ISCTE Business School
Instituto Universitário de Lisboa

BUSINESS PLAN: AN INNOVATIVE START-UP IN THE PORTUGUESE MOBILITY FOR THE ELECTRIC AND SOLAR SECTOR

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We are what we are as individual beings. Whatever else we can become is because someone has allowed it.

Somos o que somos, enquanto seres individuais. Tudo o mais que possamos vir a ser, é porque alguém o permitiu.

João Silva

Resumo

A mobilidade é um dos fenómenos que muitos especialistas tendem a estudar e explicar. Por vezes esta é relacionada com a zona de residência das pessoas ou pelo sistema de transportes que existem nas cidades. Assim, acaba por implicar que existam soluções para as atividades do dia-a-dia.

E dentro da mobilidade o autor centra-se exclusivamente na mobilidade elétrica e na mobilidade solar. A primeira é já uma realidade enquanto que a segunda é uma realidade futura. Contudo algumas empresas têm um certo grau de incerteza relativamente a este novo tipo de tecnologias para os veículos.

Existem soluções para ambas. E a Electro-Solar Mobility Solutions quer continuar a oferecer essas e outras soluções para estes mercados tais como a (i) venda de energia elétrica; (ii) a venda dos sistemas modulares; (iii) o aluguer e manutenção das baterias; (iv) a venda de peças e outros acessórios; (v) a solução Charge & Go; (vi) o desenho e o desenvolvimento de veículos solares ligeiros e pesados.

Este projeto ainda carece de investigação futura e outras soluções poderão aparecer no mercado. Esta é uma aposta importante para os dias de hoje em torno de um tema tão importante como é a mobilidade.

Palavras-chave: Mobilidade; Veículo Elétrico; Veículo Solar; Start-up

Classificação JEL:
L62 – Automóveis; Outros Equipamentos de Transporte;
M13 – Novas empresas; Start-ups

Abstract

Mobility is one of the phenomena that many specialists tend to study and explain. Sometimes it is related with the area of residence of the citizens or by the existent transport systems. Therefore, it will always imply the existence of solutions for the daily basis activities.

Regarding Mobility, the author focus exclusively on the electric and solar mobility. The first one is already a reality whereas the second one is a future reality. However, some companies have an uncertainty level about this new type of vehicle technology.

There are solutions in the market for both types of Mobility. Electro-Solar Mobility Solutions (EMS) wants to provide those and other solutions for these markets such as (i) sale of electricity; (ii) sale of modular systems; (iii) renting and maintenance of batteries; (iv) sale of parts and other accessories; (v) Charge & Go solution; (vi) design and development of light and heavy solar vehicles.

This project still needs further investigation and other solutions might appear on the market. It is an important marker for today's market in such a vital subject as Mobility.

Keywords: Mobility; Electric Vehicle; Solar Vehicle; Start-up

JEL Classification:
L62 – Automobiles; Other Transport Equipment;
M13 – New Enterprises; Start-ups

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A huge thank you to my family and friends for keeping me on track. It would not be possible without them.

Glossary

AC – Alternate Current

B2B – Business-to-Business

B2C – Business-to-Consumer

CD or CO_2 – Carbon Dioxide

CV – Corporate Venture

DC – Direct Current

ECU – Engine Control Unit

EU – European Union

EV – Electric Vehicle

GDEG – General Direction of Energy and Geology

GHG – Greenhouse Gases

ICE – Internal Combustion Engine

NDN – National Distribution Network

NTN – National Transport Network

OEM – Original Equipment Manufacturer

RES – Regulator of Energy Services

SHRM – Strategic Human Resource Management

SME – Small and Medium Enterprises

SRP – Special Regime Production

SV – Solar Vehicle

TTW – Tank-To-Wheel

V2G – Vehicle-to-Grid

WTT – Well-To-Tank

Executive Summary

Electro-Solar Mobility Solutions, henceforth called EMS, intends to be an innovative and disruptive company on the electric and solar mobility market. Therefore, all variables at reach were studied so that we could have a viable business plan. The inescapable conclusion of this project is that the future will not stop at the plug-in hybrids or 100% electric vehicles. The electric mobility future is already arousing the evolution and development of the solar vehicles. As referred to on the Literature Review, there are many issues when we discuss Electric Mobility. One of them is the charging of the electric vehicles. This can be a slow process, which increases the waiting time and, consequently, generating discontent on the population.

Other problem is the small number of charging stations available all over the country. This is an advantage for the solar mobility market since we will be able to economize on the infrastructures investment by not creating new charging stations. This means that investing now in new charging stations, which in the future will not put up to good use, is a bad decision. It is preferable to invest now in parts, components and accessories for the development and maintenance of solar vehicles.

As the automobile giants are starting to change their visions towards the electric mobility market, EMS appears in the sector with the goal of turning these problems into business opportunities. Not only can we take the automobile sector to a new landing by solving the current problems but we can also take advantage of renewable energy sources to achieve green, sustainable and environmental-friendly economy. By doing this, we can reduce the energy bill, lower the gas emissions and increase efficiency.

Other important advantage is that this business plan might be changing for better the inherent infrastructure of the internal combustion engine.

As described, the company wants to provide solutions to the electric and solar market in the short, medium and long run.

The solutions presented by the company are the following:

(i) Electricity sale on the several power supply stations of the country;
(ii) Sale of modular system to apply on light and heavy solar vehicles;
(iii) Renting and maintenance of batteries for electric and solar vehicles;
(iv) Sale of parts and other electric and solar components for electric and solar vehicles;
(v) Charge & Go Solution;
(vi) Design and Development of light and heavy solar vehicles for sale.

This project was initially focussed on the concepts' idea for a business increment of Galp Energia business network. Nevertheless, after intensive study and academic research on the impacts and changes that the Electric Mobility would bring to us, it was decided to expand the project to the conception of a business plan for a new company, a start-up.

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Introduction

Motivation

Given the *Challenge* by the Innovation Department by Galp Energia, it was needed a new *Business Venture* for this specific sector.

Objectives

The objectives of this project are to explore the *Electric and Solar* Sector and to create a *Business Plan*.

After careful review, it made sense to create this new Business Unit by the means of a *Startup*. This would be linked to Galp Energia by a *Corporate Venture.*

Outline

First, the author provides the theoretical concepts studied during the *Literature Review*.

Then it is given a pratical approach by the means of a structured *Business Plan*.

1 Literature Review

In this first project discussion, the author wishes to highlight the main topics to cover. First a general impression of the automobile sector which then leads the subject to the supply of that sector. In addition, as the reader shall understand during its reading, the automobile supply demands nowadays for higher concerns on the electric sector. This last one is mainly focussed on electric mobility but, after further investigation from the author, the evolution of this sector will be done through solar mobility. Therefore, after reviewing all concepts of this subject, an opportunity was identified in the electric and solar mobility.

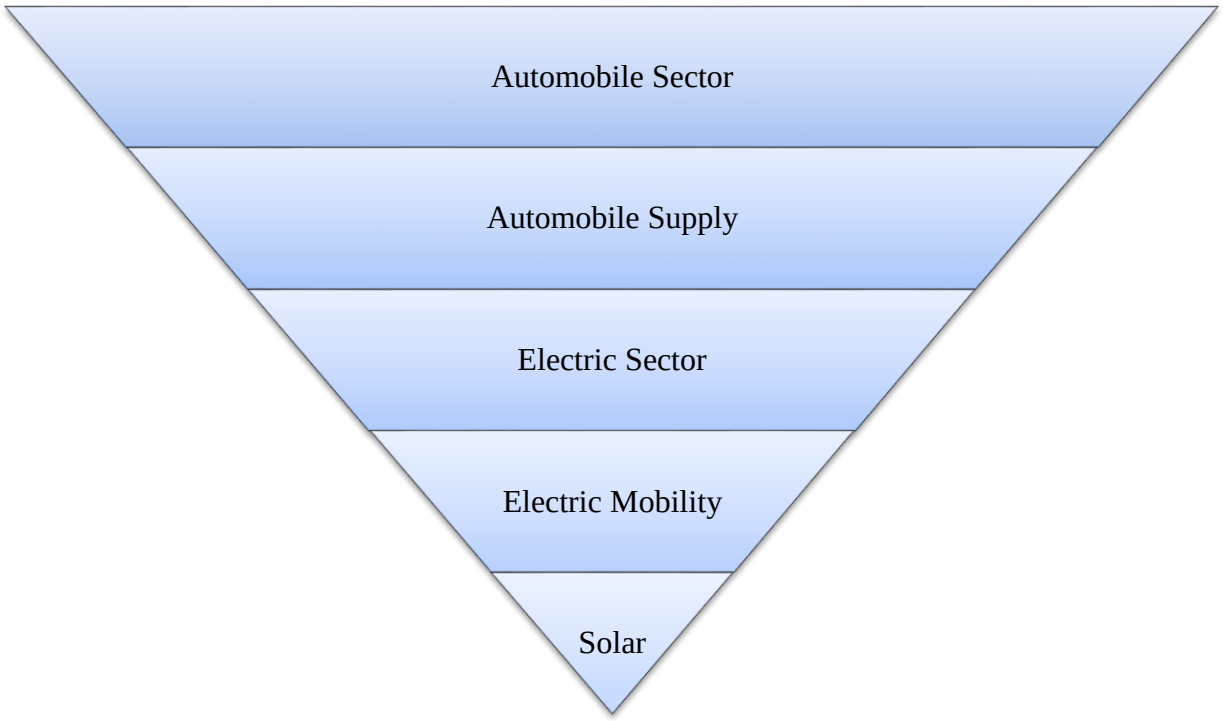


Figure 1 – Main subjects on the Literature Review (author)

1.1 Automobile Sector

1.1.1 Current Status

According to a study from Deloitte (2018) for the Cluster Automobile Association, four automobile manufacturers involve 900 supplier companies, which is one of the most valuable sectors for the Portuguese economy. This allows us to make a reference concerning the automobile sector and its importance in the Portuguese economy by being one of the most valuable sector. In 2017, the company's activity reached an equivalent to 5.9% to the Gross National Product (GNP) of Portugal. The study also states that the companies are responsible for the exports of 85% of the production equivalent to 20% of the transactional goods sold in Portugal. They represent only a small piece of the business with a total worth of 2 million euros.

The path to 2020 will be marked by an acceleration in the Portuguese vehicle production. The automobile sector is ranked one level above the remaining Portuguese industry and at the 16th place of the European industry.

