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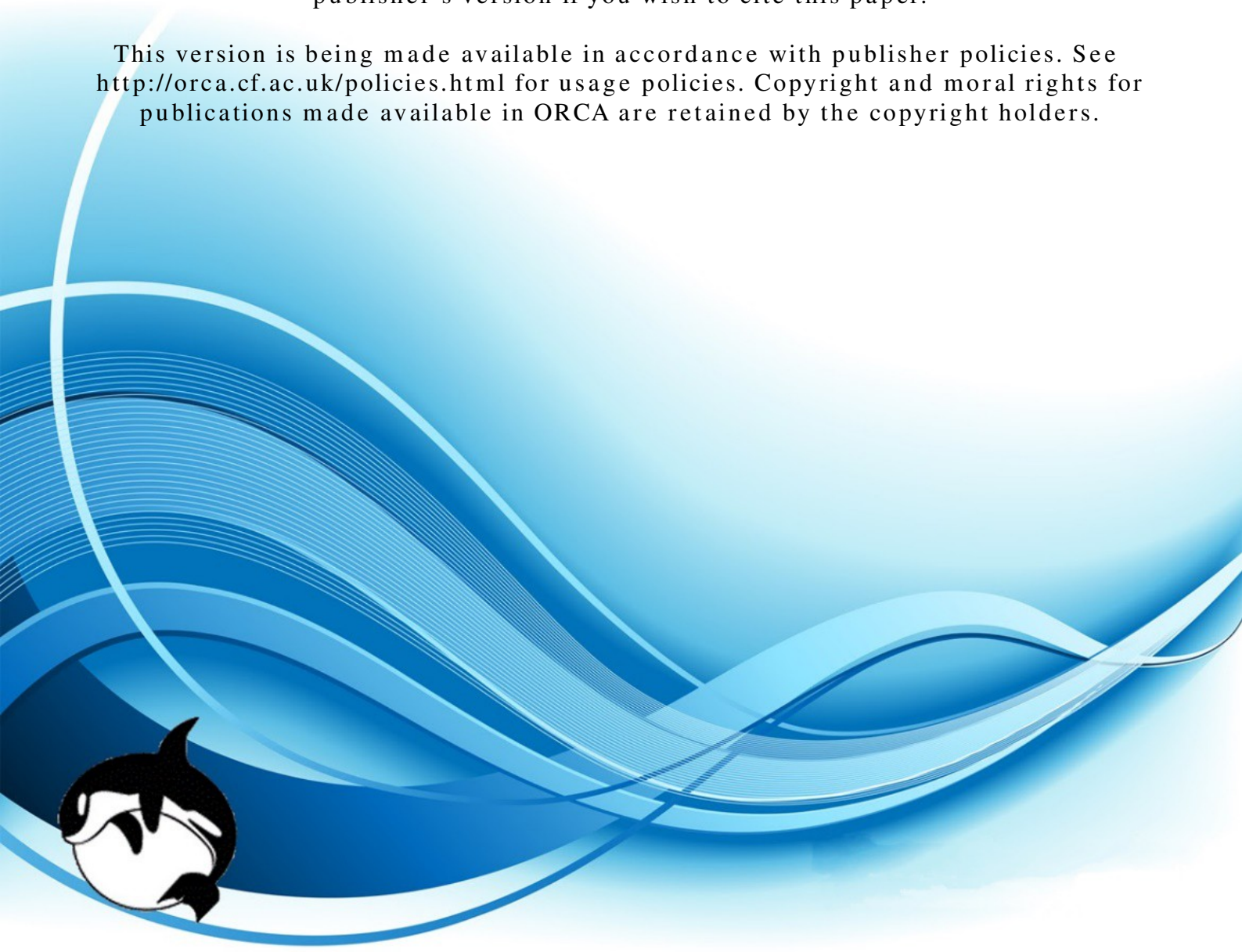

An exploration of electric-car mobility in Greece: A stakeholders' perspective

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Abstract

Following the directives set by the European Union, Greece is entering a transition phase towards electromobility. The presence of electric vehicles on the Greek market is currently low relative to other countries. The Greek government has recently established new legislation introducing financial and tax incentives towards electric vehicle purchase for both private owners and companies. This research investigates the perspectives of a group of stakeholders in response to this government initiative. Findings indicated that the financial and tax incentives set by the Greek government were a good first step towards the promotion of electric vehicles. However, aiming at an increased penetration rate of electric vehicles on the Greek market requires strategic allocation of public charging infrastructure and national coverage to enable electric vehicles to travel within and out of the urban core. Incentives should be also considerate of different socio-economic segments of the population to prevent inequalities and match their preferences. Also, the electricity provider should ensure that the network would be able to withstand the increased electricity demand that the public charging points and electric vehicles would require. Finally, successful transition towards electromobility would require promotion of electric vehicles as an act of environmental consciousness.

