisted of 11 questions, nine of which were polar questions (yes/no questions), while the remaining two were multiple choice questions. It was avoided to use specialized language.

3 Results and Findings

With a population of 418 thousand people living on just 316 km² Malta is densely populated and exhibits features of a city rather than a nation. This is especially true for the principal island. There are well over 600 passenger cars per 1,000 inhabitants, which is a European Union top-ranking (Figure 1). Given that Malta had 283,138 licensed passenger vehicles in 2016 and some 151,300 households (2015 figure), there are about 1.80 passenger vehicles per household (and 2.4 motor vehicles per household if non-passenger vehicles are accounted for). Figure 2 shows the distribution between petrol and diesel vehicles, and the growth in such licensed passenger vehicles in recent years. In addition to the high car ownership, the Maltese car fleet is rather old. Figure 3 shows the age distribution of passenger vehicles in Malta between 2008 and 2015. Nearly half the cars are older than 15 years, while the average age of passenger vehicles in the European Union as a whole is about 8 years. This contributes to traffic-related air pollution (Figure 4), which adds to air pollution levels that exceed tolerable limits (Nieto and Weissenbacher, 2012; Farrugia and Weissenbacher, 2014).

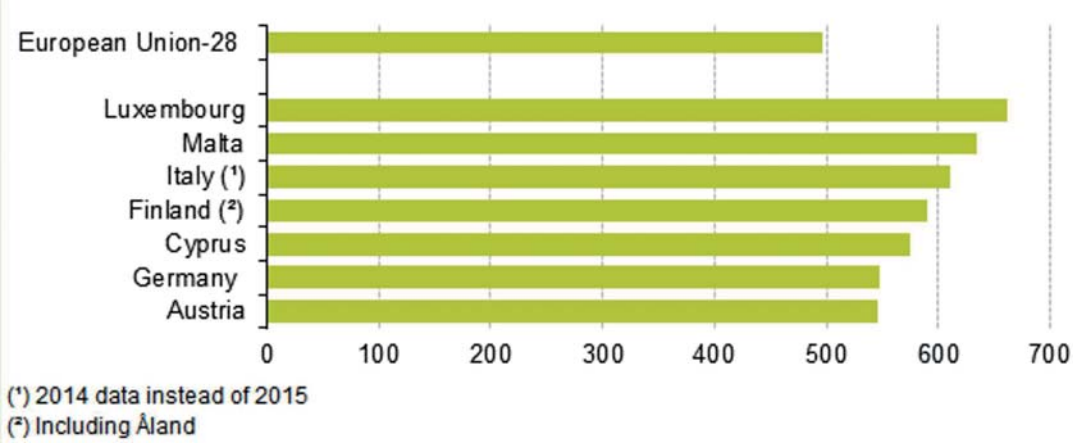

Figure 1: Number of passenger cars per 1,000 inhabitants in 2015. Graph: Eurostat.

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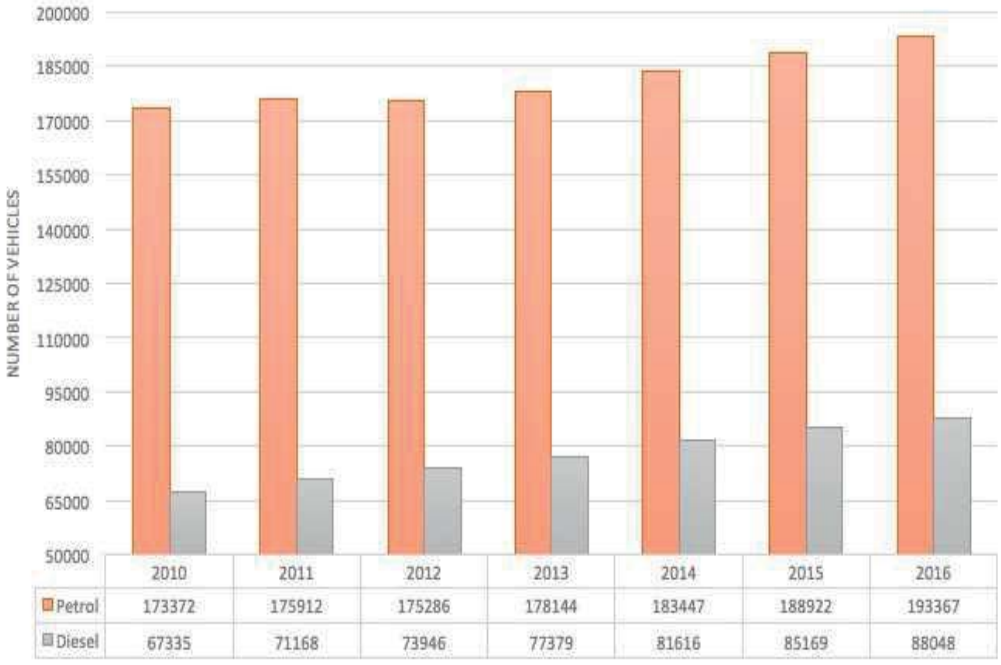