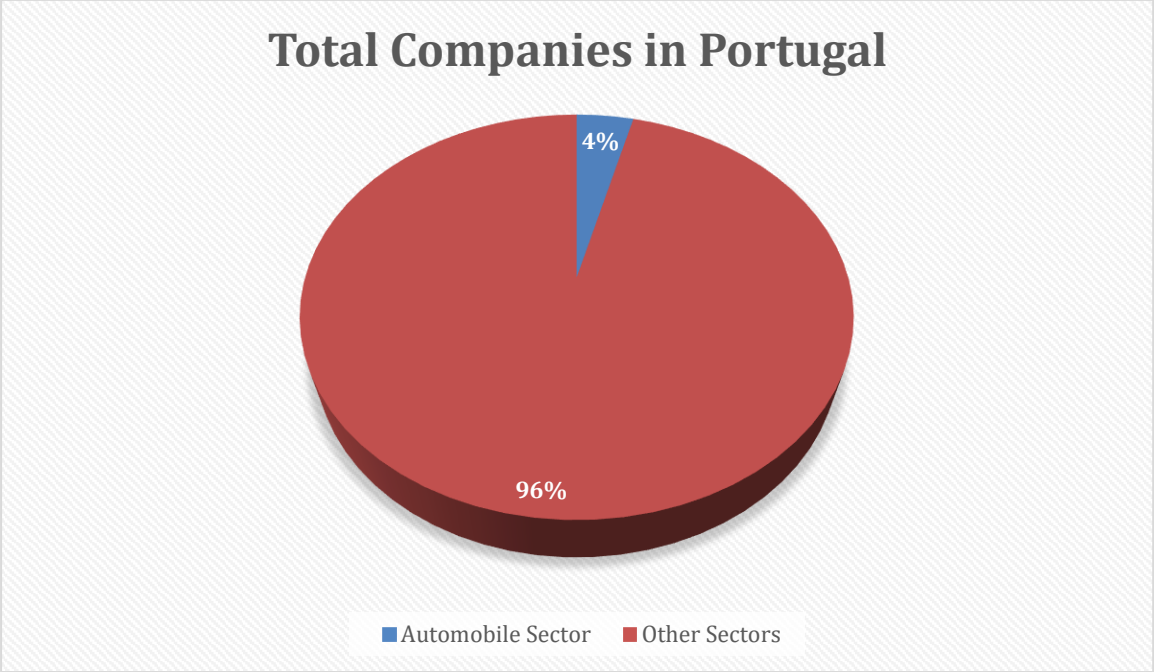
Through the analysis of the current state, we could rely on the declarations from the general-secretary from ANECRA (2017), who stated to the Portuguese press that the automobile sector was punished again. We are not pleased with this increment on the tax burden. The tax on this sector should be rethought. This obviously rely on the increase of IUC and ISV, which were included in the state budget for 2017.
According to that state budget (2017), the tax on vehicles (ISV) raises 3% on vehicles from 2017 in the environmental and cylinder capacity components. The tax on circulation (IUC) increases 0.8%. There is an aggravation on the tax for the most polluting vehicles which can reach to 8.8%. For diesel vehicles, the extra tax, which was introduced in 2014 by the previous government, is to be kept for an amount that can reach to 68.86 euro.

The entry of imported vehicles in the country has been verified. This kind of vehicles pays taxes but there is a discount, which is applicable according to the vehicle age. The maximum discount is of 52% for vehicles with five or more years old. However, this situation cannot benefit the scrapping of vehicles in end of useful life and which should have been a benefit to the environment.

In this way, on the state budget of 2017, a reduction by half in the acquisition of plug-in hybrid vehicles was proposed. This incentive is assigned through a tax benefit, which will reduce the amount to pay for the vehicle taxes in 562 euros for vehicles licenced in 2017 that present this characteristic. With this budget, the 100% electric vehicles lose the benefit that they had, that is, the discount on the vehicle taxes.

1.1.2 Statistics

The Bank of Portugal (2016) updated its study on the Analysis of the Automobile Sector, which was published in 2013. This is about the economic and financial situation of the companies in this sector between 2011 and 2016.



Graphic 1 – Total companies in Portugal (source: Bank of Portugal)

In 2015, the automobile sector comprehended 4% of the companies in Portugal (15 thousand companies) which represented 7% of business volume and 4% of the number of people at duty. The total companies were like the registered in 2011 even if the weight of the sector has been increased by 0.6% for the business volume.

The number of companies in the automobile sector which are active increased by 1.7% in comparison to 2014. This shows a recovery face to a registered stagnation state in the previous years. Among the activity segments, which compose the sector the automobile commerce, a stake of 97% of the companies and 69% of the business volume and the people at service during that year highlighted it.

Micro companies (90% of them) mainly constituted the sector. However, the big companies were responsible for the largest part of the business volume (47%). The SME aggregated the largest part of the number of people at duties (40%) and were responsible for 41% of the business volume of the sector accountable for 10% of the companies.

All of these increases of activity initiated in 2012 by which the automobile sector business volume increased 14% in 2015, demonstrated a superior growth to the total of the companies (2%), like the one registered in 2014.

The internal market determined the evolution of the business volume of the sector (11% in 2015). However, the contribution of the exports for the variation of the business volume in 2015 increased in spite of the internal market, which had decreased.

The EBITDA in 2015 increased in 59% of the automobile sector companies. The percentage of companies with negative EBITDA in the sector was of 35% in 2015. In relation to the activity and profitability, the EBITDA of the sector decreased 1% in 2015 after a raise of 30% in 2014 and 29% in 2013. The EBITDA of the companies increased 25% in 2015 after a raise of 1% in 2014. We were able to verify that the equity profitability of the sector was 6% in 2015, an identical value to the one registered in 2014 and lower to the companies' total (7%). The automobile manufacture presented a higher profitability of 14%.

The operational margin of the sector reached 4% in 2015 and the net margin reached 1%. These values are lower than the companies' total (10% and 3%, respectively). The automobile manufacture presented, in 2015, the best performance of the sector with an operating margin of 7% and a net margin of 3%.

According to the information on the Central of Credit Responsibility from the Bank of Portugal (2016), on the first quarter of 2016, the granted loans to the automobile sector for the finance sector increased 4.9% and decreased 2.1% on the company's total.

1.1.3 Trends

In the past years, no means of transport has been as criticized as the automobile sector. However, there is a simple reason not to vanish. It will be for a long time the best complement for our legs. No other vehicle with such technical detail as the automobile will ever be conceived. The most important modification that has appeared is that the vehicles are no longer toxic. For example, a clean, electric vehicle replaced the vehicle driven by gasoline with its clouds of combustion gases. However, the vehicles' autonomy or the so-called artificial ethic have been questioned. Will the automobile be a safe means of transport that could be driven or electronically commanded? We are obviously referring to electrification and solar mobility.

It is also expected that most players in the market are already rethinking their business strategies to go alongside the market challenges and the needs of their clients.

1.1.3.1 Electrification

Industrialized countries have contributed for global warming and the consequent destruction of the planet as well as the energy reserves tend to shortage. In that way, the human being is confronted with the emergent need to dispose unlimited energy because who could accomplish since the smallest function of switching on the lights to the transformable energy that man needs to survive. Energy makes the utopias themselves cease to be.

To fulfil the CO2 emission limits in the next decade we must bet more and more on the electrification of the vehicles with hybrid solutions or more radical ones.

According to McKinsey consulting company study (2017), while 5% of the vehicles sold in 2016 were equipped with electric engines, the industry predict to produce more than 50% of the new models in 2021 with electric engines. Many automobile companies are planning to add ten or more electric vehicles to their production lines because they project that they can achieve maximum potential from 100 thousand to 600 thousand electric vehicles sold within the next 5 years.

1.1.3.2 Solar Vehicles

How wonderful would it be if our vehicle could work without spending money on oil (Parida, Mishra, Srivalli, 2018). Like solar houses so as solar vehicles would work through the conversion of solar energy into electricity. On its turn, electricity would feed the batteries for the start of the vehicle's engine. There are some vehicles in which it is possible to transmit the solar energy directly to the engine but because of development restrictions it is only possible the manufacture and commercialization of components in which it is possible the energetic storage in batteries.

1.2 Automobile Supply

1.2.1 Opportunity/Problem: Fuel Supply in the Automobile Sector

In 2004, the system of fixing maximum prices for public sale was abolished which means that the liberalization of road market fuels occurred.

Over the years, in the distribution sector, the number of petrol stations have increased. According to DGEG website information (http://www.dgeg.gov.pt/), there are about 2994 petrol stations in Portugal.

In terms of market share, Galp Energia takes the lead with 28.3%.

Between 2013 and 2014, each inhabitant spent, on average, 145 litres of gasoline per year, according to DGEG (http://www.dgeg.gov.pt/). The consumption accounts unleaded gasoline 95, unleaded gasoline 98 and 98 especial.

In 2014, each inhabitant spent 502 litres of diesel per year, which includes the special diesel and the incorporated biodiesel.

Regarding butane gas, the most used on the domestic sector, the rise of its consumption is only 7 litres per inhabitant between 2013 and 2014. As for propane gas, there is a 20 litres rise per inhabitant with the average consumption rounding the 130 litres.

Portugal is still one of the European countries in which the price of fuel per litre is the highest. This is obviously due to the tax burden. The trend is that the price stays the same over the years or that it continuously rises.

In April 2015, a law came into force obliging gas companies to make several types of fuel available at different prices including simple fuel known as low-cost. Besides those, there are also the fuel additives and the premium.

The manufactures defend that due to different molecules, which are incorporated in the production of this type of fuel this can achieve a higher cleaning rate in the engine indulging its life and optimizing the car performance.

1.2.2 Types of fuel

As it is well known, there are several fuel types:

Gasoline	**Diesel**
Unleaded 95	Diesel or Simple Diesel
Additive	Additive Diesel
Unleaded 98	Colour Diesel or Green Diesel

Table 1 – Types of Fuel (author)

1.2.3 Diesel vs. Gasoline

The market trend from the past years is to purchase diesel vehicles. However, it is not the best choice. This is a decision that relies on the yearly number of kilometres travelled, on the total value of the vehicle and on its monthly payment.

The advantages of diesel are as following:

1– Despite of the initial price of the vehicle, the greatest advantage of the diesel vehicles is the fact that the consumptions are smaller, and they assure a higher autonomy. A diesel vehicle could consume until 25% less;

2– The diesel vehicles price is higher, but the owner will also earn more in case of a car retake. In the automobile sector, the diesel vehicle has a substantially higher value and there is more demand for this type of vehicles;

3– This type of vehicles has a lower emission of CO2;

4– The capacity to work with a higher binary engine at lower rotations.

The advantages of gasoline are as following:

1– The global price of the vehicle is considerably lower as well as the selling price;

2– The parts for the vehicle maintenance are normally cheaper which turns the vehicle into a greater advantage when purchased with latter years of useful life;

3– There is higher reliability from the drivers on gasoline vehicles because usually these vehicles ensure more kilometres without the need of maintenance. There is a high-quality proximity even if there are some vehicle models that presented less guarantees with gasoline;

4– The gasoline vehicles' engines have a higher turnover and a higher acceleration capacity.

1.2.4 Electric vs. Gasoline

Comparing the electricity to the supply of gasoline, we can surely understand that there are differences. These could be related to the environment, autonomy, the refilling time and costs.

1– Environmental: electricity is still zero free emissions energy. On the other hand, the gasoline is a supply source, which triggers pollution and gases or raises the greenhouse effect;

2– Autonomy: While, in general, an electric vehicle could have an average autonomy of 200 kilometres, a gasoline vehicle has an autonomy of 600 kilometres;

3– Refill Time: For an electric vehicle, this time could take between 30 minutes to 1 hour, for fast charging, or it could take 8 hours for slow charging. For gasoline vehicles, we are talking about a matter of minutes to refill the vehicle;

4– Costs: At this moment, it is relatively cheaper to supply an electric vehicle in comparison to a diesel vehicle.

1.3 Electric Sector

1.3.1 Production

Electricity production is open to competition and there are two legal regimes: ordinary regime production (ORP) and special regime production (SRP). The first one is related with the production of electricity based on non-renewable traditional sources and in great hydroelectric power plants. The second one is related to cogeneration and the electric production from the use of renewable energy sources.

1.3.2 Market

Organized electricity markets operate in open regime and they are bound to permits from the Portuguese government.

Producers on ordinary regime, marketers and special regime producers can be market agents, if it is their will.

Marketers can buy and sell electricity freely and they have the right to access the transport and distribution networks through a tariff payment. This was established by the Regulatory Entity for the Energetic Services (Entidade Reguladora dos Serviços Energéticos – ERSE). They are also subject to public service duties about quality, continuous electricity supply and should provide their clients access to information in a simple and comprehensive way.

