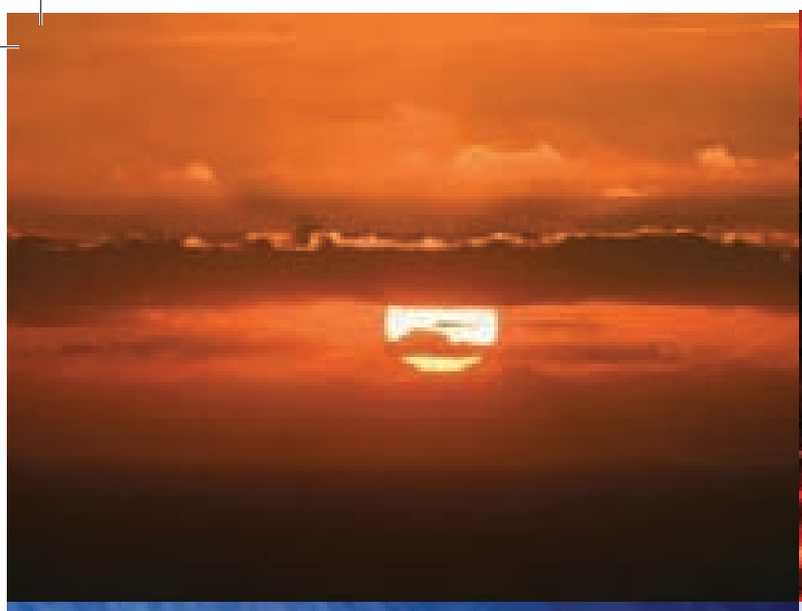
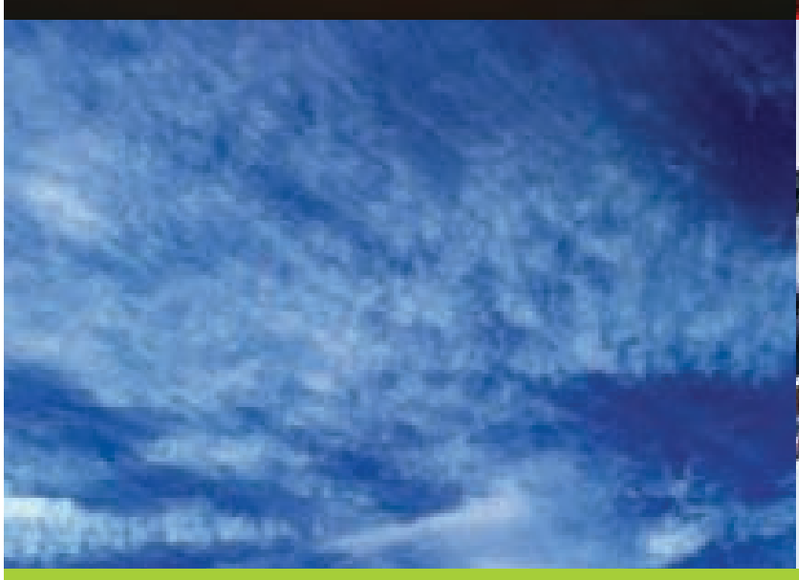
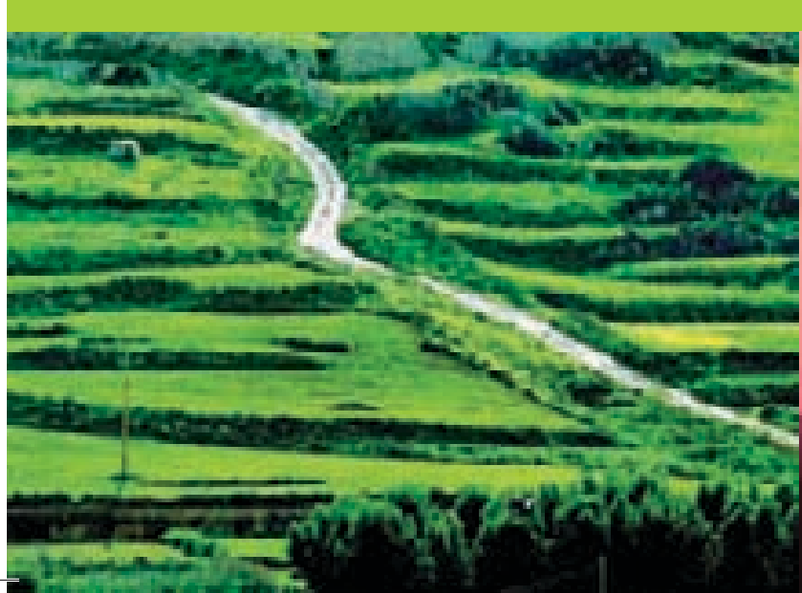




Malta National Electromobility Action Plan

November 2013

MNEP
Malta National Electromobility Platform



Contents

The Malta National Electromobility Action Plan

November 2013

Photography courtesy of Peter Paul Barbara

Foreword

According to the latest National Greenhouse Gas Emissions Inventory for Malta 2013, road transport currently accounts for 16.9% of the total greenhouse gas emissions generated in Malta.[1] This Government finds this figure alarming and unacceptable. It is the aim of this Government, therefore, to work towards making transport in Malta environmentally sustainable.

To achieve this, Government has placed the electrification of Maltese transport as one of its main pillars in its transport policy. As was indicated in the 2014 Budget Speech, Government will also be studying the feasibility of additional transport services which, so far, were not considered by previous administrations. We believe that an underground system, light rail, monorail and other related services intended for mass transit might greatly improve the efficiency of public transport in Malta. However, we also want transport to be cleaner, less polluting. It is to achieve this aim that Government will be looking into introducing the concept of the polluter-pays-principle in the transport sector. Through this principle, both transport users and transport operators would be incentivised to opt for cleaner transport.

The Electrification of transport will be implemented in a planned and phased manner. Introducing measures based on the polluter-pays-principle without introducing alternative solutions, or indeed without first installing the necessary infrastructure, will not be justifiable. Transport users must be given a fair choice.

In line with this policy, Government intends to introduce a number of measures and incentives that compliment both photovoltaic technology and the evolving technology in Battery Electric Vehicles. The Government will spend wisely and according to its means with a mix of funding mechanisms that fit the current financial situation. Small significant steps will be taken in line with the overall Government commitment to bring its finances back in order.

In this respect, and in the coming years, Government will incentivise the uptake of electric cars through a series of measures, one of which is a substantial grant for those individuals and companies who want to scrap their current car and purchase a Battery Electric Vehicle. Through these measures, and others which will follow, Government wants to send the right signals that it is supporting electromobility in a concrete manner.

To show its commitment, Government will be leading by example. As of next year, we will embark upon a gradual process of changing the current vehicle fleet to a much cleaner and energy-efficient one.

This Government will not stop here, however.

To further show the extent of its commitment towards electromobility, the Government is launching two important initiatives.

The first is the Malta National Electromobility Action Plan (MNEAP). The Action Plan will be up for public consultation and it encourages the participation of the widest possible spectrum of stakeholders; from those who regulate transport to those who operate it and make use of it. We would like everybody to contribute to this document, because transport belongs to everyone.

Secondly, to ensure that the objectives of the Electromomobility Action Plan are reached – and that the Plan is effectively implemented – Government is officially launching the Malta National Electromobility Platform (MNEP). The MNEP is a joint initiative between the Ministry for Transport and Infrastructure and Transport Malta. Besides the promotion of electromobility in Malta, the role of the MNEP is to oversee the implementation of the Action Plan through various projects and initiatives that will further the electrification of transport, even beyond the introduction of new battery electric vehicles in Malta.

Government believes that the attainment of Malta's environment and energy targets will only be possible through a mix of different measures intended to suit different uses of various types of energies. Transport will follow suit. It will be a mix and match of different propulsion systems; it will make use of different types of energies which will contribute towards the electrification of transport. This is in line with how technology is being developed. Government intends to start introducing and demonstrating such systems in specific areas where this technology can be easily implemented.

In addition, the Government is also looking closely at the use of electricity in other transport modes, including waterborne transport and related maritime infrastructure. This is in line with the latest proposal for an EU Directive on Clean Power for Transport where specific and mandatory targets are being negotiated between the EU Commission and Member States.

This was not a reactive measure however, but a pre-emptive one. Government has pre-empted the EU Commission when it comes to the now mandatory requirement to consider 'on-shore supply technology' for vessels berthed in harbours. Transport Malta, through the OP Italia-Malta funded PORT-PVEV project, is already drawing up such a study. Transport Malta will assess

[1] Malta Resources Authority, 2013; *National Greenhouse Gas Emissions Inventory for Malta 2013.* Annual Report for submission under the United Nations Framework Convention on Climate Change.

if and where on-shore supply technology can be implemented in order to improve air quality and noise emissions within maritime port areas. Through another EU Funded project - the D-Air Project - Transport Malta is also drawing up the carbon footprint of the Airport and its ancillary activities and listing measures by which the existing carbon footprint can be substantially reduced.

This way of doing policy is reflected in the manner in which the MNEP will operate. Besides facilitating market entry for the new technologies being introduced in Europe, this Action Plan will also make it a point to recognise, and learn from all the efforts that are being made by our European partners; be they Governments, European Policy Makers as well as the automotive industry itself.

As is the case whenever a new technology is put on the market, it is expected that in the following few years, there will be rapid technological advancement to be followed by increased economic development. To this effect, Government wants to ensure that through this Action Plan, and the measures it will introduce, it instils the necessary climate which will see the introduction of these technologies in Malta, in a phased and yet sustainable manner. It is in the interest of Malta to keep up with the same pace as other countries. Failure to do so is not an option.

The choice by the automotive industry to invest first in Battery Electric Vehicles and Plug-in Hybrid Electric Vehicles is mainly due to their high energy efficiency, and because they can easily be charged at home and through renewable sources of energy. This perfectly suits the Maltese scenario. In fact, when it comes to electromobility, Malta has an advantage over larger countries

and mega cities. Malta's size and the short distances travelled eliminates the issue of range anxiety. A full charge can last the average Maltese driver a whole day. Moreover, Malta's ample sunshine makes solar energy as the obvious choice in generating electricity from renewable means to achieve carbon-neutral transport. We believe that electromobility is an ideal and sustainable solution for our country.

Malta's environmental commitments are not the only reason why the Government has decided to support the electrification of transport, especially road transport. The fact that these vehicles do not emit any harmful pollutants from the exhaust tail pipe means that air quality will be greatly improved by the removal of traffic related emissions for the benefit of our citizens.

The fact that electric vehicles are propelled by a silent electric motor means that this technology will also greatly reduce traffic generated noise pollution.

In considering how to achieve our aim of making transport sustainable, we have considered the benefits that this technology will bring to Malta. We've considered and we've decided; electromobility is our preferred choice. Now make it yours.

Hon Joe Mizzi MP
Minister for Transport and Infrastructure

Transport Malta believes that one way to address the current problems relating to transport and the environment is by deploying concepts and technologies which are on the market; technologies which are state of the art, tried and tested and which can be implemented in the Maltese context. One such concept and its related technology is electromobility.

Transport Malta has always supported the development, introduction and deployment of electromobility in Malta. Evidence of this is the Authority's full support and participation in pioneering demonstration projects, such as Demo-EV and PORT-PVEV, the aim of which is to introduce and showcase the use and deployment of electric vehicles as well as the installation of nationwide charging infrastructure for public use.

We plan to keep developing electromobility in Malta and this is why the Authority's support is fully behind the Malta Electromobility Platform and Action Plan. To this affect, Transport Malta has already allocated resources, including personnel solely dedicated on the management and coordination of the latter.

Transport Malta's support of the Government's vision goes even further. The Authority believes that it can be conducive towards the Government's forthcoming Green Economy to which transport will be a major contributor. Transport Malta will also contribute towards the Government's policy to promote the country as a large-scale laboratory for the testing of technologies which are on the verge of market entry. In this way, Malta will be exposed to new technologies, advancements in research and development projects in line with the rest of the EU Member States.

This is why Transport Malta will do its utmost to ensure the successful achievement of the goals embedded within the Malta National Electromobility Platform.

James Piscopo
Chairman and CEO
Transport Malta

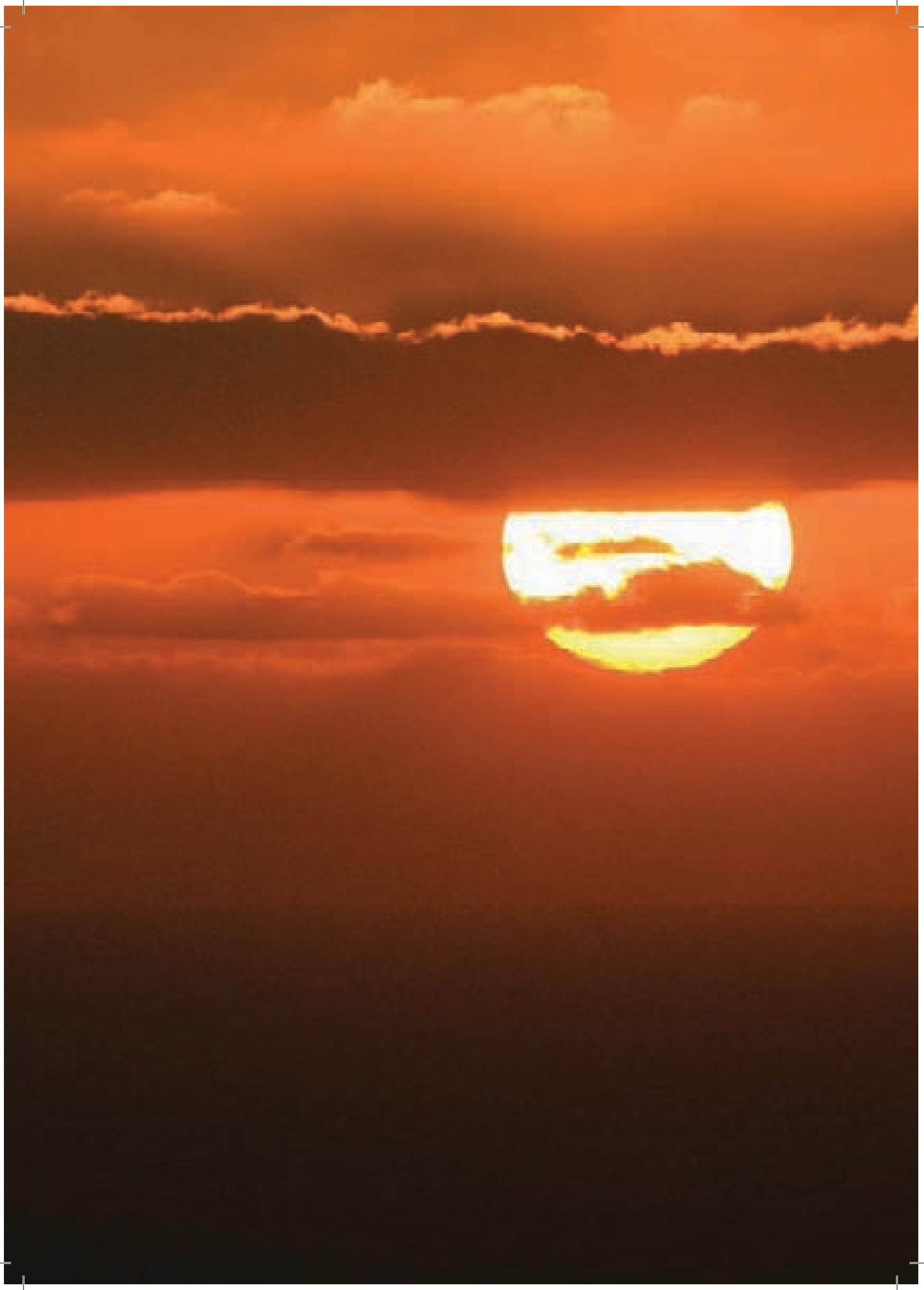
The Malta National Electromobility Action Plan is an ambitious endeavor, compiled after intense consultation with stakeholders and experts in the field of transport and electromobility; particularly with the international automotive industry. The starting point of this Plan was an evaluation of the problems existing in our national road transport sector and an assessment of the environmental targets which Malta has committed itself to achieving which, in the last few years, were left to deteriorate. Only after a full assessment of the latter, and consultation with the right stakeholders, did the Action Plan lay out its concrete road-map which is being proposed today.

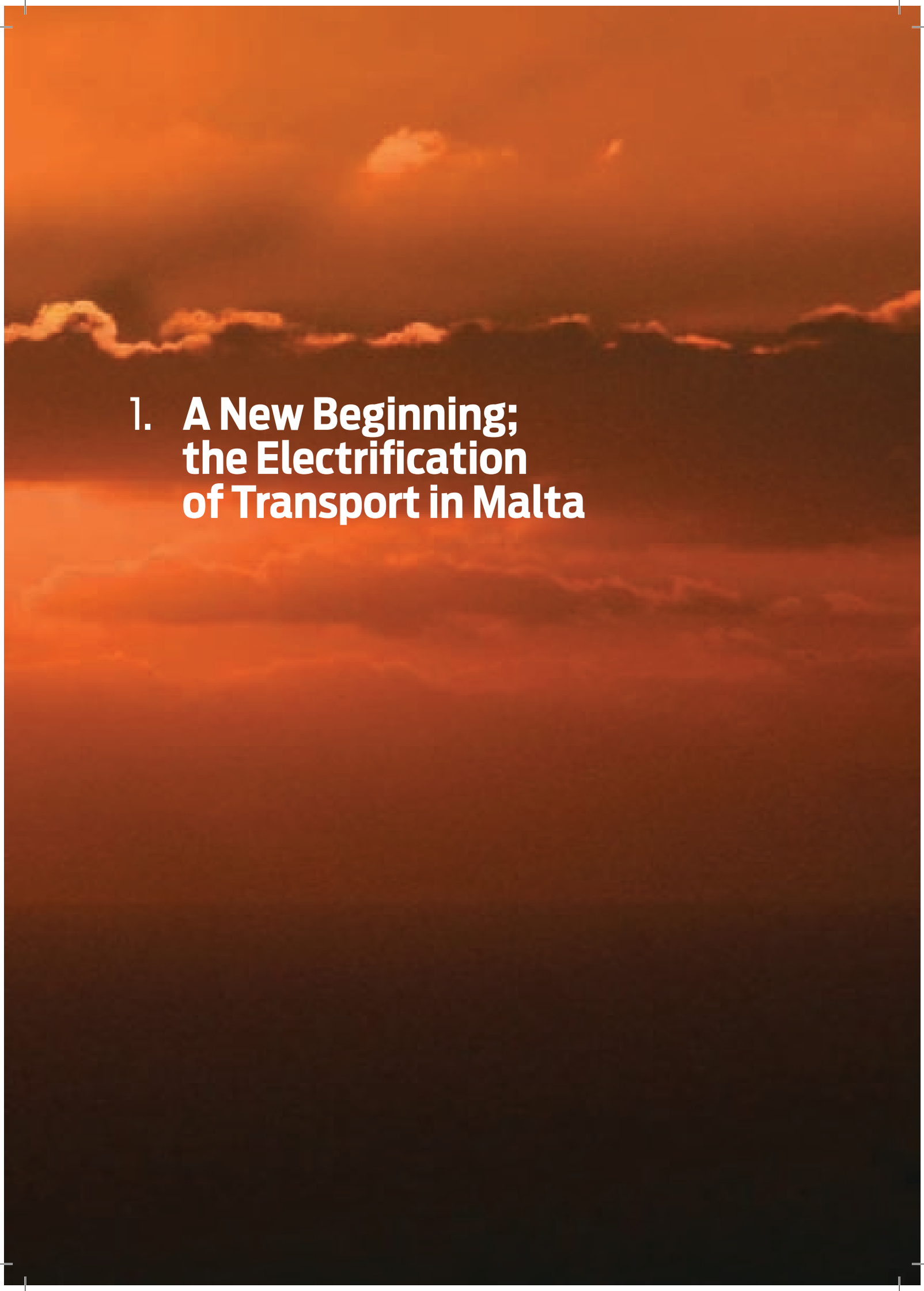
The Action Plan has sought to study the deployment of electromobility in other EU Member States, the problems that were encountered and how these were tackled. By learning from the efforts made by other Member States, the team has sought to convert these efforts to fit the Maltese context, keeping in mind the Government's goals and commitments.

The Action Plan foresees the implementation of concrete projects, programmes and measures by which Malta will contribute to its European and International environmental obligations. One such obligation is that Malta is committed to put 5,000 Battery Electric Vehicles on the road by 2020. Before now, a concrete action plan of how this was to be achieved was lacking. In fact, interim indicative targets have already been missed. This proposed Action Plan addresses the targets in hand with a number of projects and measures which have been planned and budgeted, and possible funding sources identified. The Action Plan does not only contribute to the number of BEVs on the road by 2020, but also addresses the deployment of the respective different types of infrastructure nationwide.

For the Action Plan to succeed, all stakeholders must be on board, both from within the public sector and the private sector. This is why the Action Plan and the National Electromobility Platform is involving all the stakeholders from its inception. This is an ambitious plan, but one which holds great promise for our country.

Peter Paul Barbara
National Coordinator
Malta National Electromobility Platform
and Intelligent Transport Systems





1. A New Beginning; the Electrification of Transport in Malta

1. A New Beginning; the Electrification of Transport in Malta

During the last six months, the Ministry for Transport and Infrastructure together with Transport Malta have pooled their resources to come up with a comprehensive plan of action to put land transport in Malta on track to environmental sustainability while addressing a number of EU obligations that Malta must fulfill under the 2020 Climate Change and Energy Package.

By 2020, Malta is obliged to limit its greenhouse gas emissions increase to just 5% compared to 2005 recorded levels.[2] By the same year, a share of 10% of all transport fuels consumed at national level has to come from renewable energy sources.

Additional targets emanating from the Air Quality Framework Directive[3] and the Environmental Noise Directive[4] must also be addressed.

This National Action Plan has put the achievement of the above mentioned targets as its main goal. By implementing a gradual and phased policy for the electrification of transport (addressing both private and public mobility), and by building upon existing Plans and Measures, this Action Plan will contribute to reduce the negative transport environmental externalities for the benefit of all residents; especially those living in urban cores.

Additional short-term targets must also be met. By 2020, Malta must put on the road 5,000 Battery Electric Vehicles. Furthermore at a European level, mandatory targets for the deployment of related infrastructure are currently being discussed.

The current Administration is also keeping in mind future EU-targets. The latest European Transport Policy White

[2] DECISION No 406/2009/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020

[3] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe

[4] Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise - Declaration by the Commission in the Conciliation Committee on the Directive relating to the assessment and management of environmental noise

Paper (Road-Map to a Single European Transport Area – Towards a Competitive and Resource Efficient Transport System) published in March 2011 suggests specific targets for the total phasing out of the Internal Combustion Engine (ICE) vehicle from European urban centres by 2050, with interim phasing-out targets proposed for 2030. As part of another recently proposed EU Directive (Proposal for a Directive of the European Parliament and of the Council on the Deployment of Alternative Fuels Infrastructure (COM2013/18)) the EU Commission is proposing compulsory targets for Member States on the installation of alternative fuels infrastructure, including those supporting Battery Electric Vehicles by 2020.

Although some of these objectives are long-term, the Government has decided to start addressing the eventual (and inevitable) changeover by slowly phasing in the new technology from an early stage; despite the fact that conventional vehicles will continue to be used in the medium and long-term. Through this policy, Malta will be giving the right signals that it will support the international efforts currently underway to bring about a change in the way we look at future transportation systems while still keeping in mind the Maltese 'Car Culture' and the need to bring about a gradual change in this culture.

The Electrification of Transport in Malta

Government is supporting electromobility, not because it is being forced to do so by the EU, but because electromobility and the electrification of transport presents us with the right solutions for our country's needs and context.

It is only a matter of time until personal mobility will dramatically change over the next couple of decades, where new types of vehicles and new propulsion systems will start to gain more ground and become more integrated into ICT-based Intelligent Transport Systems (ITS); where vehicles will start to 'talk to each other' and where vehicles will have two-way communications with the road infrastructure. Even the shape of the car as we know it today will change to be able to support future propulsion systems which will not necessitate the current bulkiness and structural materials needed by the cars of today.

To increase appeal for market uptake, the vehicle of tomorrow will be a 'trendy' and 'fashionable' item, marketed for the younger generation of drivers, an item which is a 'must-have' with a number of built-in nomadic devices such as integrated mobile technology including the use of different smart phone applications.