1. Background

The European Union (EU) aims to reduce its generation of carbon dioxide (CO_2) emissions from road transport by 60% until 2050 (European Commission, 2011). A follow up directive (2014/94/EU) mandates that an appropriate number of charging points for electric vehicles must be accessible to the public by 31st December 2020. The number of charging points for electric vehicles accessible to the public shall be established considering the number of electric vehicles that is estimated to be registered by the end of 2020 (European Union, 2014). In practice, EU member states should ensure that electric vehicles (EVs) can operate at least in urban and suburban agglomerations and other densely populated areas. In other words, EVs should circulate within the road networks determined by the national policy frameworks of each member state (European Union, 2014).

The EU has also introduced the term "Clean Vehicles" to include any light-duty vehicle (car or van) meeting the emission thresholds shown in Table 1 (2019/1161/EU; European Union, 2019). This directive has also set national targets for each of the member states for procuring clean vehicles, which correspond to a set minimum percentage of total number of vehicles registered. The targets are adjusted according to each member state's public expenditure on goods, public works, and services. This means that member states can independently distribute the effort across different local authorities and entities relevant to electric vehicles – for example, government, public charging station providers, local authorities, car sellers (European Union, 2019). In the case of Greece, the European Union mandates that between 2 August 2021 and until 31 December 2025, 25.3% of its vehicles should fall into the "Clean Vehicle" category. Following that period and until 31 December 2030, 25.3% of the country's vehicles need to be "Clean Vehicles" but with zero emissions (European Union 2019) (see, Table 1).

Table 1. "Clean Vehicles" as defined by the EU (source: European Union, 2019)

Until 31st December 2025	• No more than 50g/km of CO_2 emissions and • Up to 80% of applicable real driving emission limits for NOx and Particulate Number (PN)
From 1st of January 2026	• Only zero-emission vehicles • Any truck or bus using one of the following alternative fuels: hydrogen, battery electric (including plug-in hybrids), natural gas (both CNG and LNG, including biomethane), liquid biofuels, synthetic and paraffinic fuels, LPG

These targets are quite ambitious given that EV penetration on the Greek market has been low. Between 2008 and 2012, due to the global economic crisis and its impact upon the Greek economy, newly registered passenger cars in Greece fell year-on-year reaching a dip of -40% in 2012 (OECD, 2020). Since 2012, passenger car registrations have been exhibiting an upward trend reaching a maximum increase of +21.3% in 2014. However, over the period 2019-2020, EVs accounted for only 0.01% and Plug-in Hybrid Electric Vehicles (PHEVs) comprised 0.02% of the total Greek vehicle fleet, respectively (EAFO, 2020). As shown in Figure 1, from 2014 to 2020, there has been an (albeit cumulatively low) upward trend in the number of electric vehicles in Greece (EAFO, 2020). In 2020, there were 561 battery-electric vehicles (BEV) in Greece (see, Figure 1). Also, in 2020, there were 194 public EV-charging points; twice the number of points that were in operation in 2019 (EAFO, 2020).

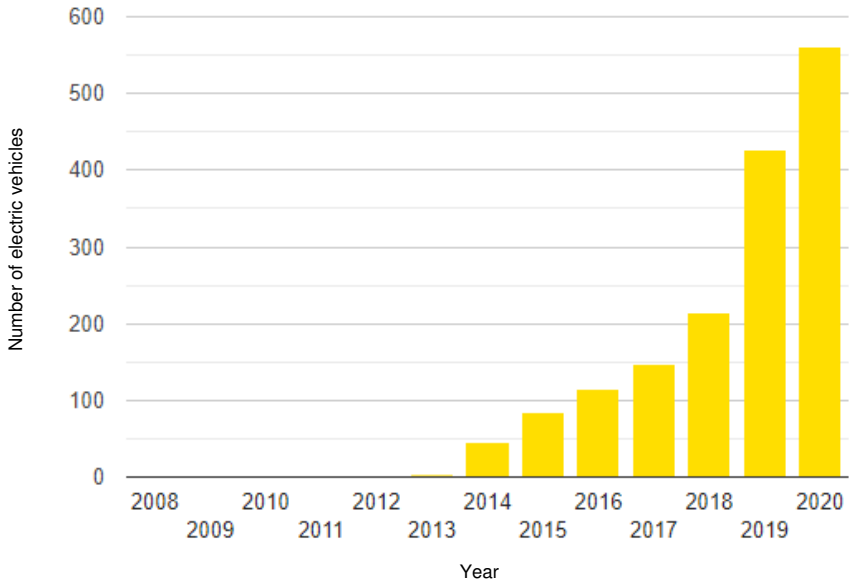

Figure 1. Total fleet of electric vehicles in Greece (Source: EAFO, 2020)