1.3.3 Consumption

Consumers are the reason why this complex system exists. In Portugal, there are almost 6.1 million consumers. The majority of them are lower tension consumers while 23 500 are Medium Tensions consumers and about 350 are high and very high-tension consumers who, in 2013, consumed more than 49 billion of kWh.

With the opening of the electricity market in Portugal, the consumers can freely choose the electricity marketer they desire.

1.3.4 Transport

The electricity transport activity in very high tension (150,220 and 400 kV) is made through RNT (through a concession granted by the Portuguese state) in public service regimen and exclusively to REN – Redes Energéticas Nacionais. The concession includes the planning, construction, operation and maintenance of RNT (Rede Nacional de Transporte) which includes the planning and technical global management of the National Electrical System. This ensures the harmonized operation of the infrastructures that integrate it as well as the service steadiness and the safety of the electricity supply.

1.3.5 Distribution

Electricity distribution is processed through Rede Nacional de Distribuição (RND). This is mainly constituted by high, medium and low-tension infrastructures. The low-tension networks distribution is operated in contracts scope of concessions established between the cities and the distributors.

1.3.6 CO_2 Emissions and European Goals

The Energy-Climate package came to establish the following goals:
- A 20% reduction on primary energy consumption by 2020;
- A 20% incorporation of renewable energies on the gross electricity consumption;
- A 20% reduction of the greenhouse gases by 2020.

The EU is determined to play an important leadership role in the global and bounding agreement for all parts involved to avoid the major impacts from climate changes. This way, the EU on COP 15 stipulated:
- Provision measures about the 2ºC goal and commitments for an effective reduction of the greenhouse gases;
- Adaptation measures;
- Measures for the technological development;
- Financing Agreement;

EU reaffirmed their 30% reduction proposal of the greenhouse gases by 2020. In relation to 1990, since when other developed countries have compromised to meet comparable reductions and countries in development contribute according to their responsibilities and capacities.

From the designated Cancun Agreements, the goals are:

- Enrolment on the Convention of the fundamental elements from the Copenhagen Agreement;
- Verification of the objective to limit the global rising temperature to 2ºC;

- Definition of a labour programme to operationalize the transparency processes and information provision by the parts to the convention;
- Creation of the Green Climate Fund, which will have an important role on the mobilization of 100 billion dollars by 2020;
- Establishment of an Adaption Board of Actions, which elevates the rising of adaptation to climate changes to the same stage of importance of migration by creating an Adoption Committee;
- Establishment of a technological mechanism to promote the cooperation regarding development and transfer of technology;
- Definition of the basis for operationalization of actions to reduce deforestation emissions in developing countries.

1.4 Electric Mobility

1.4.1 Framework

1.4.1.1 Life Cycle

A Life Cycle methodology implies an analysis of the flow of the product during all its life. This means that since the production to the usage and its end of life, passing through its recycling options and the valorisation of the remaining components, every stage in taken into consideration.

This means that a Life Cycle analysis to a propulsion vehicle technology must include not only data related to the usage of the vehicle (TTW) but also data related to the production of the fuel used (WTT) and the construction, maintenance and recycling of the vehicle itself (Materials Cradle-To-Grave).

In a way to accomplish an honest comparison between the diverse propulsion vehicle technologies, it must be held in consideration all the life cycle and not only the related component to the vehicle usage.

1.4.1.2 Analysis with Conventional Mobility

A vehicle with an internal combustion engine (ICE) has a life cycle efficiency of about 12% to 30%. The modern hybrids have efficiencies nearly close to 30%.

The electric vehicles present a life cycle efficiency of about 20% to 40%. The use of more efficient technologies to produce electricity and the growing use of renewable energies will tend to increase these values.

Electric vehicles are more efficient WTW mainly if power stations or renewable sources of energy are used.

1.4.1.3 Statistics

Electric vehicles sales rose 210% in January compared to the same period last year. The total number of electric vehicles sold was 756 according to ACAP data (2018).

In January 2017, 400 plug-in hybrid vehicles and 326 conventional hybrid vehicles were sold. The most wanted are the gasoline/electricity conventional hybrid vehicles whose sales increased 86% in the same period.

On the other hand, in January 2017, diesel vehicles sold +8.6% compared to same month of 2016 and gasoline vehicles sold +2.8%.

1.4.2 Technology

In “Vencer o Desafio da Mobilidade Elétrica”, there are three types of technology for the electric vehicles (Pedro, Byrne, 2016): The Hybrids, Battery Electric Vehicle (BEV) and Fuel Cell Electrical Vehicle (FCEV).

1.4.2.1 Hybrids

This type of technology allows the combination of two or more energy sources to move the vehicle. Usually, it integrates an internal combustion engine and an electric engine in the most diverse combinations. Byrne and Pedro (2016) refer to the Parallel Hybrid, Hybrid in Series and Plug-In Hybrid. Nevertheless, the author only pretends to elaborate on the last one, since it is the most common and known technology when referring to hybrid vehicles.

Plug-In hybrid is a hybrid combustion-electric engine with the capacity of energy storage through a lithium battery, which allows the vehicle to electrically move. The autonomy depends on the battery dimension and its mechanical configuration. In this set, the battery could be plugged to the electrical grid in the end of the journey to avoid the charging through the usage of the internal combustion engine.

1.4.2.2 Battery Electric Vehicle

In this type of technology, the propulsion is supplied by an electric engine, which is fed by a rechargeable battery. The charging of the batteries is mainly made through the connection to the electric grid and through the kinetic energy reduction on brakes and on decelerations.

1.4.2.3 Fuel Cell Electrical Vehicle

This type of electric vehicle has a fuel cell, which is used to produce the energy that feeds the electric engine. The fuel cells usually use hydrogen that issue only water and heat. This technology requires an infrastructure for the hydrogen supply to the vehicles, which may be produced based on natural gas or electrolysis processes.

1.4.3 Charging Types

The electric vehicle can be charged in charging stations on an appropriate electric plug through the respective vehicle charger. This way it gets the energy in alternating current from the plug and it charges the battery in continuous charging current.

According to Mobi.E (2011), there are four charging types.

1.4.3.1 Type 1

Charging type 1 consists on the connection of the electric vehicle to the power supply network by using standard power sockets of current until 16A. The power supply network side has either a single phase or three phases with neutro and protective conductors.

1.4.3.2 Type 2

Charging type 2 is an integrated system developed to allow an electric vehicle that only charges on type 3 to charge on an industrial and home existent plug. The charging cable has the function of pilot control since the vehicle has to be on to the command box, which is on the other side of the cable. This box allows mode 3 along the cable. From the command box, a domestic or industrial wire goes out to plug to the respective socket.

1.4.3.3 Type 3

Charging type 3 is a charging dedicated system to the electric vehicles. It uses a plug system and socket specific to electric vehicles, which can provide energy on single or three phases in multiple currents. It also has a Control Pilot functionality for additional safety.

1.4.3.4 Type 4

Charging type 4 is the indirect charging system, which means that it has an external charger, which provides current directly to the vehicle battery. The charging point is mainly made by a charging closet with a cable stuck in it.

1.4.4 Batteries

Batteries are the main factor on the electric mobility and once all challenges regarding the batteries have been solved, the electric mobility market will grow exponentially.

Therefore, the main challenges aimed at the batteries are their costs, charging time, energy density, durability and safety.

Regarding costs, these are too high, but the observed trend is the significant reduction of its values over the next years. 2020 is the year pointed out by several studies as the turning point of batteries' costs. By then, there will no longer be the need for tax breaks by the government to buy an electric vehicle.

Research and development of battery chemistry will be a key factor that will enable to increase its energy density. Therefore, the vehicle autonomy will be higher.

The goal of the battery's development enhancement will assure safety on higher levels of voltage and will enable to increase the life of the batteries. The power density will also be improved, enabling the acceleration of the charging process.

1.4.5 Vehicle-to-Grid Technology

*The vehicle-to-grid (V2G) concept aims to optimise the way we transport, use and produce electricity by turning electric cars into 'virtual power plants' (*Wagner, 2014).

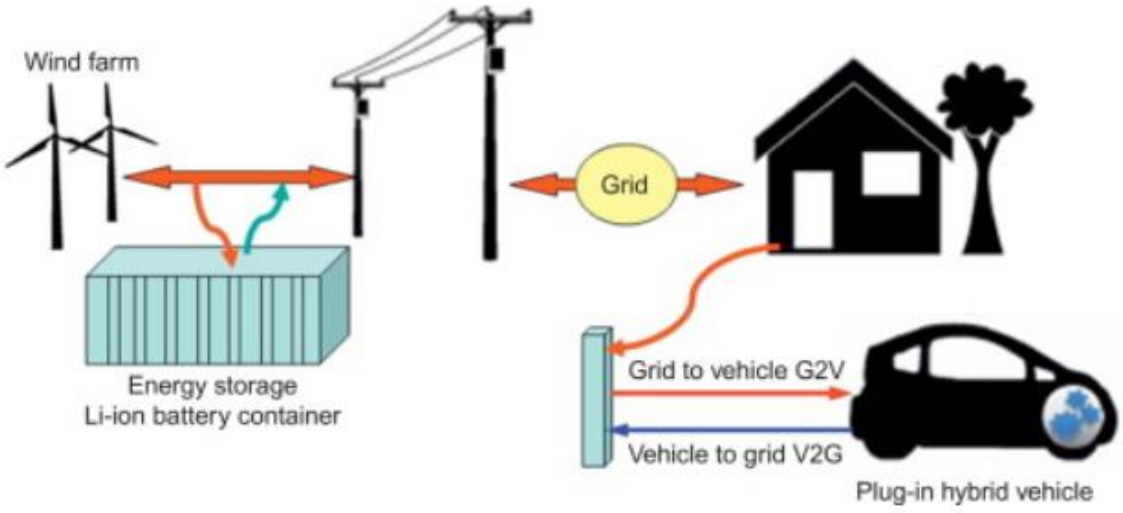


Figure 2 – Vehicle-to-Grid (source: ScienceDirect)

V2G objective is to make the electric vehicles to be used as mobile power plants to generate electricity to the power grid when necessary (Chau, 2014).

1.4.6 Brands

There are currently several brands with vehicle solutions to the electric mobility market. Some companies already invested on new strategies in a way to create and to think a new mobility future. Others are still not convinced that electric mobility is the next step.

1.4.7 Tax Breaks

Future will bring us electric mobility. By now, the maintenance costs for electric vehicles are low, which does not imply that the acquisition costs are also low. On the opposite, they are much higher. One of the reasons that could explain these high costs is the vehicle technology, mainly the batteries, as previously referred.

That is why there is an incentive programme granted by the state to help consumers enter in the electric mobility world.

On the private side, for the 100% electric vehicles there is a subsidy on the amount of 2250€ for the acquisition of new vehicles (valid for the first 1000 vehicles licensed since 2017). This type of vehicle is free from ISV tax and pays between 7.91€ and 35.87€ of IUC tax. It can also enjoy free parking on the freeway of some Portuguese cities.

For plug-in vehicles there is no subsidy for acquisition but there is a 75% reduction of ISV, limited to 562.5€, for vehicles with the minimum autonomy of 25 kilometres on the electric mode. These have the same conditions for IUC and parking as the 100% electric vehicles.

For companies, the conditions are the same as for the private side except for the autonomous taxation, VAT and depreciations.

100% electric vehicles are exempt from autonomous taxation. Nevertheless, the autonomous taxation for plug-in hybrids varies from 5%-17.5% according to the acquisition value of the vehicle.

Both for the 100% electric vehicles and for the plug-in hybrids there is a deduction on the total amount of VAT of the expenses directly related with electric tourism travels. This includes the purchase, rent, usage or maintenance. At last, expenses such as the depreciations of light passengers or mixed vehicles in the respective amount to the acquisition cost or to the re-evaluation value until the amount of 62,500€ are accepted.