As of today, a Battery Electric Vehicle owner can already use such smart applications to interact with his/her car. Checking the status of the vehicle's battery charge, climatising the car before even entering the vehicle from a smart phone, are options already available on the market.

To lessen range anxiety, the Government is in the process of installing a National Electric Car Charging Network which will provide Battery Electric Vehicle users the possibility to charge their car using publicly accessible car charging points in specific and prominent parking spaces across Malta and Gozo and which will be connected together through a network. It is expected that once the number of Electric Vehicles increases, private car parks will also offer electric car charging services. To make sure that the proper infrastructure is put in place, new applications for residential complexes and commercial premises would need to cater for a number of car-charging points.

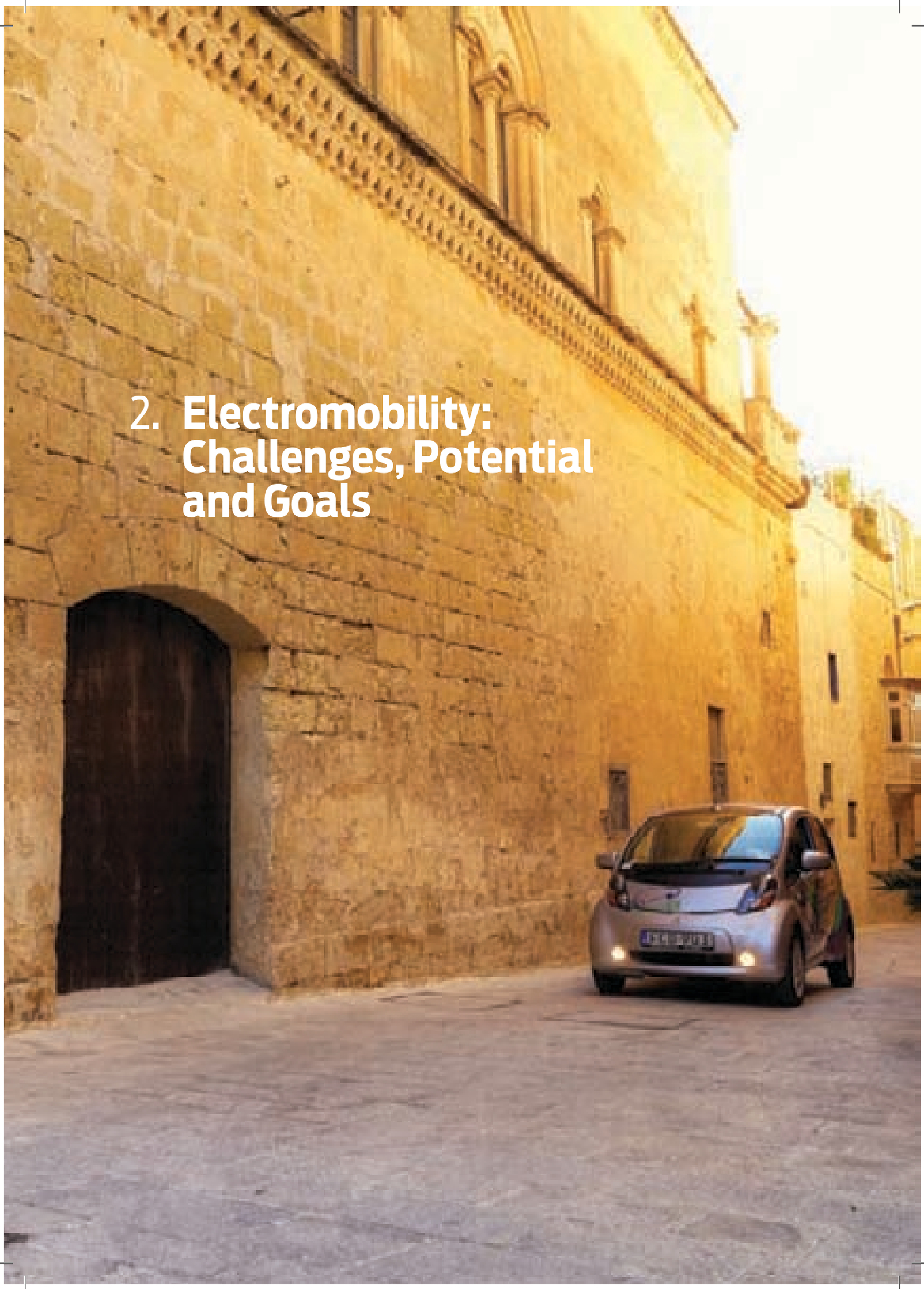
The current deployment of a nationwide Intelligent Traffic Management System in Malta will also enable Electric Vehicle owners to have full real-time traffic congestion updates and, in parallel with a GPS based navigation systems, a driver can make changes to a journey by accessing real time information on less congested road sections.

The Ministry for Transport and Infrastructure has just launched a web-based interface which can be accessible over a smart phone through which a Battery Electric Vehicle (BEV) user can pre-book a public car-charging point to see which car ports are occupied. The use of this infrastructure will be possible by registering an account with the car charging network operator. This will also enable access to the infrastructure through the use of a personalized RFID card for the purchase of electricity.

When future plans for deploying a National Multimodal Journey Planner are in effect, an electric vehicle owner will be able to access in-car information on other modes of transport such as bus schedules when using one of the public Park and Ride facilities. It will give the driver real time information on parking space availability in public car parks. From a driver-passenger safety point of view, real-time information on road flooding during bad weather will also be accessible.

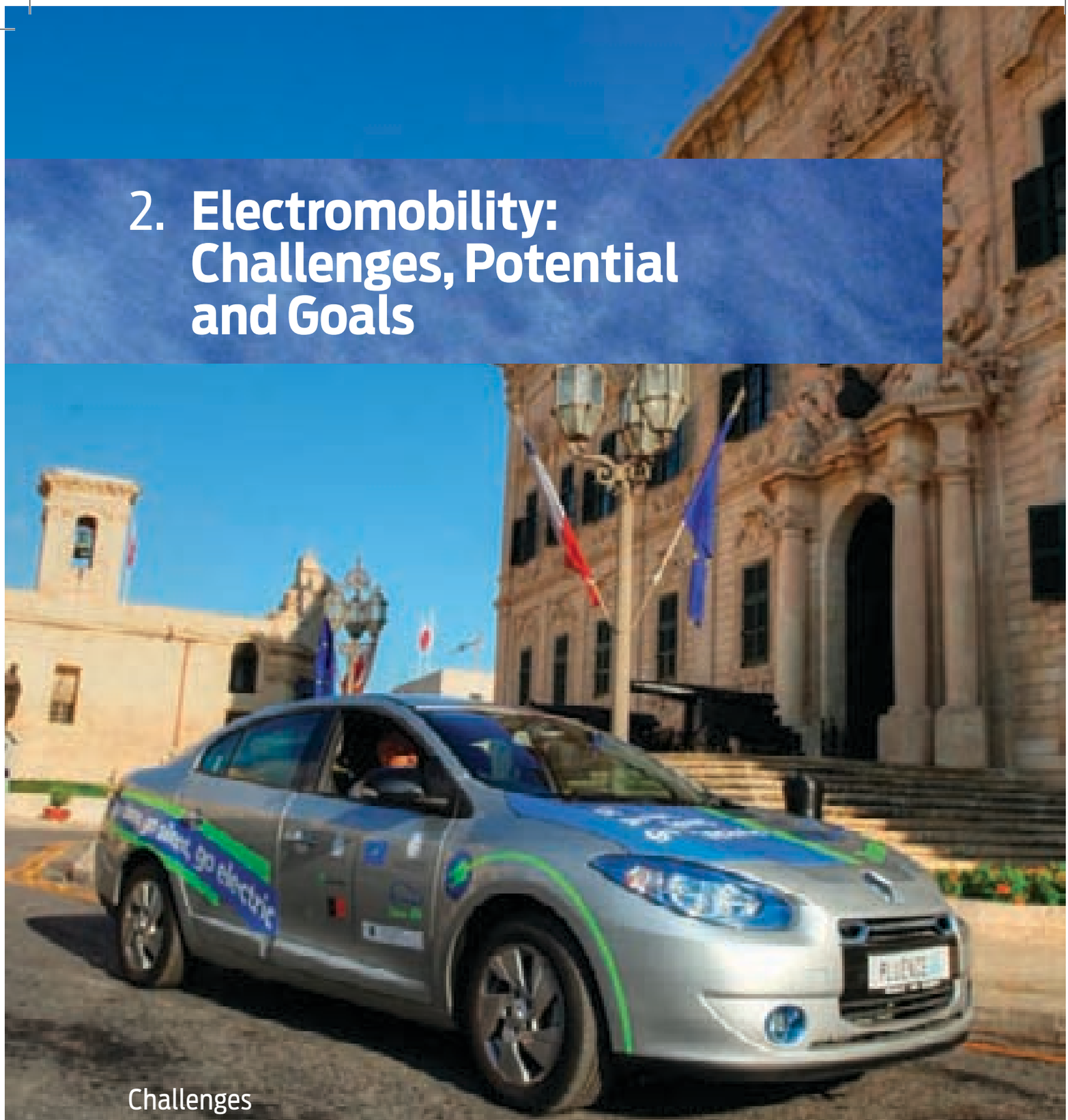
These changes are already visible on the market. After intensive investment in Research and Development, the market is now coming up with vehicles specifically designed for battery propulsion; with carbon fibre replacing materials currently used for the structure of conventional vehicles. This has made the electric car lighter and more efficient. As battery and motor technology improve, the car will continue to become more energy-efficient. While vehicles and road infrastructure continue to become more integrated and personalized, and built around the 'User lifestyle', we must continue to improve transport efficiency and environmental sustainability.

This situation will be addressed in the short term and with utmost urgency.



2. Electromobility: Challenges, Potential and Goals

2. Electromobility: Challenges, Potential and Goals



Challenges

Against this scenario, the challenges and disadvantages that electromobility is facing in bigger countries such as Germany, France, Spain, the UK and Italy, stem mainly due to range and range anxiety issues of the battery when BEVs are driven for long distances outside the urban cores; a problem which Maltese drivers will not have due to the short distances travelled in Malta.

Although criticism against BEVs is mainly centered around the battery range issue, we must remain focused on what Malta's needs are, what suits us and the overall benefits that Malta will stand to gain from this technology. It is the counter argument of why supercars are not the ideal vehicles to be used in Malta due to our short road sections and distance travelled.

For once, in the transportation sector, there is a technology that suits our needs, and therefore we must make sure that from a global perspective, electromobility is a success story. In the light of the above, we must make sure that electromobility is also pushed in other countries by giving the right signals to the industry to keep up with their endeavor in making Battery Electric Vehicles (BEVs) more efficient, more sustainable and, above all, available at a price that is affordable to consumers.

Key Challenges of Electromobility

The building of the necessary infrastructure for the Battery Electric Vehicle such as the deployment of a national electric car charging network, a change in driving habits such as journey planning, public acceptance of the new technology, the higher cost of Battery Electric Vehicles and the devising of different business models from those we are accustomed to, are some of the key challenges that have to be addressed. However, as the case of when a new technology is introduced on the market, the cost of the new technology is generally only higher when compared to the older one until the necessary economies of scale in the production process are reached. At the moment however, the higher cost for BEVs remain the most challenging.

To avoid the 'chicken and egg situation' whereby local car importers might not have been interested in exploring BEV imports due to the lack of public infrastructure, the Government took the initiative and instead of waiting for the private sector to invest in the technology, started the deployment itself. This method of action reflects the direction being taken at EU level.

Key challenges for Car Manufacturers and R&D Opportunities

It is a fact that technological products and other commodities on the market are continuously subject to innovation brought about by research and development. This applies to everything under the sun, from home and industrial appliances to telecommunication devices, computers and improved energy efficiency in conventional cars, to name just a few. BEVs are no different as car manufacturers will strive to make these more efficient and cheaper in price.

It is the Government's intention to promote Malta as a test bed for research and development in aspects relating to electromobility especially in view of the fact that a lot of research and development still needs to be carried out to make Electric Vehicles more efficient and cheaper.

Some of the challenges that still need to be addressed in electromobility are listed below. Government feels that Malta, which may be considered as a large laboratory test bed due to its geographical particularities, can contribute to.

- High Battery costs are one of the main reasons why the Battery Electric Vehicle is still more expensive to manufacture than conventional vehicles. Hence lower battery costs are required for improved market penetration of BEVs. Currently, storage capacity costs an average of €1,100 per kWh of storage which means that for a small BEV with a 90 – 100 km range, battery storage costs on the European market are at an average of €12,500. To make market penetration, the cost of battery storage must come down to approximately €400 per kWh;
- A higher energy and/or power density for batteries is needed, almost double the current lithium-ion batteries. An energy density of 200 Wh/kg is being targeted so that this permits longer distance range for BEVs. To be able to compete with conventional vehicles the density required will need to go up even to 1,000 Wh/kg;
- A battery that has a higher cycle stability and longer service life than the current 8-9 year life cycle, to meet the longer life cycle of the shell and the motor of the BEV;
- Improve charging time of batteries with shorter charging durations;
- Improve further energy efficiency;
- Further research in motor design to improve performance and efficiency;
- Further research in the integration of the motor with conventional combustion engines for range extension in highways, until BEVs are capable to have their range extended and charging times become quicker to acceptable waiting times as in conventional refueling; a solution which might be provided by introducing Hydrogen in the equation;
- Improve the structure of the shell and chassis layout to make BEVs lighter using stronger yet lighter materials, so as to reduce the overall weight of the vehicle and make it more energy efficient which in turn would extend the range per charge;
- Integration of the BEV with the electricity grid by, for example, introducing charging systems that work by induction, embedded under the road surface at normal traffic bottle necks;
- Put in place improved safety features for the user;
- Adaptation of power generation and supply to the new technology such as improved load management;
- The combination and availability of renewable energy plants such as solar farms where there are large fleets of BEVs.

Another advantage of using additional storage components could be gained through improved load management strategies and the rapid provision of reserve power, to the benefit of overall power supply efficiency.

- Charging energy storage units: Advanced solutions based on information and communication technologies (ICT) are needed here to avoid charging bottlenecks. Control and billing systems must also include micro users;
- Charging and discharging storage units: Compensating for the fluctuation effects of renewable energies through intermediate storage requires regulatory and control mechanisms at medium and low voltages;
- Advanced information and communication technologies need to be applied to ensure the continuity of load supply, avoid adverse operating states in power station and grid components and reduce balancing and reserve capacities.

Potential

In order to address the challenges laid out above, we must start to re-think mobility. For example, can car sharing be part of the solution? Is it still economically viable to own one or two vehicles? Is it more feasible to share the second vehicle rather than own it? Or better still, is it still feasible to own a vehicle in the first place when one can share a vehicle? Is it time to start looking at other forms of public transport that is public and yet still gives some sort of 'personal/private' mobility? Is it time to start shifting private cars underground to give more accessibility to public transport above ground? Is it time to seriously start thinking of introducing light rail? It is for this reason that the Government will commission a feasibility and options analyses for the introduction of an underground, rail and monorail system.

Most of the above will fall under the remit of the Malta National Electromobility Platform (MNEP), the main role of which is to promote the introduction, the facilitation of market entry and public acceptance of Battery Electric Vehicles in Malta. The MNEP's secondary role will be to test such solutions and propulsion systems, to use and promote Malta as a test bed for such technologies and solutions through a number of lighthouse and demonstration projects, by which technology could be tested.

Considering the size of the Maltese Islands, such demonstration projects will not just be demonstration projects in their own right but will become part of our solutions and infrastructural deployment. The European Union's LIFE+ funded project on electromobility, the Demo-EV Project, is one such example. The project, coordinated by the Ministry for Transport and Infrastructure with the participation of Transport Malta, the Ministry for Gozo and Enemalta, is putting in place a number of Electric Vehicle charging infrastructure on the Maltese road network. For all intents and purposes this project is a demonstration project but in fact it is giving Malta the foundations for our future national electric car charging infrastructure. Moreover, this project has enabled the Government to purchase its first fleet of Electric Vehicles, which, after being used for demonstration purposes of the project, will be retained for use and extended demonstration purposes as part of the government general vehicle fleet.

The same goes for the PORT-PVEV project funded by the EU's OP Italia-Malta 2007-2013 Territorial Cooperation Programme. This project will be introducing the latest Solar Charging Car Ports which will be deployed in and around our port areas and thus laying down the foundations for the implementation of similar infrastructure in the future.

Through these two projects, the Government has already started to slowly change its fleet from the use of conventional vehicles to more eco-friendly vehicles. Government is set to continue in this direction by participating in such projects, be they EU-funded or otherwise, including entry into Private Public Partnerships with those companies who are ready for the switch. Government will also enter into cooperation agreements with members of the private sector who come forward with innovative and sustainable solutions as well as research related projects through which green jobs can be created. This will be part of a Government's commitment to create a Green Economy for Malta.

This is being done not only to provide the right market signals to the international automotive industry but also, and above all, to encourage local car importers to start preparing themselves for the switch; to invest in the technology and prepare a programme of re-training of their employees to have the necessary skills thus enabling the country to prepare itself with the necessary competence and vocational proficiency which is currently lacking.

Malta cannot afford to fall behind the rest of the European Member States. Malta has to be a prime advocate and mover of the new technology, not just because of the various environmental targets that it has to achieve, but, above all, because it believes that electromobility is beneficial for Malta; beneficial for energy providers and consumers alike.

Goals

Malta's objectives might be different from those of France and Germany. These two countries are the prime movers behind electromobility mainly because of their automotive industry. Besides the environmental concerns that these countries have, their respective automotive industry is a major contributor to their national economic stability. For example, the main objective of the German Government is to become a world leader in the provision of this technology. Consequently Malta's objective is to be a net beneficiary and receiver of this technology. On a per capita basis, it is also in the interest of the automotive industry to facilitate market uptake of this technology in Malta.

Keeping in mind that power generation in Malta is set to become cleaner with the use of natural gas and the completion of the Malta-Italy inter-connector for the purchase of cleaner generated electricity, the environmental benefits for Malta are bound to leap forward.

Coupled with this scenario, Government's effort to increase the deployment of photovoltaic technology will also contribute to the provision of cleaner transport, when charging of electric vehicles takes place in establishments where PV infrastructure is available and the offset of solar energy production against car charging is taken into consideration.

MNEP and the Goals for Electromobility

The launching of the Malta National Electromobility Platform (MNEP) is a cornerstone in the Government's policy on the electrification of transport.

In a short time span, the Government has come up with a programme which can be implemented in a concrete manner with the participation of all the stakeholders involved. Representation in the MNEP cuts across almost all sectors of the economy. The MNEP is committed to promote a change in culture of how we look at mobility and transportation in general. This ranges from instilling the concept of eco-driving to planning one's journey from point of departure to point of destination.

Government still maintains that public transport should hold the lion's share in national transportation, and the Government understands that people will not accept to leave their car at home and use public transport without the latter first becoming fully accessible and more efficient. In a country that has seen the use of the private passenger car increasing at an alarming rate, one cannot expect that modal shift will happen overnight. Unfortunately, the way the introduction of the new public transport service was initially carried out, as far as modal shift is concerned, this has initially backfired.

It is also expected that once public transport stabilizes itself; the Intelligent Traffic Management System is fully deployed and functional; and a number of road works are completed, congestion will be lessened, bus journey times will improve and the percentage use of non-car modes increases.

Having said that, private cars would still be heavily depended upon, unless additional public transport services are introduced in the near future and this is another reason why Government will start to look at other solutions to lessen traffic congestion while striving to induce a new mobility culture.

The measures that will be introduced by the Ministry for Transport and Infrastructure are all intended to serve as catalysts for quick deployment of Battery Electric Vehicles in Malta. Such initiatives must be continued over time and respond to technological progress that is expected to be achieved, once additional vehicles are deployed in Malta. This will be done in accordance with the availability of funds and the economic situation of the country, especially in the light of tighter national budgets of the Eurozone countries.

Although the development of the essential technologies for electric drives, energy storage and grid infrastructure have made giant leaps forward, there is still need for research to improve battery efficiency, energy storage, and autonomy as well as research on new materials to make the car lighter, while improving the car charging infrastructure and networking the electricity supply chain.

In the short term, the technology available is already quite impressive and there is nothing holding us back from starting to deploy the current technologies available today. These, together with the Battery Electric Vehicles that are expected to be put on the market by the end of 2014, plus the installation of the first 90 charging points nationwide, Malta is already in a position to start the shift towards electromobility; something that the Ministry for Transport and Infrastructure together with Transport Malta are already doing.

As the national car-charging infrastructure is taking shape, the network will be extended by the Government according to the increase in demand by both BEV users and owners. By the end of 2013, Government would have installed the first phase of the charging network made up of 90 charging points in various locations across Malta and Gozo. Concurrently, the Government will also be installing five state-of-the-art solar car ports together with an additional 11 charging points in 2014.

In the meantime, as the Government and all public funded authorities, including public corporations and organizations will slowly switch to electromobility at an initial rate of approximately 25% of all yearly car purchases, the government itself will install additional charging stations to charge its fleet.

The first batch of car charging units is being funded through the Demo-EV Project and they have been placed in strategic places, after consultation with the respective Authorities and Local Councils. In fact the Ministry had consulted with the respective Local Councils whereby these were asked to advise where they would like to have the charging points installed for increased public accessibility.

The installation of the BEV charging infrastructure by the Government is a clear message from its part that it is supporting electromobility and it is also a market signal for car manufacturers and car importers that Malta is ready and committed to support such technology.

From its very inception, the MNEP has been working with international market leaders in electromobility so that Malta will be one of the first countries in which BEVs would be rolled out. This was very important since, in these early stages, leading car manufacturers will only roll out their fleets to those countries that are prepared and committed towards electromobility.

In spite of these initiatives and due to the current financial and economic challenges that we still face today, the probability is that it will take more than ten years for BEVs to achieve a significant market share, especially when conventional vehicles have been part of the Maltese culture for the last 30 to 40 years.

However, if the cost of the vehicles goes down to acceptable levels, the Government is confident that Malta has the right conditions for electromobility to flourish and get accepted at a faster rate than in other EU Member States. The Government will not be working only on the switch to electromobility but also on the culture and habits of driving and car ownership.

Irrespective of this, the Maltese Government had set upon itself a committed target to put 5,000 BEVs on Maltese Roads by 2020. With its Malta National Electromobility Action Plan (MNEAP), Malta is laying out a phased deployment plan which is spread over the next seven years.

In addition to the above, the Maltese Government will pave the way for the broad introduction of BEVs and over the coming months it will take a number of policy and regulatory measures to further assist the introduction of BEVs in the Maltese Islands. With respect to technical and infrastructure measures, Government will use current and future open European Standards to ensure interoperability, safety and acceptance by potential BEV users.

The Maltese Government is leading by example and making its contribution for the next seven years through the set up of the MNEP. Any further government activities will be subject to budget considerations, appropriations and policy decisions over the next seven years.

However, the Government wants to arrive to a point where it will no longer need to provide incentives, where the price of BEVs would come down to the price of the conventional car to an extent that it will be able to compete in a free market and to an extent that electric vehicles will come into general use and constitute a big proportion of the national vehicle fleet.

Government believes that the switch towards electromobility cannot be achieved by market forces alone or by Government intervention only, and for this reason at the point of inception, Government has opened a dialogue with the automotive industry on an international level and the stakeholders involved. In fact the MNEP structure will include the participation of all the relevant stakeholders needed to make the switch successful. Stakeholders include government departments and policy makers, authorities, local governments, service providers, the electricity generation company and related service providers as well as the industry itself; car importers and transport operators, academics, research and vocational institutions. The MNEP will be the largest and widest possible transport forum ever set up in Malta.

The MNEP and the MNEAP are the first steps by the Government of Malta to address its environmental obligations stemming out from transport related activities, to lessen its dependence on conventional fuels and increase the share of cleaner transport fuels.

As such, Government will also be pursuing the use and the promotion of electromobility not just for private and personal transport, but also its use and application for passenger public transport and the transport of goods.

It will mean a way of how we carry out transport activities, how to plan transportation and transport infrastructure as well as changing habits that in the future will no longer be sustainable. Are you ready for the change?

Definition of Electromobility

Electromobility represents the concept of using electric powertrain technologies, in-vehicle information, and communication technologies and connected infrastructures to enable the electric propulsion of vehicles and fleets. Powertrain technologies include full electric vehicles and plug-in hybrids, as well as hydrogen fuel cell vehicles that convert hydrogen into electricity. Electromobility efforts are motivated by the need to address fuel efficiency and emission requirements, as well as market demands for lower operational costs.