In 2020, Greece had an average of three electric vehicles per charging point, higher than the European average, which was equal to five electric vehicles per charging point (EAFO,2020). This number though cannot be used as an absolute representation of Greece's public EV charging infrastructure as the number of EVs remain low. For example, in Norway, the country with the highest market penetration of EVs worldwide, 36406 EVs have been registered in 2020 comprising 45.6% of the new car registrations (Global EV Outlook, 2019) compared to Greece's only 211 newly registered EVs, which correspond to only 0.4% of its market share (EAFO,2020). There were only four "fast charging" points per 100 kilometres of highway in Greece. This number is considerably lower than Europe's average, which is 39 and Norway, which has 833 "fast charging" points per 100 kilometres of highway, respectively. It is worth highlighting that Norway also has a smaller highway network of 523 kilometres compared to Greece's 2309 kilometres. (EAFO,2020).

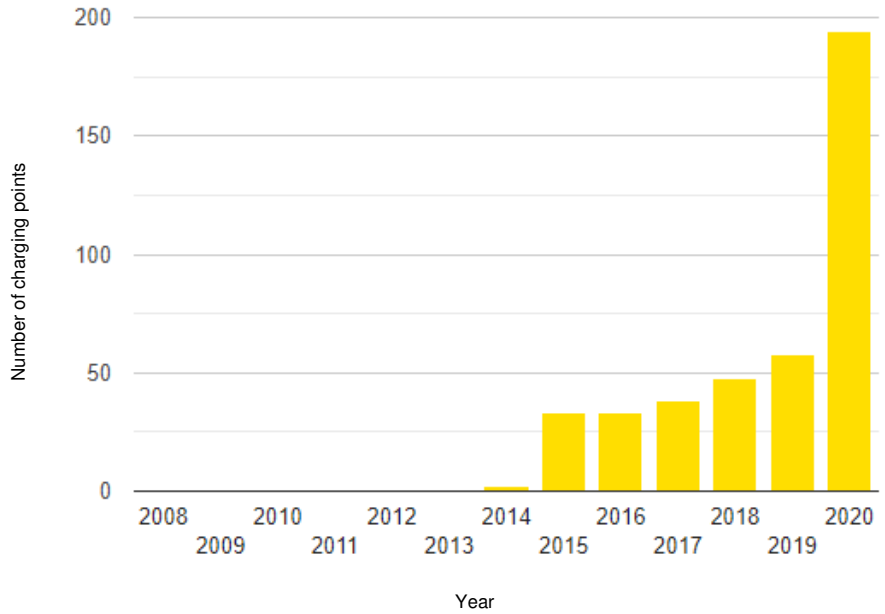

Figure 2: Total number of public charging points in Greece (Source: EAFO 2020)

To date, stimuli towards EV purchase are available across 26 out of the 27 European Union member states. Uniformly, 20 member states offer incentives to potential private buyers of electric vehicles, although Belgium, Bulgaria, Cyprus, Denmark, Latvia and Malta do not provide purchase incentives (European Automobile Manufacturers Association, 2020), they do offer tax benefits or exemptions. On the other hand, Lithuania is the only member state that does not provide any tax benefits or incentives at all and the Czech Republic offers no incentives for private owners. A summary of the financial incentives for electric vehicle purchase for private owners is shown in Table 2. Song and Potoglou (2020) also provide a detailed discussion on monetary and non-monetary policies related to EV adoption through their review and international comparison.

Table 2. Financial incentives for electric vehicle purchase for private owners in Europe (Adapted from: European Automobile Manufacturers Association, 2020)

One-off subsidy to purchase an electric vehicle	**Country**
• €1000 to €3000	Austria, Romania
• €3001 to €5000	Ireland, Spain
• €5001 to €9200	Croatia, Slovakia, Slovenia, Sweden
• €1500 - €9000 for prices up to €40000	Germany, Hungary, Poland, Portugal,
• €2000 and €7500 for prices up to €60000	Germany, France, Finland, Estonia, Italy, United Kingdom, Hungary
Tax incentives	**Country**
• Tax allowance on registration fees €5,000. • EVs also pay the minimum rate of the annual circulation tax.	Luxemburg
• EVs are exempt from VAT and import excise duties	Iceland
• EVs are exempt from paying registration tax. EVs are exempt from motor vehicle tax up to and including 2020	Netherlands