	2010	2011	2012	2013	2014	2015	2016
Petrol	173372	175912	175286	178144	183447	188922	193367
Diesel	67335	71168	73946	77379	81616	85169	88048

Figure 2: Number of petrol and diesel passenger vehicles in Malta, 2010-2016.
Data source: National Statistics Office, Malta, 2017.

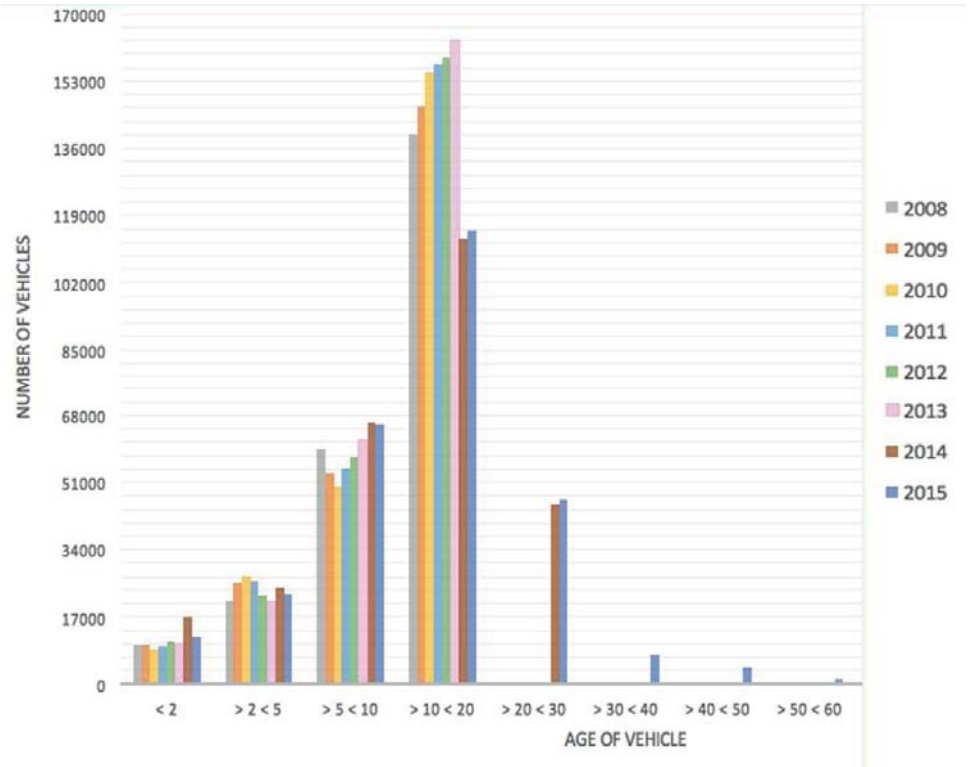

Figure 3: Age distribution of passenger vehicles in Malta 2008 to 2015.
Data source: National Statistics Office, Malta, 2009-2016.