For the purpose of this Action Plan, besides BEV, the technology recognized under the electromobility term includes; Plug-in Hybrid Electric Vehicles (PHEV), Hybrid Electric Vehicle (HEV) and Hydrogen Fuel Cell Electric Vehicles (FCEV). To the original list of vehicles it was felt that range-extender electric vehicles (REEV) should also be included due to the fact that the new type of REEV includes a fully fletched battery similar to those found on BEV, but which are aided with petrol / diesel drive trains for longer distances travelled, should this be needed.

Unlocking the Potential of Electromobility

Every new technology has its sceptics. Some said electromobility is impossible, others said it will not work while others said it will not be accepted. Luckily they were wrong. Electromobility offers solutions to suit everyone's needs, from Battery Electric Vehicles to Hydrogen Fuel Cell technology with the use of liquid and gaseous hydrogen for long distance travel.

The energy sector is in a state of constant change but one thing is for sure, fossil fuels will come to an end and in the future alternative fuel carriers will play a very important role. The future of zero emissions is already here and, like in other countries, Malta is also in the process of building a functioning electromobility network as it is our responsibility towards our children and future generations to do so. The MNEP will live up to its responsibility.

The European transport system is continuously changing, but in Malta it stagnated and went from bad to worse. As far as transport is concerned, the Government wants to take Malta into the future through a leap in quality and improved energy efficiency, guaranteeing mobility while preserving the environment by building a transport system that is based on the use of a mix of energies including electricity some of which will be produced or substituted by renewable sources of energy.

Current and future population growth coupled with economic growth – especially that of emerging economies – will increase the demand for energy. Fossil fuels alone will not be enough to meet this demand due to their limited supply and environmental repercussions. This has sparked a search for something better with the main goal to provide a world powered by clean, efficient fuels which are produced from renewable resources of energy.

Hydrogen Technology

Electromobility does not only mean the use of a Battery Electric Vehicle, but it also includes all sorts of mobility which makes use of electric drive trains and which in turn, the electricity used can be produced by a number of different sources of energy including renewable ones. Anything that uses an electric motor and a battery or fuel cell, falls under the definition of electromobility.

This includes Hydrogen Fuel Cell technology. As of today, Hydrogen can be produced from a number of processes including natural gas through a process called steam reformation. This is done by reacting steam with natural gas and, in the process, extracting Hydrogen from both compounds. Another process is the reformation of Bio-methane which can be captured from landfills.

The marriage of Hydrogen and renewable sources of energy offers a unique opportunity. In fact, Hydrogen is the missing link to the widespread use of using renewable sources of energy. When energy is generated using solar power or wind, the recurring problem is that the energy is intermittent, meaning that it must be used when the sun is out or when the wind is blowing.

Unfortunately however, energy is not always available when there is the demand for it, which means that the energy must be stored if it is to be of any value. Conventional batteries have limited storage capacities and up till now are very expensive to produce and it is here, where H_2 can solve the problem.

Today, nanotech companies are working on solar cells which dramatically improve efficiency while cutting down on costs. When electricity from renewable energy is converted to Hydrogen it can be stored and used as energy and hence it can be used when it is needed. When that happens on a large scale, then it will be the main competitor of fossil fuels.

Hydrogen is the most abundant element in the universe; it powers all of the stars including our Sun. Hydrogen is everywhere to the extent that over 90% of the atoms in the universe are Hydrogen atoms. Add oxygen and you have water, add carbon and it is a basic building block of life. In its pure state, Hydrogen can be a clean, safe and a very powerful fuel.

Billions of Euros are currently being invested to develop the technology. Hydrogen is not an energy source in itself, like coal or oil, but is a manufacturer of fuel like gas oil and electricity. We can use renewable sources of energy such as solar power and wind energy to split molecules of water; of hydrogen and oxygen and then using Hydrogen as a transport fuel and even as domestic and industrial fuel.

In the meantime, research is also being made in fuel cell propulsion systems, not just in passenger cars and buses but also in larger transporters. For example, the German Navy submarine, the U31, uses nine fuel cells for propulsion which run on Hydrogen while it also produces electricity for the command and control systems and in the process generates fresh water for the use of the crew.

The technology can also be used in ships and locomotive trains. Recently, the Helios aircraft became the first aircraft to use Hydrogen by using a light propulsion system enabled by solar panels and Hydrogen and fuel cells, flying at an altitude for observation of over 65,000 ft. This was followed by another unmanned aircraft project, headed by NASA, called Global Observatory.

The electrification of transport is the solution to achieve a viable and sustainable future transport system. Transport Malta has long believed that the future of transportation lies in the electrification of transport, where Hydrogen Fuel Cell Technology will power the larger electric drive trains used for trucks and buses while Battery Electric Vehicles will power passenger cars.

In this regard, the Ministry for Transport and Infrastructure together with Transport Malta will pursue future technology developments and facilitate demonstration and lighthouse projects accordingly and is proposing the setting up of a specific unit within the MNEP following a Malta National Hydrogen and Fuel Cell Technology Innovation Programme (MNHFCTIP) for which preparations can get underway by partnering with future potential partners.

This will be part of the Malta National Electromobility Action Plan which will step up its efforts to promote battery and all-electric drive technologies. Following other technological developments in Hydrogen Fuel Cell Technology applications for the maritime transport sector in the past few years, the Government of Malta will also follow the development of Fuel Cell Technology in the maritime sector with similar demonstration projects that were carried out in Amsterdam and in Birmingham, such as the demonstration project of the Ross Barlow canal barge project, should technology continue to develop in this direction.

Unlike similar National Development Plans of other countries, where electromobility is limited to road transport, our MNEAP and its vision will cut across as many modes as possible, including maritime vessel/crafts that can be used in coastal waters, passenger cars, motorbikes and pedalecs, vans, trucks, mini buses, buses and other modes that are propelled by electricity.

Energy Efficiency of Electric Vehicles

BEVs are the most energy efficient vehicles to-date, as can be shown in the chart on the right. When comparing the energy efficiency of BEVs with that of conventional vehicles and Hydrogen Fuel Cell Vehicles, one can see that in the case of conventional vehicles, only 22% of the fuel goes to actual propulsion and when fuel losses are taken into account, this goes down to just 19% fuel to propel the vehicle.

On the other hand, the Fuel Cell propelled vehicle, which also uses an electric motor, has an efficiency of approximately 86%. But the advantage of the latter is greatly diminished due to the electrolysis process, compression, distribution and conversion into electricity which brings efficiency down to 26% but which is still better than that of ICE.

In the case of the BEV, energy losses are greatly reduced to the extent that almost 70% of the energy is used for vehicle propulsion.

Energy Efficiency Distribution

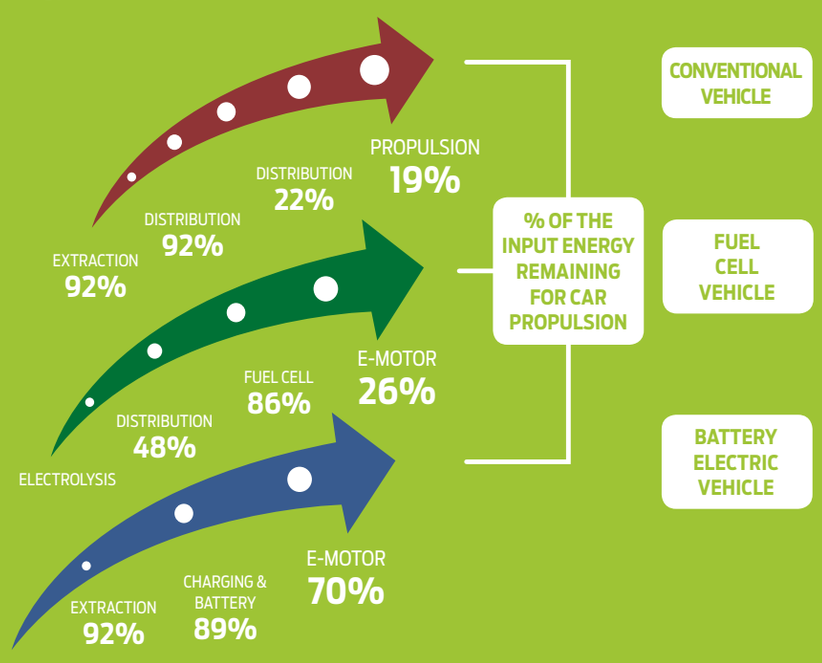


Figure 1: Energy Efficiency Distribution

BEV – Battery Electric Vehicle

Battery Electric Vehicle

Battery Electric Vehicles (BEV) also known as Electric Vehicles (EV) are full electric vehicles without using any other source of propulsion other than the electric motor and batteries. A BEV must be plugged into an electricity source, normally the electricity grid to obtain energy to propel the vehicle with a range which is usually limited by the battery pack and the charge contained therein. Although some emissions of BEVs are displaced to power generation, BEVs still produce zero harmful exhaust emissions. BEVs can provide carbon neutral transportation if they are charged to a renewable source of energy including wind farms and photovoltaic plants.

REEV – Range Extender Electric Vehicle

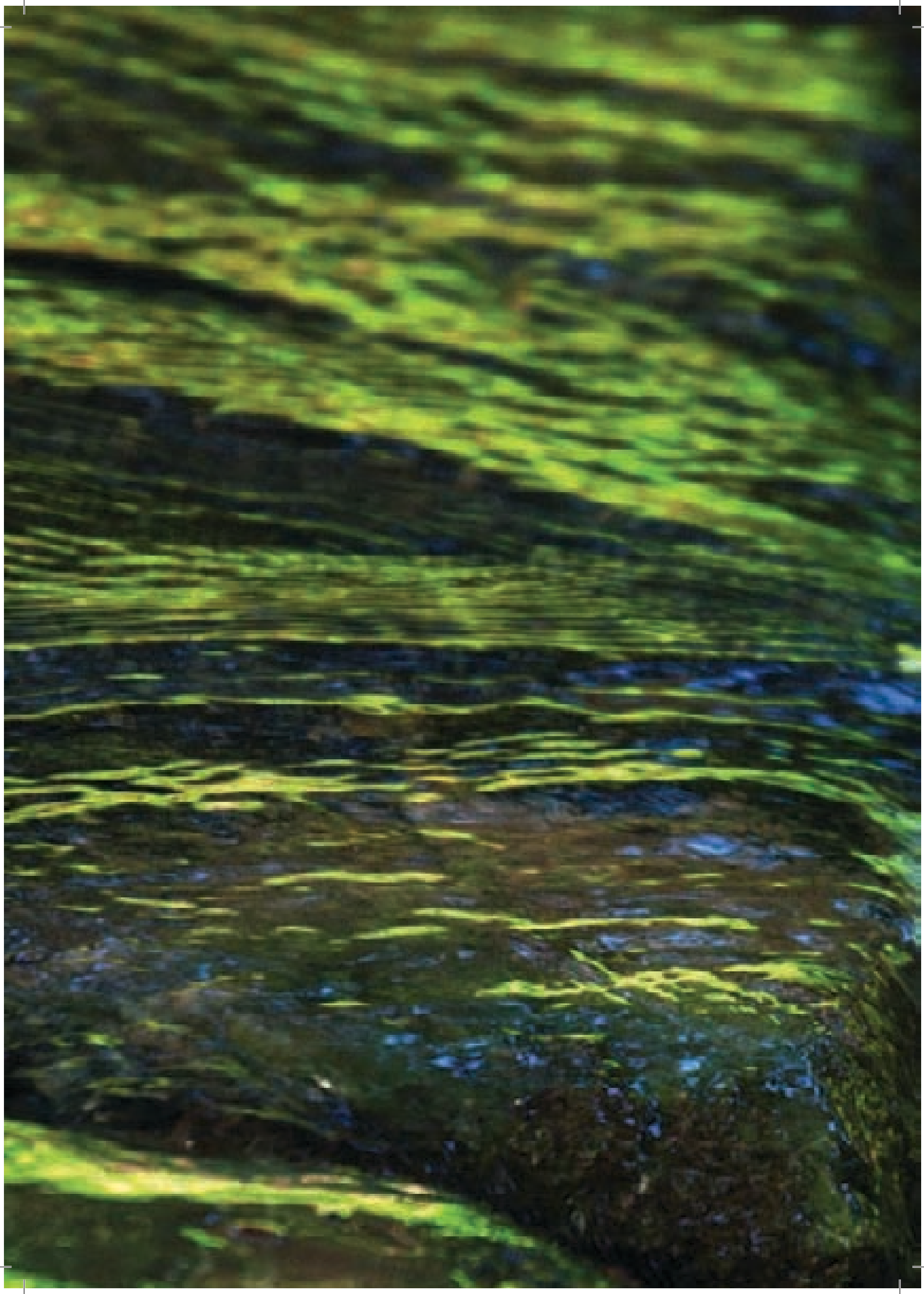
Range Extender Electric Vehicles are different then the full Electric Vehicles by adopting a compact fuel-powered generator whose sole purpose is to supply electricity when one wants to drive beyond the range of the battery. Once the battery management system detects the minimum charge level, the Range Extender automatically fires up to generate electricity.

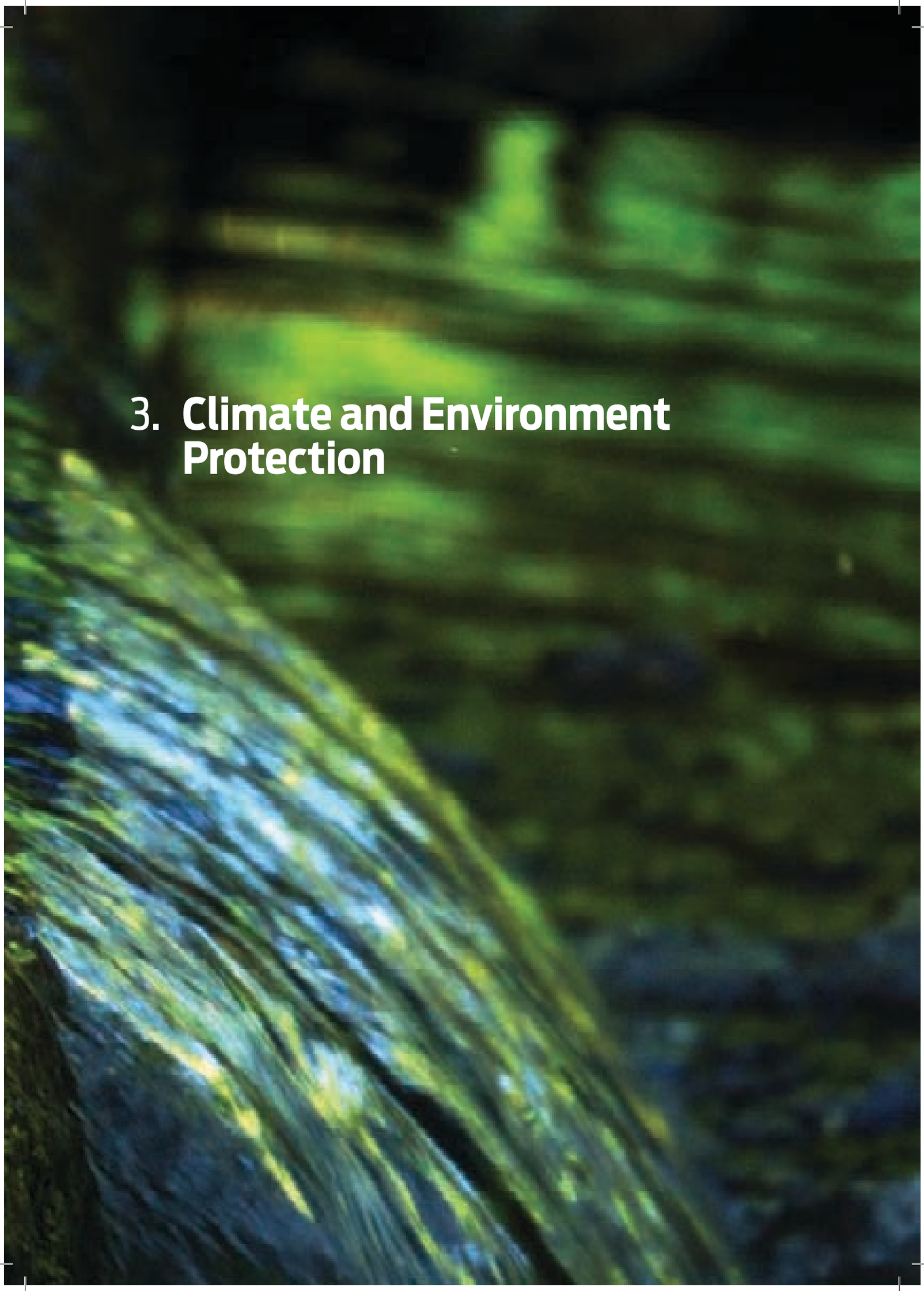
HFCEV – Hydrogen Fuel Cell Electric Vehicle

Hydrogen Fuel Cell Electric Vehicles use electricity to power motors located near the vehicle's wheels and they produce their primary electricity using a fuel cell which in turn is powered by hydrogen-filled tanks. The Hydrogen Fuel Cell Electric Vehicles produce zero harmful exhaust emissions, where the only emission is water in the form of steam through the exhaust pipe. HFCEV can provide Carbon Neutral Transportation if the Hydrogen production process is done through a renewable source of energy like hydroelectric power generation, wind farms and Photovoltaic Plants.

PHEV – Plug-in Hybrid Electric Vehicle

Plug-in Hybrid Electric Vehicles drives have a greater fuel reduction potential than most of the current hybrid vehicles. The main difference in these types of vehicles is that they have an internal combustion engine that charges the battery or by providing electricity to the electric motor. This electric motor can either assists the internal combustion engine (in parallel HEVs) or is the sole mechanical link to the wheels (in series HEVs). What makes a PHEV different from a HEV is its ability to charge the batteries by plugging in the vehicle. This feature has the advantage of allowing the vehicle to run for some distance without running the internal combustion engine at all.





3. Climate and Environment Protection

3. Climate and Environment Protection

It is a fact that electromobility will make significant contributions to reduce the levels of CO_2 emissions and anthropogenic emissions such as traffic generated emissions Besides, reducing air pollution, electromobility will also reduce traffic generated noise pollution. Anthropogenic emissions such as traffic generated emissions including sulphur oxides (Sox), nitrogen oxides (NOx), carbon monoxide (CO) and particulate matter (PM) all have a negative effect on the urban environment and human health.

For example, the oxidation of sulphur dioxide in the presence of nitrogen dioxide will produce acidic rain (H_2SO_4) which also leaves a negative effect on architecture including historical buildings while a continuous exposure to high PM levels may lead to heart and lung disease including asthma and cancer.

Therefore, putting aside what electromobility can do to help mitigate climate change, the fact that BEVs do not emit any other tail-pipe generated emissions offers a significant solution to the improvement of air quality, especially in urban centres and canyon effects.

Climate Change

According to the latest National Greenhouse Gas Emissions Inventory for Malta 2013, road transport currently accounts for 16.9% of the total greenhouse gas emissions generated in Malta.

As things stand, the current European Climate Change and Energy Targets which were approved by the European Council in 2008 in the form of the Climate Change and Energy Package, are the following:

1. Cutting greenhouse gas emissions by 20% when compared to 2005 levels
2. Having 20% of energy consumption through increased energy efficiency
3. 20% of EU energy needs must come from renewable energy sources
4. 10% of all transport fuel must come from renewable energy sources

As an EU Member State, Malta has transposed all the relevant climate change regulations and policies in order to contribute towards the overall European target to limit the increase of the mean surface temperature to 2°C less when compared to pre-industrial levels.

According to NSO statistics, over the last fifty years the mean temperature of the Maltese Islands has increased by 0.23°C every ten years. On the other hand, between 1990 and 2007, greenhouse gas emissions increased by 49% in Malta. Although this may be seen as a high increase, when taking into account GDP growth per capita, Malta is one of the lowest from all EU Member States where greenhouse gas emissions are concerned. In fact, when emissions are decoupled from economic development, it transpires that in terms of unit GDP (in billion Euros at 2000 prices) there was a decrease of 18% between 1990 and 2007 [5]. Having said that, Malta still needs to improve on its carbon emission levels.

Increase in the National Car Fleet

According to the 2008 State of the Environment Report, although the annual average national NO_2 concentration remained well below the 40µg/m³ EU and the World Health Organisation (WHO) limit value, it continued to increase between 2006 and 2007, from 25.4µg/m³ to 28.9µg/m³ respectively. In 2007, annual average values exceeded annual EU standards in 6 localities, Floriana (50.60µg/m³), Fgura (49.9µg/m³), Sliema (45.4µg/m³), Mosta (42.0µg/m³), Gzira (41.7µg/m³) and San Gwann (40.8µg/m³).

"Furthermore, 27 individual sites registered NO_2 levels higher than the EU and WHO limit, with St. Anne's Street, Floriana, increasing by 6% to 98.4µg/m³ in 2007. This suggests that nitrogen oxides are on the rise due to increasing traffic, such that this pollutant may be a problem in localities where heavy traffic and poor ventilation prevail." [6]

According to the National Statistics Office as at September 2013, the stock of licensed motor vehicles stood at 321,425, up by 0.8% over the previous quarter. Of these, 79.3% are passenger vehicles, 14.4% commercial vehicles and 5.2% motorcycles. Buses and minibuses accounted for less than 1%.

A total of 4,334 new licences were issued during the period. The majority of - 3,437 or 79.3% of the total - were issued for passenger cars, followed by motorcycles (451). Newly-licensed 'new' motor vehicles amounted to 1,923, or 44.4% of the total, and newly licensed 'used' motor vehicles totalled 2,411.

In the third quarter, 52 vehicles were exported. There were 1,535 vehicles that were no longer licensed for use on the road and another 1,211 were scrapped. As at the end of September, 195,862 vehicles, (60.9%) of the total had petrol engines while diesel engines powered 124,931 vehicles (38.9 %).

The following figure shows the impact that the exorbitant number of combustion-engine vehicles have had on the fuel supply.

[5] MEPA 2010; State of the Environment Report, 2008 p.20
[6] Ibid. p 14

Change over 2000 Levels (index)

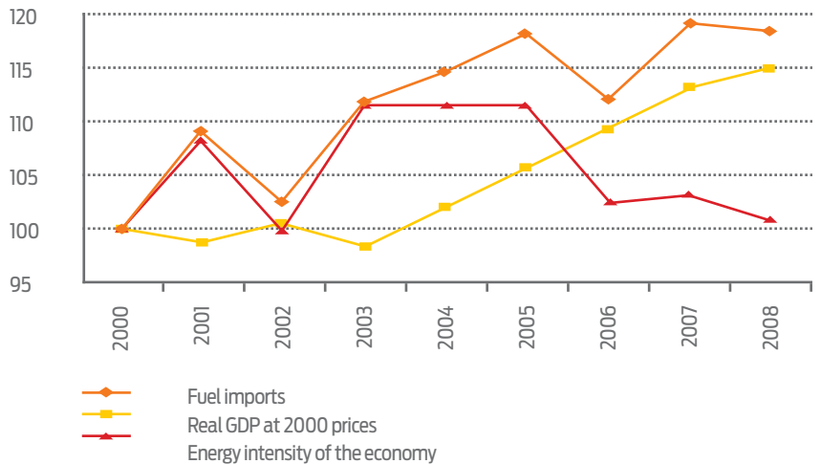


Figure 2: Impact on the Energy Supply

Air Quality in Malta

The two main pollutants associated with the use of fossil fuels in motor vehicles are Nitrogen Dioxide and Benzene. This section will take an overview of the situation of these pollutants in Malta, the levels of each pollutant recorded in the air and the resultant health effects that each pollutant causes.

Benzene

Non-methane volatile organic compounds (NMVOCs) produce photochemical oxidants by reacting with NOx in the presence of sunlight. Anthropogenic NMVOCs are emitted from sources including paint application, road transport, dry-cleaning and other solvent uses. Certain NMVOC species, such as benzene (C_6H_6) and 1,3-butadiene, are directly hazardous to human health.[7] Benzene has long been recognised as a carcinogen,[8] it can cause bone marrow not to produce enough red blood cells, which can lead to anemia. It also can damage the immune system by changing blood levels of antibodies and causing the loss of white blood cells. [9] It is a natural constituent of crude oil and because it has a high octane number, it is an important component of gasoline.