1.5 Solar Mobility

According to BMW (2019), diesel engines will remain in the market at least for more 20 years. Moreover, the estimate for the gasoline engines is of 30 more years. For the company, in the best of chances, in 2025, about 30% of their sales will be of electrified vehicles (electric and plug-in hybrid vehicles). This means that at least 80% of their vehicles will have an internal combustion engine.

For the automobile giant, the electric vehicles and their batteries have a much higher cost on raw materials.

Hence, we can conclude that electric mobility has a trend. Solar mobility. In this field, the author intends to focus on a previous discussed idea. The solar vehicle. This is of extreme importance once the renewable energies are very important for our planet and the non-renewable resources will not be here forever. In that way, as a society, we must consider sustainable and environmental-friendly alternatives. In the case of the automobile sector and, more explicitly, in the case of electric mobility, the solution must be to adopt the solar vehicle alternative.

The operation of this vehicle is extremely simple. Photovoltaic cells must be included on the roof of the vehicles. These, in their turn, will convert the solar energy into electricity so that the vehicle can move. The photovoltaic cells are based on silicone and due to the movement and interaction of the electrons, the accumulated solar energy generates electric current, which guarantee the normal movement of the solar vehicle.

The photovoltaic cells form a board, which is an integrated part of the solar panel. This is a component of the photovoltaic system. The cells are made by semiconductors, usually silicone, that absorb the light. The solar energy frees electrons on the semiconductors, which then generate an electron flow and, by the interaction between them, the electricity is generated.

After the solar energy incidence on the photovoltaic panel, this energy is converted with the aid of a microprocessor of dc-dc conversion. This energy is now compatible in a way the solar vehicle can use it. On the end of the energy conversion, this energy is sent to the battery for charging and storage.
The energy is therefore stored on the lithium batteries. Then it is transmitted to the engine when necessary and when requested by the engine controller.

There are several advantages of solar energy (Parida, Mishra, Srivalli, 2018) such as:

- fossil fuels dependency reduction because the solar energy production does not require fossil fuels;

- environmental advantages on the electricity generation in relation to other ways of electricity production;

- modularity (because the size and the generating capacity of the solar system are due to the number of the installed solar modules);

- Government grants for the development of solar energy and other sources of renewable energy such as subsidies or loans with low interest rates.

1.6 Transition to Business Plan

Electric and solar mobility sector is updated, on growing.
If there is a time to invest in companies of this sector, it is now. The future will pass through here. Given the author's research, it is certain that automobile giants are already developing and selling electric vehicles. However, when will the solar vehicle arrive?

Given the detailed information about the automobile sector and its supply network, it is completely understandable that there is room here for a business opportunity. Therefore, in which sector? To what direction? First, and as stated above, the initial process is to enter in the electric sector and continue to the solar sector. But how?

Now, the author intends to describe in detail a practical plan to attack this business opportunity. Therefore, this next business plan was created for the electric and solar mobility in order to generate a start-up that provides solutions in these markets.

2 Marketing Plan

2.1 Strategic Analysis

2.1.1 Market Description

On the subject of the charging stations, we already know that Galp Energia has at their disposal 12 integrated charging points with 36 sockets. These are in their fuel supply stations of the main highways across the country.

The supply for the purchase of electric vehicles is already reasonable. Known brands such as BMW, Mercedes and Nissan already produce and sell their electric vehicles to the final consumer. We have other companies on the market, such as Effacec, which cares about offering other electric mobility solutions.

However, as mentioned above, what about the solar vehicles? By the author's analysis, only a Dutch and an American company are right now studying the possible development of a solar vehicle. That is why this project had advanced from the sale of electricity throughout Galp Energia network to the development of solar vehicles. Other solutions are supplied to the customers as a means of subsistence to the business. As we are all aware of, the development of solar vehicles would never generate income to those companies on the short-term.

2.1.2 Competition

At this stage, we can name all the entities that offer the same services that EMS wants to provide.

One of the main competitors is Lightyear One, a Dutch company. They already presented their first solar vehicle model moved by solar energy. It has the capacity to travel long distances up to 800 kilometres, which is much higher distance than the one travelled by the electric vehicles. For more information please check https://lightyear.one/.

This vehicle has the solar panels installed and included on its design, mainly on the hood and on the roof of the vehicle. Besides that, the vehicle can recharge the battery autonomously.

According to the company's data and information, the vehicle can travel 20 thousand kilometres per year and 15 kilometres per hour per each hour of solar energy charging.

In this case, the charging is completely free, but it obviously needs favourable weather. This last one is pointed out as the major disadvantage of this type of vehicles.

The company intends to initiate to sell the vehicle by 2020 with a starting acquisition value of 119 thousand euros per unit.

2.1.3 Clients/Users

The clients of this new unit business could be private customers, companies or both.

In the Business-to-Consumer (B2C) and in the Business-to-Business (B2B) segments the author identified the following characteristics for the ideal customers and companies:

B2C – Business-to-Consumer	**B2B – Business-to-Business**
Zone: Europe	Zone: Europe
Age: From 30	Size: Big and Multinational
Civil Status: Any	Personnel: Above 300
Income: Above average	Billing: Higher than 1M€ annually

Table 2 – Clients and Users (author)

To clients and companies EMS intends to offer options (i), (iii), (iv), (v) and (vi);

To companies EMS intends to offer option (ii).

These solutions for the electric and solar mobility allow the customers the adoption of an innovative and sustainable position across the mobility sector.

2.1.4 Background Analysis

2.1.4.1 PESTEL Analysis

This allows the company to analyse the political, legal, economic, social, technological and environmental factors that could influence the business.

2.1.4.1.1 Political-Legal Context

The legal and actual framework for the electric mobility comprehends the National Legislation, Resolution of the Council of Ministers and European Legislation.

The following describes the general information by year of publication:

2014	**2015**	**2016**
- Established the legal regimen to the exercise of the electric mobility related activities; - Established rules to the creation of a pilot network for the electric mobility; - Measures of creation of an infrastructure for alternative fuels in the European Union; - Resolutions to mitigate the environmental impact from the transport sector.	- Electric Mobility Plan of Action for the locations of the fast and normal charging stations; - Set of the taxes amount for electricity commercialization for the electric mobility; - Technical requirements for granting a license for the exercise of the activity of charging stations management for the electric mobility.	- Technical rules that power charging stations should oblige; - Applicable rules for instalment of the charging stations for batteries and electric vehicles; - Conditions of civil responsibility from the electricity commercialization activities for the electric mobility;

Table 3 – Political-Legal Context (source: Portuguese Legislation)

2.1.4.1.2 Economical Context

According to the Bank of Portugal (2016), the Portuguese economy should maintain a trajectory of recovery over the projection horizon. Therefore, after a 1.4% increase in 2016, the Portuguese GNP should grow 1.7% in 2018 and 1.6% in 2019. The evolution of the activity over the projection horizon is sustained on an export's growth. Goods and services exports should be kept at 60% in 2019 above the registered level in 2008.

This increase should be accompanied by a strong growth of the companies' investments. Private consumption should be conditioned by the low growth from the real wages and for the need of continuity of the reduction processes of the indebt level of the families. In 2017-19 the exports contribution for the GNP growth will remain higher than the contribution of the internal demand.

For 2018 and 2019 there will be a significant reduction on the private consumption for 1.4% on both years. Private consumption should raise in line with the real available income. The savings rate should be held in lower levels.

The projections have information regarding investments on large infrastructures that will occur on the period 2017-19. The investment such as private and public shall benefit from funding assignment through European funds.

Surplus reduction is less marked in the current and capital balance on maintenance of low interest framework and of a normal distribution of community funds from the actual program of European funding. For 2018 and 2019 there will be a slight raise of the surplus for the current and capital balance.

2.1.4.1.3 Social Context

In terms of social behaviour, we have been watching a larger number of electric vehicles users. We can understand that the reasoning is mainly due to the social media and the new solutions for mobility. These have made the population feel tempted to experiment and change their habits.

It is more and more important the matters, which are held regarding the mobility issues, and there is obviously a change on the consumers' choices. For example, only in the first quarter of this year, the automobile sector registered more gasoline vehicles sold than diesel vehicles. This states that consumers are aware that, in a few years, it will be the end for diesel. The support for this information can be shown in the following figure (see annex XVII).

Mercado Automóvel em Portugal
Por Tipo de Energia em 2019

		Julho 2019				Janeiro a Julho 2019			
		Ligeiros Passageiros	Ligeiros Mercadorias	Pesados Mercadorias	Pesados Passageiros	Ligeiros Passageiros	Ligeiros Mercadorias	Pesados Mercadorias	Pesados Passageiros
	Gasolina	9 085	4			74 882	36		
	% Gasolina	49,3%	0,1%			50,9%	0,2%		
	Gasóleo	7 494	3 116	186	11	58 341	21 993	2 798	295
	% Gasóleo	40,6%	99,3%	96,4%	45,8%	39,7%	99,3%	98,6%	64,7%
	Elétrico	436	16			4 341	111		2
	% Elétrico	2,4%	0,5%			3,0%	0,5%		0,4%
Plug-in	Elétrico/Gasolina	291				2 022			
	% Elétrico/Gasolina	1,6%				1,4%			
	Elétrico/Gasóleo	80				432			
	% Elétrico/Gasóleo	0,4%				0,3%			
Híbridos Elétricos	Gasolina/Híbrido	657				5 104			
	% Gasolina/Híbrido	3,6%				3,5%			
	Gasóleo/Híbrido	57		3		279		9	
	% Gasóleo/Híbrido	0,3%		1,6%		0,2%		0,3%	
Híbridos Não Elétricos	Gasolina/GNC		2				7		
	% Gasolina/GNC		0,1%				0,0%		
	Gasolina/GNL								
	% Gasolina/GNL								
	Gasolina/GPL	335				1 612			
	% Gasolina/GPL	1,8%				1,1%			
	Gasóleo/GNL			1				2	
	% Gasóleo/GNL			0,5%				0,1%	
	GNC	1		2	13	18	6	16	159
	% GNC	0,0%		1,0%	54,2%	0,0%	0,0%	0,6%	34,9%
	GNL			1				14	
	% GNL			0,5%				0,5%	
	Total	18 436	3 138	193	24	147 031	22 153	2 839	456

Figure 3 – Automobile Market in Portugal (source: ACAP)

2.1.4.1.4 Technological Context

In terms of technology, the electric vehicles are still a recent discussion. Many issues still need to be solved and developed. Batteries, for example, still do not have the technical specifications that enable a higher autonomy for the vehicles. Nevertheless, the future trends that these vehicles might have a higher autonomy related to the existent. With time and technology, the costs will also become lower.

On the other hand, the solar vehicle technology is still an emerging market to explore and the technology is still less developed than the technology for the electric vehicles.

Still these are two realities for now and for the future. The transition time and space are the hybrid market. After that market is full, we will see an increase of preference for the electric vehicles. After obtaining the solar technology in Portugal, this will be the next topic for this discussion.

2.1.4.1.5 Environmental Context

As stated in the Literature Review, in the last two decades of the 20th century, it was observed a rising awareness against the problematic of the climate changes and the need to act in order to revert that tendency. Actually, the problem of climate changes is recognized as the greatest challenge of the 21st century.
In general lines, the climate changes are a result of the global warming in virtue of greenhouse gases accumulation on the upper layer of the atmosphere unleashing a greenhouse effect that promotes temperature rises from the surface.

Global warming has had serious consequences being every time more frequent the external climate phenomena, which tragically affects the population. Other issue is the natural changes to the planet cycle on the capacity of regeneration of the ecosystem and changes on the production patterns from some food cultures.