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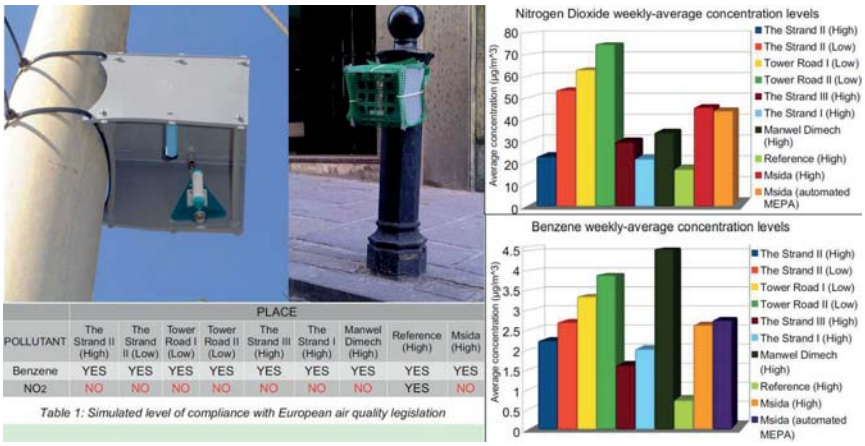

	PLACE								
POLLUTANT	The Strand II (High)	The Strand II (Low)	Tower Road I (Low)	Tower Road II (Low)	The Strand III (High)	The Strand I (High)	Manwel Dimech (High)	Reference (High)	Msida (High)
Benzene	YES	YES	YES	YES	YES	YES	YES	YES	YES
NO2	NO	NO	NO	NO	NO	NO	NO	YES	NO

Table 1: Simulated level of compliance with European air quality legislation

Figure 4: Measured concentration of air pollutants in Malta (Nieto and Weissenbacher, 2012).

With a 2016 per capita GDP of €27,900 (purchasing power adjusted) Malta remains below the EU-28 average of €29,100, and well below the income level of such countries as Austria (€37,200) and Germany (€36,000, all Eurostat data). Malta thus has access to quite vast European funding. Through five national programmes, Malta has been allocated €828 million (i.e. about €2,000 per capita) from European Structural and Investment Funds over the period 2014-2020. With a national contribution of €196 million, Malta has a total budget of €1.02 billion to be invested in various areas, including protecting the environment and improving health and well-being (European Commission, 2016). Through the LIFE+ programme, which is the EU's funding instrument for the environment and climate action, Malta part-financed the DemoEV project, which by August 2013 had installed 90 charging points on the islands. (50 pillars, 40 of which have two charging points.) The project also put 24 electric vehicles on the roads, and trained over 170 participants on the operation of electric vehicles. It was claimed that the project's market research activities showed a marked increase in overall positive perception on electric vehicles as a result of the project's activities (Calamatta, 2015). Figure 5 shows a charging pillar with one of the charging points occupied. As part of the project a website was set up that allows users to book charging times at the 50 pillars (Figure 6). However, whenever we checked the website, we only found very few pillars indicated as occupied. This is explained through the low number of electric vehicles on the roads. At the beginning of 2017, out of 283,138 passenger cars licensed in Malta, only 169 were electric vehicles (Figure 7). The electric vehicles share thus stood at less than 0.1%, and for every two battery electric vehicles on the road there was one public charging point. Notably, grant schemes have been available for the purchase of electric vehicles. A grant of €4,000 was provided for registering an electric car, which increased to €5,000 if a battery electric vehicle was registered while an internal combustion engine propelled vehicle of at least ten years of age was de-registered (Transport Malta, no date provided). In 2017, the grants were raised to €5,000 when registering a new or used electric vehicle without scrapping an older vehicle; and to €8,000 when registering a new electric vehicle and de-registering another vehicle, at least 10 years old (Transport Malta, 2017). A Nissan Leaf, a fairly typical compact electric car available with a 24kWh or 30kWh battery, costs about €26,000 in Malta when new, while used ones in a good condition can be imported for about €17,000 including delivery, Vehicle Roadworthiness Test (VRT), Average Daily Traffic (ADT) paperwork preparation, warranty and Malta registration tax. (In addition,