According to the European Environment Agency, the level of NMVOCs, including Benzene, produced by road transport in Malta was at 26% in 2011 as is depicted in the table below. [10]

Emissions by sector - 2011

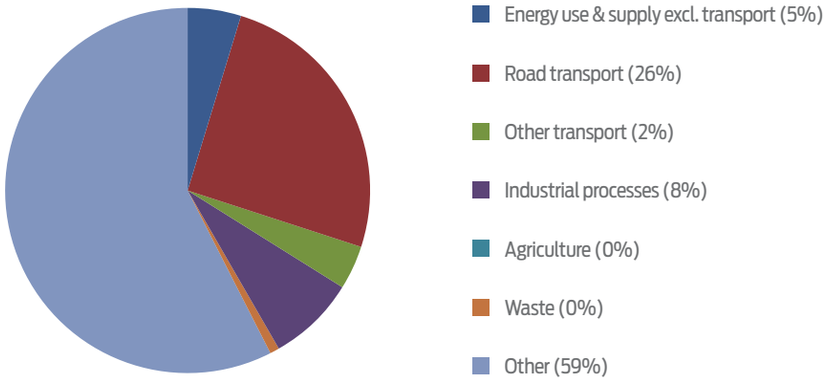


Figure 3: Non methane volatile organic compounds by sector in Malta; European Environment Agency

[7] European Environment Agency, 2013 'Air pollution fact sheet 2013 – Malta', p.2
[8] R Duarte Davidson, C Courage, L Rushton, L Levy, 2000; 'Benzene in the environment: an assessment of the potential risks to the health of the population'
[9] http://www.bt.cdc.gov/agent/benzene/basics/facts.asp, 25/10/2013
[10] European Environment Agency, 2013 'Air pollution fact sheet 2013 – Malta', p.3

The following table takes a locality-by-locality picture of the levels of benzene in Malta.

Benzene - by Street and Locality

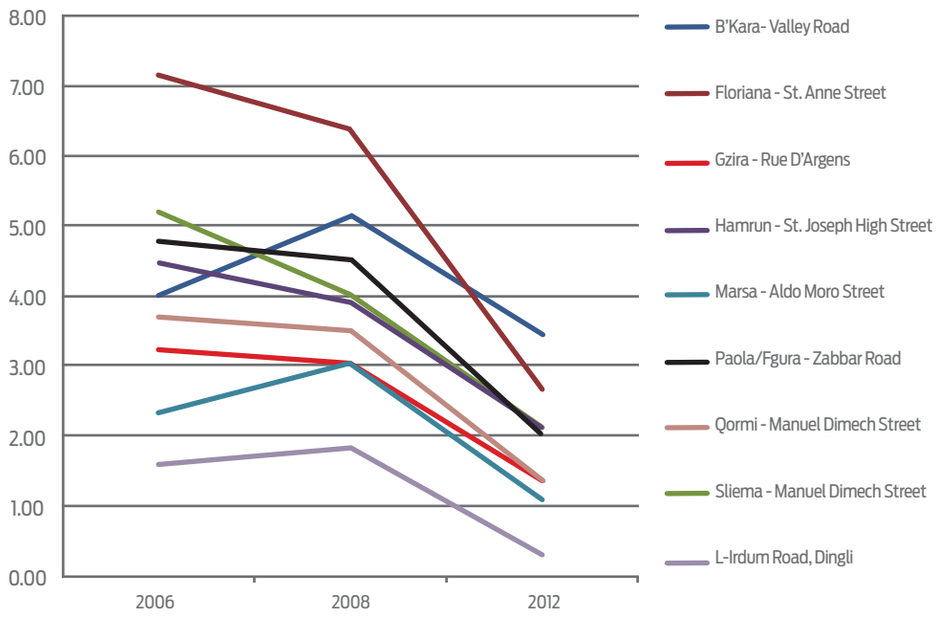


Figure 4: Annual Average Benzene Emissions by Street and Locality [11]

From the above table, it is clear that improvements in the reduction of Benzene levels have been made, especially in the years between 2008 and 2012. This reduction in Benzene emissions can be attributed to several factors, one of which can be the increasing percentage of Euro III, IV and V vehicles on Maltese roads between 2008 and 2013.

In 2008, 76% of the vehicles on the road that made use of conventional fuel were comprised of Euro II vehicles as opposed to the mere 24% which were Euro III, IV and V vehicles. This share has been drastically reduced to 52% as of October 2013 while the share of Euro III, IV, V and VI vehicles has increased to 47% in 2013. [12] This can be seen more visibly in the figures below.

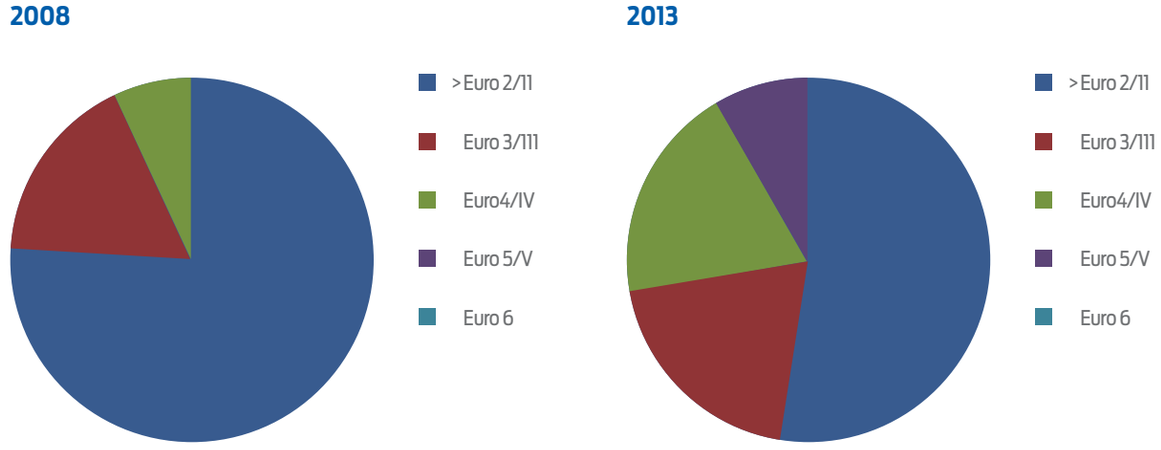


Figure 5: Vehicles on the road by Euro Emissions Standard

Euro III, IV and V vehicles burn fossil fuels more efficiently thus resulting in less tail-pipe emissions. Therefore a higher percentage of said cars on the road will result in less traffic-caused emissions.

[11] Data provided by MEPA. Disclaimer: It is important to point out that MEPA did not manage to prove equivalence of the benzene and NO2 diffusion tubes to the reference method as per Annex VI of Directive 2008/50/EC and therefore this data cannot be used to assess compliance with the legally enforced environmental quality objectives. It can however be used for comparative purposes i.e. to compare the pollution levels in one locality to the pollution levels in another locality.

[12] Data provided by Transport Malta

Nitrogen dioxide (NO_2)

Nitrogen dioxide (NO_2) belongs to a family of highly reactive gases called nitrogen oxides (NO_x). These gases form when fuel is burnt at high temperatures. Motor vehicle exhaust is one of the principle sources of these gasses.

According to epidemiological studies conducted by the World Health Organisation (WHO) it has been shown that the symptoms of bronchitis in asthmatic children increase when subjected to long-term exposure to NO_2. Reduced lung function growth is also linked to NO_2 at concentrations currently measured (or observed) in cities of Europe and North America.[13]

Furthermore, NO_2 is the main source of nitrate aerosols, which form an important fraction of Particulate Matter. Particulate Matter particles are identified according to their aerodynamic diameter, as either PM_{10} (particles with an aerodynamic diameter smaller than 10 µm) or $PM_{2.5}$ (aerodynamic diameter smaller than 2.5 µm). According to the European Environment Agency, "PM can cause or aggravate cardiovascular and lung diseases, heart attacks and arrhythmias. It can also affect the central nervous system and the reproductive system, and can cause cancer.

"One outcome of exposure to PM can be premature death. PM also acts as a greenhouse gas."[14] $PM_{2.5}$ particles are even more dangerous since, when inhaled, they may reach the peripheral regions of the bronchioles, and interfere with gas exchange inside the lungs.[15]

The effects of PM on health occur at levels of exposure currently being experienced by most urban and rural populations in both developed and developing countries. Chronic exposure to particles contributes to the risk of developing cardiovascular and respiratory diseases, as well as of lung cancer.[16] The International Agency for Research on Cancer (IARC) recently estimated that exposure to ambient fine particles has contributed to 3.2 million premature deaths worldwide in 2010, due largely to cardiovascular disease; of which 223,000 deaths were caused from lung cancer.[17]

According to the European Environment Agency, of the total Nitrogen Oxides (NO_x) in Malta in 2011, 32% were produced by road transport emissions.[18] This can be seen clearly in the figure below.

Emissions by sector - 2011

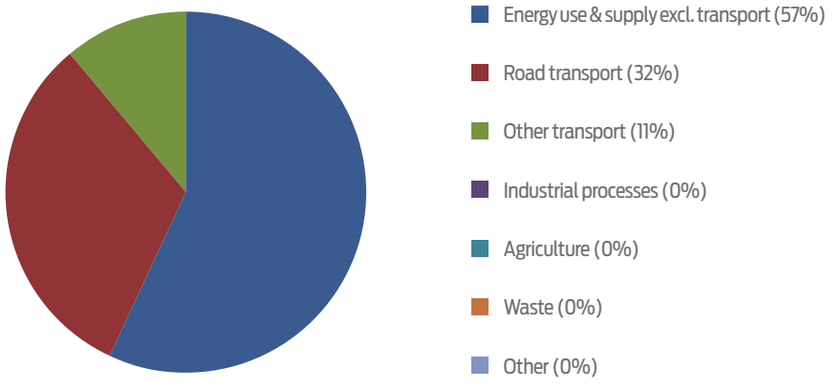


Figure 6: Nitrogen Oxides emissions by sector; European Environment Agency

[13] http://www.who.int/mediacentre/factsheets/fs313/en/, 25/10/2013
[14] European Environment Agency, 2013 'Air pollution fact sheet 2013 – Malta', p.2
[15] http://www.who.int/mediacentre/factsheets/fs313/en/, 25/10/2013
[16] http://www.who.int/mediacentre/factsheets/fs313/en/, 25/10/13
[17] IARC 2013, Scientific Publication No.161, 'Air Pollution and Cancer' Editors: Kurt Straif, Aaron Cohen, Jonathan Samet
[18] European Environment Agency, 2013 'Air pollution fact sheet 2013 – Malta', p.3

The European Environment Agency also reports that the levels of $PM_{2.5}$ generated by road transport in Malta was at 72% in 2011 as shown in the figure below. [19]

Emissions by sector - 2011

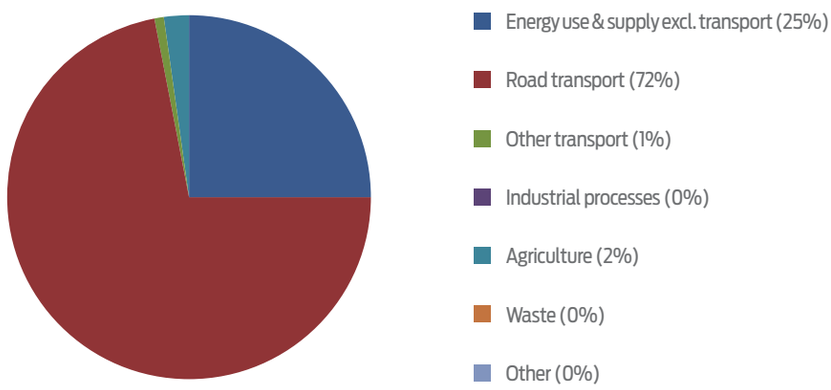


Figure 7: PM $_{2.5}$ emissions by sector; European Environment Agency

A more detailed breakdown has to be considered however. In order to assess the levels of NO_2 in Malta, this paper focuses on eight localities which represent 24% of the total Maltese population.[20] These localities are; Birkirkara, Floriana, Msida, Marsa, Gzira, Qormi, Fgura/Paola, Sliema and Hamrun. NO_2 readings taken by MEPA in each of these localities between the years of 2006 and 2012 are depicted below.

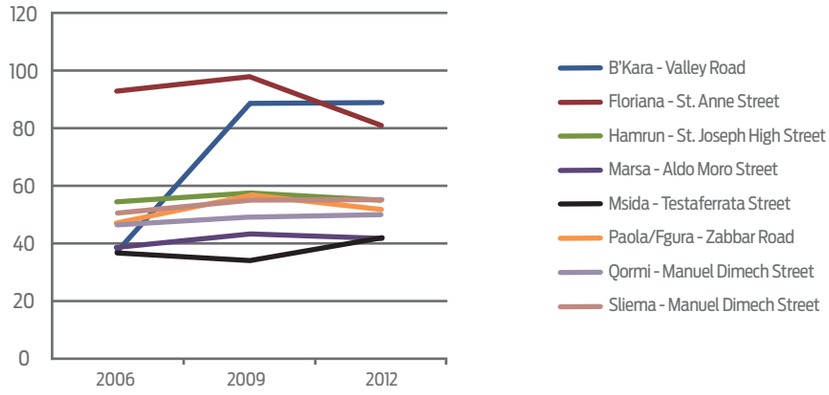


Figure 8: NO_2 Emissions by Street and Locality; MEPA Data, 2013[21]

[19] Ibid. p.5

[20] National Statistics Office 2012, 'Census of Population and Housing 2011; Preliminary Report'

[21] Data provided by MEPA. Disclaimer: It is important to point out that MEPA did not manage to prove equivalence of the benzene and NO2 diffusion tubes to the reference method as per Annex VI of Directive 2008/50/EC and therefore this data cannot be used to assess compliance with the legally enforced environmental quality objectives. It can however be used for comparative purposes i.e. to compare the pollution levels in one locality to the pollution levels in another locality.

While certain localities in Malta have registered a decreasing trend in NO_2 emissions, such as St Anne Street Floriana, the reading is still double that of other localities such as Testaferrata Street Msida – which has itself registered an upward trend within the respective six years. In other cases, namely Valley Road, Birkirkara, a clear, steep upward trend has been recorded, with readings stabilising around the high mark between 2009 and 2012. [22]

The WHO Air Quality Guidelines are designed to offer guidance in reducing the health impacts of air pollution. These guidelines are intended to inform policy-makers and to provide appropriate targets for a broad range of policy options for air quality management in different parts of the world.[23] The WHO Guidelines set 40 µg/m^3 as the annual average value for NO_2 and an annual mean of 10 µg/m^3 for $PM_{2.5}$. [24] The EU Directive on Ambient Air Quality (Directive 2008/50/EC) also sets a 200 µg/m^3 hourly limit value for NO_2 emissions. In a year, any area can exceed this limit value 18 times. The Figure below takes Marina Road, Msida as an example. Between the years of 2006 and 2011 the hourly limit value of 200 µg/m^3 has been exceeded quite a number of times, but in 2006 and again in 2011 the hourly limit value has been exceeded by more than the allowed 18 times.

Marina Road, Msida

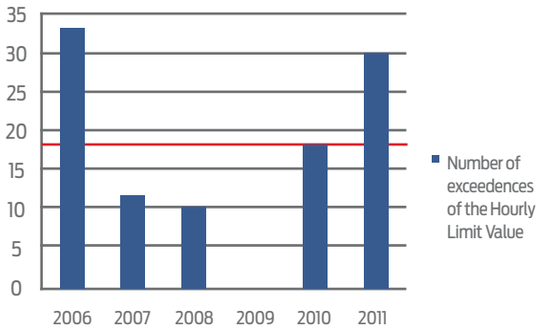


Figure 9: NO_2 Hourly Limit Value Exceedences; MEPA Data, 2013

Limit Exceedences of PM_{10} Levels

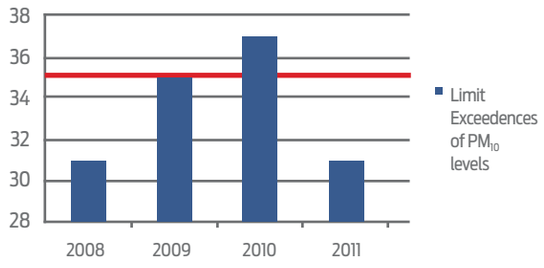


Figure 10: PM_{10} Limit Exceedences at Marina Road Msida; MEPA Data, 2013

Further to figure 9, figure 10 depicts the annual exceedences in PM_{10} levels at Marina Road, Msida. The annual exceedences limit is that of 35 times per year. In addition as can be seen from figure 10 above, emission limits at Msida have been exceeded quite a number of times. This trend is to be expected however, considering the centralized location of these localities and the rate at which the number of licensed cars on the road is increasing. In 2004, the stock of licensed motor vehicles amounted to a total of 271,137. [25] In 2012, this has increased to 314,510[26] licensed vehicles which translates into a percentage increase of 16% in 8 years.

Stock of Licenced Road Vehicles

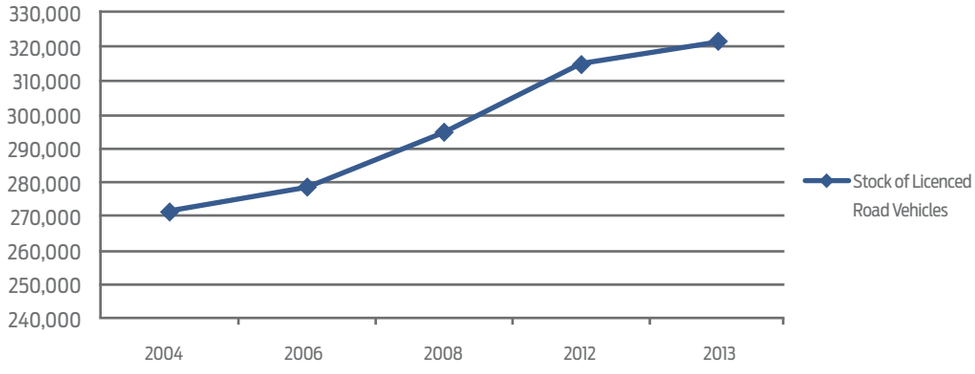


Figure 11: Stock of Licensed Road Vehicles; NSO Statistics, 2013

[22] Data provided by MEPA for comparison purposes.

[23] WHO 2005, 'Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide; Global update 2005', p.5

[24] Ibid. p.16

[25] National Statistics Office 2005, 'Transport Statistics 2005' p.71

[26] National Statistics Office 2013, 'Transport Statistics 2013' p.103

Considering the fact that the combustion process within motor vehicles is one of the main sources of NO_2 emissions, such exceedences as have been recorded in Marina Road, Msida, and the high readings taken from such roads as St Anne Street, Floriana and Valley Road, Birkirkara are to be expected. Moreover, when considering that 24% of the Maltese population lives within areas where these high readings have been recorded, the situation becomes alarming, and immediate and effective action must be taken to amend this situation.

Reducing local emissions through Electromobility

Battery Electric Vehicles are one of the main solutions that can free our towns and villages of pollutants, fine dust and noise and hence raise the quality of life.

As outlined in the previous section, microclimates in urban cores and conurbations are heavily exposed to traffic exhaust, fine-dust and noise emissions from traffic. The need and urgency to reduce these emissions from Maltese roads is a priority for the Maltese Government

EVs integration into the main system

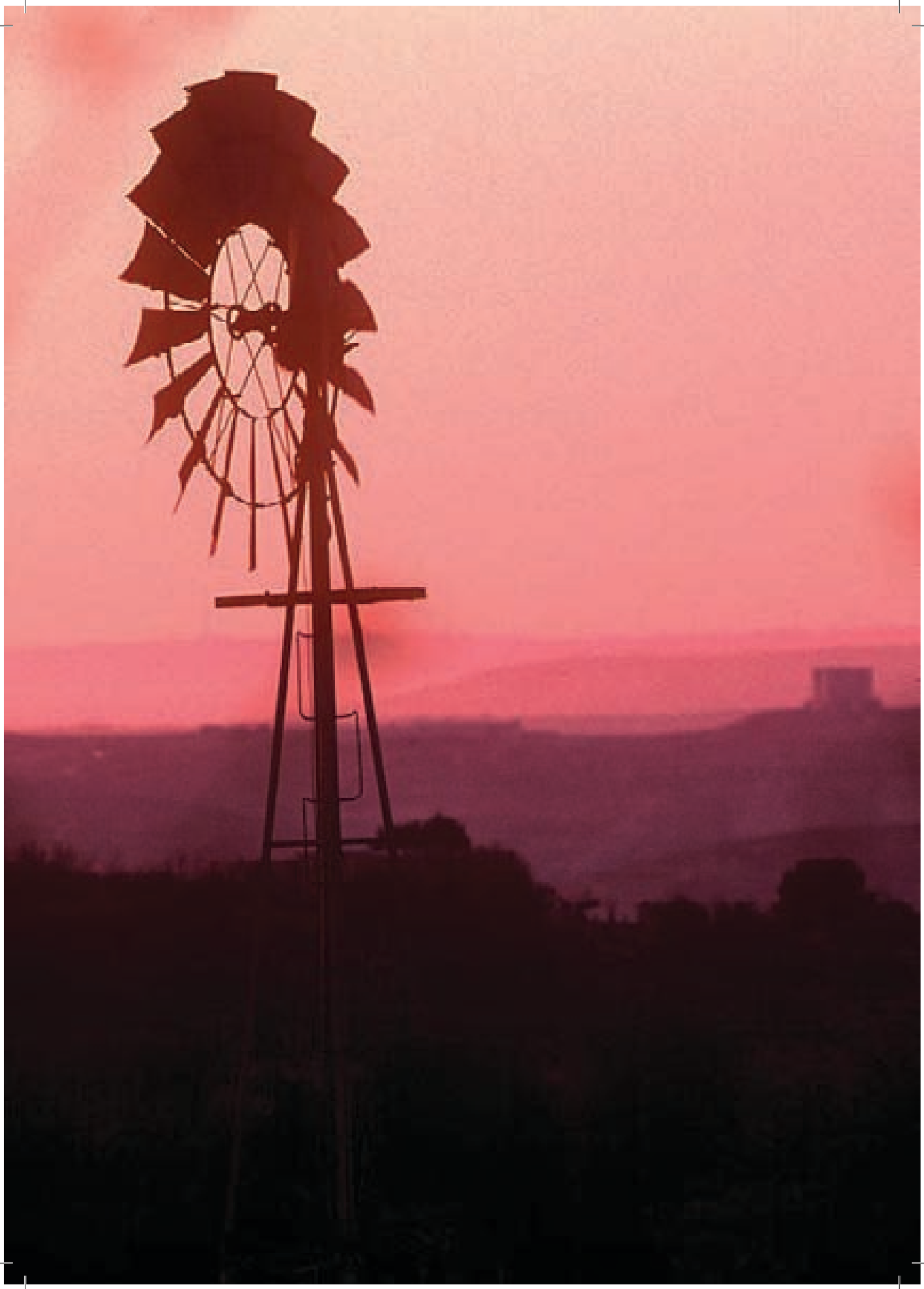
It is a fact that BEVs will help improve grid efficiency, especially during EV night charging and promote the idea of carbon neutral transport through the promotion for the uptake of photovoltaic infrastructure.

In addition, the more Electric Vehicles the more energy can be stored in their battery, meaning that the use of electric vehicle batteries for storage will increase the overall efficiency of power supply. This is done by the smoothing of production peaks, by aligning production and load curves more closely and supplying balancing energy in the future.