On 17 June 2020, the Greek Ministry of Environment and Energy introduced new legislation and announced financial, tax and charging-point-installation incentives to encourage uptake of EVs (see, Table 3; Greek Ministry of Environment and Energy, 2020). These incentives were aimed at both private car owners and companies interested in acquiring, replacing or disposing their old cars. The regulations set by the European Union and the response by the Greek government offer an excellent opportunity to explore stakeholders' views and obtain a better understanding of the early development of electromobility in Greece. This study seeks to answer the following research questions:

a) What are the stakeholders' views on the potential development of electromobility in Greece against the newly introduced legislation in the country?
b) What are the stakeholders' views on the electric vehicle incentives introduced by the Greek Government and what role would they have to play to support the electric vehicle market in Greece?
c) Would Greece manage to achieve a significant market penetration of electric vehicles to take advantage of their benefits (e.g., reduced local air pollution and noise)?

Table 3. Electric vehicle incentives set by the Greek Government (Adapted from Greek Ministry of Environment and Energy, 2020)

<table>
<tr><th></th><th>Subsidy for EV purchase</th><th>Additional subsidy for disposing old vehicle</th><th>Subsidy for EV charger installation</th><th>Free parking from 2021-2023</th></tr>
<tr><td>Private car owners</td><td rowspan="2">15% of the purchase price or up to €5.500</td><td>€ 1000 subsidy</td><td>€ 500</td><td>✓</td></tr>
<tr><td>Companies</td><td>Not applicable</td><td>30% against the value of the charger
or
50% of the value of the charger when it is installed for public use by the company
or
70% of its value for island-based companies</td><td rowspan="3">Not applicable</td></tr>
<tr><td>Light trucks and vans</td><td>15% of the purchase price or up to €5,500</td><td>€1,000</td><td>Not applicable</td></tr>
<tr><td>Taxis</td><td>25% of the purchase price or up to €8,000</td><td>€2,500</td><td>Not applicable</td></tr>
</table>

2. Methods

In light of the newly introduced legislation on EVs, this study aimed at capturing stakeholder views in response to the incentives towards purchasing of EVs and installation of EV charging points. The method chosen for collecting the required qualitative data was semi-structured interviews. Interviews offered a flexible and fluid structure in the discussion of topics, helped capture views and gain insights from the perspective of a heterogenous group of participants (Merton et al., 1990; Robbins et al., 2007). The interviewees could answer freely on the subject and express their opinions based on their own understandings (Lewis-Beck et al., 2004).

Qualitative data were collected using the interview protocol shown in Table 4. The interview questions covered three themes: 'the electric vehicle market', 'electric vehicle purchase incentives' and 'electric vehicle charging infrastructure'. All themes and topics were discussed with participants with only slight adjustments and in line with participants' affiliation and area of expertise. For example, one question for Interviewee 1 was: "what are the initiatives and the strategy that will be followed for the promotion and the establishment of electromobility at a local authority level, and the municipality of Athens, in particular?" whereas the same topic was adapted for Interviewee 2 and was introduced as: "following the voting of the government's bill considering electromobility, what is the timeframe that has been set by the Ministry for the start and the implementation of the measures in order to reach a sufficient level of infrastructure in Greece?" (see, Supplement for full list of questions).

Table 4. Themes and topics of the interviews

Theme	Topic
Electric vehicle market	EV market share, EV promotion, EV long-term establishment, EV penetration, affordability
Electric vehicle purchase incentives	EV incentives in Greece, effectiveness of the EV purchase incentives, EV market, EV promotion, affordability
Electric vehicle charging infrastructure	Development of charging infrastructure, positioning public charging points, accessibility, and affordability of public charging infrastructure

Participants were approached directly or were recommended by the researchers' academic and professional network. All participants were based in the wider region of Athens, the capital of the country where 30% of its population resides (Hellenic Statistical Authority, 2011). As shown in Table 5, respondents were relevant to the EV market, policy and decision making and charging infrastructure. Participants included representatives from car companies as they could provide valuable information on the electric vehicles and their penetration on the Greek market. Charging point companies were also contacted as these interviewees could provide insights on the development of the EV charging infrastructure. Finally, stakeholders from government and the institute of electric vehicles were approached as they were involved in the legislation and the decision making about EVs.