Some initiatives and instruments have been developed to stabilize the greenhouse gases concentrations on the atmosphere to a level that avoids a dangerous anthropogenic interference with the climate system. This enables the natural adaptation from the ecosystem to the climate changes, which ensures a sustainable economic development.

With the Kyoto Protocol, the European Union accepted the challenge to reduce the greenhouse gases by 8% in relation to 1990. According to the Responsibility Sharing Agreement carried out at community level there were goals established for the Member States. Portugal agreed to limit the rise of the greenhouse emissions by 27% in relation to those registered in 1990.

2.1.5 Porter 5 Forces

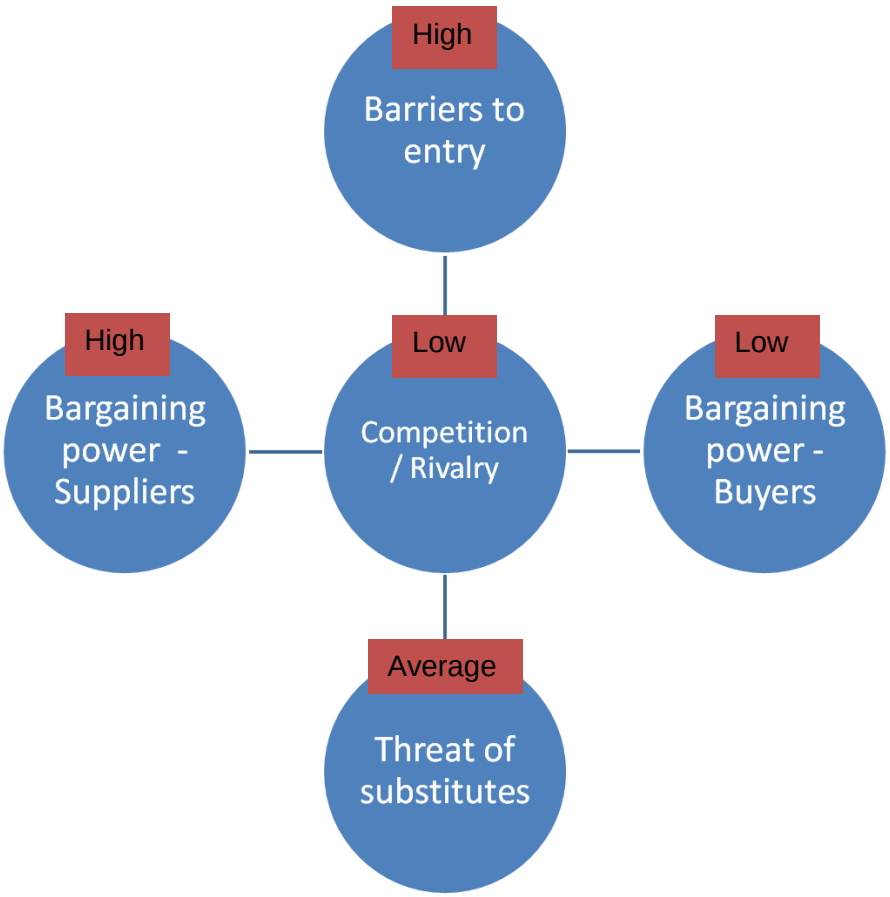


Figure 4 – EMS Porter 5 Forces (author)

This analysis allows us to understand the competition level that could affect a company. So that we can establish our corporate strategy in an efficient way, let us analyse the following factors.

2.1.5.1 Threat of New Competitors

This is a new sector for the economy. Therefore, it is highly likely that new competitors will still appear on the electric market. However, the investment and technical expertise are a necessary factor for companies that would want to enter in this business sector. Therefore, the threat of new competitors is high.

On the other hand, the solar vehicles sector is still an unknown field for many in Portugal. Consequently, the threat of new competitors for this business is low.

2.1.5.2 Bargaining Power of Suppliers

Taking into account that EMS is still a project on paper, without brand awareness and no sales record of accomplishment, no clients and no history, it is natural that the possible suppliers do not think on the possibility of discounts neither other conditions that might be advantageous for the company.
Only after establishing relationships with the right suppliers can we get considerable advantages.

As a result, we can conclude that the bargaining power of suppliers is high.

2.1.5.3 Bargaining Power of Clients

The bargaining power of clients is low because there are no certainties on this market. Therefore, the clients are not sill 100% sure of what it is happening on this sector. Nevertheless, we can turn this fact around and take advantage of it.

2.1.5.4 Threat of Substitutes

The threat of substitutes is average once there are companies on this market that already supply solutions for the electric mobility market. These are oriented for charging stations.
For the other solutions that EMS wants to provide, we still do not realize any other possible substitutes that may arise in Portugal and that may function as substitute products or services of our company.

2.1.5.5 Rivalry between Competitors

Like mentioned on the previous point, there are already companies on the market that offer solutions to the electric vehicle charging but the number is still small. Thus, the rivalry between competitors is low.

2.1.6 Critical Success Factors

Regarding the automobile sector and, more specifically, the service (ii), there are factors that could rise differences between the performances of each company. Examples of those factors could be:

a) design of the vehicle;
b) average consumption of the vehicle;
c) environmental interaction of the vehicle;
d) vehicle production costs.

a) Regarding the design, on a first phase, the objective of EMS will not be to manufacture the whole vehicle. It would be, firstly, to sell the modular system that comprehends the essential technology to the operating of the solar vehicle. The automobile companies that buy this modular system would have the full responsibility of its design;

b) The average consumption of the solar vehicle would be practically zero since we are referring to a renewable energy, solar energy;

c) The solar vehicle, besides being economic, is also environmental-friendly because it does not release emissions that could harm the atmosphere;

d) Such as mentioned before, the objective of the company will be to sell the modular system. Therefore, the cost is only directed to the acquisition of the essential parts to integrate the modular system.

2.1.7 SWOT Analysis

This analysis allows us to make an internal and external examination of the business through the Strengths, Weaknesses, Opportunities and Threats of the business.

The following table summarizes all internal and external characteristics of EMS.

Strengths	**Threats**
Innovative Products and Services	Legal, social and fiscal restraints
Innovative Company	Poor consumer use
One-Stop-Shop practical service	Entry of new competitors
Reduced price for fast charging	Entry of new products
Fast charging with Charge & Go	Services already present in the market
Weaknesses	**Opportunities**
Little advertisement	Recent and growing industry
High investment	Increasing number of electric vehicles
No brand awareness	Service Improvement
Start-up	Awareness of Society

Table 4 – EMS SWOT Analysis (author)

2.2 Marketing Strategy

2.2.1 Mission and Vision

The mission of this project consists on the creation of a new company, which would be a Corporate Venture with Galp Energia. EMS, the start-up, has objectives to provide solutions to the electric and solar mobility.

The vision of this company is to be the national reference for the activities related with the electric and solar mobility.

2.2.2 Strategic Business Objectives

This business aims to:

(i) In the short-term:

- Evaluate the viability to sell electricity on Galp power supply stations;

- Position electric and solar mobility as the new choice for the citizens;
- Sell the modular system for solar light and heavy vehicles.

(ii) In the medium-term:

- Evaluate the feasibility for renting and maintenance of batteries for electric vehicles;
- Evaluate the feasibility of purchasing and selling of parts and other electric and solar components for electric and solar vehicles.

In the case of the batteries and the parts supply, the objective would be to have a one-stop-shop where, all in the same place, the company could provide the necessary solutions to the clients.

(iii) In the long-term:

- Development of Charge & Go, solution in which the objective is the settlement of a mobile charging station so that electric vehicles could be charged whatever their location is. This means that we could offer another alternative charging opportunity to the customers. One solution that would go directly to the customer location with the same quality in case these would have to charge the vehicle on a power supply station. This service would provide geographical mobility to all clients;
- Design and development of light and heavy solar vehicles to meet the current expectations from electric and solar mobility;
- Position this start-up on the transport sector with the development of heavy solar vehicles.

2.2.3 Segmentation and Targeting

As mentioned before, the ideal customers would be in Europe, with minimum 30 years old. The civil status could be of any kind, but the income must be above average.

For the companies, they must also be located in Europe and therefore be big and multinational. It would be preferred companies with more than 300 collaborators and the annual billing shall be higher than 1 million euros.

The segmentation of this business will go inevitably through the owners of electric vehicles and for those who want to buy one.
The owners of this type of vehicles are those who will use the charging stations. Moreover, not only the charging stations but also the vehicles will need maintenance and repair.

The solar vehicles development solution are also focused on these same clients because these are aware of the needs and improvements of this electric sector. The approach for the solar vehicle will be of easy and of immediate perception for the consumers.
It still matters to understand the areas with the higher number of electric vehicles because there are the indicated zones to install new charging stations and to implement the Charge & Go solution.

2.2.4 Value Proposition

The number of charging stations will have to be increased since the trend of the automobile sector is the electrification and energy efficiency. Those charging stations will have to be installed according to the geographical areas with a higher number of electric vehicles.

In that way, EMS value proposition for the electricity sale on Galp Energia charging stations network is a partnership with the possible fundraising interested players who own a power supply station outside the Galp network and who have the wish to install a fast charging station from Galp.

The renting and maintenance of the electric vehicles' batteries would be a specialized service for the electric vehicles' users. In this way, it is important to focus on the importance of the One-Stop-Shop concept development. With this, we could add the sale of parts and components for the electric and solar vehicles.

The high, possible, ambitious but time-consuming points of this project are the development of light and heavy solar vehicles and the Charge & Go solution.

Initially, for the solar vehicles development the fixed costs would be very high. However, it makes sense for EMS to buy the necessary parts for the solar vehicles and choose to offer the modular system to the automobile giants. The same would apply to the heavy solar vehicles.

At last, the Charge & Go project would act as an urban solution in which the purpose is that EMS could offer a charging urban solution. This is a sensitive challenge for all users since many complain about the public power grid. This solution is a mobile charging station that goes directly to the customer location. It would be an efficient solution bearing in mind all the existent requests in the present market.

2.2.5 Positioning Strategy

In these circumstances, we can understand that the positioning strategy towards the solar and electric vehicles will have to regard the quality of the products and services we are going to offer to our clients.

Nevertheless, after an extensive study about the subject, we could acknowledge that there is, in this area, a trend for differentiation. In addition, it is here that makes sense for EMS to focus on. The differentiation from the electric mobility with the focus on the solar vehicle.

The respective price will follow this differentiation according to the fluctuations that will occur on the market and, of course, the price set for the clients will be very competitive.
EMS will focus on differentiation while its competition focusses on costs.

	EMS	
Competition	Leadership by Costs	Differentiation
	Focus on Low Cost	Focus on Differentiation

Table 5 – EMS Positioning Strategy (source: ISCTE Business School)

2.2.6 Short- and Medium-Term Objectives

One of the short-term objectives will be the price evaluation of the electricity sales across Galp Energia power supply network after the gathering of possible interested players who wish to install fast charging stations on their grid.
The other short-term objective is to start to sell the modular system to our automobile manufacture clients for later appliance on solar and electric vehicles.

For medium-term objectives, we pointed out the creation of One-Stop-Shop for renting and maintenance of batteries for the electric and solar vehicles as well as the sale of parts and other components for the vehicles.