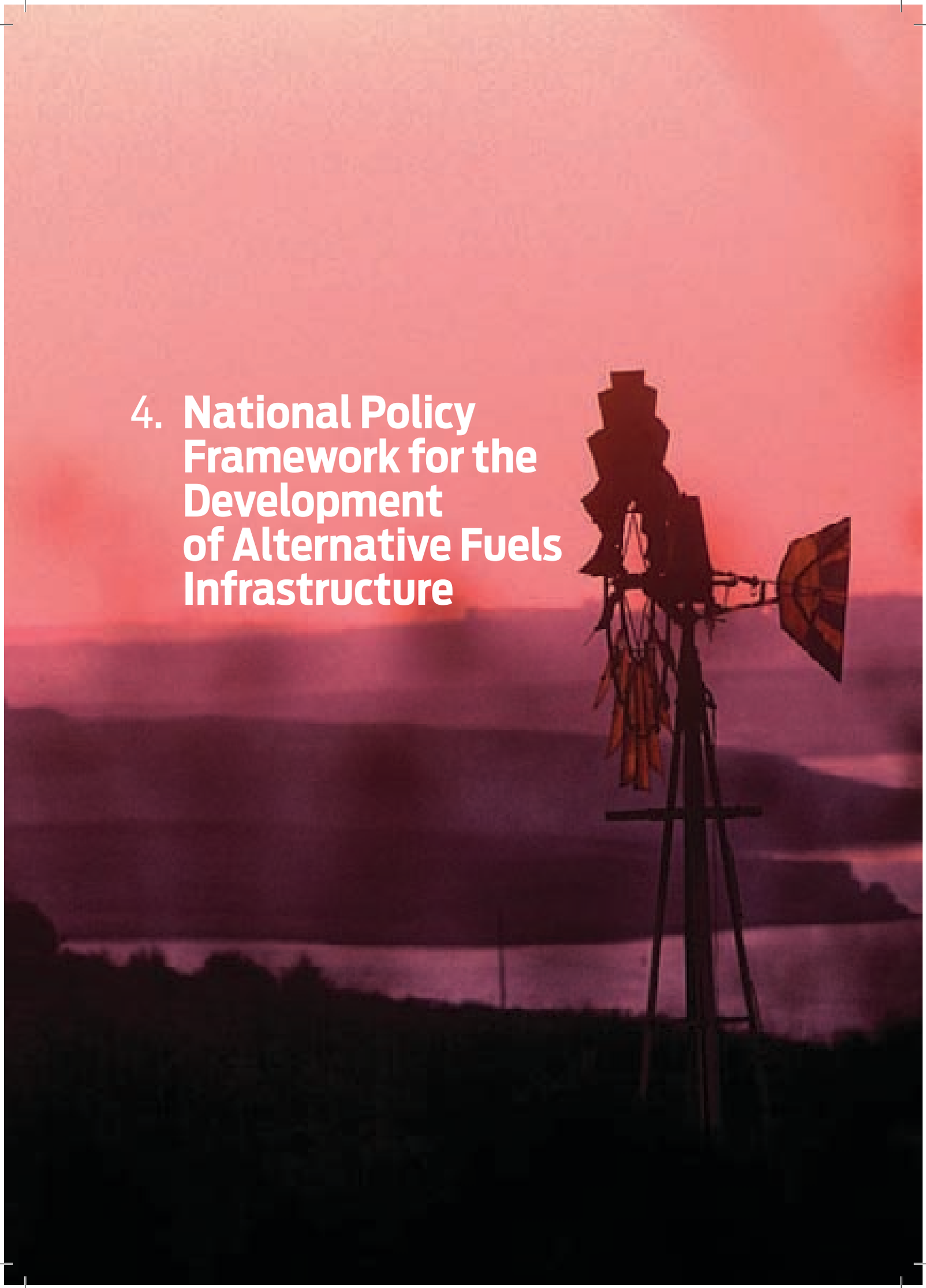
Energy storage in batteries of vehicles reduces adverse fluctuation effects and will facilitate the continued expansion of solar energy in the whole system. Having a large national BEV fleet in the future and their integration in the national grid will also raise the efficiency of conventional power stations, when the demand for energy is low, for example during the night, which in turn will contribute towards the reduction in demand for fossil fuels.

The Number of Registered BEVs by Vehicle Segment

Vehicle type	Category	Unit	PHEV & E-REV	BEV	FCEV	Total
Passenger Cars	M1	Nº	225	43	nil	268
Vehicles for Freight Transport (<3.5t)	N1	Nº	nil	nil	nil	nil
Vehicles for Freight Transport (≥3.5t)	N2 + N3	Nº	nil	nil	nil	nil
Buses and Coaches	M2 + M3	Nº	6	nil	nil	6
Quadricycles	L6e + L7e	Nº	nil	4	nil	4
Total Nº of EVs with ≥4 Wheels		Nº	231	47	nil	278
3-Wheel Vehicles	L2e + L5e + L4e	Nº	nil	nil	nil	nil
2-Wheel Vehicles	L1e + L3e	Nº	nil	33	nil	33
Industrial Vehicles		Nº	nil	24	nil	24



4. National Policy Framework for the Development of Alternative Fuels Infrastructure



4. National Policy Framework for the Development of Alternative Fuels Infrastructure

Infrastructure

In the latest Proposal for a Directive of the European Parliament and of the Council on the Deployment of Alternative Fuels Infrastructure, reference is made to the adoption of a National Policy Framework by each Member State intended for market development of alternative fuels infrastructure.

The National Policy Framework needs to contain the following elements:

i. Assessment of the state and future development of alternative fuels infrastructure of the respective Member State including trans-border continuity;
ii. Objectives and binding national targets, as required under the same proposal for the development of alternative fuels infrastructure;
iii. Assessment of measures necessary to ensure that the objectives contained in the National Policy Framework are reached.

The proposal suggests that binding national targets shall be established and which may be revised at a later stage on the basis of an assessment of internal demand within the territory of the Member State. In addition, each Member State will be obliged to report to the EU Commission on the implementation of each respective National Policy Framework.

In view of this, the MNEP will be putting in place a draft National Policy Framework with regards to the National Electric Car Charging Infrastructure to be put in place by December 2020, which however will be revised, up or down, according to BEVs uptake and demand for car-charging infrastructure.

One has to note that the MNEP has already included in the MNEAP a draft programme for the deployment of BEV electric charging infrastructure, assuming that the national targets for the registration in Malta of 5,000 BEVs will be reached, and this is irrespective of the mandatory targets proposed in the Alternative Fuel Infrastructure proposed directive. The number of mandatory car charging points assigned to Malta in the proposed directive (which is subject to change as the proposed directive is still under discussion) currently stands at 500 public car charging points nationwide.

As at end December 2013, the Ministry for Transport and infrastructure would have already deployed 90 charging points which is almost one fifth of the current assigned target.

It is envisaged that through the installation of five solar car ports which will be carried out during 2014, there will be an additional 11 charging units. The rate of deployment and number of charging units that are expected to be deployed until December 2020 can be seen in Section 7 of this document.

In the meantime, through the MNEP, a number of synergies will be created through an interface between MNEP – Enemalta and Service Providers. This will be set up to make sure that the deployment of the charging infrastructure would be done in a seamless manner, including the issue of funding.

Human Resource Build-up

The shortage of human resources in the field of electromobility needs to be addressed so that Malta would have the capability to implement the Electromobility Action Plan, in the medium and long term.

The MNEP would enter into discussions with the University of Malta and the Malta College for Science and Technology to address the shortage of scientists, engineers and technicians available and such shortage can be a constraint in the future switch to electromobility.

In this regard, the MNEP will also be making use of specific EU Funds such as the European Social Fund (ESF) as well as other EU Programmes specifically having a vocational dimension such as those falling under the Life Long Learning Programme and Erasmus+.

The MNEP will encourage the participation in EU funded research projects in this respect, such as participation in projects that would be financed under the new Horizon 2020 EU Research Programme.


LH2

BEVs Charging Infrastructure Locations

* Locations are marked for indication purposes only.

Market Entry

The MNEP will continue to promote market uptake of BEVs through a number of measures, including a number of incentives to encourage BEV uptake from private users and private companies throughout the duration of the MNEAP.

Additionally, a number of pipeline projects are being proposed through which additional BEVs and BEV charging infrastructure will be purchased and deployed. These projects will be funded through a mix of EU funds, National Funds, soft loans and private investment on the basis of private public partnerships. For the next EU Programming Period, the MNEP will enter into specific, EU funded projects which allow the involvement of private firms. Participation in such projects similar to the Green Cars Initiative which was carried out on the basis of a public private partnership, will be done accordingly and in line with the priorities of the Government.

The same concept will also be adopted for projects relating to Hydrogen vehicles and related infrastructure, whereby the MNEP intends to carry out at least the building or conversion of one petrol station which would be able to provide Hydrogen and the demonstration of Hydrogen Fuel Cell propelled vehicles. This is in line with what the EU Commission itself and other countries are doing such as Germany, France, the UK, the People's Republic of China, the US and Japan.

SWOT Analysis

Strengths

- Short distances travelled in Malta
- Mobile energy storage
- Lower electricity costs
- No need for an extensive public charging infrastructure due to short distances
- Availability of sunshine most of the year
- BEVs cost less to maintain when compared to conventional cars
- Electricity costs less than transport fuels
- No tail-pipe emissions
- Improvements in technology is resulting in reduced time for battery charging
- BEVs charging infrastructure is easy to network
- High innovation and advanced environmental awareness
- Ability to charge vehicles with RES
- Beneficial for Power Station

Weaknesses

- Lack of interest from local agents
- Not every household has a garage
- Number of apartments do not have underground parking facilities
- High battery costs
- BEVs are still very much expensive compared to Conventional Vehicles
- European and global standards and norms still in the process of standardisation
- Restricted Public Funds to offer grants, hence market penetration will take longer
- Low vocational skills
- Lack of economies of scale

Opportunities

- High Vehicle culture
- Large National Vehicle Fleet and therefore large opportunities to make the switch
- Reduction of import dependence on petroleum; securing long-term mobility
- Contribution to climate change targets
- Contribution to the reduction of tail-pipe Emissions and improvement in air quality
- Improved grid integration of solar energy renewable energies and efficiency of electricity
- Introduction of the latest technology
- Reduction of traffic generated noise pollution
- Creation of new and green jobs for highly skilled employees and re-training
- Shifting climate change targets from Non-ETS to ETS, offering investment in car battery subsidies
- Exposure to the latest R&D developments

Threats

- High costs may discourage BEV uptake
- Limited space to deploy BEV charging infrastructure
- Bad reputation of the old BEV technology
- BEV market uptake cannot be assured
- Range Anxiety
- Additional costs for monthly Battery lease (in some cases)
- Limited National Budgets that hinder incentives
- Not reaching the BEV-on-the-road target by 2020

5. The Malta National Electromobility Platform

5. The Malta National Electromobility Platform

The set-up of the Malta National Electromobility Platform is a clear sign by the Government of its commitment towards electromobility in Malta. The main role of the MNEP would be to promote the introduction of electromobility in Malta as well as to be a promoter for the electrification of transport modes in Malta. But the platform will not just serve as a marketing instrument or a place where all those involved in the platform would discuss electromobility; it also holds as one of its main objectives the implementation of a number of projects in the form of concrete plans and measures set against specific time-frames and deadlines which are organised within a very ambitious framework that would be carried out over the coming five to seven years. This will be done specifically by the setting up of a projects unit made up of a team of experts in project proposal writing and project management to assist the Government to put in place the necessary infrastructure and expose Malta to the latest cutting edge technology and innovation.

Since its inception, the MNEP has already opened a dialogue with a number of stakeholders that will be forming part of its structure, including discussions and consultations with other Government Ministries, the industry and local agents as well as research institutions.

MNEP Objectives

The MNEP's objectives are the following:

I. To be a recipient of technology transfer, both in electric drive trains and related state of the art and cutting edge technology;
II. To oversee, coordinate and efficiently manage the implementation of the Malta National Electromobility Action Plan (MNEAP);
III. To conduct close consultations among and between policy makers and all of the stakeholders involved;
IV. To appoint working groups in between the stakeholders and policy makers for specific tasks;
V. To promote research and development in electromobility;
VI. To setup a national e-Car sharing platform;
VII. To expand the national car-charging infrastructure;
VIII. To facilitate the provision of facilities should these be required by the automotive industry for the purpose of research and development and promote Malta as a large scale laboratory for electromobility;
IX. To implement the changeover of the Government vehicle fleet from a conventional cars to a clean energy fleet in a phased manner;
X. To assist Government entities and private companies to switch to electromobility and their participation in related projects;
XI. To enter into cooperation agreements with the private sector in a view to further promote electromobility and all of the objectives of the MNEP, including assisting the Government to meet its environmental targets;
XII. To participate in a number of lighthouse and demonstration projects through which all forms of electromobility applications can be demonstrated including testing of all forms of electric drive trains and related emerging technologies;
XIII. To promote and facilitate the building up of the necessary human resources and to be able to meet the challenges ahead;
XIV. To assist the Government in creating market stimulation measures for the uptake of the following:
i. All forms of Electric Vehicles and Motor Bikes
ii. Hydrogen Fuel Cell Vehicles;
iii. Hydrogen Fuel Cell Buses;
iv. Automated personal rail transport;
v. Electric Maritime transport;
vi. Deployment of infrastructure;
vii. e-Car sharing activities;
XV. Considering the introduction of light rail services in Malta;
XVI. Assisting in the change of legislation when required;
XVII. Fostering and create green jobs;
XVIII. Contributing towards the Government's role to create a Green Economy;
XIX. Organising an annual or bi-annual National Electromobility Conference.

Organising the MNEP

Structure

The Malta National Electromobility Platform is a joint initiative between the Ministry for Transport and Infrastructure and Transport Malta with the Management Board being made up of the Chairman of Transport Malta and the Permanent Secretary of the Ministry and chaired by the Hon. Minister for Transport and Infrastructure.

The second level in the structure of the platform is made up of a technical team from Transport Malta, the Ministry for Transport and infrastructure, the Ministry for Finance, the Ministry for Energy and Conservation of Water and the Ministry for Sustainable Development, the Environment and Climate Change (MSDEC).

The third level is the Stakeholder Forum which includes all other stakeholders including Ministries, Government Departments, Public Authorities, representatives from the Automotive Industry, including car importers, Transport Operators, and other Professional Associations such as representations from the social partners as well as NGOs, Malta Enterprise, the emergency services, and the Employment and Training Corporation (ETC).

Finally, the stakeholder forum also includes representation from the University of Malta, the Malta College for the Arts and Sciences as well as the Malta Council for Science and Technology.

To make sure that the MNEP will function as intended, a special projects unit and marketing unit is being set up with the engagement of officers from TM and MTI to oversee the activities of the Platform including the functioning of the organisational setup, internal consultations within the MNEP itself as well as the implementation of the Malta National Electromobility Action Plan including the preparation of pipeline lighthouse and demonstration projects as well as their implementation. The Unit will also be in charge of running information and marketing campaigns as well as the organisation of specific electromobility events to raise public awareness.

Implementation of the MNEAP

The time frames set for the implementation of the MNEAP are spread over a period of six years starting from 2014 to 2020, by which time Malta should have at least 5,000 Battery Electric Vehicles registered on Maltese roads. Although this number may seem to be small when compared to the rest of Malta's national fleet, accomplishing such a target will not be an easy task especially during the first few years of its set-up.

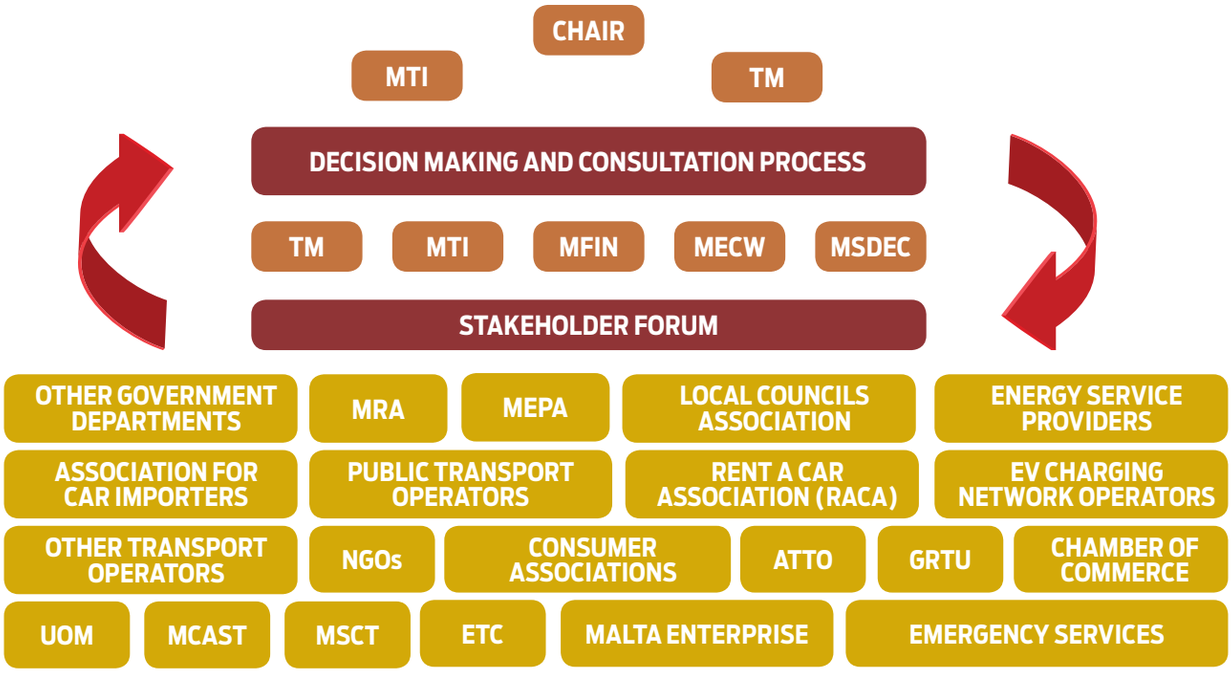
There are several factors that make this task hard to achieve including; the fact that Malta may not be one of the first batch of countries that will start receiving electric vehicles from leading car manufacturers for the consumer market, the fact that the choice of these vehicles is still rather limited on the local market, coupled with the reality that BEVs are relatively still more expensive to purchase.

Therefore, in order to assist in the achievement of this target, the Government is also contributing its share by committing itself with a minimum of 25% of all vehicles that are purchased by Government, including Ministries, Government Departments, Public Authorities and other public funded entities, will be Battery Electric Vehicles. This commitment will start as from 2014.

Another commitment that the Platform will take upon itself is that whenever there are new future Government policies, the

The Malta Electromobility Platform

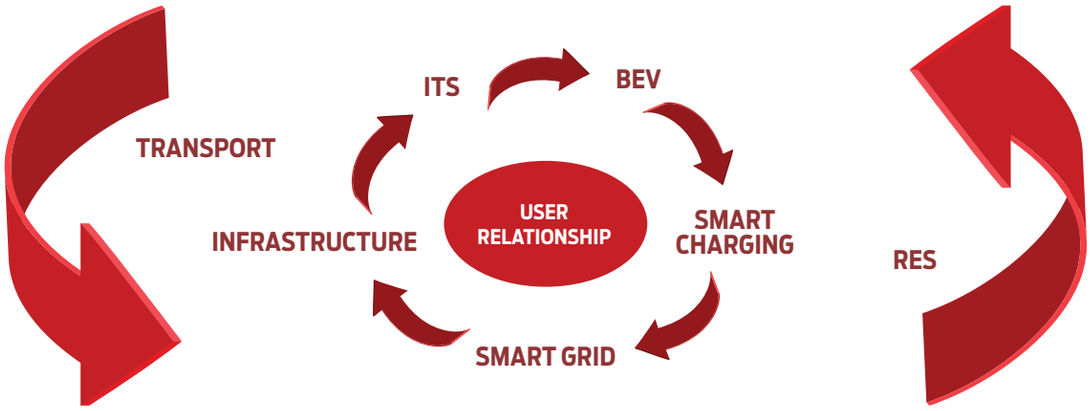
The Structure

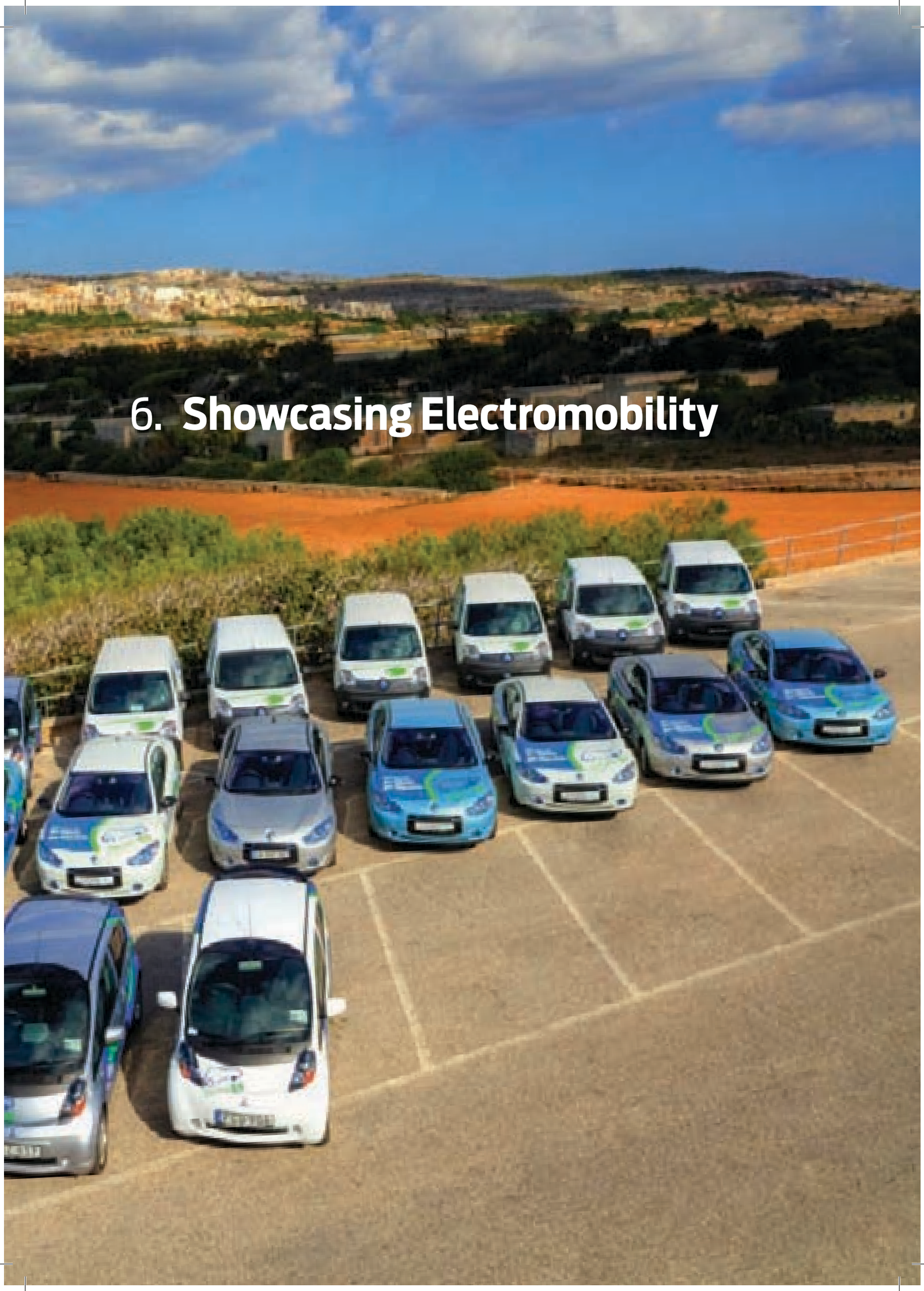


Platform will see that Government policy on electromobility and the electrification of transport is included or reflected in such policy areas, like for example, future policies on energy and fuel strategies, policy areas relating to Climate Change and Air Quality, road infrastructure and spatial planning.

Government believes that this is the way forward to a faster reduction in Malta's dependence on petrol and diesel fuels through the deployment of new drive concepts and technologies as well as the introduction, in a phased manner, of the latest modern transport solutions such as the e-Car Sharing concept which is becoming a convenient, sustainable and cheaper way to travel as far as personal passenger transport is concerned; as is being seen in many European cosmopolitan cities.

User Centric Approach to the Individual Components





6. Showcasing Electromobility

6. SHOWCASING ELECTROMOBILITY

With national levels of transport emissions reaching as high as 32% for nitrogen oxide and 26% for benzene in 2011, it is evident that the Transport Sector is one of the main sectors that needs to be dealt with if the ambitious environmental targets are to be reached.

The lack of tail-pipe emissions, the relative energy efficiency of the vehicles themselves and the potential of generating energy from renewable means, places electric mobility as a key factor in contributing towards the achievement of these targets. However, the potential of electric mobility as a driving factor in reaching the 10% target for 2020 very much depends on the electricity generation method, as well as the market uptake of full electric vehicles; two variables which can only be maximized to their full potential through the deployment of the vehicles themselves and the carrying out of field tests that will provide important insights into the technological maturity of the vehicles and the different charging methods; the vehicles energy requirements and user acceptance.

To this effect, EU funding was used to focus on the following topics:

- Deployment and testing of Battery Electric Vehicles in the national context both in the passenger car sector and the commercial sector;
- Charging methods, with a particular focus on the provision and possibility of carbon neutral transportation;
- Informative and educational campaigns targeted at potential users.