Table 5. Interviewees, their affiliation, and roles

Interviewee	Affiliation	Role	Interview Duration
Interviewee 1	Municipality of Athens	Mayor	20 minutes
Interviewee 2	Ministry of Environment and Energy	General Secretary	18 minutes
Interviewee 3	Car import company	Electromobility manager	1hour and 10 minutes
Interviewee 4	Car import company	Public relations and corporate affairs	22 minutes
Interviewee 5	Electric vehicle institute of Greece	President and EV owner	24 minutes
Interviewee 6	Charging station supply company	Business development director	21 minutes

The interviews were conducted between 14 July and 14 September 2020. In total, six interviewees participated in this study. One interview was conducted face-to-face and the others were conducted via telephone or Skype. Although telephone interviews are less popular for semi-structured interviews than face-to-face interviews (Opdenakker, 2006), they are an effective and flexible data-collection method (Carr and Worth, 2001, p. 521). The latter was especially the case in our study as interviews took place during the COVID-19 pandemic restrictions and the requirements for social distancing were in effect. The interviews were conducted in Greek, were transcribed, and then translated in English. The qualitative data were thematically analysed.

3. Results and discussion

3.1 Stakeholder perceptions of the electric vehicle market in Greece

Participants stated that over the last five years the EVs market is showing signs of growth. Interviewee 1 stated that "the predicted reduction of purchase prices would also help the electric vehicle market". Interviewee 3 stressed that *"until July 2020, we are noticing an increase of 110% in sales in the EV category compared to last year. But we are also expecting a further increase in the following years"*. Interviewee 4 was also optimistic on the future uptake of electric vehicles in Greece stating that *"the penetration of electric vehicles on the Greek market is expected to steadily increase. Combined with the flexibility and low transport costs that electric vehicles offer as well as the financial and tax incentives set recently by the government, our expectations are positive, and we believe that electric vehicles will gain a significant share of the Greek market in the future".* A positive sign, according to Interviewee 3, was that "[…] *consumers in Greece are now well informed about electric vehicles themselves and that the trend these days from both the consumers and car manufacturers is electromobility*".

There is also an ongoing effort from the perspective of different entities relevant to the car market (e.g., car import companies, charger point providers, car dealerships) to contribute towards the uptake of electric vehicles. Different offers exist to potential electric vehicle buyers including free public charging and discounted house charging programmes. For example, Interviewee 4 stated that *"amenities and benefits are offered as well as digital support with applications and services which make the transition to an electric vehicle easier".*

Many interviewees, however, recognised that there exist limitations that turn consumers away from electric vehicles. Interviewee 3 mentioned that *"limitations have to do with the driving range, the price as well as the infrastructure surrounding electric vehicles"*. Interviewee 5 also argued that "[…] *in addition to incentives, further actions need to be taken by the government to address these limitations; otherwise, the incentives scheme will be of no use*". Interviewee 3 mentioned that "*even though there are positive signs on the electric vehicle market, electric and plug-in hybrid vehicles only exhibit a c.1.2% share of the Greek vehicle market".*

A consistent statement amongst all participants was that another limitation was that most of the electric vehicle owners do not purchase them as an act of environmental consciousness but as an act of trying out a new technology. This finding was in line with previous research. In Norway, for example, Ryghaug and Toftaker (2016) found that for a long-term adoption of electric vehicles to be achieved it is important for buyers to consider electric vehicle as an environmental technology of high value to society. Interviewee 2 mentioned that "[…] *following an attitude of environmental consciousness combined with the education towards the younger generations on how the environment can be protected, within the next 10 years the perception of the consumers and their choices on transportation would have changed moving on to a greener behaviour*". Interviewee 6 also stated that "*to establish electric vehicles and make them more accessible, car manufacturers should try and offer electric vehicles at equal prices as regular combustion engines. Electromobility by itself is nothing more than a ring of a bigger chain, which has to do with our perception of our ecosystem and how we understand our relationship with the environment".* Interviewee 1 was optimistic for this cultural transition stating *"newer generations are way happier to deal with the task of protecting the environment"*. These findings were in line with Skjølsvold and Ryghaug (2020) who suggested that there are potential benefits in actively supporting communities that engage with ideas around electromobility that are considered out of the ordinary. These communities might achieve a change in perception and culture away from the traditional methods used to commute and travel but towards environmental consciousness.

3.2 Stakeholder reactions to electric vehicle incentives

All interviewees were in favour of the Greek government Bill that was recently introduced to support EV adoption with financial and tax incentives and deployment of EV charging infrastructure. They all highlighted that this was a necessary first step on behalf of the Greek government. The Bill places exclusive responsibility upon the Ministry of Environment to handle business-cases for electromobility in Greece; in particular, a special division responsible for all the cases and the legislation around electromobility is now housed within the Ministry. Interviewee 5 agreed that this consolidation of responsibility within government: *"[…] cures an important problem, which was the endless bureaucracy and co-responsibility for the matter of electromobility across different ministries in Greece*". While such an initiative points towards the right direction, there may be further issues to be addressed regarding the governance of elements that fall within the jurisdiction of another ministry. For example, the decision-making on fuel taxes, which falls under the responsibility of the Ministry of Economics.