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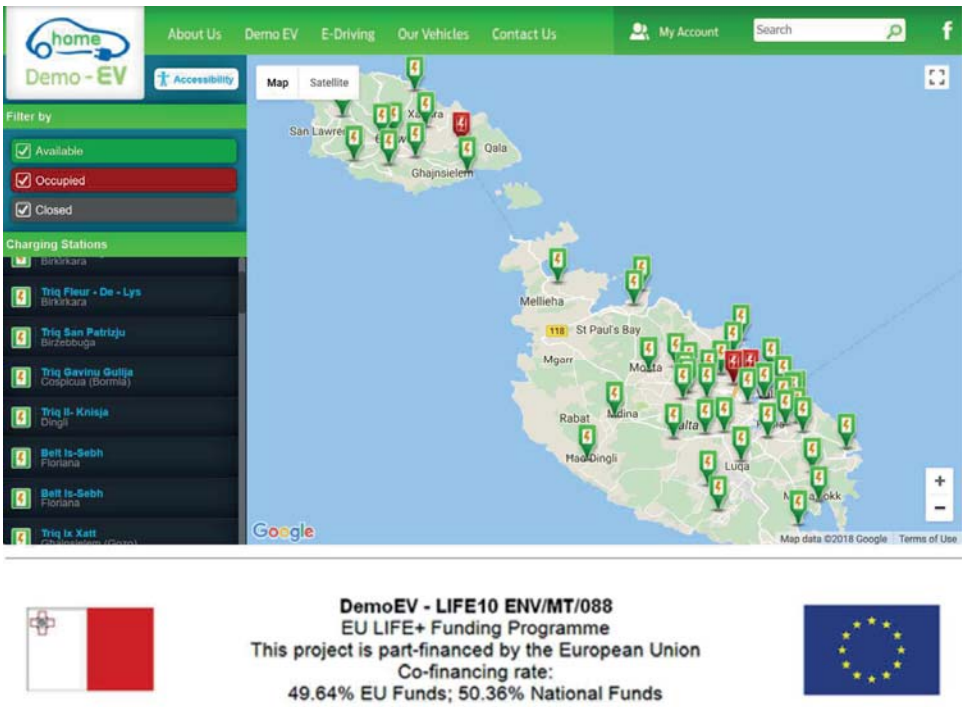
there is a €70 fee for the number plates and the road license of just €10 per year.) An €8,000 grant would bring the price of a new Nissan Leaf down to €18,000, while a new compact Toyota Auris with an internal combustion engine costs some €17,500 in the most basic configuration.

Figure 5: Electric vehicle charging pillar in Malta (Picture: Google Street View).



DemoEV - LIFE10 ENV/MT/088
EU LIFE+ Funding Programme
This project is part-financed by the European Union
Co-financing rate:
49.64% EU Funds; 50.36% National Funds

Figure 6: Screenshot of Demo-EV website, http://www.electricvehiclesmalta.eu/chargingstations

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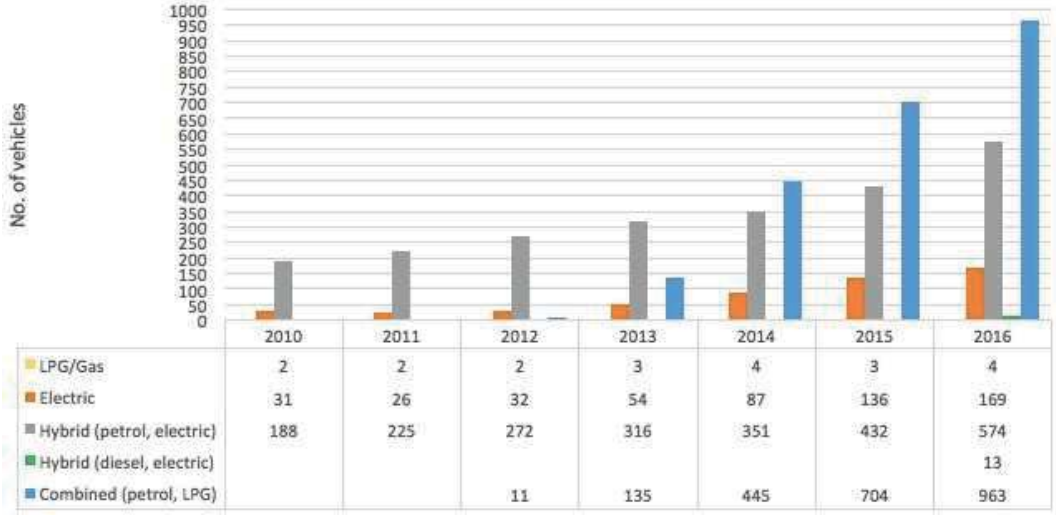

	2010	2011	2012	2013	2014	2015	2016
LPG/Gas	2	2	2	3	4	3	4
Electric	31	26	32	54	87	136	169
Hybrid (petrol, electric)	188	225	272	316	351	432	574
Hybrid (diesel, electric)							13
Combined (petrol, LPG)			11	135	445	704	963

Figure 7: Number of passenger vehicles with alternative fuels in Malta, 2010-2016.
Data source: National Statistics Office, Malta, 2017.