The Demo-EV Project

Demonstration of the feasibility of electric vehicles towards climate change mitigation	
Partnership	Ministry for Transport and Infrastructure, Transport Malta, Ministry for Gozo, Enemalta
Duration of Project	Sept 2011 – Dec 2014
EU Co-financing:	This project is co-financed at 50% through the LIFE+ financial Instrument
Website:	www.electricvehiclesmalta.eu

Project objectives

The main objective of this project is to introduce BEVs in the Maltese Islands while demonstrating and testing their feasibility in the Maltese urban and topographic context as well as demonstrating a solution towards meeting Malta's environmental targets.

The Demo-EV project will:

- Demonstrate how to attain Malta's targets under the Climate Change and Energy Package;
- Implement measures included in the Malta National Air Quality Plan;
- Introduce EV charging infrastructure.

Specific Objectives:

1. Study whether carbon neutrality can be achieved by recharging full electric vehicles in buildings where photovoltaic systems are installed;
2. Evaluate the actual energy efficiency of BEVs;
3. Inform potential users on full electric vehicles and campaign towards the substitution of internal combustion engine vehicles with BEVs;
4. Study the environmental and economic efficiency of different ways of recharging BEVs;
5. Laying the foundations for a national car-charging infrastructure.

Project Implementation

This project will contribute towards these objectives by implementing a pilot project that has been running from September 2011 to December 2014. Twenty-four full electric vehicles varying from light goods vans to passenger vehicles of different classes have been purchased and distributed among volunteers ranging from private households, commercial delivery companies and government entities. The vehicles will be tried and tested by private citizens and companies who will use these BEVs as their primary household/business car, and thus test the actual feasibility of the vehicles when applied in the day-to-day household/commercial needs.

In this way, therefore, the vehicles will be tested in the context in which they are meant to be used and the project will be able to properly assess the vehicles' energy-efficiency and cost-effectiveness in the Maltese context while also assessing different ways of re-charging the vehicles.

This will be done from single-phase household electrical supply; three-phase public charging points connected to the national grid; household/business electrical supply whereby photovoltaic panels are installed at the volunteers households/business establishments.

Project actions:

- Deployment of 24 BEVs ranging from light goods vans to passenger cars of different classes

- Installation of 90 charging points in Malta and in Gozo

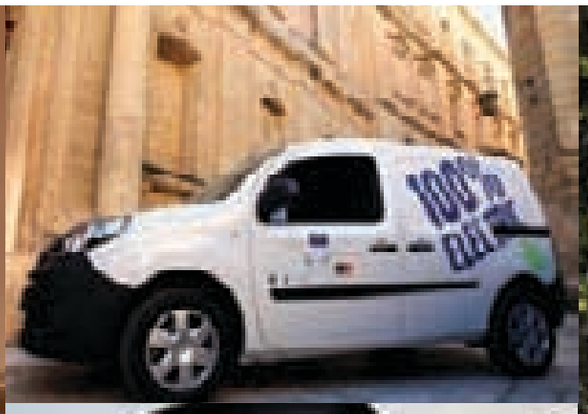
The charging points are being installed in different localities across Malta and Gozo targeting suitable public parking areas, and other easily accessible locations in urban cores taking into consideration a wide geographical distribution to cover the entire Maltese Islands. The pillars will be connected to the grid with a three-phase power supply to minimize the time it takes to charge the vehicle from eight hours down to four hours.

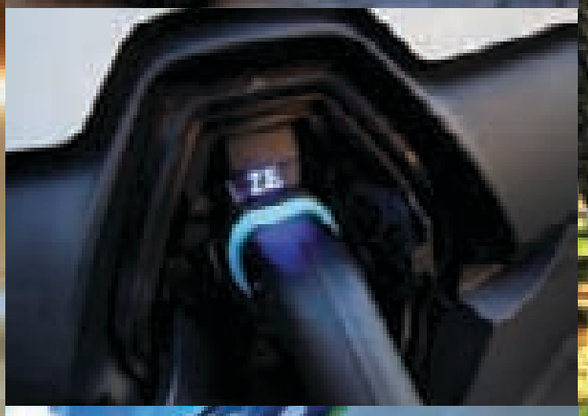
The charging points will be made available to the public and will be inter-connected and remotely managed. Therefore a system of pre-booking of any single charging point will be available.

- Pilot and demonstration period to test Full Electric Vehicles' feasibility and adaptability within local topographic and specific climatic conditions

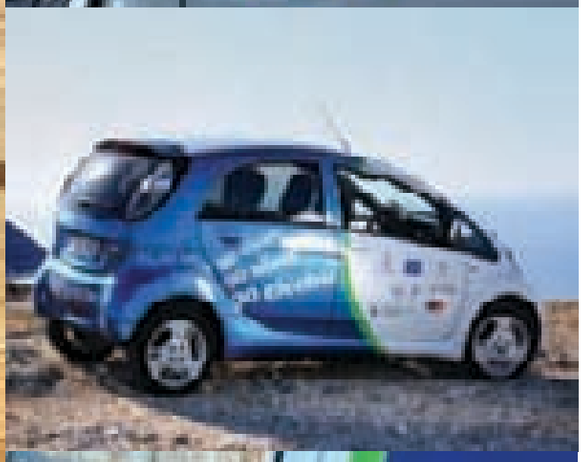
Volunteers will use the cars for their normal day-to-day use either as part of their household needs, business and/or administrative operations or commercial activities depending on the type of the participating volunteer. Volunteers will be rotated periodically throughout the pilot project to maximize the number of vehicle users.

The volunteers are critical in the demonstration element of this project – they are the ones who will actually be testing the vehicles. From preliminary findings results are encouraging,






ELECTRIC!



One of the first volunteers who actually started to test these vehicles is the Minister for Transport and Infrastructure himself, and the first results obtained so far are positive.

- Information Campaign – dissemination of results nationwide

An important element of this project is the information and education campaign which will be carried out while the vehicles will be rolled out during the demonstration period. Here, the results gathered during the demonstration – from the volunteers' surveys and data gathered from the vehicles will be disseminated as widely as possible to the target audience and stakeholders. The marketing tools chosen for the campaign are the creation of a specific project website and other websites, TV commercials, short documentary features, printed media, press conferences and press releases as well as billboards. The intensive campaign will start to take place from the end of 2013 and the beginning of 2014.

Expected Results:

Since this project is essentially a field test, the results will be gathered through a series of data gathering exercises throughout the demonstration period.

Once the vehicles are deployed, the users will note their daily driving habits, which are being assumed to be equal to those made with a conventional vehicle. Data recording from electricity metres and charging points used to charge the vehicles will be recorded. Comparative analysis of this data could then start.

This will include:

1. Energy Efficiency (comparative data tank-to-wheel of both conventional vehicles compared to BEVs);
2. Comparative analysis between unit cost of electricity against normal carbon based fuel (tank to wheel);
3. Comparative analysis of charging data between PV installed infrastructure vs conventional car charging in the absence of PV infrastructure;
4. Carbon savings from BEV charging through the electricity grid;
5. Carbon savings from BEV charging where photovoltaic infrastructure is present.

The Port PVEV Project

Demonstrating how to make ports more energy efficient as well as demonstrating the use of electric mobility in ports and port areas		
Partnership	Transport Malta, Catania Port Authority, Ministry for Transport and Infrastructure (Malta), Province of Caltanissetta	
Duration of Project	September 2012 to December 2014	
EU Financing Programme:	OP Italy-Malta 2007-2013	
Project Website:	www.portpvev.eu	

Objectives of the PORT-PVEV Project

This project will demonstrate how ports, port areas and their hinterlands can become carbon neutral with the aim of decoupling economic growth from non-renewable sources of energy.

Specific Objectives

Demonstrating reductions in port operations' dependence on non-renewable sources of energy through:

1. The use of solar energy to partly power administrative buildings and reduce port areas' dependence on non-renewable source of energy, thus reducing green house gas emissions;
2. Deployment of solar car ports inclusive of BEV charging stations in public car parks within port areas to contribute towards the achievement of carbon neutral transport in ports;
3. Launch electromobility in Catania, Gela and Valletta Harbour areas to partly substitute combustion engine vehicles used to service the respective port operations;
4. Study options for future policy implementation to further decarbonise port areas including a feasibility study of on-shore supply technology for berthed vessels using electricity from the national grid instead of using on-ship heavy fuel oil.

Projects Activities

The PORT-PVEV objectives will be reached in two ways:

- Demonstration
- Studies

Demonstration

PV panels installed at port-administration buildings (Malta Transport Centre) will help to reduce port operations' dependence on fossil fuels. Moreover, a span of 1,460.76 m^2 of roof will be covered by PV panels that are estimated to generate 296,000 kWh per annum.

The project will study ways of how to use the solar energy produced to power BEVs used within port areas. To this effect, a total of 37 BEVs, including passenger cars, light goods vans, crew vans, quadricycles, motorcycles and electric bicycles, will be bought and used in port operations within the partner port areas.

Charging infrastructure to power these vehicles will also be purchased and installed within the Partners' port areas including solar charging stations which will be used to test whether completely carbon neutral road transport can be achieved. The Solar Charging Stations will be tent-like structures; covered by PV panels some of which will be connected directly to charging points. An electric vehicle will be able to park under the structure, connect to the charging point and charge its battery directly from the electricity generated by solar power. This will demonstrate carbon neutral transportation.

The wide range of vehicles that will be bought as part of this project is intended to test different types of cars in different scenarios. Tourists visiting the port area of Catania will be able to make use of electric bikes to travel around the city; port officials working at the Gela port area will be making use of crew vans in and around the port; administration officers in the Valletta Grand Harbour will be making use of full electric quadricycles and crew vans as well as normal passenger cars for their work-related travel needs. All these different types of vehicles will be demonstrated as part of the pilot project; the feasibility of the cars tested and their efficiency promoted in view of the wider uptake of green modes of transport.

Studies

Local green plans for ports and port areas will be compiled to suggest future policies for the implementation of green energy actions to further decarbonise port areas in each of the partner ports as a second stage to this project. The suggested actions will serve as a continuation to the results achieved in this project.

The project will not only stop at road transport, however. It will also study the feasibility of grid-connected infrastructure to power berthed vessels using electricity from the national grid instead of the high-polluting heavy fuel oil.

This will not only improve air quality within the port areas but also vastly reduce noise generated by ship engines.

Activities in Malta

Transport Malta

i. Deployment of 11 full electric vehicles including 2 light goods vans, 4 crew vans, 2 passenger cars, 3 quadricycles;
ii. The installation of a Photovoltaic Plant to be installed on the roof of Malta Transport Centre;
iii. Charging pillars will be installed at the Malta Transport Centre to charge the vehicles deployed as part of the project;
iv. Study into the feasibility of shore side energy supply for berthed vessels at the port of Valletta.

Ministry for Transport and Infrastructure

Solar Car Ports and Charging Stations:

A number of solar car ports including car charging points will be installed in key and prominent car parks in port areas. These include:

i. 1 four-car solar car port at Cirkewwa
ii. 1 four-car solar car port at Deep Water Quay in Marsa
iii. 3 one-car solar car ports at Ta' Xbiex Marina

Activities in Sicily

The Port Authority of Catania

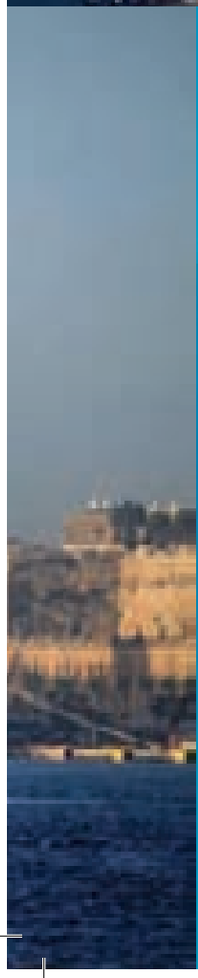
I. Deployment of full Electric Vehicles including 20 electric bikes and 1 passenger car
II. Installation of facilities to store and charge the electric bikes
III. Solar Charging Station: 1 four-car solar car port in Catania harbour area
IV. A Local Plan for future implementation of green transport policies

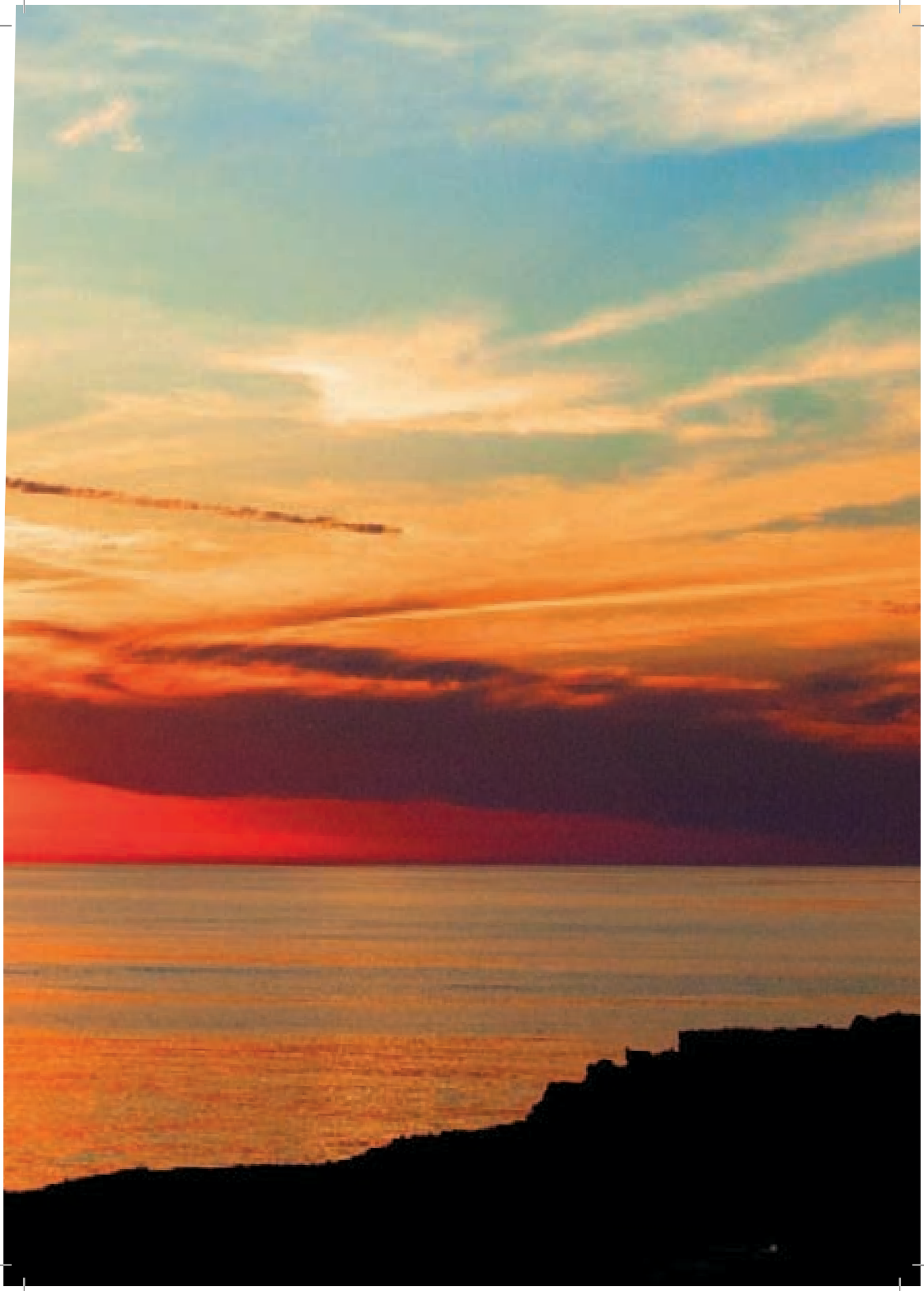
Province of Caltanissetta

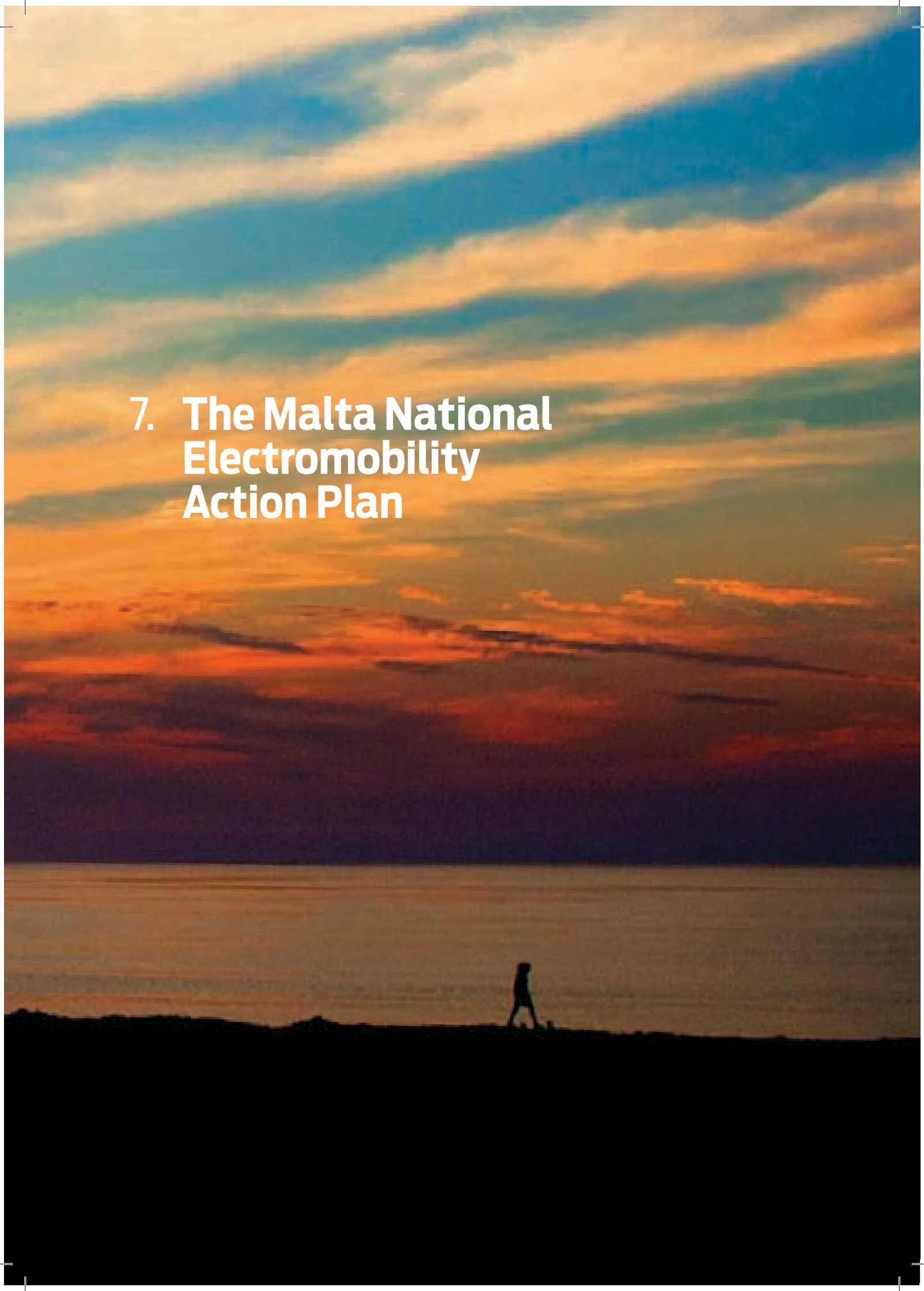
I. Purchase of a number of BEVs including 3 crew vans and 2 passenger cars
II. Car charging infrastructure including 3 charging pillars at Gela port area
III. A Local Plan for future implementation of green transport policies

Expected Results

- A strategic assessment on whether solar power produced locally through PV plants installed on buildings and solar car charging ports is sufficient to offset the energy necessary to power electric vehicles used to service port operations with the aim of maximizing results achieved through this pilot project;
- An assessment of the adaptability of different types of full electric vehicles in port operations' transportation needs;
- Generation of 296,000kWh per annum of renewable energy sources through the use of photovoltaic infrastructure;
- Deployment of 37 electric vehicles and electric bicycles which will consequently substitute combustion engine vehicles used within port areas thus providing for cleaner air quality within the partner port areas;
- Deployment of solar carports and car charging infrastructure at four localities within partner port areas;
- Local plans focusing on the three partner port areas that will pave the way for future policy implementation on energy efficient transport.







7. The Malta National Electromobility Action Plan

7. The Malta National Electromobility Action Plan

The Goals

Electromobility will contribute towards the implementation of energy, climate and air quality policy goals.

Environment Protection

1. Electromobility will make a significant contribution to meet Malta's climate mitigation targets;
2. Using renewable sources of energy to meet the energy demands of BEVs will also contribute towards the 10% target of clean transport fuel from renewable sources of energy;
3. The additional electrical energy requirements in this sector will be met with electricity from renewable energies or from cleaner energy purchased from the European Continent through the Malta-Italy inter-connector currently being put in place. The prime source for electromobility will be electric current from variable renewable energies as much as possible through solar energy;

The Economic Sector

4. To make Malta the first electromobility networked island;
5. Use innovative procurement management in the public sector to create volume in BEV purchase;
6. Setting up of new business models for electromobility to provide more opportunities for more growth through new products and services;

Research and Development

7. Supporting standardisation;
8. Promote research to interlink industry and science as closely as possible;
9. Networking the motor-vehicle industry through cooperation agreements, energy and information technology sectors along new supply chains to increase the momentum in motion for electromobility and innovation;
10. To achieve the above, measures will be taken to step up research in all areas of electromobility, network and extend research infrastructures as well as promoting mutual exchange between researchers from industry and science;

The New Transport Age

11. Electromobility is the first step in Malta in a strategy to reduce oil dependency;
12. Electromobility will assist in paving the way for a new culture of mobility and modern urban and development planning;
13. A number of plans and measures will be put in place to speed up the market entry of BEVs to achieve the Maltese Government ambitious target of putting 5,000 BEVs on the road by 2020, possibly more, in the wake that by 2050, most urban traffic will be without conventional vehicles. This will also entail the deployment of the appropriate car-charging infrastructure;
14. Besides private transport, the MNEP will also support the introduction of electromobility for commercial transport purposes (e.g. urban goods delivery vehicles, local public transport) and two-wheeled vehicles;
15. Additional support action through a number of schemes and demonstration projects for introducing electromobility for public transport (e.g. mini buses for local public transport and larger buses using hydrogen Fuel Cells);
16. Demonstration projects for the introduction of the Fifth Mode of Transport in the form of automated transport pods;

Market Acceptance

17. To implement this change in a culture centered round climate and environment protection social approval and acceptance must be gained;
18. The MNEP will adopt a transparent, consultative approach, an open dialogue with the public through information campaigns which aim to ensure the provision of information on the implementation of the Development Plan and engage in a broad dialogue;
19. The acceptance and market development of electromobility will be supported with the setup of a regulatory framework and appropriate systems of incentives.

The Action Plan

The Malta National Electromobility Action Plan outlines the promotion and deployment of BEVs, built around a horizontal strategy with the collaboration of all possible stakeholders envisaged, including different Governmental Departments, Public Authorities, Public and Private Corporations and Companies, the Automotive Industry including both OEMs and local car importers, Social Partners, academics and researchers. It includes all the economic actors of the country because transportation is one of the main economic sector.

It also provides for devising a scheme to integrate the additional power

demand generated by electromobility into the grid, link this demand with renewable energy sources and use electromobility to contribute to grid load management. This will ultimately place Malta as a lead market for electromobility and enhance the long-term competitiveness of the country.

The creation of the MNEP is intended to install the participation of all the stakeholders through concerted action revolving around exchange of information, networking and knowledge transfer, as well as direct investment.