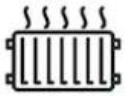
2.2 Marketing-Mix

2.3.1 Products/Services

As mentioned above, EMS will provide the following:

(i) Sale of electricity in the several power supply stations of the country

(ii) Sale of the modular system for appliance on light and heavy solar vehicles



(iii) Renting and maintenance of batteries for electric and solar vehicles

(iv) Sale of parts and other components for electric and solar vehicles

(v) Charge & Go Solution

(vi) Design and development of light and heavy solar vehicles for sale

Source of the pictures: https://www.freepik.com/

To complement the information concerned to the modular system, this is composed by an integrated set of photovoltaic cells, which are usually displayed on the roof of the vehicles. These cells are based on silicone and their function is to receive the solar energy. Then, this energy is converted to electricity through the dynamo, which then will storage the energy on the battery of the vehicle.
This is the modular system that EMS wants to assemble and sell to the automobile giants.

The project Schedule that includes the sales of these solutions is the following:

	2020											
	January	February	March	April	May	June	July	August	September	October	November	December
Project Approval	X	X										
Market Prospect for power reseller customers			X	X								
Purchase of Modular System Components			X	X	X			X	X	X		
Modular System Assembly				X	X	X	X	X	X	X	X	X
Clients Fundraising				X	X	X	X	X	X	X	X	X
Modular System Sales							X	X	X	X	X	X
Brand Creation			X	X	X	X	X					
Fairs Presence			X	X	X	X	X			X	X	X
Online Platforms Development			X	X	X	X	X					
Batteries Purchase					X	X	X					
Batteries Sell/Renting							X	X	X	X	X	X
Parts and Acessories Purchase							X	X	X			
Online Parts and Acessories Sales							X	X	X	X	X	X

Table 6 – Project Schedule (author)

2.3.2 Price

For the electricity sales, the prices will be the same as the ones offered by Galp Energia.

For the rest of the products/services from EMS, the final price of sale will depend on the meetings and contacts with possible suppliers.

In the values present below on this business plan, the author only presents an estimate form of the hypothetical values for this simulation.

2.3.3 Distribution

The distribution channels for this new business unit will be:

- Internet: the customers could see on the company website updated information about the electric and solar mobility network with all its advantages, costs and other relevant information;

- Television: EMS could provide campaigns to their customers with possible discounts and offers;

- Fairs: the company could signal its presence on national and international fairs focused on this business segment. For example, on Mobi Lisbon Summit. This way, the company can show to the public all the associated advantages to buy products or services from EMS.

2.3.4 Communication

The communication channels to increase the number of sales could be:

- Direct Marketing: through EMS services, the service itself will attract potential new customers. This is called the push-pull communication strategy. In this way, the company can push the service to the client and the client will pull the service to other new clients;

- Publicity: EMS will have an active communication role through the social media.

2.4 Marketing Costs Estimate

For initial marketing costs, we estimate an initial amount of 100,000.00€ for expenses such as:

- Brand creation;
- Presence on national and international fairs;
- Presence on automobile conventions;
- Creation of Online Platforms;
- New clients' attraction.

3 Organizational and Operational Plan

3.1 Capacity, Logistics and Operations

The key challenges for logistics are to have the right products with the right quantity, at the right place, at the right time and with minimum cost.

This leads us to Logistic attributes which:

- Time: *"(…) is the value created by making something available at right time. Products are not valuable to customers if they are not available precisely when they are needed."* (Stock and Lambert, 1993).

- Place: *"(…) is the value created or added to a product by making it available for purchase or consumption in the right place. Logistics is directly responsible for adding place utility to products as itefficiently moves raw materials, in-process inventory, and finished goods from point-of-origin to point-of-consumption."* (Stock and Lambert, 1993).

- Quantity: *"(…) additionally (to time and place utility), (…) (value is created) by making available the right quantity to serve clients/customers. If the right quantity is not delivered possession utility is not completely fulfilled".* (Carvalho et al., 2011)

3.1.1 Sizing, Location and Productive Process/Operations

For the (i) sale of electricity, EMS would use the main power stations from Galp Energia or of other companies that would like to be associated with this concept.

For the (ii) sale of the modular system, the objective would be to rent a warehouse so that EMS could assembly all the necessary parts of this concept.

The (iii) renting and maintenance of the batteries and the (iv) sale of parts and other components could be performed on the *One-Stop-Shop* that would be located nearby the warehouse for logistic reasons.

Finally, for (v) Charge & Go solution and for (vi) design and development of light and heavy solar vehicles there are no plans since these are long-term objectives.

At the productive process level, it would be necessary machinery and industrial equipment for the assembly of the modular system.

3.2 Human Resources

The human resources policy will be to follow a strategic human resources management approach. This because SHRM is *the pattern of planned human resource deployments and activities intended to enable an organization to achieve its goals* (Wright & McMahan, 1992, p. 298).

3.2.1 Chart/Structure

According to Gratton and Truss there is a three-dimensional people strategy. The three dimensions for people management (Gratton & Truss, 2003) are: vertical alignment; horizontal alignment and action. In the chart below we can see the correlation between them:

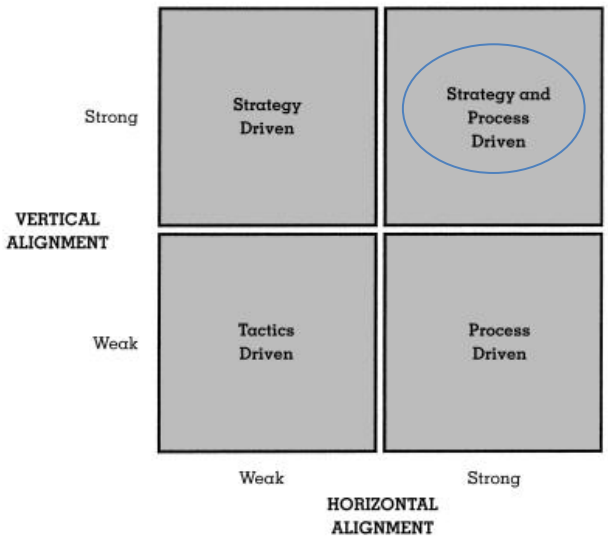


Figure 5 – Three-dimensional people strategy (author)

The objective of EMS is to be Strategy and Process Driven, focusing on the alignment between the business goals and the people strategy and to have an internal alignment between the set of HR policies making up the people strategy.

Regarding the team of the project, the only member is the author, Adriano Silva. The experience of the member is merely academic in the electric and solar mobility. This came from a challenge launched by the Department of Innovation of Galp Energia for the development of a business plan in the Electric Mobility sector.

In case the project is accepted at the university and it is settled that there is economic and financial viability to forward the company, it becomes essential to enlarge the management team. On a first basis, it would be necessary to hire a collaborator with technical knowledge, mainly in automation or with a mechanical engineering degree.

On a later stage, it would be helpful to have a collaborator with computer skills to develop online and mobile platforms for tablets and smartphones. Software development skills or other computer programmers would also be desirable computer skills.

4 Economic and Financial Viability Plan

4.1 Technical Resources

4.1.1 Needed for Investment

For administrative purposes, some supplies would be required such as secretaries, chairs, printers, laptops, mobile phones and others. This implies an investment of (see annex X):

	Quantity	Cost
Total Administrative Costs	11	11 979,98 €

Table 7 – Administrative Costs (author)

4.1.2 Needed for Operations

For productive/operations purposes, some machinery equipment, industrial and packaging equipment, transport vehicles and equipment for exclusion of waste and other residues would be necessary. This implies an investment of (see annex XI):

	Quantity	Cost
Total Operation Costs	20	280 000,00 €

Table 8 – Operations Costs (author)

4.2 Revenue Forecast

For the electricity sale on the Galp Energy power supply network, considering that the cost for each 50 kilometres of charging is 1€ and assuming that the Portuguese electric vehicles users do a daily charging, the revenue forecast for this service would be as following (see annex III):

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Total Revenue	13 700,94 €	16 623,81 €	19 258,69 €	22 115,50 €	25 209,84 €	29 918,25 €	35 316,24 €	41 494,65 €	48 555,58 €	56 613,75 €

Table 9 – Revenue forecast from electricity sales (author)

For the modular system sale to later appliance on light and heavy solar vehicles, the revenue forecast would be as following (see annex IV):

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Total Revenue	420 000,00 €	553 960,00 €	791 436,80 €	1 087 560,10 €	1 554 332,48 €	2 307 056,38 €	3 171 316,74 €	4 533 813,71 €	6 482 067,45 €	8 911 663,78 €

Table 10 – Revenue forecast from modular system sales (author)

In this case, we assumed that the material price for sale could change accordingly to the annual price evolution of purchase of these materials.

For the renting and maintenance of batteries, the revenue forecast would be as following (see annex V):

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Total Revenue	15 071 035,79 €	19 156 961,04 €	23 250 173,15 €	30 513 226,98 €	36 438 870,80 €	43 244 511,11 €	51 046 890,77 €	59 977 301,26 €	70 183 324,94 €	81 830 780,34 €

Table 11 – Revenue forecast for renting and maintenance of batteries

For the sales of parts and other components for electric and solar vehicles, it would be necessary to analyse, together with the customers, their needs. Only that way we could have a different price table for each product.

On an initial phase, EMS will focus on these objectives. There is no revenue forecast for the other solutions because they are long-term objectives.

4.3 Project Assumptions

4.3.1 Revenues

In total revenues, we estimate the revenues presented for the electricity, modular system and batteries sales as well as sales of batteries with maintenance (see annex VI).

Revenues	2020	2021	2022	2023	2024	2025
Total	29 822 220,73 €	37 926 657,85 €	46 148 533,13 €	59 084 806,86 €	70 813 396,84 €	84 501 545,74 €

Table 12 – Revenues (author)

4.3.2 COGS

COGS	2020	2021	2022	2023	2024	2025
Total	16 180,00 €	16 798,00 €	17 477,80 €	18 225,58 €	19 048,14 €	19 952,95 €

Table 13 – COGS (author)

Mainly, the costs of goods sold here are for (see annex VII):

- installing of the charging stations;
- buying and assembling of the modular systems;
- buying of batteries and other accessories.

NOTE: For the electricity sale, we assume the 10,000.00€ price of cost for each fast charging station.

4.3.3 Supply and External Services

For this area, the author estimates costs mainly on (see annex VIII):

- specialized services;
- supplies;
- Energy;
- transports;
- services

	2020	2021	2022	2023	2024	2025
SES Total	23 838,96 €	23 088,51 €	23 607,17 €	24 141,38 €	24 691,63 €	25 258,38 €

Table 14 – Supply and External Services (author)

4.3.4 Personnel Expenses

Based on the monthly paid wages to the collaborators, we can estimate a total for personnel expenses per year (see annex XII):

	2020	2021	2022	2023	2024	2025
Total Personnel Expenses	1 076,04 €	24 201,64 €	24 422,23 €	24 644,90 €	24 869,85 €	25 096,90 €

Table 15 – Personnel Expenses (author)

4.3.5 Working Capital Needs

To keep the start-up running at full operational mode, EMS will have the following values of working capital needs per year of labour (see annex XIII):

	2020	2021	2022	2023	2024
Working Capital Total	395 860,58 €	94 886,19 €	486 410,81 €	60 700,14 €	566 277,61 €

Table 16 – Working Capital Needs (author)

4.3.6 Investment

The investments needed are mainly on (see annex IX):

- Basic equipment;
- Transport equipment;
- Administrative equipment;
- Computer Software;
- Others.

	2020	2021	2022	2023	2024	2025
Tangible Fixed Assets Total	41 493,31 €	40 131,33 €	40 811,13 €	18 225,58 €	19 048,14 €	19 952,95 €
Intangible Assets Total	10 000,00 €	0,00 €	0,00 €	0,00 €	0,00 €	0,00 €
Investment Total	51 493,31 €	40 131,33 €	40 811,13 €	18 225,58 €	19 048,14 €	19 952,95 €

Table 17 – Investments (author)

4.4 Economic Feasibility Analysis of the Project

4.4.1 Future Cash Flows

On the first year of labour, the cash flow is negative but, after the second year (2020), the cash flow starts to show positive figures, based on our estimation (see annex XIV).