With regard to the survey, the demographics of respondents were as follows. Female respondents (54%) and male respondents (46%) were relatively equally represented. The median age was 30 years for female and 37 years for male respondents. (For comparison, the median age of the Maltese population as a whole is 41.5 years.) In terms of highest completed education, 2% of respondents stated primary, 19% secondary, and 79% tertiary. (For comparison, 32.3% of the Maltese population have tertiary level education.) The survey response revealed that half of the respondents use a car daily and that just over half of the respondents not using a car on a daily basis were women. Ninety percent of respondents considered pollution generated by road traffic as a problem. Of the remaining ten percent, most were non-users of cars on a daily basis. Notably, these respondents resided in areas of relatively low traffic volume (Pembroke, Swieqi and Mgarr). Over 85% of respondents had never driven an electric vehicle. Among those who had, there was only one woman. Close to half of the respondents had never considered buying an electric vehicle. Among men the share of those who had indeed considered such purchase was larger (65%) compared to female respondents (42%). Many of those who had considered buying an electric vehicle had previously driven one. A question regarding the main reasons of concern allowed for a choice of up to three answers out of the following: “The purchase price is too high”; “The driving range is not sufficient”; “The battery lifetime and its replacement costs”; “Maintenance costs”; “Charging takes too long”; “Availability of charging points”; “The resale value”; and “The technology”. The top-ranking concerns were 1. “availability of charging points”, 2. “the battery lifetime and its replacement costs”, and 3. “the purchase price is too high”. However, 85% of both male and female respondents indicated that they would consider buying an electric vehicle if the upfront cost would be the same as with a conventional car (internal combustion engine), and 78% stated that if they were to buy a car within the next two years, they would purchase an electric vehicle if it was economically possible. Only 26% of respondents knew about the grant scheme available for the purchase of electric vehicles, and only 35% knew that

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electric cars require the lowest registration tax and annual road license fee. Answering a question shown with a map that indicated the location of charging points, just over half of all respondents stated that they had not noticed any of the charging points on the streets of Malta. Regarding the most important benefit of electric cars, over 67% felt that this was that electric vehicles do not produce tailpipe exhaust. The second most important benefit (chosen by 14% of respondents) was that “It shows that the owner is an environmentally friendly person”.

4 Conclusions and Recommendations

Due to its size, insularity and local air pollution issues Malta offers potential to become an early adopter of widespread electro-mobility. Driving range anxiety is indeed absent, according to our survey, and the local environmental benefits of electric vehicles seem to be well known. However, with just 169 battery electric vehicles compared to 283,138 licensed passenger cars on the roads by the start of 2017, we have to conclude that providing a relatively extensive public charging infrastructure, as established by the DemoEV project, is not as such sufficient to trigger a transition within the given time frame. And although it might be argued that more than but a few years are required to see the full effect of such project, it is discouraging that the 2014-2015 increase in battery electric vehicles (49) slowed again to 33 between 2015 and 2016. This trend remains if additional battery electric vehicles are calculated as a percentage of additional petrol and diesel passenger vehicles. Our survey, in which holders of tertiary education were overrepresented, attracted a large share of respondents already interested in electric vehicles. Compared to the low observed electric vehicle registration (below 0.1% of the total), a large percentage of respondents (15%) had already driven an electric vehicle, which might in part be an achievement of the DemoEV project. Nevertheless, the installed charging stations remained invisible for the majority of respondents, and the top-ranking concern was the “availability of charging points.” Similarly, cost-related concerns ranked very high, while existing purchase incentive schemes were unknown to an overwhelming majority of respondents. We thus conclude that further information campaigns about measures already in place are required to promote electric vehicle use in Malta.

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