The Malta Nation Electromobility Action Plan is made up of five important pillars:

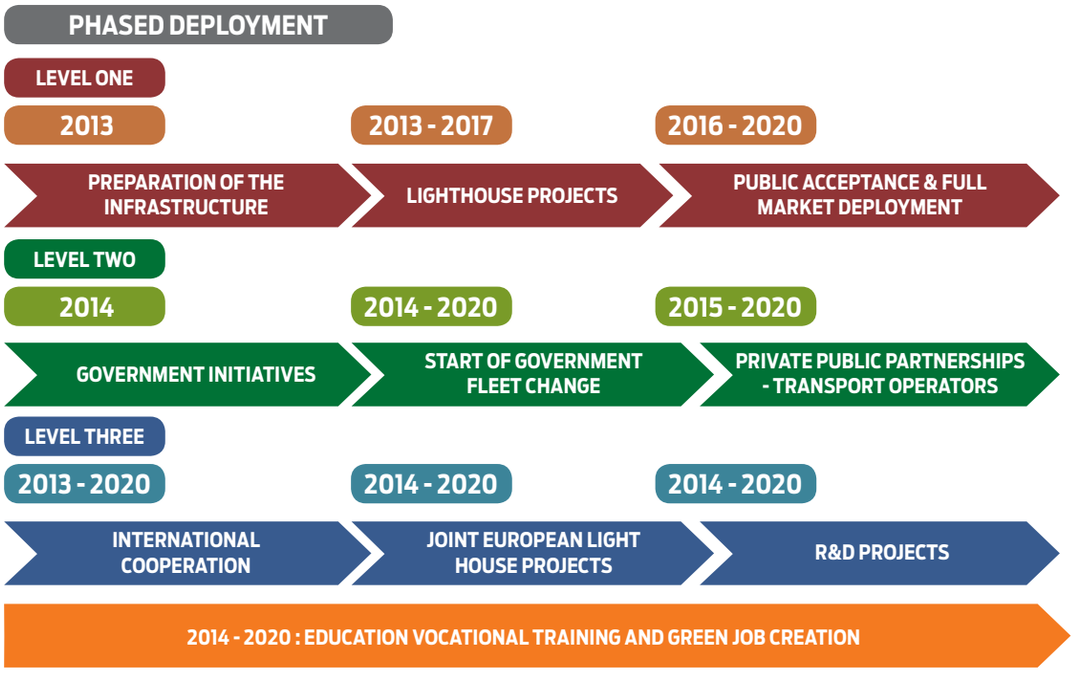
1. Plans and Measures roll out for market penetration
2. A number of Demonstration Projects
3. Marketing and Education Campaign to speed up Public Acceptance
4. Human Resources Build up
5. International Cooperation

The implementation of the MNEAP is summarised in the diagram below.

The implementation and development of the MNEAP as presented will be carried out over a seven year period, officially commencing from January 2014 and will be completed by the end by December 2020. Although one must say that considerable work has already been carried out as part of both the Demo-EV and PORT-PVEV projects.

The Malta Electromobility Platform

Approach



The timeframes for the implementation of the plan are specifically chosen to coincide with the timeframes of the EU targets set for 2020.

The MNEAP is divided in three levels, each level commencing on approximately the same start date, for the simple reason that all levels complement each other and one cannot do without the other.

In addition to the above, intensive consultations are being carried out with the forerunners in the production of BEVs, both on an International as well as on a national level to make sure that BEVs are put on the market as from 2014. In the meantime, officials from MTI and TM started working on the incentives and other initiatives that will be launched by Government as from 2014. Moreover the partners in the Demo-EV Project led by MTI continued their preparatory work for the installation of the national car-charging infrastructure so that this would be in place by the end of 2013 and in time to coincide with the roll out of the BEVs deployed by the same project.

ROLLOUT OF THE ACTION PLAN

LEVEL ONE

- PREPARATION OF THE INFRASTRUCTURE 2013 - 2020
- DEMONSTRATION PROJECTS 2013 - 2020
- PUBLIC ACCEPTANCE & FULL MARKET DEPLOYMENT 2016 - 2020

LEVEL TWO

- GOVERNMENT INITIATIVES 2014 - 2020
- START OF GOVERNMENT FLEET CHANGE 2014 - 2020
- PRIVATE PUBLIC PARTNERSHIPS - TRANSPORT OPERATORS 2015 - 2020

LEVEL THREE

- INTERNATIONAL COOPERATION 2013 - 2020
- JOINT EUROPEAN LIGHT HOUSE PROJECTS 2014 - 2020
- R&D PROJECTS 2014 - 2020

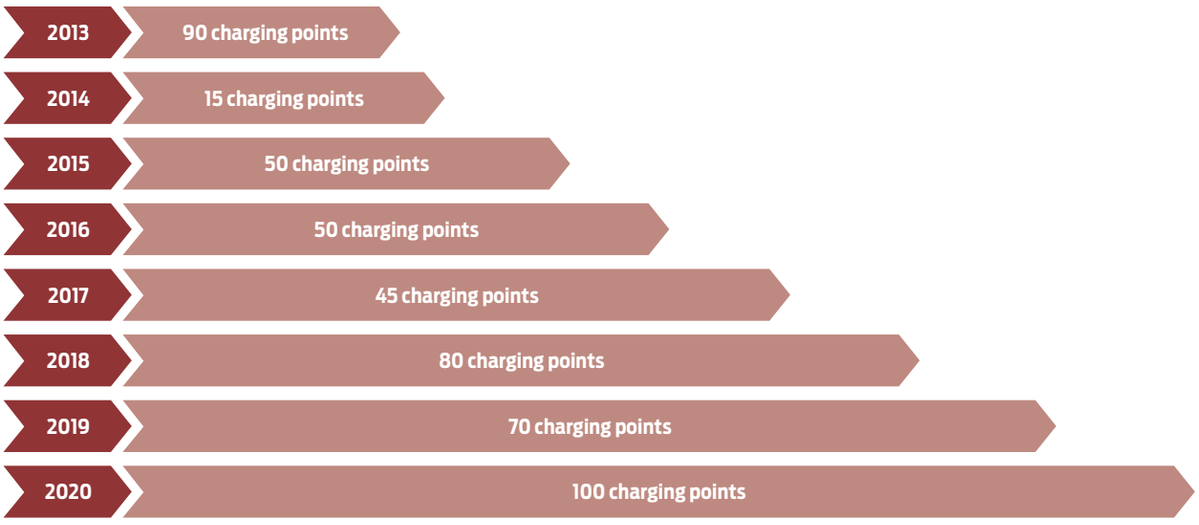
LEVEL ONE - INFRASTRUCTURE PREPARATION AND DEPLOYMENT 2013 – 2020

CAR CHARGING INFRASTRUCTURE

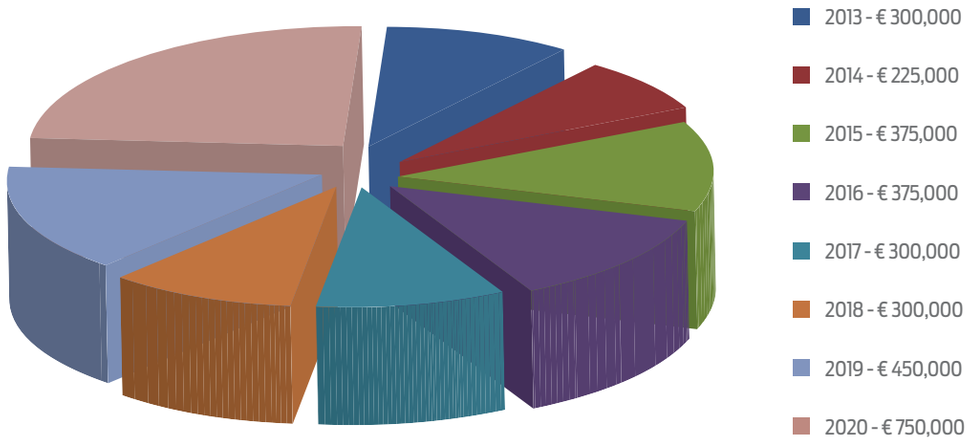
Keeping in mind the fact that Malta will soon be bound by European mandatory targets to put in place national car charging infrastructure, Government is taking into consideration, as a bench mark, the current proposed EU target for Malta of 500 public charging points by 2020.

The Government's plan is to have deployed a mix and match of the latest technology on the market. In fact, the first 90 charging points that are currently being installed across Malta and Gozo could easily be upgraded to meet the advancement in battery technology and charging needs. The deployment of the car charging infrastructure will be done in phases as indicated in the next figure. The deployment includes a mix and match of technologies that would be available on the market at the time of deployment and will be in the form of slow, semi-fast and fast charging points, depending on the status of the technology at the time of deployment.

Funding for the deployment will very much depend on the type of infrastructure that will be installed. If the technology being deployed is new on the market, these will be funded



Car Charging Infrastructure Expenditure 2013 - 2020



through demonstration projects, while other charging points similar to what is already installed, will be through a mix and match of both EU and national funds. Additionally, if the demand exceeds the projected deployment due to a rapid BEV take-up in a particular locality, additional charging pillars will be deployed in that specific area.

SOLAR CAR PORTS

By the end of 2014, the MNEP would have installed five state-of-the-art solar car ports in a number of locations around sea ports. These Solar Car Ports are going to be financed with a mix of EU Funds (OP Malta-Italia 2007-2013) and National Funds.

- One four-car Solar Car Port at Deep Water Quay in Marsa
- One four-car Solar Car Port at the Cirkewwa Harbour Car Park
- Three one-car Solar Car Ports at the Ta' Xbiex Marina

Similar additional Solar Car Ports will be installed as from 2015 onwards in locations such as Sliema Ferries, Marsaxlokk, Birzebbuga, Ta'Qali, Qawra, Marsa – Menqa, Mgarr (Gozo) and Victoria (Gozo), Malta International Airport provided that EU funds are secured and subject to MEPA permits.

SOLAR CAR SHELTERS

In addition to the Solar Car Ports, the MNEP will also be working on an ambitious programme to put in place a number of photovoltaic plants within public car parks. Government will be open to private public partnerships for such infrastructure to similar initiatives by the private sector where private/ public car parks are concerned.

Such are a number of public car parks where these Solar Car Shelters can be installed. The MNEP is looking at areas which could yield a significant generation of Solar Power. These potentially include, Ta'Qali parking areas, Mellieha and Golden Bay car-parks, Rabat Saqajja Car Park, Marsxlokk Car Park and Park and Ride Facilities such as that of Marsa and Pembroke.

HYDROGEN FUEL STATION

One of the most ambitious programmes of the MNEP over the coming seven years will be the building of a hydrogen fuel station. In order to be viable, the station will also offer the sale of LPG, biofuels, petrol and diesel. It is still being considered whether accompanying this would be an appropriate onshore wind farm with three wind turbines or a solar farm, whereby enough energy will be generated to power the small onsite electrolysis plant needed to produce hydrogen. Currently the MNEP is looking at areas where this station can be built. Government is also open to implement this project on a PPP arrangement with the private sector, although the financing of the hydrogen technology would come from the new EU Hydrogen Joint Technical Initiative II under the new EU Programming Period 2014 - 2020.

PROPOSED PROJECT

LEVEL ONE – DEMONSTRATION PROJECTS 2014 – 2020

PROJECTS

In order to step up market entry of BEVs, a gradual switch to the electrification of the various modes of transport, including the preparation for the respective infrastructure, the Government through the MNEP will embark on a number of projects. Funding will come from various sources, including EU Funds, National Funds, soft loans and direct private investment in a number of Private Public Partnership arrangements.

The following are a number of demonstration and pipeline projects that are being prepared in this regard. It is to be noted that some of these projects below include the deployment of infrastructure already referred to above.

A good number of these projects are intended to accelerate BEV deployment and will directly contribute to the National Target to deploy 5,000 BEVs on Maltese Roads. Each project below indicates the number of BEVs that will be purchased through these demonstration projects. The budgets and sources of funding for these projects are already identified.

1 The Adopt an EV Project

The 'Adopt an EV Project' includes the purchase of one hundred different types of Electric Vehicles by the MNEP (in partnership with the Ministry for Transport and Infrastructure) for the purpose of the project. The project involves the set up of a scheme whereby the general public, (where beneficiaries must have installed at their residence a photovoltaic infrastructure), would be invited to scrap their vehicle in return for the use of a BEV for a period of three years. After the three year period, the scheme could either be renewed, or have the fleet added to the Government general fleet to replace conventional vehicles. For the duration of the project, the management of the scheme would be awarded to a third party.

Project: Adopt an EV
Deployment: 100 BEVs

2 The Ultra Pod Project

The project will connect together specific locations by means of driverless electric pods. The project's aim will be higher accessibility through electromobility. Locations where this will be implemented are still being studied. However targeted areas are the environs of Mater Dei Hospital, University of Malta as well as Cottonera.

3 The Light Rail Project

A feasibility study and actual implementation (if proved to be feasible) of a light rail system using induction technology to carry public passengers using scheduled public transport from the Floriana P+R to Valletta City Gate (and possibly City Centre) and back. The project will also include the semi pedestrianisation of St. Anne Street in Floriana.

Feasibility Studies on Mass Public Transport: A number of studies and options analyses will be launched to assess the feasibility of underground, light rail and monorail systems in specified locations around Malta.

4 Driver-less Pods

This is a Demonstration Project using the latest cutting edge technology being currently tested in the UK. The project is currently being evaluated.

5 Public Transport Electric Routes Project

This is another Demonstration Project which will be carried out in conjunction with the public transport operator, where a main route would be chosen for the use a high capacity electric bus. Vehicles will be fast charged on certain bus stops and interchanges using "Quick Charging Technology".

6 Urban Public Transport Electric Routes Project

This demonstration project will also be used in conjunction with other potential partners including transport operators and local councils. The project includes the purchase and deployment of 20 of the latest Electric Mini Buses on the market, which will service secondary bus routes or circular routes in towns and villages, interconnecting routes to the town/ village bus interchanges. The locations that these buses would be used in are those locations which suffer most from high localised traffic generated pollution.

Project: Urban Transport Electric Routes
Deployment: 20 BEV

7 The Solar Car Shelters Project

This project includes a number of solar car parks and car charging infrastructure in main parking areas to demonstrate carbon neutral transport as already indicated.

8 The Carbon Neutral Transport Project

Additional solar car ports in main parking areas to demonstrate carbon neutral transport as indicated above and the purchase of 6 BEVs for the use of Local Councils participating in the project

Project: Carbon Neutral Transport
Deployment: 6 BEVs

9 Solar-PV-Noise Project

This Demonstration Project includes the installation of Solar-PV-Noise barriers along identified stretches of road especially in areas of high ecological importance. The project would be carried out with the participation of the private sector. The project will target the production of renewable energy sources which will be fed into the grid and provide protection against traffic generated noise pollution, using a technology that has dual functionality. The project will also include the purchase of an additional 5 Electric Vans for the use of the Road Maintenance Unit within the Road Infrastructure Directorate of TM.

Project: Solar PV-Noise
Deployment: 5 BEVs

10 The e-Car Sharing Project

BACKGROUND

During 2012, there was a mixed performance in the international car markets. While the emerging economies of Brazil, China and India continued to show growth and hence proved to be important markets for the automotive industry, the situation in Western Europe proved to be somewhat different with new car registration showing a slump, year on year to a decline of 8.3% (-11.7 million vehicles) the lowest since 1993. The greatest declines were registered in Italy (19.9%), France (-14.1%) and Spain (-13.4%) which in effect mirror the economic problems faced by these countries in the same year, a situation totally different from that of the UK which registered a 5.3% increase, while Germany registered a decline of 2.9%.

In the rest of the world, global demand for automotive-related financial services remained high in the reporting period. Customers are paying closer attention to the total cost of mobility and are increasingly deciding just to use a car, rather than actually owning one. In view of this, new mobility services such as car sharing are gaining in importance and popularity.

The leasing sector in Germany continued to expand in both the commercial vehicle and passenger car segments in the 2012 fiscal year.

The influential portal, Automotive News Europe in May 2013 reported that according to Frost & Sullivan, car-sharing in Europe is expected to grow to 15 million users by 2020, compared to the current 700,000, where the greatest potential markets are expected to be Germany, France and the UK and where 1 in 3 of each car sharing vehicle would be an Electric Vehicle.[27]

The Automotive industry itself is taking the plunge to have a share of the growing car sharing market. Ford just launched Ford2go while Daimler and BMW are extending the service they are already offering to customers. Daimler has extended its service Car2go in partnership with Europcar and BMW with its program DriveNow in partnership with Sixt.

This demonstration project being proposed here includes the purchase of 30 BEV of various types and classes which will be done in partnership with a car leasing/hire company and a number of Local Councils. For the purpose of this project, Malta is being divided in different e-Car Sharing Electromobility Hubs. Through this project, a National e-Car Sharing Platform will be put in place.

Project: e-Car Sharing
Deployment: 30 BEVs

11 The Hotel e-Car Sharing, Project

This is another demonstration project for which EU funding will be sought. The aim of the project is to demonstrate e-car sharing to increase the added value of tourism. The e-car sharing initiatives will be demonstrated within a chain of hotels or a number of hotel chains and includes the purchase of 30 additional BEVs and fast charging infrastructure. Potential project partners are the MIA, MTA, TM and Hotel Chains.

Project: e-Car Sharing - Hotel
Deployment: 30 BEVs

12 The e-Car Sharing, Gozo Project

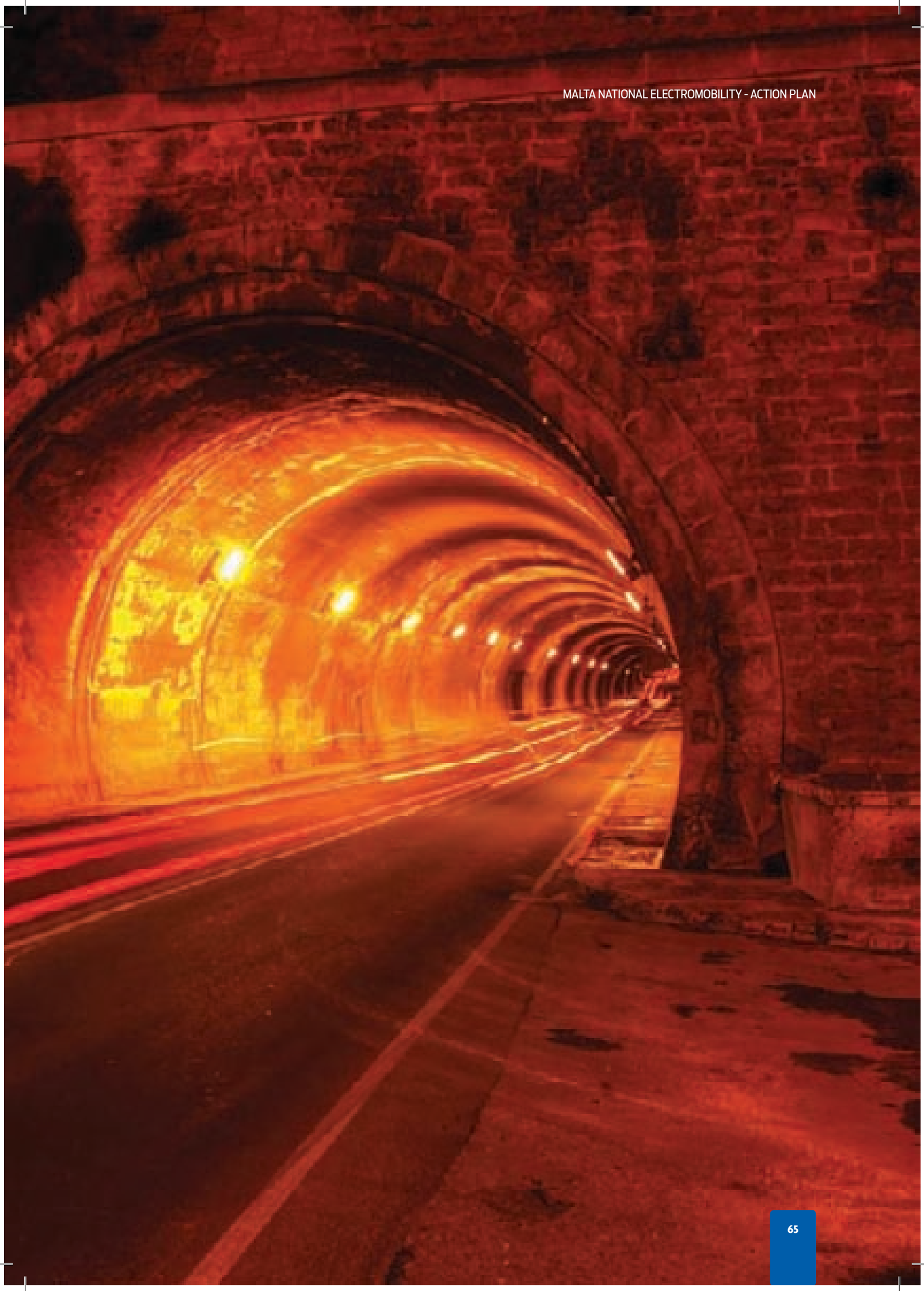
This demonstration project is similar to the above, to which EU funding will be sought. The aim of the project is to demonstrate e-car sharing to increase the added value of tourism in Gozo. The e-car sharing projects will possibly be demonstrated at Mgarr and Victoria, Gozo. The project includes the purchase of 30 BEVs and Fast Charging Infrastructure.

Project: e-Car Sharing - Gozo
Deployment: 30 BEVs

13 Electric Water Taxis Project

This project will demonstrate the use of the electric battery in water taxis and ferries. EU funding will be sought for this project. For the implementation of

[27] http://www.autonews.com/article/20130530/ANE/130529917/ford-joins-europe-car-sharing-sector-as-demand-surges#ixzz2jUjZZP1B



this project, foreign partnership with a number of cities, such as Venice and Amsterdam, will also be sought. The project will be intermodal in nature and hence will connect a number of different modes; it will also include the purchase of charging infrastructure and two electric mini buses per partner.

Project: Electric Water Taxi
Deployment: 2 BEVs

14 The H_2 Project

This will be one of the major and most challenging projects of the MNEP. The project will include the building and/or conversion of a Fuel Service Station into a hydrogen fuel station with the production of hydrogen on site through electrolysis. The project will also include the purchase of 3 of the latest Fuel Cell Buses and three Fuel Cell M1 vehicles. The project may also be accompanied by another project to build a Solar Farm or a three-wind turbines. The project will be funded by the EU Hydrogen Joint Technical Initiative II with the participation of European Partners.

Project: Hydrogen Fuel Station
Deployment: 3H_2 Buses 3 M1 H_2 Fuel Cell Vehicles

15 The EV Essentials Project

This project will demonstrate the use of BEV for Essential Services such as the Police, Civil Protection and Postal/Parcel Delivery Services. EU funds will be sought for this project. Projected deployment will include the purchase and demonstration of several types of BEVs and fast charging infrastructure.

Project: EV Essentials
Deployment: 20 BEVs

16 The Last-Mile Project

The Last Mile Delivery of Goods Project will be showcased in either of these localities: Valletta, Mdina, Paola, Victoria (Gozo) and will include the leasing of premises and the delivery of goods from the premises to city/town centre using BEV. The project will also include the purchase of 20 electric delivery vans.

Project: The Last Mile
Deployment: 20 BEVs

17 The ELECTRIC CYCLE Project

This project will demonstrate pedelecs and charging infrastructure at bus termini – Valletta, Mgarr (Gozo), Victoria (Gozo), Mdina as well as a number of Local Councils of towns and villages with high tourism value.

Project: The Electric Cycle
Deployment: 200 BEVs

18 The Shore-Side Supply Project

A shore-side supply pilot project will be demonstrated at the Port of Valletta if the completion of a feasibility study currently being carried out shows that technology is feasible. The project will demonstrate shore-side supply technology; how ships and ports can become cleaner by switching off their auxiliary engines to use electricity from the National Electricity Grid.

19 MODUS II – ITS

This project is a continuation of the MODUS project and will demonstrate a mix of ITS and BEV technologies. It will demonstrate the latest Intelligent Transport Systems to enhance traffic management in urban cores and increase road safety. It will also demonstrate Infrastructure – Vehicle Technology (I2V and V2I) and vice versa.

Project: MODUS II
Deployment: 5 BEVs

20 The H-Res Project

A number of vocational and research projects will be launched. These will be financed through the Life-Long Learning Programme and ESF Funds. Potential partners are MCAST and UOM, the industry and car agents.

21 Research Projects and the creation of an Electromobility Research Hub

Participation in a number of Research and Development projects to be mainly funded by the EU Research programme, Horizon 2020. Research will be on new vehicle concepts, battery and new car structures and materials. The project will also see the creation of an Electromobility Hub in possible partnership with Malta Enterprise, International Automotive Companies, University of Malta and MCAST.