	2020	2021	2022	2023	2024	2025
Total Cashflow	-447 353,89 €	15 419 279,04 €	18 458 608,26 €	24 883 367,72 €	29 425 731,59 €	35 935 377,28 €

Table 18 – Future Cash flows (author)

4.5 Sources of Project Funding

Galp Energia is the first funding source of the project with the Corporate Venture between both companies. In addition, as EMS is a start-up, Galp will have to finance the total amount that is needed for the first year. This means that in year 1 (2019) Galp will invest 51,493.31 € in EMS.

Over the time, and if other types of funding would be necessary, we could resort to bank loans or entrepreneurship concourses with the objective of gaining investors' funding for EMS activity.

4.6 Global Project Feasibility Analysis

At the end of each year, after all revenues and expenses are dully recorded and after being cleared all depreciations and taxes, we estimated the following net values for this venture (see annex XV):

	2020	2021	2022	2023	2024	2025
Total Net Income	12 207 608,43 €	15 518 199,84 €	18 933 034,76 €	24 902 973,24 €	29 956 081,84 €	35 952 645,24 €

Table 19 – Total Net Income (author)

5 Conclusions

After this exhaustive research and practical study, the author can conclude that electric and solar mobility are, for sure, the future for the automobile sector.

There are no doubts that the plug-in hybrids and 100% electric vehicles sales will continue to rise even though some automobile giants do not agree on this approach. However, the consumer is the final decision-maker. He or she is the reason why every company works.

Further research is needed mainly on the technical requirements for this type of vehicles and for the implications these may cause in our status. There are fewer studies on the solar mobility because it is a field not yet fully covered. Nevertheless, it will be in the future.

In this business opportunity, there will be place to create ventures and business plans for these sectors.
That is why EMS wants to be present in this market. By providing all these services, this new start-up will be a reference in the Portuguese and European market.

On the first year it will be difficult to have a good performance, but we can look at year 1 (2019) as the pilot year. If it goes as planned, it is possible to have a better outcome on the second year, and so on.

Another objective of the company is to keep continuously rising and that it is only possible with the aid of other collaborators. In that way, it will be necessary to recruit new talents mainly in the field of engineering or automation.

With the financial help and guidance expertise of our main partner, *Galp Energia*¸ it will be possible to develop such an interesting project.

Finally, this project or business plan is only a draft because if it had been carried forward it would have needed some changes because a business plan is never perfect. It always needs to adjust to the market and consumer needs.

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7 Annexes

Annex I – EMS Logo

Annex II – Porter 5 Forces Framework

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Cost per 50 km	1,00 €	1,05 €	1,10 €	1,16 €	1,22 €	1,34 €	1,47 €	1,62 €	1,78 €	1,96 €
Update Rate	-	5%	5%	5%	5%	10%	10%	10%	10%	10%
Number of Users	13 700,94	15 832,20	17 468,20	19 104,20	20 740,20	22 376,20	24 012,20	25 648,20	27 284,20	28 920,20
Number of Daily Charging	13 700,94	15 832,20	17 468,20	19 104,20	20 740,20	22 376,20	24 012,20	25 648,20	27 284,20	28 920,20
Total Revenue	13 700,94 €	16 623,81 €	19 258,69 €	22 115,50 €	25 209,84 €	29 918,25 €	35 316,24 €	41 494,65 €	48 555,58 €	56 613,75 €

Annex III – Total Revenue Forecast from Electricity Sales

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Modular System Sales	420 000,00 €	553 960,00 €	791 436,80 €	1 087 560,10 €	1 554 332,48 €	2 307 056,38 €	3 171 316,74 €	4 533 813,71 €	6 482 067,45 €	8 911 663,78 €
Number of System sold	100	120	156	195	254	342	428	556	723	904
Sales Growth Rate	-	20%	30%	25%	30%	35%	25%	30%	30%	25%
Photovoltaic Panel Cost	180,00 €	180,00 €	180,00 €	180,00 €	180,00 €	180,00 €	180,00 €	180,00 €	180,00 €	180,00 €
Battery Cost	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €
Dynamo Cost	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €	2 000,00 €
Price per Modular System	4 180,00	4 598,00	5 057,80	5 563,58	6 119,94	6 731,93	7 405,12	8 145,64	8 960,20	9 856,22
Update Rate	-	10%	10%	10%	10%	10%	10%	10%	10%	10%
Assembly Fee	2 000,00 €	2 200,00 €	2 420,00 €	2 662,00 €	2 928,20 €	3 221,02 €	3 543,12 €	3 897,43 €	4 287,18 €	4 715,90 €
Total Revenue	420 000,00 €	553 960,00 €	791 436,80 €	1 087 560,10 €	1 554 332,48 €	2 307 056,38 €	3 171 316,74 €	4 533 813,71 €	6 482 067,45 €	8 911 663,78 €

Annex IV – Total Revenue Forecast from Modular System Sales

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Battery Price	2 000,00 €	2 200,00 €	2 420,00 €	2 662,00 €	2 928,20 €	3 221,02 €	3 543,12 €	3 897,43 €	4 287,18 €	4 715,90 €
Update Rate	-	10%	10%	10%	10%	10%	10%	10%	10%	10%
PVP	2 200,00 €	2 420,00 €	2 662,00 €	3 194,40 €	3 513,84 €	3 865,22 €	4 251,75 €	4 676,92 €	5 144,61 €	5 659,07 €
Profit Margin	10%	10%	10%	20%	20%	20%	20%	20%	20%	20%
Renting Option	183,33 €	201,67 €	221,83 €	266,20 €	292,82 €	322,10 €	354,31 €	389,74 €	428,72 €	471,59 €
Renting and Maintenance Option	174,17 €	191,58 €	210,74 €	239,58 €	263,54 €	289,89 €	318,88 €	350,77 €	385,85 €	424,43 €
Discount Rate	5%	5%	5%	10%	10%	10%	10%	10%	10%	10%
Direct Buy Option	2 200,00 €	2 420,00 €	2 662,00 €	3 194,40 €	3 513,84 €	3 865,22 €	4 251,75 €	4 676,92 €	5 144,61 €	5 659,07 €
Number of Users	13 700,94	15 832,20	17 468,20	19 104,20	20 740,20	22 376,20	24 012,20	25 648,20	27 284,20	28 920,20
Total Revenue with Maintenance	14 317 484,00 €	18 199 112,99 €	22 087 664,49 €	27 461 904,28 €	32 794 983,72 €	38 920 060,00 €	45 942 201,70 €	53 979 571,14 €	63 164 992,45 €	73 647 702,31 €
Total Revenue	15 071 035,79 €	19 156 961,04 €	23 250 173,15 €	30 513 226,98 €	36 438 870,80 €	43 244 511,11 €	51 046 890,77 €	59 977 301,26 €	70 183 324,94 €	81 830 780,34 €

Annex V – Total Revenue Forecast for Batteries Sales and Maintenance

Revenues	2020	2021	2022	2023	2024	2025
Electricity Sales	13 700,94 €	16 623,81 €	19 258,69 €	22 115,50 €	25 209,84 €	29 918,25 €
Modular System	420 000,00 €	553 960,00 €	791 436,80 €	1 087 560,10 €	1 554 332,48 €	2 307 056,38 €
Batteries	15 071 035,79 €	19 156 961,04 €	23 250 173,15 €	30 513 226,98 €	36 438 870,80 €	43 244 511,11 €
Batteries with Maintenance	14 317 484,00 €	18 199 112,99 €	22 087 664,49 €	27 461 904,28 €	32 794 983,72 €	38 920 060,00 €
Total	29 822 220,73 €	37 926 657,85 €	46 148 533,13 €	59 084 806,86 €	70 813 396,84 €	84 501 545,74 €

Annex VI – Total Revenues

COGS	2020	2021	2022	2023	2024	2025
Electricity Sales	10 000,00 €	10 000,00 €	10 000,00 €	10 000,00 €	10 000,00 €	10 000,00 €
Modular System	4 180,00 €	4 598,00 €	5 057,80 €	5 563,58 €	6 119,94 €	6 731,93 €
Batteries	2 000,00 €	2 200,00 €	2 420,00 €	2 662,00 €	2 928,20 €	3 221,02 €
Total	16 180,00 €	16 798,00 €	17 477,80 €	18 225,58 €	19 048,14 €	19 952,95 €

Annex VII – Total COGS

Supply and Exernal Services								
			2019	2020	2021	2022	2023	2024
Number of Months			12	12	12	12	12	12
Growth Rate			0%	3,00%	3,00%	3,00%	3,00%	3,00%
	VAT Rate	Monthly Value	0	1	2	3	4	5
Subcontracts	23,0%		0,00	0,00	0,00	0,00	0,00	0,00
Specialized Services	23,0%							
Specialized Works	23,0%	150,00	1 800,00	1 854,00	1 909,62	1 966,91	2 025,92	2 086,69
Maintenance		60,00	720,00	741,60	763,85	786,76	810,37	834,68
Publicity	23,0%	100,00	1 200,00	1 236,00	1 273,08	1 311,27	1 350,61	1 391,13
Honoraries	23,0%	300,00	3 600,00	3 708,00	3 819,24	3 933,82	4 051,83	4 173,39
Repairs	23,0%	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Materials	23,0%							
Tools	23,0%	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Technical Books	23,0%		20,00					
Office Equipment	23,0%	15,00	180,00	185,40	190,96	196,69	202,59	208,67
Energy	23,0%							
Electricity	23,0%	18,75	225,00	231,75	238,70	245,86	253,24	260,84
Fuel	23,0%	20,00	240,00	247,20	254,62	262,25	270,12	278,23
Water	23,0%	10,00	120,00	123,60	127,31	131,13	135,06	139,11
Transports	23,0%							
Conventions	23,0%	150,00	1 800,00	1 800,00	1 800,00	1 800,00	1 800,00	1 800,00
Stands	23,0%	333,33	3 999,96	3 999,96	3 999,96	3 999,96	3 999,96	3 999,96
Services	23,0%							
Rent	23,0%	0,00	0,00					
Communication	23,0%	25,00	300,00	309,00	318,27	327,82	337,65	347,78
Insurance	0,0%		0,00	0,00	0,00	0,00	0,00	0,00
Representative Expenses	23,0%	150,00	1 800,00	1 854,00	1 909,62	1 966,91	2 025,92	2 086,69
Agency Creation			750,00					
Commercial Register			360,00					
Brand Creation			124,00					
Cleaning	23,0%	50,00	600,00	618,00	636,54	655,64	675,31	695,56
Other services	23,0%	500,00	6 000,00	6 180,00	6 365,40	6 556,36	6 753,05	6 955,64
TOTAL			**23 838,96**	**23 088,51**	**23 607,17**	**24 141,38**	**24 691,63**	**25 258,38**
VAT Deductible			5 462,56	5 289,35	5 408,01	5 530,23	5 656,11	5 785,78
TOTAL + VAT			**29 301,52**	**28 377,86**	**29 015,17**	**29 671,61**	**30 347,74**	**31 044,15**