All participants were optimistic that these incentives would encourage uptake of EVs in Greece. For example, Interviewee 1 stressed that the reason the Greek government initiated the Bill for EV purchases was that Greece is far behind in this sector compared to other European countries in terms of the number of EVs on the road. Also, Interviewee 4 felt that the package of incentives summarised in Table 3, were "*undoubtedly an important motive for the electric vehicle market, especially for private owners*". Interviewee 3 reported that within the first 15 days following the introduction of the Bill and the accompanied incentive schemes, there were 250 applications for subsidies towards EV purchases. This would mark an approximately 50% increase in the number of EVs in Greece, as there were only 561 EVs registered in the country by the end of 2020 (EAFO, 2020). Interviewee 3 also claimed that these numbers showed an optimistic trend as "[…] *these applicants had been waiting for months to apply for these subsidies*".

Financial subsidies and tax incentives are core mechanisms to encourage EV uptake and are seen positively by potential buyers and vehicle owners (Gómez Vilchez et al., 2019; Song and Potoglou, 2020). Santos and Davies (2020) also reported that stakeholders across Germany, Austria, Spain, the Netherlands and the UK agreed that financial and tax incentives would have a positive impact on EV market penetration. The authors collected stakeholder perceptions using Likert-scale and open-ended questions through an online survey questionnaire distributed to 143 experts. Also, Aarestrup and Odeck (2015) recognised the increase in the use of electric vehicles and Norway's highest number of electric vehicles per capita in the world to be the result of multiple economic incentives including tax benefits and charging subsidies. Finally, Pasaoglou et al. (2016) also found that subsidies for EV components encouraged a shift from conventional internal combustion vehicles to EVs. Their study was based on an agent-based simulation model at the European level.

On the other hand, Interviewees 3 and 6 expressed their reservations as to what extend financial and tax incentives would facilitate wider electric-vehicle market penetration on the Greek market. This was in line with Harrison and Thiel (2017) who reported that subsidies benefit available electric vehicle technologies in the short term (up to 5 years) from the time the subsidies have been set, even in the absence of other policies. Longer duration of subsidies did not achieve a significant impact in the electric vehicle sales. They can provide market impetus in the beginning but market growth beyond initial deployment needs to be sustained by market mechanisms. The authors also reported that offering electric vehicle

purchase incentives before all the relevant required infrastructure is ready might lead to technology lock-in and inhibit long-term maturity of less developed technologies (Harrison and Thiel, 2017).

The participants in our study also agreed that even though currently owning an electric vehicle is a privilege. Interviewee 3, for example, stressed that *"*[…] *the subsidies offered are not such that will make electric vehicles cheap, they just make them more affordable; they still do not compete with the prices of conventional cars. This means that electric vehicles are only affordable to a minority of the Greek consumers"*. This was in line with, for example, studies by Trommer et al. (2015) in Germany and Mohammed et al. (2016) in Canada who also concluded that private users of electric vehicles were predominantly educated individuals who were employed and had higher than average income. On the other hand, they argued that socioeconomic and demographic factors alone cannot offer a full picture of the electric vehicle market, as individual beliefs were also important, and the intention of the potential buyers must be understood further. This is an important point also raised by scholars who have argued that EV tax incentives alone may be less effective for some socio-economic groups and thus may contribute to increased inequalities (Gómez Vilchez et al., 2019). For example, Sovacool et al. (2019) argued that electric mobility may only be 'accessible to the rich' thus 'eroding elements of distributive justice'. Their evidence was based on semi-structured interviews with 257 expert participants across Denmark, Finland, Iceland, Norway and Sweden.

Other policy initiatives to encourage EV penetration in a more balanced (equality-oriented) approach may involve, for example, penalizing manufacturers based on their fleet carbon emissions to minimise cost-transfer across stakeholders (Thomopoulos and Harrisson, 2016). Morton et al. (2017) also reported that financial incentives and information provision may be ineffective across all segments of potential buyers as their "preferences may be motivated by different factors". The authors recommend the development of initiatives and government strategy to be tailored upon the profiles of the buyer segments (i.e., the 'submarket level') and the population's mobility needs. Another option would be the recommendation by Harrison and Thiel (2017) who argued that the use of long-term emission target regulations may be a necessity for a successful technology transition to electromobility.