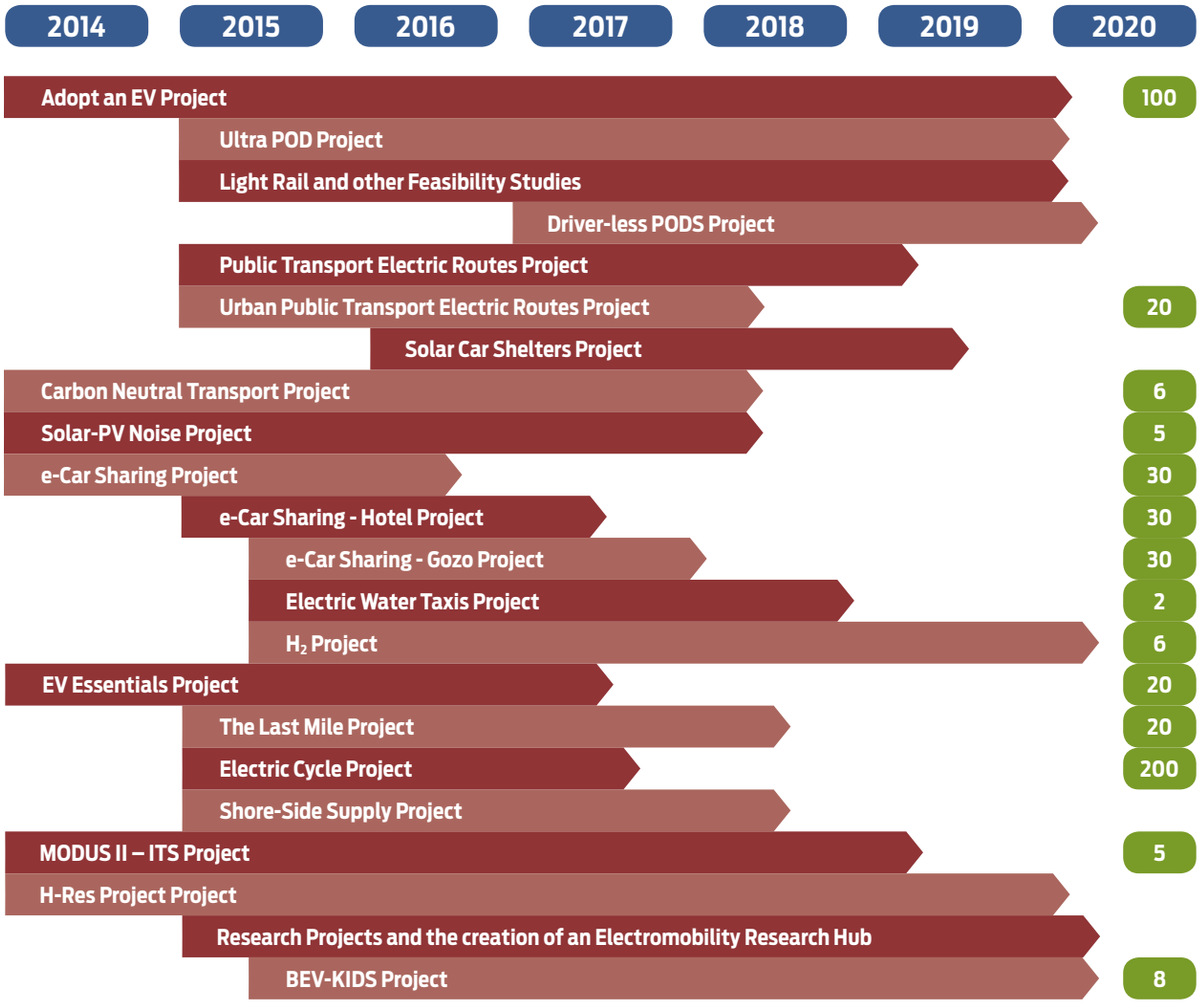
22 The BEV-KIDS Project

Through this project a number of Electric Buses (8) would be purchased and used in conjunction with the Ministry of Education for providing clean transport for school children. This will contribute to cleaner air quality near schools in urban centres.

Project: BEV-KIDS
Deployment: 8 Electric Buses

Time-Frames

The time lines for these proposed projects are as depicted in the figure below. The figure also shows the approximate number of electric vehicles that each project will be deploying on the road, up to a total of 482 BEVs.



LEVEL ONE - PUBLIC ACCEPTANCE AND FULL MARKET DEPLOYMENT 2016 -2020

Throughout the lifetime of the MNEAP, the MNEP will be rolling out a marketing and educational campaign intended to promote the new technologies through the array of projects indicated above. The object of the educational campaign is that by 2020, the general public would have accepted BEV technology.

The funding of the campaign would come from a mix of National and EU funds, some of which will be incorporated within the design and schedule of the projects listed above.

LEVEL TWO - GOVERNMENT INITIATIVES 2014 – 2018

ROLL OUT OF PROPOSED MEASURES for 2014 – 2020

Government commitment towards electromobility is in line with the current Government's Work Programme, where there is a clear commitment that the Government will introduce a number of measures to incentivise both the use of renewable energy sources as well as to promote electromobility. This is in line with the Government's holistic strategy to reduce traffic generated air-pollution and improve air quality levels.

With respect to Battery Electric Vehicles, from January 2014 to December 2020, Government will be introducing a number of monetary and fiscal measures which are intended to assist in the market penetration of the latest Battery Electric Vehicles. Furthermore, the Government has also committed itself to put in place electric car charging infrastructure nationwide.

Among the measures that Government will be considering is the exemption of all registration fees (excluding VAT) and circulation fees for all electric vehicles for the next seven years.

Concrete Measures

In line with the Government's policy to encourage the uptake of Electric Vehicles in Malta, the MNEP has forwarded a number of measures for the consideration of the Ministry of Finance. The following is a summary of all the incentives that the MNEP has proposed.

A package of measures has been specifically designed for BEVs take-up to contribute towards the Government goal to 'green' transport, to increase the demand for BEVs by potential consumers and to contribute towards the Green Economy Policy just published recently. This approach has been taken particularly due to the lukewarm approach taken by car importers to start importing these vehicles which has been attributed to unclear consumer demand; which in turn results from the relative high cost of these vehicles when compared to internal combustion engine (ICE) vehicles.

Fiscal Incentives

Fiscal Incentives in the form of direct payments are a very effective instrument to assist market entry of BEVs as proven in other countries. These are not only important to assist market penetration but are usually requested by OEMs before they even consider to start exporting BEVs in other countries. This is due to the fact that BEVs are generally more expensive than conventional vehicles and BEVs would not be able to compete. Hence OEMs prefer to export BEVs where they can compete on a level playing field.

As from January 2014, the Government will be introducing the first direct incentives in the form of scrappage schemes specifically for BEVs. These come at a crucial time when the latest BEVs are being put on the consumer market for the first time.

In the past, there were similar initiatives introduced by previous administrations but the technology was not yet fully developed as it is today thus making these incentives futile.

The incentives that will be rolled out as from 2014 will serve as a test of consumers' uptake as well as the reaction of the local market, in particular that of the car importers to see whether they are willing to start importing the vehicles.

However, one still has to point out that there is still a limited range of BEVs on the market, although it is expected that by the end of 2014, a total of 17 new BEV models would be put on the market.

During the course of 2014, the MNEP will put forward for the consideration of the Government a number of fiscal incentives which would be rolled out each year in parallel with the supply and demand of BEVs in the market by leading automotive manufacturers.

In the meantime, the MNEP is already entering into discussions with commercial banks in order to provide additional measures to ease market penetration of BEVs, including the possibility of low-interest loans. The MNEP's target is that such loans would be in the region of 2.5% to 3.0% p.a on a loan up to €30,000.

In addition, the MNEP wil issue a scheme intended for companies for commercial use of BEVs in line with National State Aid Rules to increase BEV rollout, especially for companies which employ fleet management. In the meantime, a number of existing measures relating to BEV depreciation allowances will be kept in place and strengthened.

A number of non-monetary incentives will also be made available for those who will be purchasing BEVs which includes the right to book parking spaces, use of bus lanes as well as incentives on the price of car batteries and subsidies on the cost to charge BEVs at night for owners who do not have the facility of home charging. These measures will be kept in place until the 5,000 BEVs national target is reached.

Implementation

As seen in the table on the right, measures 1 and 2 shall apply to electric powered vehicles for personal, public and business use that derive their motive power exclusively from an electric motor. Similar schemes will continue to run until Malta reaches its 5,000 Battery Electric Vehicles target.

All of the above schemes will be managed by the MNEP in conjunction with the Ministry of Finance and Transport Malta. Measures 1, 2, 4, 6, and 8 will be implemented by the Land Transport Directorate within Transport Malta. The measures will only be a one time grant. This condition does not apply for Public Agencies and Private Companies who have large vehicle fleets. Potential beneficiaries will fill in the necessary forms published by the MNEP as provided in eventual legal notices.

Additionally, a used BEV which is being registered in Malta for the first time and which previously was registered in an EU Member State shall be exempt from paying any Vehicle Registration Tax providing that the vehicle mileage has not exceeded 10,000 km at the time of registration in Malta. Individuals who have made use of previous scrappage schemes are not eligible for these schemes. Individuals and Companies who benefited from previous schemes related to the purchase of Electric Vehicles are eligible for this scheme since the technology has changed considerably.

Proposed Measures for 2015 Onwards

Measure 1

Through this measure it is expected that a total of 280 Battery Electric Vehicles will be put on the road.

* Second hand BEVs that are less than six months old with a mileage of not more than 10,000 Km are also eligible.

A grant of up to 25% of the purchase price of a new* Battery Electric Vehicle (BEV) for vehicles in categories M1 and N1 up to a maximum sum of €5,000. The scheme will include a scrappage scheme specifically designed to encourage the replacement of ICE vehicles with BEV.

The scheme will apply as follows:

i. A grant not exceeding the sum of €4,500 for the purchase of a new BEV (M1 and N1), which grant is intended for first time vehicle buyers.

ii. An additional grant of €500 on part i. above, for those owners who want to replace their existing registered ICE M1 or N1 vehicle with an M1 or N1 BEV providing such vehicle is de-registered and scrapped at an approved end-of-life vehicle facility.

iii. In addition to the above, electric vehicles which are smaller than M1 and N1 will also benefit from a grant of €1,500.

Measure 2

Households and Businesses that will be investing in both photovoltaic infrastructure (including those availing themselves of any PV related grants and that are capable of generating a minimum of 2.2kWp) together with Measure 1 above for the purchase of a BEV will be eligible for a further grant of €1,000 in addition to the grant on the PV infrastructure. Measure 2 will be applicable to all beneficiaries of Measures 1 above.

Measure 3

A grant of not more than 25% of the purchase price but not exceeding €500 will be given on a first come first served basis for the purchase of new Battery Electric Motor Cycles, Battery Electric Mopeds and Battery Electric Tricycles . The amount of such electric powered two and three wheel vehicles that will be financed under this scheme will be capped to the first 100 purchased.

Measure 4

Vehicle Registration Tax of newly registered new and used BEVs will be reduced to zero, provided the distance travelled by the used BEV has not exceeded 10,000 km before registration. This measure will be kept in place until the first 5,000 vehicles are registered or until the price of BEVs will reach that of conventional vehicles without the need for grants.

Measure 5

Electric vehicle owners who do not have access to home charging facilities due to the absence of the garage will be able to night charge their vehicle at subsidised rates

Impacts

The expected impacts of these measures are the following:

i. Contribution for the achievement of the national target of 5,000 BEVs to be put on the road by 2020;
ii. Contribute and assist the new technologies employed to break into the consumer market and compete on an almost identical level playing field with ICE conventional vehicles within the same category of vehicles;
iii. The proposed rates will reduce the general higher cost of BEVs when compared with ICE propelled vehicles. With the respective grants, the price of the BEV would be closer to conventional ICE vehicles, especially when the battery is leased on a monthly basis.

Outcomes

The expected outcomes of these measures are the following:

i. Improve air quality
ii. Reduction of GHG Emissions
iii. Contribute towards the implementation of the National Air Quality Action Plan submitted to the EU Commission
iv. Contribution to the 10% RES fuel for transport target under the Climate Change and Energy Package
v. Reduction of Traffic generated Noise Pollution

LEVEL TWO – START OF GOVERNMENT FLEET CHANGE 2014 -2020

Measure 6

As from next year, 25% of all vehicles purchased by Government (Departments and Ministries) have to be BEVs. In case of minimum numbers, between 1 and 5 vehicles, one of them should be a BEV. Between 5 and 10 vehicles, two of the vehicles shall be BEV. The Government will increase the percentage in an incremental manner and in accordance with the availability of the vehicles on the market.

Through this measure, Government wants to give a clear signal of its commitment towards electromobility and to increase BEVs demand for increased take up. This is also being done to incentivise car-importers to start promoting electromobility. Moreover, this measure is in line with S.L 174.07: Cleaner and More Energy-Efficient Road Transport Vehicles Regulations. The measure will target all types of BEVs. It applies to vehicles that have never been registered in any country and must be any of the following:

- M1 vehicles
- N1 vehicles
- L7e (quadricycles)

The measure shall apply to BEVs intended for Government operational use, including Government Departments and Ministries. The scheme will continue to run until Malta reaches its 5,000 BEVs target until the price of the new technology stabilises and becomes equivalent to the price of conventional vehicles, at which point all the Government fleet would have started to be replaced. The above programme would be co-managed between the newly set up National Electromobility Platform and the Ministry for Finance with the assistance of the Licensing Department within the Land Transport Directorate of Transport Malta.


BUS STOP

LEVEL TWO – PUBLIC PRIVATE PARTNERSHIPS 2014 – 2020

The participation of the private sector in the implementation of the MNEAP is of paramount importance for the MNEP. The role of the private sector is evident in the inclusion of the private sector within the MNEP stakeholder forum, which ranges from the automotive industry itself up to transport operators.

The role that the private sector will play is also evident in its inclusion in most of the pipeline projects indicated above. This has been greatly manifested in the execution of the two projects currently underway whereby without the cooperation of the automotive industry and local car importers, these would have never been carried out successfully.

LEVEL THREE – INTERNATIONAL COOPERATION 2013 – 2020

As early as May 2013, the Ministry for Transport and Infrastructure together with Transport Malta has started to explore the possibilities of entering into a number of cooperation agreements with major and leading automotive companies and other leading multinationals specialising in related services for electric vehicle infrastructure management and related services, including Intelligent Transport Systems.

This policy will be spearheaded by the MNEP on behalf of the MTI and TM and will be carried out throughout the implementation phase of the MNEAP. The second objective for these agreements is to bring to Malta the very latest cutting-edge technology in electromobility to keep abreast with the major EU Member States which are on the forefront of technology and innovation. In turn, this will expose our automotive and IT sector to another niche of specialisation and will contribute directly towards the creation of a Green Economy and the creation of Green Jobs, a policy which has just been launched by the Government through the Budget Speech.

Green Jobs

The measures and projects provided for in the MNEAP have in mind a direct contribution towards the creation of Green Jobs in the Automotive, Energy and IT Sectors. This will in turn contribute towards the creation of new jobs, safeguarding current jobs through re-training and re-deployment, strengthening the forces for growth and hence contribute to the GDP and, above all, to the modernisation of the country. This will spill over to other economic sectors, such as energy suppliers, public utilities, ICT service providers and research institutions who will also benefit from this Action Plan.

National and International Cooperation Agreements

The first Memorandum of Understanding (MoU) was signed with the French electric vehicle manufacturer Renault Z.E. The agreement was signed in Paris by the Minister for Transport and Infrastructure, the Hon Joe Mizzi MP, and the Permanent Secretary of the same ministry, during a visit to the Renault Z.E Centre in Paris in conjunction with the Demo-EV Project.

The MNEP is currently working on similar bilateral cooperation agreements with a number of international and multi-national companies which have expressed interest to work with the Maltese Government in the field of electromobility. The MNEP considers this as paramount to enable it to implement the MNEAP and hence is already actively working in this direction. Government is open to such agreements with all multinationals and other strategic partners that can contribute towards the promotion of electromobility in Malta.

This is why a number of the projects previously listed involve the participation of other European partners most of which will be strategic in nature. This is important as regards technology and knowledge transfer especially from countries which are forerunners in electromobility. In order not to be left behind, the MNEP will:

- Keep abreast with activities in electromobility in other countries and the automotive industry especially on developing technologies, infrastructure, participation in pan-European projects, practices and standards;
- Involve itself in European roadmaps and programmes on electromobility;
- Coordinate and manage Government procurement of BEVs;
- Involve itself in activities promoted or organized by the European Commission and open a working relationship with the European Investment Bank;
- Involve itself in European Networks.

LEVEL THREE – DEMONSTRATION AND R&D PROJECTS

Participation in applied research will stimulate R&D in Malta. Such research activities can include the participation of educational and research institutions such as the University of Malta and MCAST and include projects like; electrochemistry with the focus on electromobility and engineering, including combined research in energy storage units – such as battery technology and research in mobile energy converters, grid integration and fuel cell technology. A step further would be to develop joint curricula for the specific promotion of junior scientists.

The projects referred to earlier on, all have an element of research built in them to further knowledge on ICT/ITS for electromobility and smart grids; the performance of renewable energies sources and electromobility; Intelligent car-charging infrastructure and intelligent parking and reservation of parking spaces intended for public car-charging.

The current projects that Transport Malta and the Ministry for Transport and Infrastructure are already involved in serve as data gathering exercises in car traffic management; BEV energy efficiency in various situations, charging performance as well as testing alternative charging methods and infrastructures. Other fleet tests are being made with respect to commercial traffic and commercial use of BEVs, especially the performance of BEVs in situations where a lot of stop and go driving is involved as will be demonstrated in the Demo-EV Project.

Additional research will be carried out in respect of electromobility in the public domain such as the proposed 'Adopt a BEV Project' - where a number of vehicles will be given for three years in return for scrapping a conventional vehicle.

Other demonstration projects with a research element include research on integrated mobility schemes, use of electric and Hydrogen Fuel Cell buses and battery storage.

Other research projects to be considered are:

- Hybrid buses for ecological/local public passenger transport (via the MNEP)
- Small fleets of at least 10 mini buses on specific public transport routes
- Installing a pilot project for hydrogen fuel station
- A pilot project with the use of Biomethane extracted from landfills
- BEV battery testing as part of R&D activities
- Involving local researchers in research projects relating to new materials and new technologies
- Promoting Malta as a beta test site for new BEV concept vehicle testing to test energy efficiency in specific urban and sub-urban environments
- Research on the optimisation of the electric motor
- Testing the use of fuel cells to supply additional electrical energy in all-electric vehicles (range extender through the use of hydrogen)
- Grid integration with the use of ICT and Grid-BEV –charging infrastructure interfaces
- Impact of BEVs on electricity generation/optimisation of BEVs and the grid
- Interfacing ITS and BEVs
- Studying the potential of mobile energy storage (BEV battery energy storage)
- Data transfers and data gathering which is important for future mobility concepts and business models
- Data on driver behaviour
- Ascertaining of kilometre costs
- Carbon neutral transportation.

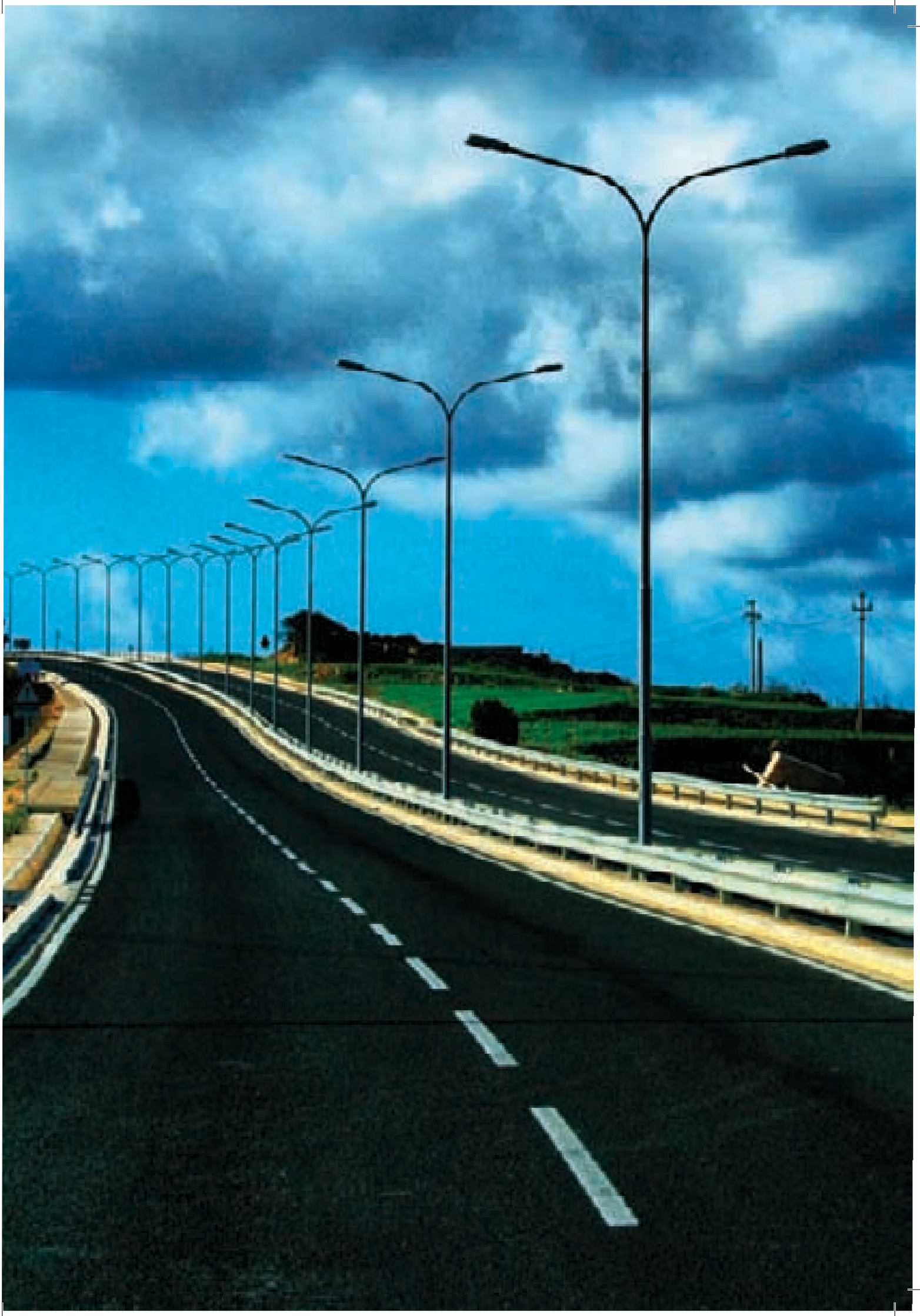
Standardisation and Interoperability

The MNEP will make sure that any infrastructure deployed by the private sector would be interoperable and of European standards. Private Operators of car charging infrastructure would be required to make use of the national platform for car charging and run on open standards.

Furthermore, to make sure that the roll out of electromobility is not hindered in any way, all infrastructure put in place will have to be interoperable and international standards employed including those relating to plugs, power inputs and safety measures, standardised components and interfaces where applicable. This also includes suitable metering technologies and corresponding billing systems. With respect to standardised safety, the Ministry for Transport and Infrastructure is in the process of providing the Civil Protection Directorate with the necessary standardised equipment and safety wear for Civil Protection Department (CPD) employees in case they need to be deployed on traffic accidents, rescue and salvage. In addition, the Ministry has organised a short course for CPD and other emergency services on how to deal with situations involving an electric vehicle.

Abbreviations Used

BEV	Battery Electric Vehicle
CPD	Civil Protection Department
EV	Electric Vehicle
GHG	Greenhouse Gas
HEV	Hybrid Electric Vehicle
HFCEV	Hydrogen Fuel Cell Electric Vehicle
FCEV	Fuel Cell Electric Vehicle
ICE	Internal Combustion Engine
ITS	Intelligent Transport System
MNEAP	Malta National Electromobility Action Plan
MNEP	Malta National Electromobility Platform
MNHFCTIP	Malta National Hydrogen and Fuel Cell Technology Innovation Programme
NMVOC	Non-Methane Volatile Organic Compounds
PHEV	Plug-in Hybrid Electric Vehicle
PM	Particulate Matter
PPP	Public Private Partnership
PV	Photovoltaic
REEV	Range Extender Electric Vehicle
RES	Renewable Energy Sources
RFID	Radio Frequency Identification
R&D	Research and Development



MINISTRY FOR TRANSPORT AND INFRASTRUCTURE

MNEP
Malta National Electromobility Platform

tm
Transport Malta