Annex VIII – Total Supply and External Services

Investment							
Investment per year		**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Tangible Fixed Assets							
Natural Resources and Land		0	0	0	0	0	0
Buildings and other Constructions		0	0	0	0	0	0
Basic Equipment		16 180	16 798	17 478	18 226	19 048	19 953
Transport Equipment		23 333	23 333	23 333	0	0	0
Administrative Equipment		1 830	0	0	0	0	0
Other Tangible Fixed Assets		150	0	0	0	0	0
Tangible Fixed Assets Total		**41 493**	**40 131**	**40 811**	**18 226**	**19 048**	**19 953**
Intangible Assets							
Development Projects		0	0	0	0	0	0
Computer Software		10 000	0	0	0	0	0
Other Intangible Assets		0					
Intangible Assets Total		**10 000**	**0**	**0**	**0**	**0**	**0**
Biological Assets		0	0	0	0	0	0
Investment Total		**51 493**	**40 131**	**40 811**	**18 226**	**19 048**	**19 953**

Annex IX – Total Investment

	Quantity	Cost	Useful Life	Annual Depretiation	Accumulated Depretiation	Present Value
Secretary	2	100,00 €	10	20,00 €	100,00 €	- €
Chairs	2	80,00 €	10	16,00 €	80,00 €	- €
Others	1	150,00 €	2	75,00 €	375,00 €	- 225,00 €
Printers	1	150,00 €	5	30,00 €	150,00 €	- €
Laptos	2	899,99 €	5	360,00 €	1 799,98 €	- 899,99 €
Phones	2	599,99 €	3	399,99 €	1 999,97 €	- 1 399,98 €
Online Platforms	1	10 000,00 €	20	500,00 €	2 500,00 €	7 500,00 €

Annex X – Total Administrative Costs

	Quantity	Cost	Useful Life	Annual Depretiation	Accumulated Depretiation	Present Value
Machinery	2	100 000,00 €	10	20 000,00 €	100 000,00 €	- €
Industrial Equipment	5	50 000,00 €	15	16 666,67 €	83 333,33 €	- 33 333,33 €
Packing Equipment	8	20 000,00 €	15	10 666,67 €	53 333,33 €	- 33 333,33 €
Transport Vehicels	3	70 000,00 €	10	21 000,00 €	105 000,00 €	- 35 000,00 €
Exclusion of Waste Equipment	2	40 000,00 €	5	16 000,00 €	80 000,00 €	- 40 000,00 €

Annex XI – Total Operations Costs

Personnel Expenses

	0	1	2	3	4	5
Number of Months	14	14	14	14	14	14
Annual Increase (wages + lunch subsidy)	0%	1,00%	1,00%	1,00%	1,00%	1,00%

Peronnel Board (number of people)	0	1	2	3	4	5
Administration	1	1	1	1	1	1
Full Time	0	1	1	1	1	1
Part-time	0	0	0	0	0	0
TOTAL	**1**	**2**	**2**	**2**	**2**	**2**

Peronnel Board (number of work months)	0	1	2	3	4	5
Administration	12	12	12	12	12	12
Full Time	12	12	12	12	12	12
Part-time	3	12	12	12	12	12
Others	3	6	12	12	12	12

Basic Monthly Wage	0	1	2	3	4	5
Administration	650	657	663	670	676	683
Full Time	600	606	612	618	624	631
Part-time	300	303	306	309	312	315

Annual basic wage - TOTAL Colaborators	0	1	2	3	4	5
Administration	0	9 191	9 283	9 376	9 470	9 564
Full Time	0	8 484	8 569	8 655	8 741	8 828
Part-time	0	0	0	0	0	0
TOTAL	**0**	**17 675**	**17 852**	**18 030**	**18 211**	**18 393**

Other Expenses		0	1	2	3	4	5
Social Security							
Social Entities	0,00%	0	2 183	2 205	2 227	2 249	2 272
Personnel	23,75%	0	2 015	2 035	2 055	2 076	2 097
Occupational Accident Insurance	1,00%	0	177	179	180	182	184
Feeding Subsidy	89,67	1 076	2 152	2 152	2 152	2 152	2 152
Feeding Subsidy (number of months)		12	12	12	12	12	12
Comissions and Benefits							
Social Entities							
Personnel							
Formation							
Other personnel expenses							
TOTAL		**1 076**	**6 527**	**6 570**	**6 615**	**6 659**	**6 704**

TOTAL PERSONNEL EXPENSES	**1 076**	**24 202**	**24 422**	**24 645**	**24 870**	**25 097**

SUMMARY TABLE	**0**	**1**	**2**	**3**	**4**	**5**
Wages						
Social Entities	0	9 191	9 283	9 376	9 470	9 564
Personnel	0	8 484	8 569	8 655	8 741	8 828
Compensation Charges	0	4 198	4 240	4 282	4 325	4 368
Occupational Accident Insurance	0	177	179	180	182	184
Social Expenditures	1 076	2 152	2 152	2 152	2 152	2 152
Other personnel expenses	0	0	0	0	0	0
TOTAL PERSONNEL EXPENSES	**1 076**	**24 202**	**24 422**	**24 645**	**24 870**	**25 097**

Colaborator Retentions		**0**	**1**	**2**	**3**	**4**	**5**
Retention SS							
Management/Administration	23,75%	0	1 011	1 021	1 031	1 042	1 052
Other Personnel	11,00%	0	424	428	433	437	441
Retention IRS	5,00%	0	884	893	902	911	920
TOTAL		**0**	**2 319**	**2 342**	**2 366**	**2 389**	**2 413**

Annex XII – Total Personnel Expenses

Working Capital Needs	**2020**	**2021**	**2022**	**2023**	**2024**
Cash reserves and bank	1 491 111,04	1 896 332,89	2 307 426,66	2 954 240,34	3 540 669,84
Credit to Clients	2 451 141	3 117 260	3 793 030	4 856 285	5 820 279
Average durability of materials on wharehouse	0	0	0	0	0
Suppliers Credit	1 329,86	1 380,66	1 436,53	1 497,99	1 565,60
Public State Sector	3 545 062	4 521 465	5 517 723	7 261 917	8 732 406
Working Capital Needs	**395 861**	**490 747**	**581 297**	**547 111**	**626 978**

Working Capital Needs Investment per year	**395 861**	**94 886**	**486 411**	**60 700**	**566 278**

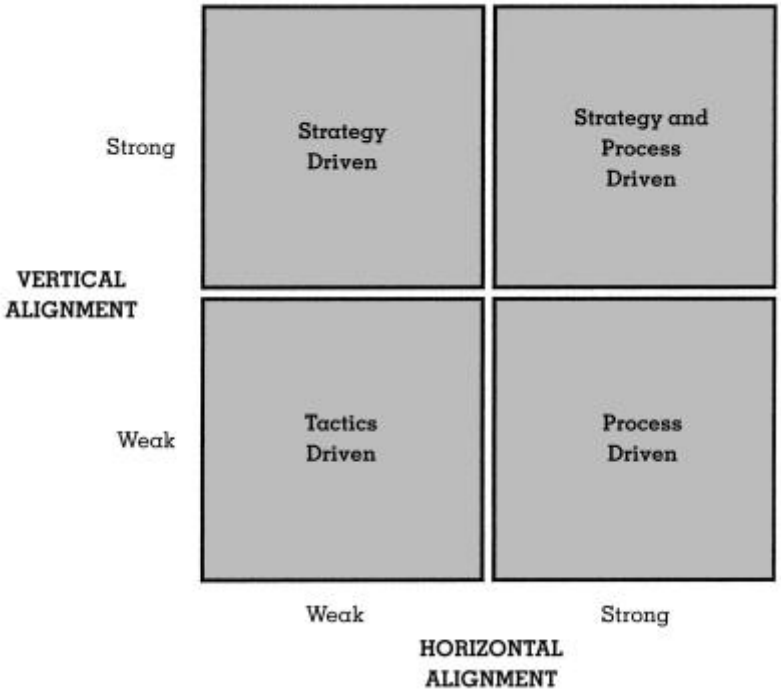
Annex XIII – Total Working Capital Needs

Project CashFlow	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Operational Cashflow	**12 227 250**	**15 554 297**	**18 985 830**	**24 962 293**	**30 011 057**	**35 955 330**
Fixed Assets Investment	51 493	40 131	40 811	18 226	19 048	19 953
Working Capital Investment	395 861	94 886	486 411	60 700	566 278	0
Total Investment	**447 354**	**135 018**	**527 222**	**78 926**	**585 326**	**19 953**
Total Cashflow	**-447 354**	**15 419 279**	**18 458 608**	**24 883 368**	**29 425 732**	**35 935 377**
Accumulated Cashflow	*-447 354*	*14 971 925*	***33 430 533***	*58 313 901*	*87 739 633*	*123 675 010*

Annex XIV – Total Cash flows

	2020	**2021**	**2022**	**2023**	**2024**	**2025**
Revenues	15 504 736,73	19 727 544,85	24 060 868,64	31 622 902,58	38 018 413,12	45 581 485,74
Expenses	16 180,00	16 798,00	17 477,80	18 225,58	19 048,14	19 952,95
Supply and External Service	23 838,96	23 088,51	23 607,17	24 141,38	24 691,63	25 258,38
Personnel Expenses	1 076	24 202	24 422	24 645	24 870	25 097
EBITDA	15 463 641,73 €	19 663 456,70 €	23 995 361,45 €	31 555 890,71 €	37 949 803,50 €	45 511 177,51 €
Depretiations	10 972,83	20 165,76	29 494,66	33 139,77	30 712,57	1 500,00
EBIT	15 452 668,90 €	19 643 290,94 €	23 965 866,79 €	31 522 750,94 €	37 919 090,93 €	45 509 677,51 €
Income Tax	3 245 060,47	4 125 091,10	5 032 832,03	6 619 777,70	7 963 009,10	9 557 032,28
Total Net Income	12 207 608,43 €	15 518 199,84 €	18 933 034,76 €	24 902 973,24 €	29 956 081,84 €	35 952 645,24 €

Annex XV – Total Net Income



Annex XVI – Three-dimensional people strategy

Mercado Automóvel em Portugal
Por Tipo de Energia em 2019

	Julho 2019				Janeiro a Julho 2019			
	Ligeiros Passageiros	Ligeiros Mercadorias	Pesados Mercadorias	Pesados Passageiros	Ligeiros Passageiros	Ligeiros Mercadorias	Pesados Mercadorias	Pesados Passageiros
Gasolina	9 085	4			74 882	36		
% Gasolina	49,3%	0,1%			50,9%	0,2%		
Gasóleo	7 494	3 116	186	11	58 341	21 993	2 798	295
% Gasóleo	40,6%	99,3%	96,4%	45,8%	39,7%	99,3%	98,6%	64,7%
Elétrico	436	16			4 341	111		2
% Elétrico	2,4%	0,5%			3,0%	0,5%		0,4%
Elétrico/Gasolina	291				2 022			
% Elétrico/Gasolina	1,6%				1,4%			
Plug-in Elétrico/Gasóleo	80				432			
% Elétrico/Gasóleo	0,4%				0,3%			
Gasolina/Híbrido	657				5 104			
% Gasolina/Híbrido	3,6%				3,5%			
Híbridos Elétricos Gasóleo/Híbrido	57		3		279		9	
% Gasóleo/Híbrido	0,3%		1,6%		0,2%		0,3%	
Gasolina/GNC		2				7		
% Gasolina/GNC		0,1%				0,0%		
Gasolina/GNL								
Híbridos Não % Gasolina/GNL Elétricos								
Gasolina/GPL	335				1 612			
% Gasolina/GPL	1,8%				1,1%			
Gasóleo/GNL		1				2		
% Gasóleo/GNL		0,5%				0,1%		
GNC	1	2	13		18	6	16	159
% GNC	0,0%	1,0%	54,2%		0,0%	0,0%	0,6%	34,9%
GNL		1				1	14	
% GNL		0,5%				0,5%		
Total	18 436	3 138	193	24	147 031	22 153	2 839	456

Annex XVII – Automobile Market in Portugal