The incentives package in the newly introduced Greek legislation also includes initiatives to financially help local authorities and private companies. Also, financial incentives will be offered to private companies to install charging points (see, Table 3). Local authorities can also independently introduce measures to promote electric vehicles. Interviewee 1, for example, stated that 'the municipality of Athens is planning on offering free parking spaces to electric vehicles on designated parking spots around the city where conventional vehicles would have to pay starting in January 2021 and for a period of two years'.

Finally, interviewees were optimistic that improvements to the incentives for electric vehicles would be inevitably adjusted over time. Interviewee 6 mentioned that 'it would be ideal to retain the incentive scheme for electric vehicles until the price of an electric vehicle would be almost equal to the price of a conventional vehicle of the same size category'. Interviewee 6 also asserted that 'price parity between conventional and electric vehicles could take place around 2022-2024'.

3.3 Stakeholder perceptions to the electric-vehicle charging infrastructure in Greece

The important relationship between wider market penetration of EVs and the charging and electricity infrastructure were highlighted by all participants. This finding was in line with Sierzchula et al. (2014) who suggested that the financial incentives set by a government and the charging infrastructure were strongly associated with the penetration of electric vehicles. Participants in our study, however, expressed concerns that an increase in the market penetration of EVs would require adequate charging infrastructure to support this shift. They argued that the current state of charging infrastructure aimed at supporting electromobility in Greece is not ready to face the expected increase of electric vehicles. Interviewee 3 stated *"[…] electric vehicles cannot be sustained by themselves; they are part of a broader network"*. Interviewee 3 also stressed that *"many years are required and something big has to happen infrastructure-wise where we can eventually say that electric vehicles have a considerable share within the Greek market"*. He also added that *"first the electric vehicle charging infrastructure network should be present, and then electric vehicles can follow. There should be a core public charging network so electric vehicle charging can be supported".* This view contradicts Harrison and Thiel (2017) who argued that to achieve a success of infrastructure provision other measures and policies such as financial incentives need to be successful.

Another aspect that was stressed was the development of public charging infrastructure throughout the country to enable long-distance travel. Interviewee 6 mentioned that "[…] *currently, the ratio between the available public charging points and the number of electric vehicles on the road is amongst the highest in Europe*". This, however, is due to the very low number of electric vehicles in Greece. In 2020, there were 150 public charging points in the country. The absolute number of chargers appears adequate, but the development of the network cannot offer national coverage that would allow intra-urban travel by electric vehicles or simply to travel outside the urban core.

The importance of installing "fast chargers" for public use, especially across the national road network was also mentioned by all interviewees. "Fast chargers" significantly reduce charging times and are an important aspect of the charging infrastructure. Interviewee 5 stated: *"without having enough of these types of public chargers, electric vehicles cannot be used across the motorway network of Greece and no one will choose EVs for long-distance journeys"*. However, Interviewee 5 recognised the challenge around the development of fast-charging points due to the high investment and maintenance costs. This finding was also in line with Yilmaz and Krein (2013) who argued that there is a significant cost in investing in charging points with maintenance of these points being an additional cost factor.

Most interviewees argued that EV charging currently cannot adequately take place outside the users' home or work. Interviewee 3 stressed that *"the national electricity provider has announced that 1000 charging points will be installed but they haven't announced where are they going to be placed"*. On the other hand, Interviewee 2 mentioned that "*there is a programme, which will give to different municipalities the ability to conduct allocation studies for public charging points*". Currently, such studies are taking place to address the issue of charging point allocation in the country (e.g., Karolemeas et al., 2021).

As the range of electric vehicles is increasing and electric vehicles would potentially support travel for all trip purposes, public charging points should be strategically placed to make the use of electric vehicles across the country. Interviewees 3 and 5 highlighted that the number of public charging points is important, but it is more important to pay attention on where these chargers are going to be installed. These statements were in line with Sierzchula et al. (2014) who argued that the installation of the required charging infrastructure must be carefully planned to be as efficient as possible and cover user needs.

The low numbers of electric vehicles in Greece do not make a strong business case for a private investment opportunity. Interviewee 5 suggested that "*the government should be responsible for the public charger instalment and allocation and then after the infrastructure is developed, try to attract investment from private companies active in car services or the oil and energy industry".* Responding to this point, Interviewee 1 stated: *"we are starting as an early phase with 40-60 electric vehicle chargers across Athens, which at the beginning will be available for free and will continue to expand our charging network"*.

The development of the infrastructure and the expected increase in the number of electric vehicles would inevitably cause a considerable increase of load to Greece's national electricity network. Interviewee 1 stressed that *"the first thing that matters is if the electricity network could sustain all the electric vehicle chargers that are going to be installed simultaneously"*. Interviewee 2 stated that *"there is already a plan being submitted from the Handler of Greek Network and Distribution of Electric Energy (HGNDEE), which is aimed to support the network of electricity distribution with medium-voltage stations in order to enable public charging points"*. Medium-voltage stations operate between 1 kilovolt and 35 kilovolts (IEEE,2002). Interviewee 2 stressed that the instalment of fast chargers would be a potential threat to the network as they require a lot of electric power within a very short time.

4. Conclusion

This study contributes to an increasingly growing body of knowledge regarding the electric-vehicle mobility. While electric vehicles in some countries have now an established share on their vehicle market, several other countries are only now commencing their efforts towards an electric mobility shift; Greece is one of the latter examples. Motivated by the current European Legislation, in 2020, the country introduced its first Bill along with a package of incentives to encourage a shift from conventional to electric vehicles. The government initiatives to enable wider introduction of EVs on the Greek market are in line with initiatives across other countries (Tsang et al., 2012; Song and Potoglou, 2020).

The aim of this study has been to capture the stakeholders' perspectives and gather this evidence in support for any future (and hopefully) more rapid developments towards electrification of the fleets in Greece. Our study was aimed at shedding light on what this Bill would potentially mean, especially regarding its effectiveness and the potential areas for improvements from a stakeholder perspective. Therefore, the focus has been on the key elements of the Bill; financial incentives and the charging infrastructure. Further work could also explore measures beyond what is specified in the Bill such as further taxation on petrol/diesel vehicle registration and fossil fuels. However, such 'stick' initiatives may be met with unease by current conventional vehicle owners who cannot afford an electric car (Munoz, 2019).

Our findings indicated that all stakeholders in this study recognised that the financial and tax incentives for electric vehicle purchase introduced by the Greek government were an important initial step towards the electric mobility on the Greek roads. Input from interviews was in line with evidence in the current literature that additional measures should place emphasis on raising the profile of electric vehicles as 'environmentally friendly' options and enhancing the charging infrastructure that would address electric-vehicle user needs and support electric mobility. Greece needs to develop its public charging infrastructure, to make the use of electric vehicles feasible within and outside the urban cores as most electric vehicle users currently charge their cars at home or their workplace.

This is the first exploratory study within a pre-mature EV market in Greece, which aimed at capturing initial reactions to a new legislation offering the first set of incentives to potential

buyers and deployment of EV infrastructure. One limitation of this work is the relatively small and heterogenous group of stakeholders who participated in the study. COVID-19 restrictions prevented us from accessing a potentially wider number of participants and conduct face-to-face interviews. Having established a precedent communication with participants, future work will aim at expanding the number of respondents and monitor their views and reactions regarding deployment of EV infrastructure and as sales evolve. Despite these limitations, the EV market is only now emerging in Greece and the collected evidence does provide a first set of reactions against government initiatives to promote EVs. Also, the interviews did reach a level of saturation regarding stakeholder views and reactions to the Bill (Creswell, 1998).

The introduced legislation unfortunately coincided with the emergence of the COVID-19 pandemic, which may present additional challenges and impacts upon accelerating EV market penetration in Greece and worldwide. The current evidence of the car market presents a mixed picture, which would be hard to project in the medium- and long-term. For example, new car registrations across Europe were down by -79% in April 2020 when compared with 2019 registrations (ICCT, 2020). However, the market significantly recovered experiencing an overall drop of -25% for 2020 relative to 2019. In the meantime, EV sales exhibited an overall increase capturing 11% of new vehicle registrations in 2020 (vs. 3% in 2019; ICCT, 2020). The wider impacts of COVID-19 pandemic upon the car market and the EV penetration in the medium- and long-term opens a new area for future monitoring and research.

Finally, our findings suggest that the Greek government could retain the financial and tax incentives for electric vehicle purchase until prices of electric vehicles are comparable with their conventional equivalents and until sufficient public charging infrastructure is deployed. Having said that, it is also important to conduct exploratory studies to identify potential-buyer segments and investigate their preferences, as prior evidence has indicated that these preferences may differ significantly (Morton et al., 2017). As a result, a package of incentives beyond subsidies and tax relieves should be flexible to match the profile-segment of potential buyers and the needs of the electric vehicle market. More generally, future studies should place emphasis on countries that are currently falling behind the electric-vehicle market penetration by exploring new ‘business models’ of EV ownership and use (e.g., Liao et al., 2019).

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